पंडित रविशंकर शुक्ल विश्वविद्यालय, रायपुर छत्तीसगढ़ भारत
Pt. Ravishankar Shukla University, Raipur Chhattisgarh, India
Estd-1964 – recognized by UGC U/s 2(f) and 12 (B)
NAAC "A" Grade

Syllabus 2019-2020

MBA

SYLLABUS

TWO YEARS MBA (FULL TIME) PROGRAMME

Academic Session: 2019-2020

INSTITUTE OF MANAGEMENT
PT. RAVISHANKAR SHUKLA UNIVERSITY, RAIPUR

INSTITUTE OF MANAGEMENT
PT. RAVISHANKAR SHUKLA UNIVERSITY, RAIPUR

TWO YEAR M.B.A. (FULL TIME) PROGRAMME
COURSE STRUCTURE
Academic Session: 2019-20

FIRST SEMESTER	**MARKS**		
	External	Internal	Total
111 Management Concepts and Process	70	30	100
112 Organisational Behavior	70	30	100
113 Quantitative Methods	70	30	100
114 Managerial Economics	70	30	100
115 Accounting for Managers	70	30	100
116 Information Technology with Computer Lab Work	70	30	100
117 Environment and Management	70	30	100
118 Business Legislations	70	30	100
119 Industry Based Project & Viva-I	70	30	100
			900
SECOND SEMESTER			
121 Managerial Communication	70	30	100
122 Management Science	70	30	100
123 Human Resource Management	70	30	100
124 Financial Management	70	30	100
125 Marketing Management	70	30	100
126 Production Management	70	30	100
127- Research Methodology	70	30	100
128 Business Ethics & Indian Ethos	70	30	100
129 Industry Based Project& Viva -II	70	30	100
			900

THIRD SEMESTER		MARKS	
231 Organizational Effectiveness & Change	70	30	100
232 International Business	70	30	100
233 Management Information System	70	30	100

- **Specialization -Group A: MARKETING (COMPULSORY)**

234 Marketing Research & Consumer Behavior	70	30	100
235 Sales & Advertising Management	70	30	100
236 Industrial & Service Marketing	70	30	100

- **Specialization Group B *(Any One Group is to be Opted)***

FINANCE

237F. Security Analysis and Portfolio Mgt.	70	30	100
238F. **Management of Financial Services**	70	30	100

HUMAN RESOURCE MANAGEMENT

237H. Human Resource Development	70	30	100
238H. Legal Framework of HRM	70	30	100

SYSTEM

237 S. System Analysis & Design	70	30	100
238 S. RDBMS & SQL Concepts	70	30	100
239 TRAINING REPORT & VIVA	**70**	**30**	**100**

			900

FOURTH SEMESTER	MARKS		
241. Strategic Management	70	30	100
242. Retailing Management	70	30	100
243 Corporate Social Responsibility	70	30	100

- **Specialization- Group A : MARKETING (COMPULSORY)**

244 International Marketing	70	30	100

- **Specialization -Group B :(*Any One Group is to be Opted)***

FINANCE			
245F.International Financial Mgt.	70	30	100
246F. Project Planning, Analysis & Mgt	70	30	100
HUMAN RESOURCE MANAGEMENT			
245H. Compensation Management	70	30	100
246H. Mgt. of Industrial Relations	70	30	100
SYSTEM			
245S. Business Process Re-Engineering & ERP	70	30	100
246S. Fundamentals of Computer Architecture	70	30	100

			600

Note:

1. Specialization Group B has three functional specializations in the area of Finance HRM and System. Out of these three specializations, any one as a whole is to be opted. First two papers from the opted specialization are to be studied in the third semester and remaining two papers are to be studied in the fourth semester.

2. Comprehensive viva will be based on all the subjects studied during all the semesters.

MBA - FIRST SEMESTER (Session: 2018-2019)

MANAGEMENT CONCEPTS AND PROCESS (FT-111)

- Concepts, nature, scope , significance, functions and principles of management ,historical evolutions of management thoughts Management Process, System Approaches to Management
  - Planning-concepts, components and steps involved in planning process, MBO, Individual and Group Decision Making.
  - Organizing- principles , centralization, decentralizations, delegation, employees' empowerment, line & Staff Authority, Different types of organization structures, staffing.
  - Directing and Coordinating Assumptions in directing, Principles of Directing, .
  - Controlling, nature, scope, functions, steps and control techniques.

Suggested Readings:

1. Stoner and Freeman, **Management,** Prentice Hall, N. Delhi.
2. Koontz, O' Donnell Wechrich, **Principles of Management**, McGraw Hill, New York.
3. Peter F. Drucker, **The Practice of Management,** Allied Publishers.
4. Massie, **Essentials of Management,** AITBS, New Delhi.
5. Terry and Franklin,**Principles of Management**, AITBS, New Delhi.
6. Agrwal, R.D.**Organisation and Management**- TMH, New Delhi

ORGANISATIONAL BEHAVIOUR (FT-112)

- Understanding Human Behavior, Individual Differences, Personality, Attitudes, Values, Emotional Intelligence.
- Intra-personal Processes: Sensation, Perception, learning, Motivation. Inter-personal Process, stress management.
- Leadership, Socialization, Counselling, Mentoring.
- Group Behavior -Intra-group and Inter-group processes and behaviour, Team Development and Team Functioning
- Conflict Management - Intra and Inter personal conflict.

Suggested Readings:

1. Luthans Fred, Organisational **Behaviour**.,New York, McGraw Hill.
2. Robbins S.P., Organisational **Behaviour**, New Delhi, PHI.
3. Singh, Dalip, **Emotional Intelligence** at Work, Response Books, Sage
4. Davis Keith, **Human Behaviour at Work**, TMH, New Delhi
5. Pareek Udai, **Organisational Behaviour,** Oxford, IBH, Mumbai
6. Hersey Paul and Blanchard, **Management of Organisational Behaviour**, Prentice Hall of India, New Delhi.
7. Uma Shekharan, **Organisation Behaviour**, TMH, New Delhi.
8. Dwivedi, R.S. **Human Relations and Organisational Behaviour,** Galgotia, New Delhi.

QUANTITATIVE METHODS (FT-113)

- Mathematical basis of Managerial Decision: Functions A.P. & G.P. and their Managerial Applications, Matrices, Markov chains.
- Frequency Distributions and their Analysis - Measures of Central Tendency and Dispersion.
- Probability Theory and Probability Distributions – Binomial, Poisson, Normal and exponential
- Correlation and Regression Analysis (Linear)
- Index Numbers, Time Series Analysis and Forecasting.

Suggested Readings:

1. Chadha, N.K. **Statistics for Behavioural and Social Scientists**, Reliance Publishing House, Delhi.
2. Gupta, S.P. and Gupta M.P. **Business Statistics**, New Delhi, Sultan Chand.
3. Kazmier, L.J. and Pohl, N.F. **Basic Statistics for Business and Economics**, New York, McGraw Hill.
4. Levin Richard I and Rubin David S. **Statistics for Management,** New Jersey, Prentics Hall Inc.
5. Terry, Sineich, **Business Statistics by Examples**. London, Collier Macmillan Publishers.
6. Roy, **"Business Statistics",** Pustak Bhawan, Allahabad.
7. Sharma, J. K. Business Statistics, Pearson Education Pte. Ltd.

MANAGERIAL ECONOMICS (FT-114)

- Nature and Scope of Managerial Economics, Fundamental Concepts in Managerial Economics, Role and Responsibilities of Managerial Economist.
- Law & Nature of Demand, Demand Determinants, Demand Forecasting, Demand Function, Elasticity of Demand, Consumer Surplus. Law of Returns and Production Functions and cost output relations, Market structure.
- Price-output decisions under different market conditions - Perfect and Imperfect Competition, Monopoly, Monopolistic Competition, Oligopoly, Non-Price Competition, Price Discrimination, Types of price discrimination.
- Balance of Payment, Concept and measurement of National Income, Gross Domestic Savings, Gross Domestic Capital Formation.
- Nature and Concept of Profit, Theories of Profit, Business Fluctuations and Trade Cycles, Impact of Trade Cycle on Society.

Suggested Readings:

1. Adhikary,M. **Business Economics.**, New Delhi, Excel Books.
2. Baumol, W.J. **Economic Theory and Operations Analysis**, New Delhi, Prentice Hall Inc.
3. Chopra, O.P., **Managerial Economics,** New Delhi, Tata Mcgraw Hill.
4. Keat Paul G & Philips K.Y. Young, **Managerial Economics**, Prentice Hall, New Jersey.
5. Koutsoyiannis, A. **Modern Micro Economics**, New York, Macmillan.
6. Milgrom, P and Roberts J. **Economics, Organisation and Management**. Englewood Cliffs, New Jersey, Prentice Hall Inc.
7. Mehta P.L., Analysis, **Problems & Cases,** Sultan Chand & Sons, New Delhi.

ACCOUNTING FOR MANAGERS (FT-115)

- Financial Accounting – Concept, Importance and Scope, Generally Accepted Accounting Principles, Preparation of Financial Statements with special reference to analysis of a Balance Sheet and Measurement of Business Income
- Financial Statement Analysis - Ratio Analysis, Funds Flow Analysis, The Statement of Cash Flows
- Management Accounting – Concept, Need, Importance and Scope; Basic Concepts in Cost Accounting – Material, Labour, Overheads, Job and Process Costing.
- Budget and Budgetary Control, Types of Budget – Flexible Budget, Cash Budget.
- Costing for Decision-making, Standard Costing, Cost Volume Profit Analysis, Responsibility Accounting.

Suggested Readings :

1. Anthony R N and Reece J S. **Accounting Principles**, Homewood, Lllinois, Richard D. Irwin.
2. Bhattacharya S K and Dearden J. **Accounting for Management** : Text and Cases. New Delhi, Vikas.
3. Heitger, L E and Matulich, Serge. **Financial Accounting.** New York, McGraw Hill.
4. Hingorani, N L. and Ramanathan, A.R. **Management Accounting.**, New Delhi, Sultan Chand.
5. Horngren, Charles etc. **Principles of Financial and Management** Accounting. Englewood Cliffs, New Jersey, Prentics Hall Inc.
6. Needles, Belverd, etc. **Financial and Managerial Accounting.** Boston, Houghton Miffin Company.
7. Vij, Madhu. **Financial and Management Accounting**. New Delhi, Anmol Publications.

Information Technology (FT-116)

- Introductions to Computers- Hardware, Software, System software, Application software and packages, Introduction to embedded software
- Fundamentals of Operating System, DOS, Windows, Introduction to DBMS Concepts and integration of applications, Basics of data processing, Data hierarchy, Data file structures ,Emerging Communication Technologies
- Commonly used software Packages like Microsoft Word, Microsoft Excel, Microsoft Power Point, Tally etc.
- Types of Network- LAN, WAN and MAN, Introduction to Electronic Commerce and Electronic Business, Overview of cyber security, Cloud Computing, Artificial Intelligence.
- Introduction to World Wide Web- Internet Operations- Internet Browsers and Business Websites, Use of Search Engines and Google Applications, Use of internet as a medium of marketing, Managerial issues in reaching consumers / organizations through internet.

Suggested Readings

1. Burch, John and Grudnitski Gary. **Information Systems** : Theory and Practice, New York, John Wiley.
2. David, Van Over. **Foundations of Business Systems.** Fort Worth, Dryden.
3. Eliason, A.L. **On-Line Business Computer Applications.**, Chicago, Science Research Association.
4. Estrada, Susan. **Connecting to the Internet**. Sebastopol, C A, O'Reilly.
5. John, Moss Jones, **Automating Managers : the implications of Information Technology for Managers.** London, Pinter.
6. Long, L. **Computers,** Englewood Cliffs, New Jersey, Prentice Hall Inc.
7. Summer, M. **Computers Concepts and Uses.,** Englewood Cliffs, New Jersey, Prentice-Hall Inc.

ENVIRONMENT AND MANAGEMENT (FT-117)

- Business Environment: Nature, Scope and its relevance in Management Decision Making.
- State Participation in Business, Interaction between Government and Business, Socio-Cultural and Political Environment and its effect on Business.
- Government Control over price and distribution; Consumer Protection Act (CPA), New Industrial Policy of the Government, Monetary and Fiscal Policy.
- Industrial Ecology, Environmental Management System : EMS Standards, ISO 14000. Environmental Accounting and Auditing, Clearance/Permissions for establishing industry
- GATT/WTO origin and main section of WTO Agreement, Patents, IPRS, Industrial Pollution – Air, Water, Land Pollution and its effects on Business, Environmental Ethics.

Suggested Readings :

1. Francis Cherumilam, **Business Environment,** Himalaya Publishing House
2. Adhikari, M., **Economic Environment of Business**
3. Gupta, D., **Indian Government & Politics**
4. Ghosh P.K. & Kapoor, G.K. **Business & Society**
5. K.Aswathapa, **Essential of Business Environment,** PHI
6. Sidiqui, Saleem, **Business Environment,** Pearson Education Pte. Ltd

BUSINESS LEGISLATIONS (FT-118)

- The Indian Contract Act 1872, Essentials of a valid contract, Void agreements, Performance of Contracts & its remedies, Quasi-contracts. Agency, Bailment, Pldge, Guarantee and Indemnity.
- An overview of The Negotiable Instruments Act 1881. Holder-in-Due Course, Arbitration.
- The Companies Act, 2013 : Nature and Types of Companies. Formation. Memorandum and Articles of Association, Prospectus Allotment of Shares, Winding Up. .
- Consumer Protection Act , 2019 : Objectives, Consumer Right, Consumer Protection Council, Central consumer Protection Authority, Consumer Dispute Redressal Commission, Mediation, Offences and Penalties. IT Act 2000: Salient features, Digital Signature, Electronic Governance, Electronic Records, Certifying Authorities, Electronic Signature Certificate, Duties of Subscribers, Penalties and Adjudication, Cyber Appellate Tribunal, Offences and Inter Midiaries not to be liable in certain cases.
- An Overview of Labour Legislations in India like Industrial Dispute Act, Trade Union Act, Employee (Workmens') Compensation Act.

Suggested Readings :

1. Tuteja S.K. **Business Law For Managers,** New Delhi, Sultan Chand.
2. Kapoor, N. D. Mercantile Law.
3. Datey, V. D. Business and Corporate Laws, Taxman
4. Padhi, P. K., Legal Aspects of Business, PHI
5. Kuchhal, M. C., Business Laws, Vikas Publishing House
6. Pandit, M. S. and Pandit, Sobha., Business Law, Himalaya Publishing House
7. Grover and Kapoor, Company and Business Law, S. Chand

Industry Based Project – I (FT-119)

Students will prepare Industry Based Projects individually on the basis of topics allotted to them. **The Industry Based Project submitted by the students will be evaluated by the external examiner and viva will be based on the Project.**

MBA - SECOND SEMESTER (Session: 2018-2019)

MANAGERIAL COMMUNICATION (FT-121)

- Importance and Nature of Business Communication, Channels and Media of Communication, Communication Networks, Effectiveness of Communication ; Process of Communication
- Barriers to Communication; Writing Business Reports, Communication Theories
- Oral Communication, Resume preparations, public speaking and negotiations skills; Legal aspects of Business Communication
- Listening Skills, Presentation Skills, Non Verbal Communication
- Feedback Skills, Interview skills, Counselling Skills, Communication on Disciplinary Matters, Group Discussion and Meetings.

Suggested Readings :

1. Bowman, Joel P and Branchaw, Bernadine P. **Business Communication: From Process to Product**, Dryden Press, Chicago.
2. Hatch, Richard.:**Communicating in Business.**, Science Research Associates, Chicago.
3. Murphy, Herta A and Peck, Charrles E. **Effective Business Communications**, Tata Mc Graw Hill, New Delhi.
4. Pearce, C Glenn etc. **Business Communications : Principles and Applications**, John Wiley, New York.
5. Treece, Maira. **Sucessful Business Communications**, Allyn and Bacon Boston.
6. Bahal, Sushil. **Business Communication,** Sage Publication
8. Rao, N. and Das R. P., Communication Skills, Himalaya Publishing House

MANAGEMENT SCIENCE (FT-122)

- Management Science – Basic Concepts and its Role in Decision Making, Linear Programming: Formulation, Graphical Method, Simplex Method, Concepts of Duality, Post Optimality Analysis.
- Integer Programming , Branch and Bound Algorithm, Transportation and Assignment Models, Routing Problems, Sensitivity Analysis.
- Queuing Theory; Inventory Management Techniques
- PERT and CPM, Decision Theory and Decision trees.
- Game Theory; Simulation, Markow Analysis, Goal programming.

Suggested Readings :

1. Gould, F.J.etc. **Introduction to Management Science**. Englewood Cliffs, New Jersey, Prentice Hall Inc.
2. Mathur, K and Solow, D. **Management Science**, Englewood Cliffs, New Jersey, Prentice Hall Inc.
3. Narag A.S. **Linear Programming and Decision Making**. New Delhi, Sultan Chand.
4. Sharma, J.K. **Operations Research : Theory and Applications**. New Delh, Macmillian India Ltd.
5. Taha, H.A. **Operations Research – An Introduction**. New York, Mc Millan.
6. Theirouf, R J and Klekamp, R.C. **Decision Making Through Operations Research,** New York, John Wiley.

HUMAN RESOURCE MANAGEMENT (FT-123)

- Concepts and Perspectives on Human Resource Management; Evolution and Philosophy of Human Resource Management, HR challenges in changing environment
- Human Resource Policy and Planning; Human Resource records and Audit, Job Analysis. Methods of , Job Analysis, Description , Job specification.
- Recruiting and Selecting Human Resources ,Placement , and Induction,
- Manpower Training and Development, Performance Appraisal and Potential Evaluation; Job Evaluation, Wage Determination and Compensation management.
- Employees' Welfare; Industrial Relations; Grievance Management, Exit Policy and Implications; Overview of international Human Resource Management.

Suggested Readings :

1. Das, R.P. **Management of Industrial Relations**, Varanasi, MTC
2. Rao, N and Das R.P. **Cases in Human Resource Management**, Himalaya Publishing House, Mumbai.
3. Aswathappa, K. **Human Resource and Personnel Management** Tata McGraw Hill, New Delhi.
4. De Cenzo, D.A. & Robbins S P. **Human Resource Management**, New York, John Wiley.
5. Guy, V & Mattock J. **The New International Manager**, London, Kogan Page.
6. Holloway, J. ed. **Performance Measurement and Evaluation**. New Delhi, Sage.
7. Monappa, A. & Saiyadain M. **Personnel Management**., New Delhi, Tata Mc-Graw Hill.
8. Dwivedi, R.S. **HRM in Indian Organisation**, New Delhi, Galgotia.
9. Pareek, Udai. **Designing & Managing Human Resource System**, New Delhi, Oxford Pub. Co.
10. Stone, Lloyed and Leslie W.Rue, **Human Resource and Personnel Management** Richard D. Irwin, Lllionis.
11. Vohra, N. D. Quantitative Techniques for Managers

FINANCIAL MANAGEMENT (FT-124)

- Financial Management: An Overview, Acquisition of funds, allocation of funds and allocation of income, Nature and Scope, Profit Maximisation v/s Wealth Maximisation, Financial levarage, Operating leverage.
- Capital Budgeting : Concept and Significance, Derivative of Cash flow in a Capital Budgeting Situation, Techniques and methods of capital budgeting, conflicts between NPV and IPR, Cost of capital, Weighted Average Cost of Capital.
- Working Capital Management: overview, Management of Cash, Accounts receivables and inventories, Financing current assets. Cash Management Models.
- Retained earnings and Dividend Policy, Types of Dividend, Dividend Theories, Dividend Practices in India. Bonus Shares
- Sources of Long Term and Short-term Finance, Capital Structure Theories and Factors.

Suggested Readings :

1. Hampton, John. **Financial Decision Making**. Englewood Cliffs, New Jersey, Prentice Hall Inc.
2. Van Horner, James C. **Financial Management and Policy**, New Delhi, Prentice Hall of India.
3. Winger, Bornard and Mohan, Nancy. **Principles of Financial Management,** New York, Macmillan Publishing Company.
4. J.C. Van Horne, **Fundamentals of Financial Management**, PHI, New Delhi.
5. Weston Brigham, **Managerial Finance**, McGraw Hill, New York
6. I.M. Pandey, **Financial Management**, Vikas Pub.House, New Delhi.
7. P. Chandra, **Financial Management**, TMH, New Delhi.
8. S.C. Kuchhal, **Financial Management**, Chaityna Publishing House, Aligarh.
9. R.M. Srivastava, **Financial Decision Making**, Himalaya Publishing House, Mumbai.

MARKETING MANAGEMENT (FT-125)

- Marketing: Concept, Nature and scope. Marketing Environment Ps of Marketing, BCG Matrix
- Marketing Information & Research, Market Segmentation and Targeting, Buying Behaviour. Understanding Consumer & Industrial Markets
- Product Decisions- Types of Product, Product mix, Product Life Cycle, New Product Development Stages, Branding and Pricing Methods, Factors Influencing Pricing Decisions, Packaging , CRM including Concept of Relationship Marketing
- Channel Management, Sales Management, Promotion Management .
- Marketing Control. Specific Marketing Issues : Rural Marketing, Retail Marketing, Marketing of E-Business, Consumerism, Globalisation, Green Marketing, Brand ; Meaning and role , Brand Building strategies.

Suggested Readings :

1. Philip Kotler, **Marketing Management Analysis**, PHI, New Delhi.
2. R.S. Davar, **Modern Marketing Management**, Universal Book Sellers, New Delhi.

3. Stanton & Futrell, **Fundamentals of Marketing**, McGraw Hill, New York.
4. McCarthy, **Basic Marketing**, Universal Book Sellers, New Delhi.
5. Ramaswamy, V.S. I, **Marketing Management : Analysis,** Planning: Implementation & Control, Macmillan, Chennai.
6. Philip Kotler & Armstrong Jr., **Principles of Marketing** : PHI, New Delhi.
7. Ramswamy V.S. & Nama Kumari, S, **Marketing Management Planning, Implementation & Control**, McMillan India Ltd.

PRODUCTION MANAGEMENT (FT-126)

- Meaning, Nature, Significance and Scope / Role / Functions of Production Management, Relationship with other Management Functions, Different Production Systems : Continuous and Mass Production Intermittent Production, Batch / Job-Shop Production
- Product Design , Plant Location, Plant Layout, .
- Production Planning and control, Capacity Planning, Scheduling and Sequencing in the Context of Continuous and Intermittent Systems. TQM & SQC.
- Materials Management -Value Analysis, Waste and Scrap Disposal, Classification and Codification, Standardisation, Variety Reduction, Material Handling, JIT.
- Work study, Methods Study, Work Measurement, Industrial Safety and Safety Management, Maintenance Management.

Suggested Readings :

1. Adam, E E & Ebert, RJ. **Production & Operation Management.** New Delhi, PHI.
2. Paneerselvam, Production Management, PHI
3. Ashwathapa, Production & Operations Management
4. Chunawala and Patel, Production Management
5. Buffa, E.S. **Modern Production Management**, John Wiley (New York).
6. Chary S.N. **Production and Operations Management**, New Delhi, TMH.
7. Dilworth, James B. **Operations Management : Design, Planning & Control for Manufacturing & Services**, Singapore, Mc Graw Hill.

RESEARCH METHODOLOGY (FT-127)

- Concepts of Research, Scientific Approach to Research, Types of Social Science Researches.. Research Process and Planning for Research, Formulation of Research Problem,
- Research Designs – Exploratory, Descriptive and Experimental Research Designs, Sampling Design, Sources and Methods of Data Collection, Observation Design, Interviewing for Research, Formulation of Questionnaire.
- Scaling Techniques, Techniques of Data Analysis (including Statistical Techniques) like ANOVA, Awareness of Software Packages relevant to Management Researches
- Interpretation of Data and Drawing Inferences, Research Report Writing, Research Publications.
- Applications in Marketing Research with special reference to Product Research, Service Research, Advertising Research and Sales Research.

Suggested Readings :

1. Bernet, Roger : **Management Research,** ILO.
2. Kothari, C. R. Research Methodology, New Age International
3. Fowler, Floyd J.Jr., **Survey Methods**, Sage Pub.
4. Salkind, Nell J., **Exploring Research.**, Prentice Hall, NJ.
5. Dwivedi, R.S. Research Methodology in Behavioural Sciences- McMillian.

BUSINESS ETHICS AND INDIAN ETHOS (FT-128)

- Ethics: Nature, Scope , Purpose , Importance of Ethics and moral Standards. Religion and ethics, Source of Ethics, Ethics and Management system ,Ethical issues and Analysis in management. Personal Framework for ethical choices, Values.

- Business Ethics: Scope , Need, Importance, Factors influencing Business Ethics, Ethical Theories, Morality and ethics, Valve based organization , Ethical pressure in individual in organization.
- Management Ethics: Business Ethics and society, Society expectations from business, Values for Managers, Cultural Contradictions, Spirituality and leadership,
- Ethics in Business Functions: Marketing, Finance, Human Resource and Production, Environmental Ethics, Gender issues ecological consciousness.
- Business Ethos: Interaction between ethos, morality and law, Characteristics, Principles and issues of Business Ethos, Social Responsibility of Business Corporate Governance and Ethics.

Suggested Reading

1. S.K.Chakraborty Human Response in Organisation : Towards the Indian Ethos : TMH, New Delhi.
2. J. Petrick and J. Quinn Management Ethics: Integrity at work
3. S.K. Chakraborty QWL and Managing by Human Values — TMH, New Delhi.

Industry Based Project - II
FT- 129

Students will prepare industry based projects individually on the basis of topics allotted to them. **The Industry Based Project submitted by the students will be evaluated by the external examiner and viva will be based on the Project.**

MBA - THIRD SEMESTER (Session: 2018-2019)

ORGANISATIONAL EFFECTIVENESS AND CHANGE (FT-231)

- An overview of Organisational structure, Behavioural implication of organizational structure, factors influence in designing organizational structure and job design. Organizational Effectiveness-Approaches, need and significance
- Organisational development- nature, goals, process , Diagnosis methods and intervention mechanisms
- Organizational change- need, factors, change agents, resistance and approaches to manage changes.
- Organisational conflicts – causes, nature measures to resolve organisational conflicts.
- Organisational culture and climate, organizational learning, power and politics in the organization, integration and control.

Suggested Readings

1. S. P Robbins **Organisational Theory** PHI , New Delhi
2. S.P.Robbins **Organisational Behaviour** PHI, New Delhi
3. F.Luthans , **Organisational Behaviour** TMH, New Delhi
4. R.S. Dwivedi ,**Organisational Behaviour and Human Relations** McMillan, New Delhi.
5. Uma Sekharan, **Organisational Behaviour**, TMH, New Delhi.
5. French and Bell, **Organisational Development,** PHI, New Delhi.

INTERNATIONAL BUSINESS (FT – 232)

- Basics of International trade, Trade Theories, Porter's Generic Strategies; Global Entry Strategies; Balance of Payment Instruments of trade policy; tariffs, quotas; Indias Foreign Trade policy .
- Institutional set-up for export promotion in India, salient features of the current EXIM policy . Export procedure documentation. Multinationals (MNCs) in India: Role of Multinationals in the development of developing countries, Export promotion policies.
- Problems and Prospects of Indian Businesses in abroad, Anti – Dumping Duties, regulatory framework of International Trade, Policy and Performance of export zones and EOU , Export Incentives.Foreign Investments in India: Foreign Direct Investment (FDI) and Foreign Institutional Investment(FII) .
- Export marketing : Indian and Global context; WTO: Origin of WTO, Implications of enforcement of WTO on Indian Business.
- Trade agreement pertaining to trade in goods and services ,Multilateral Environmental agreement (MEAs)..International trade blocks , NAFTA, ASEAN, SAARC, EU, WTO and dispute settlement mechanism.

Suggested Reading :

1. Francis Cherunilam, **International Business**
2. Cherunilam, **Business Environment.**
3. Bhalla, V.K. and Shivramu **International Business Environment and business , New Delhi , Anmol.**
4. Eiteman, D.K. & Stopnehill, **Multinational business Finance ,** New York Wesley
5. Subba Rao, International Business, Himalaya Publishing House

MANAGEMENT INFORMATION SYSTEMS (MIS) (FT- 233)

- Management Information System. The System Approach and System View of Business, Introduction to the Process of M.I.S. Development.
- Management Information System Design - Defining the Problem, Set System Objectives, Determining information needs, sources, Development and selection of alternative design, Gross Design, Report.

- Implementation of MIS : Stages of Implementation ; Evaluating the system , maintenance of the system ,Technology monitoring, Emerging opportunity for global buisness
- Information system for Decision Making, Basic Information System Related to Finance, Production, Marketing and Human Resources.
- MIS and Decision Making - Phases of Decision making process- Intelligence, Design & choice. Programmed V/s Non-Programmed Decisions. Expert System and Decision Support System.

Suggested Readings :

1. Robert G. Murdic Joel E, Ross, James R. Clagget, **Information Systems for Modern Management**, PHI, New Delhi.
2. Gordon B Davis,M.H. Olson, **Management Information Systems,** Prentice Hall, New Jersey.
3. Jerome Kanter, **Management Oriented Management Information System,** PHI, New Delhi.
4. N. Subramaniam, **Introduction To Computers,** Himalaya, Mumbai.
5. P.K. Sinha, **Computer Fundamentals,** BPB, New Delhi.

SPECILISATION
COMPULSORY GROUP A - MARKETING

MARKETING RESEARCH AND CONSUMER BEHAVIOUR (FT- 234)

- Marketing Research – Concept, nature, scope, significance, advantages and limitations, steps involved in marketing research.
- Research design and its types, product pricing, promotion and advertising research, marketing research in India, data collection, sources of data, data analysis and interpretation , major techniques of marketing research and report writing.
- Consumer behavior(CB) - nature , concept ,scope, CB Models, significance of consumer behaviour Consumer vs customer and consumer decision making
- Internal factors influencing consumer behaviour - life style, motivation, attitude, learning, perception and personality.
- External factors influencing buying behaviour – family, groups, social class and cultural , cognitive dissonance, diffusion of innovation.

Suggested Reading :

1. D.D. Sharma, **Marketing Research**, Himalayan Pub. , Mumbai
2. G.C. Beri , **Marketing Research,** TMH, New Delhi
3. M.N. Mishra, **Marketing Research,** Sultanchand , New Delhi.
4. Peter D. Bennet and H.H. Kes, **Consumer Behaviour**
5. Walters and Paul, **Consumer Behaviour,** McGraw Hill, New York.
6. Shiffman, L.G. & Kanuk, LL., **Consumer Behaviour,** PHI, New Delhi
7. Balckwell, Engle and Kollat, Consumer Behaviour.
8. Pal, Sumitra, Consumer behavior, S. Chand
9. Nair, Suja. Consumer behavior, Himalayan Pub. , Mumbai
10. **Solomon,** Consumer Behaviour, Pearson

SALES AND ADVERTISING MANAGEMENT (FT- 235)

- Sales Management - Meaning, Significance, Functions of Sales Manager, Recruitment, Selection, Training and Motivation of
  Sales Personnel, Role of Technology in automation of sales function.
- Sales Organization - Theory of Selling, Allocation of Sales
  Territory, Sales Forecasting, Sales budgeting, Different tools in sales promotion and their specific advantages and limitation, Management of Return on Investment.
- Role of Advertising in Marketing Process, Legal, Ethical and Social Aspect of advertising, advertising media, types, strategy, Media selection.
- Purchase Proposition, Unique Selling Proposition, Measuring Advertising Effectiveness, Advertising Agency and its role.
- Determination of target audience, building of advertising programme – Message, Headlines, Copy Logo, Illustration Appeal, Layout.
  Campaign Planning, Media Planning, Budgeting, Evaluation.

Suggested Reading :

1. Still, Cundiff and Govani, **Sales Management**, PHI, New Delhi.
2. Charles Futrell, **ABC of Selling,** AITBS, New Delhi.
3. Ramaswamy, **Sales Management**, Sterling, New Delhi.
4. Bellur and Bekman, **Sales Management,** Himalaya, Mumbai.
5. Manendra Mohan, **Advertising Management,** TMH, New Delhi.
6. Aaker, Batra and Myers, **Advertising Management,** Prentice Hall of India, New Delhi.
7. Norris, **Advertising Management,** Prentice Hall of India, New Delhi.
8. B.S. Rathore, **Advertising Management,** Himalaya, Mumbai.

INDUSTRIAL AND SERVICE MARKETING (FT – 236)

- Industrial Marketing: Classification of industrial goods & services, Types of industrial product lines, new product development, industrial product life cycle & strategies, pricing of industrial products.
- Formulating Channel strategies and physical distribution decisions: objectives, nature of industrial distribution channels, Logistics, Promotional Strategies for Industrial goods and services: Sales promotion, publicity and public relations, direct marketing, personal selling, Advertisement
- Concepts, Nature, Emergence, Growth and Importance of Services, Marketing Challenges, Service Classification
- Marketing of Service Business, Understandings Service Market, Services and Consumer Behaviour, Segmentation of Marketing of Services, Management of Service Quality.
- Marketing Mix in Service Marketing, Advertising, Branding of Services, Relationship Marketing, Retail Marketing.

Suggested Readings:

1. Richard M.Hill et, al., **Industrial Marketing**, A.T.B.S, Publishers and Distributors, New Delhi
2. Gross, A.C. etc. **Business Marketing**, Boston, Houghton Mifflin.
3. Michael H.Morris, Industrial and Organizational Marketing, Mcmilan Publishing Company, New York
4. David T.Wilson, —Pricing Industrial Products and Servicesll, Institute for the study of Business Markets, College of Business Administration, Pennsylvania State University.
5. Michael D.Hutt, Thomas W.Speh, Business Marketing management- A strategic view of industrial and organizational markets, Thomson south western, Singapore.
6. Lovelock, Christopher H. Managing Services : Marketing Operations and Human Resources.Englewood Cliffs, New Jersey, Prentice Hall Inc.
7. Lovelock, Christopher H. Service Marketing.Englewood Cliffs, New Jersey, Prentice Hall Inc.
8. McDonald, Malcom and Payne, A. Marketing Planning for Services. Butterworth, Heinemann.

Suggested Readings :

1. Bhalla, V.K. **Management of Financial Services**. Anmol, New Delhi.
2. Bhalla, VK. And Dilbag, Singh. **International Financial Centres**. New Delhi, Anmol.
3. Ennew C, Trevor Watkins & Mike Wright : **Marketing of Financial Services,** Heinemann Professional Pub.
4. Gordan, E and K. Natrajan, **Emerging Scenario of Financial Services,** Himalaya Publishing House.
5. Meidan, Arthur Brennet, M. **Option Pricing : Theory & Applications**. Toronto, Lexington Books.
6. Kim, Suk and Kim, Seung. **Global Corporate Finance : Text and Cases.** Miami Florida, Kolb.
7. P.R. Agrawal, **Mutual Funds**, Orient Law Huge, Allahabad.
8. Khan M. Y. Financial Services, TMH

HUMAN RESOURCE MANAGEMENT AREA

Human Resource Development (FT –237 H)

- HRM Vs HRD, HRD Philosophy and Goals of HRD, HRD Sub-systems/Process Mechanisms , HRD Intervention Mechanism.
- Effectiveness of Training : Identifying Training Needs, Organising Training Programmes, Evaluation and Follow-up of Training, Recent Development in Training System
- Performance Appraisal & Management, Potential Appraisal & Development, Feedback and Performance Counselling,
- HRD Climate and Practices in organizations, HRD Culture, HRD Audit, HRD Culture and Climate in Indian Organisations.
- Career & succession Planning & Development, Introduction to concept and Processes of Quality Management and continuous improvement processes,

Suggested Readings :

Sungara Raju, S.M., **Total Quality Management,** New Delhi, Tata McGraw-Hill Pub.Co.Ltd.

1. Pareek and Rao, **Designing and Managing Human Resource, Systems,** Oxford & IBH Pub. House
2. French and Bell, **Organisation Development**, PHI, New Delhi.
3. Rao, T.V., **Recent Experiences in HRD**, New Delhi. Oxford & IBH
4. Pareek, Udai, **Evaluation of HRD**, Jaipur, Rawat Publications
5. Rao T.V., **HRD Audit**, Oxford IBH, Mumbai.

LEGAL FRAMEWORK OF HUMAN RESOURCE MANAGEMENT (FT -238 H)

- Emergence and Objectives of Labour Laws and their impact on Socio-Economic Environment. Employees Welfare Measure.
- Social Security Measures and Laws- Workmen's Compensation Act, Employees' State Insurance Act.
- Provident Fund Act , Payment of Gratuity Act and Maternity Benefits Act.
- Wage Legislations and Bonus Act – The Law of Minimum Wages, Payment of Wages Act, Payment of Bonus Act.
- Laws Relating to Working Conditions in Factories Act, Contract Labour (R &A) Act.

Suggested Readings :

1. Ghaiye, B R, **Law and Procedure of Departmental Enquiry in Private** and Public Sector. Lucknow, Eastern Law Company.
2. Malhotra, O P. **The Law of Industrial Disputes.** Vol.I and II. Bombay, N.M. Tripathi.
3. Malik, P L. **Handbook of Industrial Law**. Lucknow, Eastern Book.
4. Saini, Debi S. **Labour Judiciary, Adjudication and Industrial Justice.** New Delhi, Oxford.
5. Saini, Debi S. **Redressal of Labour Grievances, Claims and Disputes,** New Delhi, Oxford & IBH.
6. Seth, D.D. **Industrial Dispute Act, 1947**. Vol.I & II. Bombay, N.M. Tripathi.
7. Srivastava S.C. **Industrial Relations and Labour Law.** New Delhi, Vikas.
8. N.D. Kapoor, Mercantile Law Sultan Chand and Sons, New Delhi.

9. Newton M P Payne, A. The Essence of Service Marketing.New Delhi, Prentice Hall of India.
10. Verma, H V. **Marketing of Services**. New Delhi, Global Business Press.
11. **Industrial Marketing**, Krishna K Havaldar, 2nd Edition, Tata McGraw Hill
12. **Industrial Marketing Management**, Michael D Hutt and Thomas W Speh, The Dryden Press

SPECILISATION GROUP – B

(ANY ONE GROUP IS TO BE OPTED)

FINANCE AREA

SECURITY ANALYSIS AND PORTFOLIO MANAGEMENT (FT- 237 F)

- Investment Return and Risk, Cost of Investing in Securities; Mechanics of Investing; Markets and Brokers; Investment Companies; Objectives of Security Analysis; Investment Alternatives; Valuation Theories of Fixed and Variable Income Securities.
- The Return to Risk and the Investment Decision; Derivative markets, Fundamental and Technical Analysis, Efficient Market Theory.
- Portfolio Management – An Optimum Portfolio Selection Problem, Markowitz Portfolio Theory, The Mean Variance Criterion (MVC) – The Nature of Investment Risk, MVC and Portfolio Selection, the Investment in Liquid Assets, Portfolios of Two Risky Securities, A Three Security Portfolio, The relationship between the Unleveraged and Leveraged Portfolio.
- Sharpe Single Index Model; Application of Market Model in Portfolio Construction; Capital Asset Pricing Model, Factor Models and Arbitrage Pricing Theory.
- Optimum Portfolios – Constructing the Optimum Portfolio, Portfolio Investment Process; Bond Portfolio Management Strategies; Investment Timing and Portfolio Performance Evaluation.

Suggested Readings :

1. Amling, Frederic. **Investment Englewood Cliffs**, New Jersey, PHI .
2. Bhalla, V.K. **Investment Management : Security Analysis and Portfolio Management**,New Delhi, S.Chand.
3. Fischer, Donald E. and Joardan, Ronald J. **Security Analysis and Portfolio Management,** New Delhi, PHI.
4. Alexander, Gordon J. and Sharpe, Willliam F. **Fundamentals of Investments,** Englewood Cliffs, New Jersey, Prentice Hall Inc.
5. Elton, Edwin J and Gruber, Martin J. **Modern Portfolio Theory and Investment Analysis**. New York, John Wiley.
6. Lee, Cheng F. etc. **Security Analysis and Portfolio Management**. Scott, Foresman.
7. Markowitz, Harry M. Mean. **Variance Analysis in Portfolio Choice and Capital Markets**. London, Basic Blackwell.
8. Kevin, S. Security Analysis and Portfolio Management, PHI

MANAGEMENT OF FINANCIAL SERVICES (FT- 238 F)

- Financial System and Markets; Indian Financial System, Concept, Nature and Scope of Financial Services; Regulatory Framework for Financial Services; Management of Risk in Financial Services;
- Mutual Funds; Merchant Banking Services : Managing of Issue Shares and Bonds, Hire Purchase; Debt Securitization;
- Housing Finance; Credit Rating; Venture Capital, Factoring, Forfeiting and Bill Credit Discounting, Insurance.
- Evaluation of an Acquisition, Takeover and Merger, Leasing and Financial Evaluation of a Lease.
- Money Market, Foreign Investment : FDI, FIIs investment Strategies, New Market Instruments. Corporate Risk Management.

SYSTEM AREA
SYSTEMS ANALYSIS AND DESIGN (FT – 237 S)

- Overview of Systems Analysis and Design; Software applications today – the changing scenarios – Introduction to different methodologies and Structured System Analysis – Problem identification – requirement analysis : tools and techniques – feasibility analysis – operational. Technical and economical feasibility – details of SDLC approach. Business Systems Concept.
- System Development Life Cycle; Project Selection; Feasibility Study. Tool for Analysis and Design of Business Systems; Methodologies Available; Need for Structured Techniques; Structured Techniques Available. System Requirement Specification and Analysis; Data Flow Diagrams; Data Dictionaries; Process Organisation and Intersections; Decision Analysis; Decision Trees and Tables.
- Expansion, Explosion and Normalization, Detailed Design; Modulation; Module Specification; File Design; Data Base Design,
- System Control and Quality Assurance; Documentation Tools. Testing Techniques Available; System Controls and Audit Trails; System Administration and Training; Conversion and Operations Plan.
- Hardware and Software Selection; Hardware Acquisition; Benchmarking, Vendor Selection, Operating System Selection, Language Processors, Performance and Acceptance Testing Criteria. Managing Data Processing in an Organisation; Data Processing Setup; Project Management Techniques for Managing Software Projects.

Suggested Readings :

1. Award. Elias M. **Systems Analysis and Design.** 2nd ed., new Delhi. PHI
2. Coad, Peter and Edward, Yourdon. **Object-Oriented Analysis.** 2nd ed., Englewood Cliff, New Jersey, yourdon Press.
3. Whitten, J.L. etc. **System Analysis and Design Methods**. New Delhi. Galgotia.
4. Marco. T.D. **Structured Analysis & System Specification,** New Delhi, Yourdon press.
5. Rajaraman, V. **Analysis and Design of Systems.** New Delhi, PHI.

RDBMS & SQL CONCEPTS (FT – 238 S)

- Database - Definition, Concepts and Developments - Traditional file Oriented approach, Need for Database, Uses of Database, Design of Database, Distributed Data Processing System.
- RDBMS : Introduction - Database and DBMS Software, Three Layered Architecture, Advantages and Disadvantages of a Database, History; Data Modeling – Object Oriented and Record Based Models, E.R. Model and E-R Diagram Examples and Exercises, Hierarchical, Network, Relational Model, Normalisation Techniques - 1st , 2nd , 3rd normal form, Examples and Exercises, E.F. Codd's 12 Rules for a relational Database.
- Database Concepts – Transaction Management, Properties of a Transaction, Commit and Rollback, Concurrency, Locking, Access Control, Data Integrity, Integrity Constraints, Auditing, Backup and Recovery; Data Dictionary – System Catelogue, Distributed Database and Distributed Data Access.
- Introduction to Client – Server and ODBC connectivity. SQL : SQL Language – DML Commands – Select, Insert, Update, Delete – retrieving data, summarizing data, adding data to the database, updating data to the database and deleting data.
- Simple queries – use of WHERE, Arithmetic, Comparison and logical operators, ORDER BY, GROUP BY and Group Functions. Multi table queries, Sub-queries, Views; DDL Commands – Table and View Create, Alter, Drop Integrity Constraints; Transaction Processing – Commit, Rollback, Save point.

Suggested Readings :

1. Coleman, Pat and Peter Dyson, **Internets BPB Publication**, New Delhi.
2. Keen, Peter and Mark McDonald, **The e-Process Edge**, Delhi. Tata McGraw Hill.
3. Oberoi, Sundeep **e-Security and You**, Delhi, Tata McGraw Hill.
4. Richart, Alberto Manuel and Stephen Asbury, **Active Server Pages** 3, IDG Books, Delhi.
5. Hansen G.W. & Hansen J.V. **Data Base Management & Design,** PH, Englewood Cliff, New Jersey.

6. Hawryszkiewyca I.T. **Database Analysis & Design,** Macmillan, New York. Weldon J. Database Administration, Plenum Press, New York

TRAINING REPORT AND VIVA (FT –239)

The training report submitted by the students will be evaluated by the external examiner and viva will be based on the training report.

CORPORATE SOCIAL RESPONSIBILITY (FT- 243)

- Corporate Social Responsibility: Concept, Historical Evolution of CSR, Developmental Phases of CSR ,Benefits and Criticisms, CSR in Emerging Economies of the world
- National voluntary Guidelines on Social, Environmental and Economic Responsibilities of Business: Principles for Ethics, Transparency and Accountability in business practices, Products Life Cycle Sustainability , Employees' well-being, Stakeholder Engagement, Safety of Human Rights, Environment Protection, Policy Advocacy, Inclusive Growth for all stake holders, Customer Value
- SEBI Guidelines for Corporate Social Responsibility Reporting, Provisions for CSR in Companies Act 2013: Definition, CSR Activities, CSR Committees, CSR Policy, CSR Expenditure, CSR Reporting, Display of CSR activities on its website
- Understanding the thrust areas mentioned in schedule VII of the Companies Act 2013, Understanding the practices adopted by companies with respect to CSR Committees, activities and policy
- Impact of CSR Practices on Sustainable development, Generation of Employment, Promotion of Education, Gender Equality and women empowerment, Improvement of Health services

Suggested readings

1. Sanjay K. Agarwal, Corporate Social Responsibility in India, SAGE Publications.
2. Madhumita Chatterji, Corporate Social Responsibility, Oxford University Press

MARKETING AREA (COMPULSORY)

INTERNATIONAL MARKETING (FT –244)

- Nature, Scope and Significance of International Marketing, Foreign Trade Concepts and Theories.
- Analysis of International Marketing Environment. Trends in India's Foreign Trade, Governmental Agencies in International Marketing, Export Houses.
- International Marketing Intelligence and Marketing Research, Orgnaisational Structures in Foreign Market, Managing International Marketing Communication and its Sales Force.
- Planning for Overseas Market- Product Strategy, International Product Life Cycle, Pricing Decisions, Distribution Channel Decisions: Organization of Shipping ,Chartering Practices , Marine Cargo Insurance, and Promoting Products for Exports including Fairs and Exhibitions.
- Export finance, Methods of Payment, Letter of Credit, ECGC, Brief study of International Economic Institutions – World Bank, GATT, UNCTAD,IMF etc.

Suggested Readings :

1. Bhattacharya, B. **Export Marketing : Strategies for Success**, New Delhi, Global Business Press.
2. Johri, Lalit M. **International Marketing : Strategies for Success.** University of Delhi, Faculty of Management Studies.
3. Keegan, Warren. **Global Marketing Management. Englewood Cliffs,** New Jersey, Prentice Hall Inc.

MBA - FOURTH SEMESTER (Session: 2018-2019)

STRATEGIC MANAGEMENT (FT – 241)

- Nature, Purpose, Importance and historical evolution of Business Policy, Concept and applications of Corporate Strategy, Strategic Management : Definition, model and process for Strategy Formulation :Ansoff growth vector.
- Strategic Intent – Vision, Mission, Purpose and Objectives,
- Environmental Analysis : External environment and orgnisational Appraisal; Environmental threat and opportunity profile; competitive advantage of a firm, Core competency, strategic advantage profile; SWOT Analysis.
- Strategic Alternatives-merger, acquisition, diversification, mordernisation, integration, joint venture, turn around. Strategic Choice- objective and subjective considerations in strategic choice; Managing Cultural Diversity; Global Entry Strategy.
- Strategic Implementation, Activating Strategies, Structural Implementation, Functional Implementation, Leadership implementation, Behavioural Implementation, Strategy Evaluation, Strategic Control, Operational Control Techniques of Strategic Evaluation and Control.

Suggested Readings :

1. Azhar Kazmi, **Business Policy & Strategic Management,** TMH, New Delhi.
2. Keen, Peter and Mark McDonald, **The e-Process Edge**, Delhi. Tata McGraw Hill.
3. P.K. Ghosh, **Business Policy-Strategic Planning and Mgmt.,** Sultan Chand and Sons, New Delhi.
4. V.P. Michael, **Business Policy and Environment,** Sultan Chand and Sons, New Delhi.
5. R.M. Srivastava, **Corporate Strategy and Planning,** Himalaya, Mumbai.
6. R. Nanjundaiah, **Strategic Planning and Business Policy,** Himalaya, Mumbai.
7. Steiner, Miner, **Management Policy and Strategy,** MacMillan, London.
8. I. Ansoff, **Strategic Management,** MacMillan, London.
9. Peters Tom. **Business School in a Box,** New York, Macmillian.
10. Hamel G. & Prahallad C.K. **Competing for the Future,** Boston, HBS Press.

RETAILING MANAGEMENT (FT – 242)

- Retailing: Nature, Scope and opportunities, Types of retailers: merchandise retailers, non-store retail formats, service retailing; types of ownership, functions of retailers; FDI and retailing in India, Emerging issues of Retailing in India different kinds
- Customer Buying Behaviour: types of buying decisions, buying process, social factors influencing buying decisions in retailing.
- Retail Market Strategy: definitions, retail planning process, financial strategy, location strategy, human resource strategy, retail MIS.
- Retail Mix Strategies: buying merchandise, pricing, retail communication mix, multi channel retailing.
- Managing the store, store layout and design, space planning, merchandise presentation techniques, store ambience, customer service

Suggested Readings :

1. Ahuja, G K & Gupta, Ravi. **Systematic Approach to Income Tax,** Allahabad, Bharat Law House.
2. Bhalla, V.K.Modern **Working Capital Management,** New Delhi, Anmol.
3. Bhalla, V.K. **Financial Management and Policy,** New Delhi, Anmol.
4. Chandra, Prasanna. **Projects : Preparation, Appraisal,** Budgeting and Implementation, New Delhi, Tata Mc Graw Hill.
5. Dhankar, Raj S. **Financial Management of Public Sector Undertakings.** New Delhi, Westville.

HRM AREA

COMPENSATION MANAGEMENT (FT- 245 H)

- Wage Determination : Wage concepts; minimum fair and living wages. Process and Theories of Wage Determination, job Evaluation and Job Pricing. Machinery for wage fixation, Managerial Remuneration in India. Job Evaluation Techniques.
- Human Resource Record and Audit; Rewards, Incentives and Wage Differentials: Types of rewards and incentives; different incentive plans, Dearness Allowance and other Allowances, Fringe Benefits. Wage Differentials , Profits – Sharing , Co Partnership & Payment of Bonus with special reference to India.
- Wage and Productivity : Concept of Productivity, Productivity of Labour and payment of Wages , the level of living of Indian Workers wages and earnings of Indian worker. Problem of low productivity in the Indian workforce.
- Wage regulations in India : Salient provisions of : Minimum Wages Act, 1948 , Payment of Wages Act, 1936 Payment of Bonus Act, 1965, Equal Remuneration Act, 1976
- Wage Policies in India : Concept of wage policy: Objectives, Evolution and Development of wage policy and its constraints in Indian Organisations.

Suggested Readings :

1. E.B. Flippo , **Personnel Management** , TMH
2. Decenzo and Robbins , **Human Resource Management**, PHI, New Delhi.
3. N.D. Kapoor, **Mercantile Law**, Sultan Chand & Sons.
4. A.M. Sharma ,**Compensation Management,** Himalaya Publishing House, Mumbai.
5. Dewivedi, R.S. **Personnel and Human Resource Management – An Indian Experiences,** New Delhi, Galgotia.

4. Onkvisit, Sak and Shaw, J.J. **International Marketing : Analysis and Strategy** : New Delhi, Prentice Hall of India.
5. Terpstra, Vern and Sarthy, R. **International Marketing**. Orlando, Dryden Press.
6. Walter, I and Murphy, T. **Handbook of International Business,** New York, John Wiley.

FINANCE AREA

INTERNATIONAL FINANCIAL MANAGEMENT (FT –245 F)

- International Financial Management: Nature, Scope and Objectives, Domestic v/s International Financial Management, Theories of International Financial Management, International Financial System and institutions.
- Types of Foreign Exchange Markets and Transactions, Quoting Foreign Exchange Rates, Spread, Cross Rates, Forward Rates, Quoting Forward Rates; Organisation of the Foreign Exchange Markets; Foreign Exchange Risk.,
- Accounting and Transaction Exposures, Theory and Practice of Forecasting Exchange Rates. Forward Contracts; Future Contracts; Other Derivative Securities; Types of Traders; Futures Markets and the use of Futures in Hedging,
- Forward and Future Prices; Interest Rate Futures; Swaps; Options Markets; Properties of Stock Option Prices; Trading Strategies Involving Options; Options on Stock Indices; Currencies and Futures Contracts; General Approach to Pricing Derivatives Securities; Interest Rate Derivative Securities; Derivatives Market in India.
- International Receivables and Inventory Management, International Investment Strategy, International Cash Management, International Financial Strategies.

Suggested Readings :

1. Abdullah, F.A. **Financial Management for the Multinational Firm.** Englewood Cliffs, New Jersey, PHI.
2. Bhalla, V.K. **International Financial Management,** New Delhi, Anmol.
3. Buckley, Adrian, **Multinational Finance,** New York, PHI.
4. Kim, Suk and Kim, Seung. **Global Corporate Finance : Text and Cases,** Miami Florida, Kolb.
5. Shapiro, Alan C. **Multinational Financial Management,** New Delhi, PHI.
6. AbP.G. Apte, **International Financial Management,** TMH, New Delhi. Shaprio, **Multinational Financial Management,** PHI, New Delhi.

PROJECT PLANNING, ANALYSIS AND MANAGEMENT (FT – 246 F)

- Generation and Screening of Project Idea; Capital Expenditure; Importance and Difficulties; Market Demand and Situational Analysis; Technical Analysis; Financial Analysis; Analysis of Project Risk; Firm Risk and Market Risk; Social Cost Benefit Analysis.
- Multiple Projects and Constraints; Network Techniques for Project Management, Problem of Time and Cost Overrun in Public Sector Enterprises in India; Assessment of the Tax Burden; Environmental Appraisal of Projects.
- Project Finance : Project Financing in India, Infrastructure Finance Vs. Project Finance, Business and Major Players (Global and India).
- Role of FI and banks and shift in Portfolio of FI and banks, Skills required for Career in Infrastructure Finance.
- Infrastructure Projects Appraisal in a Financial Institution : Appraisal process.

MANAGEMENT OF INDUSTRIAL RELATIONS (FT – 246 H)

- Industrial Relations- concept, nature, scope, objectives. Industrial Relations system, Strategic choice theory of IR. Significance of IR in liberalization and globalisation of Indian economy. National Trade Union Management.
- Trade Unionism, Problems of Indian Trade Unions. Future of Indian Trade Unionism and Related Issues, Unfair Labour Practices, Grievance – Imp, Process and Practices Handling Procedures.
- Industrial Disputes – Causes & Remedies, Settlement Machinery, Industrial Relations Legislations-Industrial Disputes Act, Trade Unions Act, Standing Orders Act.
- Collective Bargaining stages; Negotiation, Process, Collective, Bargaining in Indian Organisations. New Trends in Collective Bargaining. Disciplinary Inquiries and actions: Domestic Enquiry ,Disciplinary action;, Employee Discipline: Importance , Causes and Forms.
- Workers' Participation in Management. Emerging Trends in Industrial Relations Management, Managing Union free organizations

Suggested Readings :

1. Das,R.P. **Management of Industrial Relations,** Varanasi, MTC.2002.
2. Kochan, T.A. and Katz Henry. **Collective Bargaining and IR,** Homewood Illinois Richard D. Irish.
3. Mamkoottam, K.Trade Unionism. **Myth and Reality.** New Delhi, Oxford University Press.
4. Niland J R etc. **The Future of Industrial Relations.** New Delhi, Sage.
5. Ramaswamy, E.A. **The Rayon Spinners The Strategic Management of Industrial Relations.** New Delhi, Oxford University Press.
6. Virmani, B.R. **Participative Management vs. Collective Bargaining .** New Delhi, Vision Books, Webb, Sidney & Webb, Beadtrice. Industrial Democracy. Melbourne, Longman.
7. **Modern Labour Law and IR**, Srikanta Mishra, Sultan Chand & Sons, New Delhi.
8. Dwivedi, R.S. **Industrial Relations**, Galgatia, New Delhi,
9. Monappa,Arun, **Industrial Relations**, TMH, New Delhi

SYSTEM AREA

BUSINESS PROCESS RE-ENGINEERING & ERP (FT – 245 S)

- Conceptual Foundation of Business Process Re-engineering; Role of Information Technology in BPR; Process Improvement and Process Redesign; BPR Experiences in Indian Industry;
- Process Identification and Mapping; Role/Activity Diagrams; Process Visioning and Benchmarking. Business Process Improvement. Business Process Redesign; Man Management for BPR Implementation; Re-organizing People and Managing Change.

- Enterprise Resources Planning : Evolution of ERP-MRP and MRP II problems of system islands need for system integration and interface early ERP Packages
- ERP products and Markets – Opportunities and problems in ERP selection and implementation; ERP implementation : identifying ERP benefits team formation – Consultant intervention-Selection ERP – Process of ERP
- E-Business : Introduction to 1 – Net technologies – Evolution of E-commerce, EDI and E-Business, Security and Privacy Issues – technologies for E-Business, Future and Growth of E-Business.

Suggested Readings :

1. Carr, D K and Johansson, H J. **Best Practices in Re-engineering**. New York, McGraw Hill.
2. Champy, James, **Re-engineering Management : The Mandate for New Leadership.** London, Harper Collins.
3. Coulson-Thomas, **C.Business Process Re-engineering : Myth & Reality.** London, Kogan Page.
4. Hammer, Michael. **Re-engineering the Corporation : A Menifesto for Business Revolution**. London, Nicholas Brealey.
5. Jayaraman, M S. et al. **Business Process Re-engineering.** New Delhi, Tata McGraw Hill.
6. Hammer, Micheal and Jamts Chamby, **Reengineering the Corporation.**
7. Ptak, Carol A. & Eli Schragenheim, **ERP**, St. Lucie Press, New York.

FUNDAMENTALS OF COMPUTER ARCHITECTURE (FT – 246 S)

- Fundamental of Data Processing and Input/Output
  Fundamental of OS, Types of OS-Batch, Time Sharing, Parallel, Real time, Networks, Client Server
- File Systems, Directory .Structure, Process Management, Switching, Scheduling
- Memory Management, Swapping, Segmentation, Paging, Virtual Memory
- Multi-programming and Multitasking System
- Parallel Processing, Virtual Storage, Open Systems

Suggested Readings :

1. Leon and Leon , **Fundamentals of IT**
2. Rajaramana , **Fundamentals of Computers**

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Pre-Ph.D. Course Work (Session 2018-19)

Research Methodology (101)

Unit 1

- Concepts of Research, Research Process and Planning for Research, Formulation of Research Problem.

Unit 2

- Research Designs – Exploratory, Descriptive and Experimental Research Designs, Sampling Design.

Unit 3

- Hypothesis Testing: Parametric and Non-Parametric Tests, especially t-test, Z test, ANOVA (F test), Chi square test. Data Analysis and Interpretation of Data. Use of SPSS for Data Analysis, Drawing Inferences.

Unit 4

- Report Writing, Ethical issues in Social Sciences Research, Plagiarism and its prevention, Nuances in publishing process in academic journals: Citation Index, h-Index, i10-Index, JIF and Journal Metrics, References : different styles like APA, Havard, Chicago and MLA.

Unit 5

- Basic knowledge of Microsoft Word, Excel, Power Point, Use of Internet Resources for research: Google & Google Scholar, Inflibnet resources.

Review of Literature and Seminar (102)

1. Project based on review of research work: use of literature, knowledge of national and International Journals, Impact factor, Citation index, SCI Journals. (To be supervised and evaluated by Guide concerned).

2. Seminars; Open seminar, evaluation will be done by member of DRC.

Pre-Ph.D. Course Work (Session 2019-20)

Research Methodology (101)

Unit 1

- Concepts of Research, Research Process and Planning for Research, Formulation of Research Problem.

Unit 2

- Research Designs – Exploratory, Descriptive and Experimental Research Designs, Sampling Design.

Unit 3

- Hypothesis Testing: Parametric and Non-Parametric Tests, especially t-test, Z test, ANOVA (F test), Chi square test. Data Analysis and Interpretation of Data. Use of SPSS for Data Analysis, Drawing Inferences.

Unit 4

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Unit 5

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Review of Literature and Seminar (102)

1. Project based on review of research work: use of literature, knowledge of national and International Journals, Impact factor, Citation index, SCI Journals. (To be supervised and evaluated by Guide concerned).

2. Seminars; Open seminar, evaluation will be done by member of DRC.

Pre-Ph.D. Course Work (Session 2020-21)

Research Methodology (101)

Unit 1

- Concepts of Research, Research Process and Planning for Research, Formulation of Research Problem.

Unit 2

- Research Designs – Exploratory, Descriptive and Experimental Research Designs, Sampling Design.

Unit 3

- Hypothesis Testing: Parametric and Non-Parametric Tests, especially t-test, Z test, ANOVA (F test), Chi square test. Data Analysis and Interpretation of Data. Use of SPSS for Data Analysis, Drawing Inferences.

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- Report Writing, Ethical issues in Social Sciences Research, Plagiarism and its prevention, Nuances in publishing process in academic journals: Citation Index, h-Index, i10-Index, JIF and Journal Metrics, References : different styles like APA, Havard, Chicago and MLA.

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- Basic knowledge of Microsoft Word, Excel, Power Point, Use of Internet Resources for research: Google & Google Scholar, Inflibnet resources.

Review of Literature and Seminar (102)

1. Project based on review of research work: use of literature, knowledge of national and International Journals, Impact factor, Citation index, SCI Journals. (To be supervised and evaluated by Guide concerned).

2. Seminars; Open seminar, evaluation will be done by member of DRC.

Pt. Ravishankar Shukla University, Raipur

Scheme of Examination

M.A./M.Sc. (MATHEMATICS) (Semester-I)

2019 - 20 (Examination – Dec. 2019) onwards

There shall be five papers. Each paper shall have 100 marks. **Overall tally of marks will be 500.**

Paper	Description	Theory	Sessional	Practical	Total Marks
I	Advanced Abstract Algebra (I)	80	20	-	100
II	Real Analysis (I)	80	20	--	100
III	Topology	80	20	--	100
IV	Advanced Complex Analysis (I)	80	20	--	100
V	Advanced Discrete Mathematics (I)	80	20	--	100

M.Sc./M.A. Course (First Semester)
PAPER -I

Advanced Abstract Algebra (I)

Max. Marks 80

Unit-I Groups - Normal and Subnormal series. Composition series. Jordan-Holder theorem. Solvable groups. Nilpotent groups.

Unit-II Field theory- Extension fields. Algebraic and transcendental extensions. Separable and inseparable extensions. Normal extensions.

Unit-III Perfect fields. Finite fields. Primitive elements. Algebraically closed fields.

Unit-IV Automorphisms of extensions. Galois extensions. Fundamental theorem of Galois theory.

Unit-V Solution of polynomial equations by radicals. Insolvability of the general equation of degree 5 by radicals.

Books Recommended:

1. P.B.Bhattacharya, S.K.Jain, S.R.Nagpaul: Basic Abstract Algebra, Cambridge University press
2. I.N.Herstein: Topics in Algebra, Wiley Eastern Ltd.
3. Quazi Zameeruddin and Surjeet Singh : Modern Algebra

References

1. M.Artin, Algeabra, Prentice -Hall of India, 1991.
2. P.M. Cohn, Algebra,Vols. I,II &III, John Wiley & Sons, 1982,1989,1991.
3. N.Jacobson, Basic Algebra, Vols. I , W.H. Freeman, 1980 (also published by Hindustan Publishing Company).
4. S.Lang, Algebra, 3rd edition, Addison-Wesley, 1993.
5. I.S. Luther and I.B.S. Passi, Algebra, Vol. I-Groups, Vol.II-Rings, Narosa Publishing House (Vol.I-1996,Vol. II-1999)
6. D.S.Malik, J.N.Mordeson, and M.K.Sen, Fundamentals of Abstract Algebra, Mc Graw-Hill, International Edition,1997.
7. Vivek Sahai and Vikas Bist: Algebra, Narosa Publishing House, 1999.
8. I. Stewart, Galois theory, 2nd edition, chapman and Hall, 1989.
9. J.P. Escofier, Galois theory, GTM Vol.204, Springer, 2001..
10. Fraleigh , A first course in Algebra Algebra, Narosa,1982.

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M.Sc./M.A. Course (First Semester)
PAPER-II

Real Analysis (I)

Max. Marks 80

Unit-I Sequences and series of functions, pointwise and uniform convergence, Cauchy criterion for uniform convergence, Weierstrass M-test, Abel's and Dirichlet's tests for uniform convergence, uniform convergence and continuity, uniform convergence and differentiation, Weierstrass approximation theorem.

Unit-II Power series, uniqueness theorem for power series, Abel's and Tauber's theorems. Rearrangements of terms of a series, Riemann's theorem.

Unit-III Functions of several variables, linear transformations, Derivatives in an open subset of R^n, Chain rule, Partial derivatives, interchange of the order of differentiation, Derivatives of higher orders, Taylor's theorem, Inverse function theorem, Implicit function theorem.

Unit-IV Jacobians, extremum problems with constraints, Lagrange's multiplier method, Differentiation of integrals.

Unit-V Partitions of unity, Differential forms, Stoke's theorem.

Recommended Books:

1. Principle of Mathematical Analysis By Walter Rudin (3rd edition) McGraw-Hill, Kogakusha, 1976, International student edition.
2. Real Analysis By H.L.Roydon, Macmillan Pub.Co.Inc.4th Edition, New York .1962.

References

1. T.M. Apostol, Mathematical Analysis, Narosa Publishing House, New Delhi,1985.
2. Gabriel Klambauer, Mathematical Analysis, Marcel Dekkar,Inc. New York,1975.
3. A.J. White, Real Analysis; an introduction, Addison-Wesley Publishing Co.,Inc.,1968.

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4. G.de Barra, Measure Theory and Integration, Wiley Eastern Limited, 1981.
5. E. Hewitt and K. Stromberg. Real and Abstract Analysis, Berlin, Springer, 1969.
6. P.K. Jain and V.P. Gupta, Lebesgue Measure and Integration, New Age International (P) Limited Published, New Delhi, 1986 Reprint 2000).
7. I.P. Natanson, Theory of Functions of a Real Variable. Vol. l, Frederick Ungar Publishing Co., 1961.
8. Richard L. Wheeden and Antoni Zygmund, Measure and Integral: An Introduction to Real Analysis, Marcel Dekker Inc.1977.
9. J.H. Williamson, Lebesgue Integration, Holt Rinehart and Winston, Inc. New York. 1962.
10. A. Friedman, Foundations of Modern Analysis, Holt, Rinehart and Winston, Inc., New York, 1970.
11. P.R. Halmos, Measure Theory, Van Nostrand, Princeton, 1950.
12. T.G. Hawkins, Lebesgue's Theory, of Integration: Its Origins and Development, Chelsea, New York, 1979.
13. K.R. Parthasarathy, Introduction to Probability and Measure, Macmillan Company of India Ltd., Delhi, 1977.
14. R.G. Bartle, The Elements of Integration, John Wiley & Sons, Inc. New York, 1966.
15. Serge Lang, Analysis I & II, Addison-Wesley Publishing Company, Inc. 1969.
16. Inder K. Rana, An Introduction to Measure and Integration, Norosa Publishing House, Delhi, 1997.
17. Walter Rudin, Real & Complex Analysis, Tata McGraw-Hill Publishing Co.Ltd. New Delhi, 1966.

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M.Sc./M.A. Course (First Semester)
PAPER-III

Topology

Max. Marks 80

Unit-I Countable and uncountable sets. Infinite sets and the Axiom of Choice. Cardinal numbers and its arithmetic. Schroeder-Bernstein theorem. Cantor's theorem and the continuum hypothesis. Zorn's lemma, well-ordering theorem.

Unit-II Definition and examples of topological spaces. Bases and sub-bases. Subspaces and relative topology. Alternate methods of defining a topology in terms of terms of Kuratowski Closure Operator and Neighbourhood Systems. Continuous functions and homeomorphism.

Unit-III First and Second Countable spaces. Lindelof's theorems. Separable spaces. Second countability and separability. Separation axioms; their Characterizations and basic properties. Urysohn's lemma, Tietze extension theorem.

Unit-IV Compactness. Continuous functions and compact sets. Basic properties of Compactness. Compactness and finite intersection property. Sequentially and countably compact sets. Local compactness and one point compactification. Stone-Cech compactification.

Unit-V Compactness in metric spaces. Equivalence of compactness, countable compactness and sequential compactness in metric space. Connected spaces. Connectedness on the real line. Components. Locally connected spaces.

Recommended Books:

1. James R.Munkres, Topology, A First Course, Prentice Hall of India Pvt. Ltd., New Delhi,2000.
2. K.D.Joshi, Introduction to General Topology, Wiley Eastern Ltd., 1983.

References

1. J. Dugundji, Topology, Allyn and Bacon, 1966 (reprinted in India by Prentice Hall of India Pvt. Ltd.).
2. George F.Simmons, Introduction to Topology and modern Analysis, McGraw-Hill Book Company, 1963.
3. J.Hocking and G Young, Topology, Addison-Wiley Reading, 1961.

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4. J.L. Kelley, General Topology, Van Nostrand, Reinhold Co., New York,1995.
5. L. Steen and J. Seebach, Counter examples in Topology, Holt, Rinehart and Winston, New York, 1970.
6. W.Thron, Topologically Structures, Holt, Rinehart and Winston, New York,1966.
7. N. Bourbaki, General Topology Part I (Transl.),Addison Wesley, Reading, 1966.
8. R. Engelking, General Topology, Polish Scientific Publishers, Warszawa, 1977.
9. W. J. Pervin, Foundations of General Topology, Academic Press Inc. New York,1964.
10. E.H.Spanier, Algebraic Topology, McGraw-Hill, New York,1966.
11. S. Willard, General Topology, Addison-Wesley, Reading, 1970.
12. Crump W.Baker, Introduction to Topology, Wm C. Brown Publisher, 1991.
13. Sze-Tsen Hu, Elements of General Topology, Holden-Day,Inc.1965.
14. D. Bushaw, Elements of General Topology, John Wiley & Sons, New York, 1963.
15. M.J. Mansfield, Introduction to Topology, D.Van Nostrand Co. Inc.Princeton,N.J.,1963.
16. B. Mendelson, Introduction to Topology, Allyn & Bacon, Inc., Boston,1962.
17. C. Berge, Topological Spaces, Macmillan Company, New York,1963.
18. S.S. Coirns, Introductory Topology, Ronald Press, New York, 1961.
19. Z.P. Mamuzic, Introduction to General Topology, P. Noordhoff Ltd.,Groningen, 1963.
20. K. K. Jha, Advanced General Topology, Nav Bharat Prakashan, Delhi.

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M.Sc./M.A. Course (First Semester)
PAPER-IV

Complex Analysis (I)

Max. Marks 80

Unit-I Complex integration, Cauchy-Goursat. Theorem. Cauchy's integral formula. Higher order derivatives. Morera's Theorem. Cauchy's inequality and Liouville's theorem. The fundamental theorem of algebra. Taylor's theorem. Laurent's series. Isolated singularities. Meromorphic functions.

Unit-II Maximum modulus principle. Schwarz lemma. The argument principle. Rouche's theorem Inverse function theorem.

Unit-III Residues. Cauchy's residue theorem. Evaluation of integrals. Branches of many valued functions with special reference to arg z, logz and z^a.

Unit-IV Bilinear transformations, their properties and classifications. Definitions and examples of Conformal mappings.

Unit-V Spaces of analytic functions. Hurwitz's theorem. Montel's theorem Riemann mapping theorem.

Recommended Books:

1. Complex Analysis By L.V.Ahlfors, McGraw - Hill, 1979.
2. J.B. Conway, Functions of one Complex variable, Springer-Verlag, International student-Edition, Narosa Publishing House,1980.

References

1. H.A. Priestly, Introduction to Complex Analysis, Clarendon Press, Oxford 1990.
2. Complex Function Theory By D.Sarason
3. Liang-shin Hahn & Bernard Epstein, Classical Complex Analysis, Jones and Bartlett Publishers International, London, 1996.
4. S. Lang, Complex Analysis, Addison Wesley, 1977.
5. D. Sarason, Complex Function Theory, Hindustan Book Agency, Delhi, 1994.
6. Mark J.Ablowitz and A.S. Fokas, Complex Variables: Introduction and Applications, Cambridge University press, South Asian Edition, 1998.
7. E. Hille, Analytic Function Theory (2 Vols.) Gonn & Co., 1959.
8. W.H.J. Fuchs, Topics in the Theory of Functions of one Complex Variable, D.Van Nostrand Co., 1967.

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9. C.Caratheodory, Theory of Functions (2 Vols.) Chelsea Publishing Company, 1964.
10. M.Heins, Complex Function Theory, Academic Press, 1968.
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12. S.Saks and A.Zygmund, Analytic Functions, Monografic Matematyczne, 1952.
13. E.C Titchmarsh, The Theory of Functions, Oxford University Press, London.
14. W.A. Veech, A Second Course in Complex Analysis, W.A. Benjamin, 1967.
15. S.Ponnusamy, Foundations of Complex Analysis, Narosa Publishing House, 1997.

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M.Sc./M.A. Course (First Semester)
PAPER-V

Advanced Discrete Mathematics (I)

Max. Marks 80

Unit-I Formal Logic-Statements. Symbolic Representation and Tautologies. Quantifiers, Predicates and Validity. Propositional Logic. Semigroups & Monoids-Definitions and Examples of Semigroups and monoids (including those pertaining to concatenation operation).

Unit-II Homomorphism of semigroups and monoids. Congruence relation and Quotient Semigroups. Subsemigroup and submonoids. Direct Products. Basic Homomorphism Theorem.

Unit-III Lattices-Lattices as partially ordered sets. Their properties. Lattices as Algebraic Systems. Sublattices, Direct products, and Homomorphisms. Some Special Lattices e.g., Complete, Complemented and Distributive Lattices. Boolean Algebras-Boolean Algebras as Lattices. Various Boolean Identities. The Switching Algebra example. Subalgebras,

Unit-IV Direct Products and Homomorphisms. Join-Irreducible elements, Atoms and Minterms. Boolean Forms and Their Equivalence. Minterm Boolean Forms, Sum of Products Canonical Forms. Minimization of Boolean Functions. Applications of Boolean Algebra to Switching Theory (using AND,OR & NOT gates). The Karnaugh Map Method.

Unit-V Grammars and Languages-Phrase-Structure Grammars. Rewriting Rules. Derivations. Sentential Forms. Language generated by a Grammar. Regular, Context-Free, and Context Sensitive Grammars and Languages. Regular sets, Regular Expressions and the Pumping Lemma. Kleene's Theorem. Notions of Syntax Analysis, Polish Notations. Conversion of Infix Expressions to Polish Notations. The Reverse Polish Notation.

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Recommended Books:

1. Elements of Discrete Mathematics By C.L.Liu
2. J.P. Tremblay & R. Manohar, Discrete Mathematical Structures with Applications to Computer Science, McGraw-Hill Book Co., 1997.

References

1. J.L. Gersting, Mathematical Structures for Computer Science, (3rd edition), Computer Science Press, New York.
2. Seymour Lepschutz, Finite Mathematics (International) edition (1983), McGraw-Hill Book Company, New York.
3. S.Wiitala, Discrete Mathematics-A Unified Approach, McGraw-Hill Book Co.
4. J.E. Hopcroft and J.D Ullman, Introduction to Automata Theory, Languages & Computation, Narosa Publishing House.
5. C.L Liu, Elements of Discrete Mathematics, McGraw-Hill Book Co.
6. N. Deo. Graph Theory with Application to Engineering and Computer Sciences. Prentice Hall of India
7. K.L.P.Mishra and N.Chandrashekaran, Theory of Computer Science PHI(2002)

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Pt. Ravishankar Shukla University, Raipur

Scheme of Examination

M.A./M.Sc. (MATHEMATICS) (Semester-II)

2019 - 20 (Examination – Dec. 2019) onwards

There shall be five theory papers. Each paper shall have 100 marks. **Overall tally of marks will be 500.**

Paper	Description	Theory	Sessional	Practical	Total Marks
I	Advanced Abstract Algebra (II)	80	20	-	100
II	Real Analysis (II)	80	20	--	100
III	General and Algebraic Topology	80	20	--	100
IV	Advanced Complex Analysis (II)	80	20	--	100
V	Advanced Discrete Mathematics (II)	80	20	--	100

M.Sc./M.A. Course (Second Semester)
PAPER-I
Advanced Abstract Algebra (II)

Max. Marks 80

Unit-I Modules - Cyclic modules. Simple modules. Semi-simple modules. Schuler's Lemma. Free modules. Noetherian and artinian modules and rings-Hilbert basis theorem. Wedderburn Artin theorem. Uniform modules, primary modules, and Noether-Lasker theorem.

Unit-II Linear Transformations - Algebra of linear transformation, characteristic roots, matrices and linear transformations.

Unit-III Canonical Forms - Similarity of linear transformations. Invariant subspaces. Reduction to triangular forms. Nilpotent transformations. Index of nilpotency. Invariants of a nilpotent transformation. The primary decomposition theorem. Jordan blocks and Jordan forms.

Unit-IV Smith normal form over a principal ideal domain and rank. Fundamental structure theorem for finitely generated modules over a Principal ideal domain and its applications to finitely generated abelian groups.

Unit-V Rational canonical from. Generalised Jordan form over any field.

Books Recommended:

1. P.B.Bhattacharya, S.K.Jain, S.R.Nagpaul : Basic Abstract Algebra, Cambridge University press
2. I.N.Herstein : Topics in Albegra, Wiley Eastern Ltd.
3. Quazi Zameeruddin and Surjeet Singh : Modern Algebra

References

1. M.Artin, Algeabra, Prentice -Hall of India, 1991.
2. P.M. Cohn, Algebra,Vols. I,II &III, John Wiley & Sons, 1982,1989,1991.
3. N.Jacobson, Basic Algebra, Vols. I & II,W.H. Freeman, 1980 (also published by Hindustan Publishing Company).
4. S.Lang, Algebra, 3rd edition, Addison-Wesley, 1993.

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5. I.S. Luther and I.B.S. Passi, Algebra, Vol. I-Groups, Vol.II-Rings, Narosa Publishing House (Vol.l-1996,Vol. II-1999)
6. D.S.Malik, J.N.Mordeson, and M.K.Sen, Fundamentals of Abstract Algebra, Mc Graw-Hill, International Edition,1997.
7. K.B. Datta, Matrix and Linear Algebra, Prentice Hall of India Pvt. Ltd., New Delhi,2000.
8. S.K.Jain,A. Gunawardena and P.B Bhattacharya, Basic Linear Algebra with MATLAB, Key College Publishing (Springer-Verlag),2001.
9. S.Kumaresan, Linear Algebra, A Geometric Approach, Prentice-Hall of India, 2000.
10. Vivek Sahai and Vikas Bist, Algebra, Narosa Publishing House, 1999.
11. I. Stewart, Galois theory, 2nd edition, chapman and Hall, 1989.
12. J.P. Escofier, Galois theory, GTM Vol.204, Springer, 2001.
13. T.Y. Lam, lectures on Modules and Rings, GTM Vol. 189, Springer-Verlag,1999.
14. D.S. Passman, A Course in Ring Theory, Wadsworth and Brooks/Cole Advanced Books and Softwares, Pacific groves. California, 1991.
15. Fraleigh , A first course in Algebra Algebra, Narosa,1982.

M.Sc./M.A. Course (Second Semester)
PAPER-II

Real Analysis (II)

Max. Marks 80

Unit-I Definition and existence of Riemann-Stieltjes integral, Properties of the Integral, integration and differentiation, the fundamental theorem of Calculus, integration of vector-valued functions, Uniform convergence and Riemann-Stieltjes integration, Rectifiable curves.

Unit-II Lebesgue outer measure. Measurable sets. Regularity. Measurable functions. Borel and Lebesgue measurability. Non-measurable sets. Integration of Non-negative functions. The General integral. Integration of Series.

Unit-III Measures and outer measures, Extension of a measure. Uniqueness of Extension. Completion of a measure. Measure spaces. Integration with respect to a measure. Reimann and Lebesgue Integrals.

Unit-IV The Four derivatives. Lebesgue Differentiation Theorem. Differentiation and Integration. Functions of Bounded variation.

Unit-V The L^p-spaces. Convex functions. Jensen's inequality. Holder and Minkowski inequalities. Completeness of L^p, Convergence in Measure, Almost uniform convergence

Recommended Books:

1. Principle of Mathematical Analysis by W. Rudin
2. Real Analysis by H. L. Roydon

References

1. T.M. Apostol, Mathematical Analysis, Narosa Publishing House, New Delhi,1985.
2. Gabriel Klambauer, Mathematical Analysis, Marcel Dekkar,Inc. New York,1975.
3. A.J. White, Real Analysis; an introduction, Addison-Wesley Publishing Co.,Inc.,1968.
4. G.de Barra, Measure Theory and Integration, Wiley Eastern Limited, 1981.
5. E. Hewitt and K. Stromberg. Real and Abstract Analysis, Berlin, Springer, 1969.

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6. P.K. Jain and V.P. Gupta, Lebesgue Measure and Integration, New Age International (P) Limited Published, New Delhi, 1986 Reprint 2000).
7. I.P. Natanson, Theory of Functions of a Real Variable. Vol. l, Frederick Ungar Publishing Co., 1961.
9. Richard L. Wheeden and Antoni Zygmund, Measure and Integral: An Introduction to Real Analysis, Marcel Dekker Inc.1977.
10. J.H. Williamson, Lebesgue Integration, Holt Rinehart and Winston, Inc. New York. 1962.
11. A. Friedman, Foundations of Modern Analysis, Holt, Rinehart and Winston, Inc., New York, 1970.
12. P.R. Halmos, Measure Theory, Van Nostrand, Princeton, 1950.
13. T.G. Hawkins, Lebesgue's Theory, of Integration: Its Origins and Development, Chelsea, New York, 1979.
14. K.R. Parthasarathy, Introduction to Probability and Measure, Macmillan Company of India Ltd., Delhi, 1977.
15. R.G. Bartle, The Elements of Integration, John Wiley & Sons, Inc. New York, 1966.
16. Serge Lang, Analysis I & II, Addison-Wesley Publishing Company, Inc. 1969.
17. Inder K. Rana, An Introduction to Measure and Integration, Norosa Publishing House, Delhi, 1997.

M.Sc./M.A. Course (Second Semester)
PAPER-III

General and Algebraic Topology

Max. Marks 80

Unit-I Tychonoff product topology in terms of standard sub-base and its characterizations. Projection maps. Separation axioms and product spaces.

Unit-II Product spaces. Connectedness and product spaces. Compactness and product spaces (Tychonoff's theorem). Countability and product spaces.

Unit-III Embedding and metrization. Embedding lemma and Tychonoff embedding. The Urysohn metrization theorem. Metrization theorems and Paracompactness-Local finiteness. The Nagata-Smirnov metrization theorem. Paracompactness. The Smirnov metrization theorem.

Unit-IV Nets and filter. Topology and convergence of nets. Hausdorffness and nets. Compactness and nets. Filters and their convergence. Canonical way of converting nets to filters and vice-versa. Ultra-filters and Compactness.

Unit-V The fundamental group and covering spaces-Homotopy of paths. The fundamental group. Covering spaces. The fundamental group of the circle and the fundamental theorem of algebra

Recommended Books:

1. James R.Munkres, Topology, A First Course, Prentice Hall of India Pvt. Ltd., New Delhi,2000.
2. K.D.Joshi, Introduction to General Topology, Wiley Eastern Ltd., 1983.

References

1. J. Dugundji, Topology, Allyn and Bacon, 1966 (reprinted in India by Prentice Hall of India Pvt. Ltd.).
2. George F.Simmons, Introduction to Topology and modern Analysis, McGraw-Hill Book Company, 1963.
3. J.Hocking and G Young, Topology, Addison-Wiley Reading, 1961.
4. J.L. Kelley, General Topology, Van Nostrand, Reinhold Co., New York,1995.
5. L. Steen and J. Seebach, Counter examples in Topology, Holt, Rinehart and Winston, New York, 1970.

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6. W.Thron, Topologically Structures, Holt, Rinehart and Winston, New York,1966.
7. N. Bourbaki, General Topology Part I (Transl.),Addison Wesley, Reading, 1966.
8. R. Engelking, General Topology, Polish Scientific Publishers, Warszawa, 1977.
9. W. J. Pervin, Foundations of General Topology, Academic Press Inc. New York,1964.
10. E.H.Spanier, Algebraic Topology, McGraw-Hill, New York,1966.
11. S. Willard, General Topology, Addison-Wesley, Reading, 1970.
12. Crump W.Baker, Introduction to Topology, Wm C. Brown Publisher, 1991.
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14. D. Bushaw, Elements of General Topology, John Wiley & Sons, New York, 1963.
15. M.J. Mansfield, Introduction to Topology, D.Van Nostrand Co. Inc.Princeton,N.J.,1963.
16. B. Mendelson, Introduction to Topology, Allyn & Bacon, Inc., Boston,1962.
17. C. Berge, Topological Spaces, Macmillan Company, New York,1963.
18. S.S. Coirns, Introductory Topology, Ronald Press, New York, 1961.
19. Z.P. Mamuzic, Introduction to General Topology, P. Noordhoff Ltd.,Groningen, 1963.
20. K.K.Jha, Advanced General Topology, Nav Bharat Prakashan, Delhi.

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M.Sc./M.A. Course (Second Semester)
PAPER-IV

Advanced Complex Analysis (II)

Max. Marks 80

Unit-I Weierstrass' factorisation theorem. Gamma function and its properties. Riemann Zeta function. Riemann's functional equation. Runge's theorem. Mittag-Leffler's theorem.

Unit-II Analytic Continuation. Uniqueness of direct analytic continuation. Uniqueness of analytic continuation along a curve. Power series method of analytic continuation Schwarz Reflection Principle. Monodromy theorem and its consequences.

Unit-III Harmonic functions on a disk. Harnack's inequality and theorem. Dirichlet Problem. Green's function.

Unit-IV Canonical products. Jensen's formula. Poisson-Jensen formula. Hadamard's three circles theorem. Order of an entire function. Exponent of Convergence. Borel's theorem. Hadamard's factorization theorem.

Unit-V The range of an analytic function. Bloch's theorem. The Little Picard theorem. Schottky's theorem. Montel Caratheodory and the Great picard theorem. Univalent functions. Bieberbach's conjecture (Statement only) and the "1/4-theorem.

Recommended Books:

1. L.V. Ahlfors, Complex Analysis, MCGraw - Hill, 1979.
3. J.B. Conway, Functions of one Complex variable, Springer-Verlag, International student-Edition, Narosa Publishing House,1980.

References

1. H.A. Priestly, Introduction to Complex Analysis, Clarendon Press, Oxford 1990.
2. Liang-shin Hahn & Bernard Epstein, Classical Complex Analysis, Jones and Bartlett Publishers International, London, 1996.
3. S. Lang, Complex Analysis, Addison Wesley, 1977.
4. Mark J.Ablowitz and A.S. Fokas, Complex Variables: Introduction and Applications, Cambridge University press, South Asian Edition, 1998.

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5. E. Hille, Analytic Function Theory (2 Vols.) Gonn & Co., 1959.
6. W.H.J. Fuchs, Topics in the Theory of Functions of one Complex Variable, D.Van Nostrand Co., 1967.
7. C.Caratheodory, Theory of Functions (2 Vols.) Chelsea Publishing Company, 1964.
8. M.Heins, Complex Function Theory, Academic Press, 1968.
9. Walter Rudin, Real and Complex Analysis, McGraw-Hill Book Co., 1966.
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11. E.C Titchmarsh, The Theory of Functions, Oxford University Press, London.
12. W.A. Veech, A Second Course in Complex Analysis, W.A. Benjamin, 1967.
13. S.Ponnusamy, Foundations of Complex Analysis, Narosa Publishing House, 1997.
14. D. Sarason, Complex Function Theory, Hindustan Book Agency, Delhi, 1994.

M.Sc./M.A. Course (Second Semester)
PAPER-V

Advanced Discrete Mathematics (II)

Max. Marks 80

Unit-I Graph Theory-Definition of (Undirected) Graphs, Paths, Circuits, Cycles, & Subgraphs. Induced Subgraphs. Degree of a vertex. Connectivity. Planar Graphs and their properties. Trees. Euler's Formula for connected planar Graphs. Complete & Complete Bipartite Graphs. Kuratowski's Theorem (statement only) and its use.

Unit-II Spanning Trees, Cut-sets, Fundamental Cut -sets, and Cycle. Minimal Spanning Trees and Kruskal's Algorithm. Matrix Representations of Graphs. Euler's Theorem on the Existence of Eulerian Paths and Circuits. Directed

Unit-III Graphs. In degree and Out degree of a Vertex. Weighted undirected Graphs. Dijkstra's Algorithm.. strong Connectivity & Warshall's Algorithm. Directed Trees. Search Trees. Tree Traversals.

Unit-IV Introductory Computability Theory-Finite State Machines and their Transition Table Diagrams. Equivalence of finite State Machines. Reduced Machines. Homomorphism.

Unit-V Finite Automata. Acceptors. Non-deterministic Finite Automata and equivalence of its power to that of Deterministic Finite Automata. Moore and mealy Machines. Turing Machine and Partial Recursive Functions.

Recommended Books:

1. Elements of Discrete Mathematics By C.L.Liu
2. Graph Theory and its application By N.Deo
3. Theory of Computer Science By K.L.P.Mishra and N.Chandrashekaran

References

1. J.P. Tremblay & R. Manohar, Discrete Mathematical Structures with Applications to Computer Science, McGraw-Hill Book Co., 1997.
2. J.L. Gersting, Mathematical Structures for Computer Science, (3rd edition), Computer Science Press, New York.
3. Seymour Lepschutz, Finite Mathematics (International) edition 1983), McGraw-Hill Book Company, New York.

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4. S.Wiitala, Discrete Mathematics-A Unified Approach, McGraw-Hill Book Co.
5. J.E. Hopcroft and J.D Ullman, Introduction to Automata Theory, Languages & Computation, Narosa Publishing House.
6. C.L Liu, Elements of Discrete Mathematics, McGraw-Hill Book Co.
7. N. Deo. Graph Theory with Application to Engineering and Computer Sciences. Prentice Hall of India.

Pt. Ravishankar Shukla University, Raipur

Scheme of Examination

M.A./M.Sc. (MATHEMATICS) (Semester-III)

2019 - 20 (Examination – Dec. 2019) onwards

There shall be five theory papers. Two compulsory and three optional. Each paper shall have 100 marks. Out of these five papers, the paper which has theory and practical both, the theory part shall have 70 marks and practical part shall have 30 marks. **Overall tally of marks in theory and practical will be 500.**

Paper		Description	Theory	Sessi-onal	Practi cal	Remark
Compulsory Papers						
I		Integration Theory and Functional Analysis (I)	80	20	--	--
II		Partial Differential Equations & Mechanics (I)	80	20	--	--
Optional Papers						
III	A	Fundamentals of Computer Science (Object Oriented Programming and Data Structure)	70	--	30	For regular students only
	B	Fuzzy Set Theory & Its Applications (I)	80	20	--	--
	C	Mathematical Biology (I)	80	20	--	--
IV	A	Operations Research (I)	80	20	--	--
	B	Wavelets (I)	80	20	--	--
V	A	Programming in C (with ANSI Features) (I)	70	--	30	For regular students only
	B	Graph Theory (I)	80	20	--	--

M.Sc./M.A. Course (Third Semester)

PAPER -I

Integration Theory and Functional Analysis (I)

Max. Marks 80

Integration Theory:

Unit-I Signed measure. Hahn decomposition theorem, mutually singular measures. Radon-Nikodym theorem. Labesgue decomposition. Riesz representation theorem. Extension theorem (Caratheodory).

Unit-II Lebesgue-Stieltjes integral, product measures, Fubini's theorem. Differentiation and Integration. Decomposition into absolutely continuous and singular parts.

Unit-III Baire sets. Baire measure, continuous functions with compact support. Regularity of measures on locally compact spaces. Integration of continuous functions with compact support, Riesz-Markoff theorem.

Functional Analysis :

Unit-IV Normed linear spaces. Banach spaces and examples. Quotient space of normed linear spaces and its completeness, equivalent norms. Riesz Lemma, basic properties of finite dimensional normed linear spaces and compactness.

Unit-V Weak convergence and bounded linear transformations, normed linear spaces of bounded linear transformations, dual spaces with examples.

Books Recommended :

1. P.R. Halmos, Measure Theory, Van Nostrand, Princeton, 1950.
2. B.Choudhary and S.Nanda, Functional Analysis with Applications. Wiley Eastern Ltd. 1989.
3. H.L. Royden, Real Analysis, Macmillan Publishing Co. Inc., New York, 4'h Edition, 1993.

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References

1. S.K. Berberian, Measure and integration, Chelsea Publishing Company, New York, 1965.
2. G. de Barra, Measure Theory and Integration, Wiley Eastern Limited, 1981.
3. P.K. Jain and V.P. Gupta, Lebesgue Measure and Integration, New Age International (P) Limited, New Delhi, 2000.
4. Richard L. Wheeden and Antoni Zygmund, Measure and Integral : An Introduction to Real Analysis, Marcel Dekker Inc. 1977.
5. J.H. Williamson, Lebesgue Integration, Holt Rinehart and Winston, Inc. New York. 1962.
6. T.G. Hawkins, Lebesgue's Theory of Integration: Its Origins and Development, Chelsea, New York, 1979.
7. K.R. Parthasarathy, Introduction to Probability and Measure, Macmillan Company of India Ltd., Delhi, 1977.
8. R.G. Bartle, The Elements of Integration, John Wiley & Sons, Inc. New York, 1966.
9. Serge Lang, Analysis I & II, Addison-Wesley Publishing Company, Inc. 1967.
10. Inder K. Rana, An Introduction to Measure and Integration, Narosa Publishing House, Delhi, 1997.
11. Walter Rudin, Real & Complex Analysis, Tata McGraw-Hill Publishing.
12. Edwin Hewitt and Korl Stromberg, Real and Abstract Analysis, Springer-Verlag, New York.
13. Edwin Hewitt and Kenneth A. Ross, Abstract Harmonic Analysis, Vol. 1, Springer-Verlag, 1993.
14. G. Bachman and L. Narici, Functional Analysis, Academic Press, 1966.
15. N. Dunford and J.T. Schwartz, Linear Operators, Part I, Interscience, New York, 1958.
16. R.E. Edwards, Functional Analysis, Holt Rinehart and Winston, New York, 1965.
17. C. Goffman and G. Pedrick, First Course in Functional Analysis, Prentice Hall of India, New Delhi, 1987.
18. P.K. Jain, O.P. Ahuja and Khalil Ahmad, Functional Analysis, New Age International (P) Ltd. & Wiley Eastern Ltd., New Delhi, 1997.
19. R.B. Holmes, Geometric Functional Analysis and its Applications, Springer-Verlag, 1975.
20. K.K. Jha, Functional Analysis, Students' Friends, 1986.
21. L.V. Kantorovich and G.P. Akilov, Functional Analysis, Pergamon Press, 1982.
22. E. Kreyszig, Introductory Functional Analysis with Applications, John Wiley & Sons, New York, 1978.
23. B.K. Lahiri, Elements of Functional Analysis, The World Press Pvt. Ltd., Calcutta, 1994.
24. A.H.Siddiqui, Functional Analysis with Applications, Tata McGraw-Hill Publishing Company Ltd. New Delhi

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25. B.V. Limaye, Functional Analysis, Wiley Eastern Ltd.
26. L.A. Lustenik and V.J. Sobolev, Elements of Functional Analysis, Hindustan Publishing Corporation, New Delhi, 1971.
27. G.F. Simmons, Introduction to Topology and Modern Analysis, McGraw-Hill Book Company, New York, 1963.
28. A.E. Taylor, Introduction to Functional Analysis, John Wiley and Sons, New York, 1958.
29. K.Yosida, Functional Analysis, 3'" edition Springer-Verlag, New York, 1971.
30. J.B. Conway, A Course in Functional Analysis, Springer-Verlag, New York, 1990.
31. Walter Rudin, Functional Analysis, Tata McGraw-Hill Publishing Company Ltd., New Delhi, 1973.
32. A. Wilansky, Functional Analysis, Blaisdell Publishing Co., 1964.
33. J. Tinsley Oden & Leszek F. Dernkowicz, Applied Functional Analysis, CRC Press Inc., 1996.

M.Sc./M.A. Course (Third Semester)
PAPER -II
Partial Differential Equations and Mechanics (I)

Max. Marks 80

Partial Differential Equations

Unit-I Examples of PDE. Classification. Transport Equation-Initial value Problem. Non-homogeneous Equation. Laplace's Equation-Fundamental Solution, Mean Value Formulas, Properties of Harmonic Functions, Green's Function, Energy Methods.

Unit-II Heat Equation-Fundamental Solution, Mean Value Formula, Properties of Solutions, Energy Methods. Wave Equation-Solution by Spherical Means, Non-homogeneous Equations, Energy Methods.

Analytical Dynamics:

Unit-III Generalized coordinates. Holonomic and Non-holonomic systems. Scleronomic and Rheonomic sytems. Generalized potential. Lagrange's equations of first kind. Lagrange's equations of second kind. Uniqueness of solution. Energy equation for conservative fields. Hamilton's variables. Donkin's theorem. Hamilton canonical equations. Cyclic coordinates. Routh's equations.

Unit-IV Poisson's Bracket. Poisson's Identity. Jacobi-Poisson Theorem. Motivating problems of calculus of variations, Shortest distance. Minimum surface of revolution. Brachistochrone problem. Isoperimetric problem. Geodesic. Fundamental lemma of calculus of variations. Euler's equation for one dependent function and its generalization to (1) 'n' dependent functions, (ii) higher order derivatives. Conditional extremum under geometric constraints and under integral constraints.

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Gravitation:

Unit-V Attraction and potential of rod, disc, spherical shells and sphere. Surface integral of normal attraction (application & Gauss' theorem). Laplace and Poisson equations. Work done by selfattracting systems. Distributions for a given potential. Equipotential surfaces. Surface and solid harmonics. Surface density in terms of surface harmonics.

Books Recommended :

1. L.C. Evans, Partial Differential Equations, Graduate Studies in Mathematics, Volume 19, AMS, 1998.
2. F. Gantmacher, Lectures in Analytic Mechanics, MIR Publishers, Moscow, 1975.
3. R.C.Mondal, Classical Mechanics, Prentice Hall of India
4. S.L. Loney, An Elementary Treatise on Statics, Kalyani Publishers, New Delhi, 1979.

References

1. Books on Partial differential equation by I.N. Sneddon, F. John, P. Prasad and R. Ravindran, Amarnath etc.
2. A.S. Ramsey, Dynamics Part II, The English Language Book Society and Cambridge University Press, 1972.
3. H. Goldstein, Classical Mechanics (2nd edition), Narosa Publishing House, New Delhi.
4. I.M. Gelfand and S.V. Fomin, Calculus of Variations, Prentice Hall.
5. Narayan Chandra Rana & Pramod Sharad Chandra Joag, Classical Mechanics, Tata McGraw Hill, 1991.
6. Louis N. Hand and Janet D. Finch, Analytical Mechanics, Cambridge University Press, 1998.
7. A.S. Ramsey, Newtonian Gravitation, The English Language Book Society and the Cambridge University Press.

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M.Sc./M.A. Course (Third Semester)
PAPER-III (A)
Fundamentals of Computer Science-Theory and Practical
(Object Oriented Programming and Data Structure)

Max. Marks. 100
(Theory-70 +Practical-30)

Unit-I Object Oriented Programming-Classes and Scope, nested classes, pointer class members; Class initialization, assignment and destruction.

Unit-II Overloaded functions and operators; Templates including class templates; class inheritance and virtual functions.

Unit-III Data Structures-Analysis of algorithms, q, W, 0, o, w notations ; Sequential and linked representations, Lists, Stacks, and queues;

Unit-IV Trees: Binary tree- search tree implementation, B-tree (concept only);

Unit-V Sorting: Insertion sort, shell sort, quick-sort, heap sort and their analysis; Hashing-open and closed.

Books Recommended :

1. S.B. Lipman, J. Lajoi: C++ Primer, Addison Wesley.
2. B. Stroustrup; The C++ Programming Language, Addison Wesley.
3. C.J. Date : Introduction to Database Systems, Addison Wesley.
4. C. Ritehie: Operating Systems-Incorporating UNIX and Windows, BPB Publications.
5. M.A. Weiss, Data Structures and Algorithm Analysis in C++, Addison Wesley.

Practical Examination Scheme

Max. Marks – 30	Time Duration – 3 Hrs.
Practical (two)	20 Marks(10 marks each)
Viva	05 Marks
Sessional	05 Marks

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M.Sc./M.A. Course (Third Semester)
PAPER-III (B)
Fuzzy Set Theory and Its Applications (I)

Max Marks – 80

UNIT-I Fuzzy sets-Basic definitions, α-level sets. Convex fuzzy sets. Basic operations on fuzzy sets. Types of fuzzy sets. Cartesian products, Algebraic products. Bounded sum and difference, t-norms and t-conorms.

UNIT-II The Extension Principle- The Zadeh's extension principle. Image and inverse image of fuzzy sets. Fuzzy numbers. Elements of fuzzy arithmetic.

UNIT-III Fuzzy Relations on Fuzzy sets, Composition of Fuzzy relations. Min-Max composition and its properties.

UNIT-IV Fuzzy equivalence relations. Fuzzy compatibility relations. Fuzzy relation equations. Fuzzy graphs, Similarity relation.

UNIT-V Possibility Theory-Fuzzy measures. Evidence theory. Necessity measure. Possibility measure. Possibility distribution. Possibility theory and fuzzy sets. Possibility theory versus probability theory.

REFERENCES :

1. H.J. Zmmemann, Fuzzy set theory and its Applications, Allied Publishers Ltd. New Delhi, 1991.
2. G.J. Klir and B. Yuan- Fuzzy sets and fuzzy logic, Prentice-Hall ol India, New Delhi, 1995.

M.Sc./M.A. Course (Third Semester)
PAPER-III (C)
Mathematical Biology (I)

Max. Marks - 80

Part-A: Simple Single Species Models

UNIT-I

Continuous Population Models: Phase plane analysis of ODE. Exponential Growth model, the Logistic Population Model, qualitative analysis, Harvesting in Population Models, Constant-yield harvesting, constant-effort harvesting, a case study of eutrophication of a lake.

UNIT-II

Discrete Population Models: Linear Models, graphical solution of difference equations, equilibrium analysis, period-doubling and chaotic behavior, discrete-time metered models, two-age group model and delayed recruitment, a case study of oscillation in flour beetle populations.

Part-B : Models for interacting species

UNIT-III

Introduction and Mathematical preliminaries: The Lotka-Volterra equations, the chemostat, equilibria and linearization, qualitative solutions of linear systems, periodic solutions and limit cycles, models for giving up smoking and retaining of workers by their peers.

UNIT-IV

Continuous Models for Two Interacting Populations: Species in competitions, Predator-Prey system, Kolmogorov Models, Mutialism, The community matrix, the nature of interactions between species, invading species and coexistence, a predator and two competing prey, two predators competing for prey.

UNIT-V

Harvesting in Two-Species Models: Harvesting of species in competition, Harvesing of predator-prey systems, some economic aspects of harvesting, optimization of harvesting returns.

Text Book:

1. Fred Brauer, Carlos Castillo-Chavez, Mathematical Models in Population Biology and Epidemiology, Biology, Springer (2010)

Reference Books:

1. Nicholas F. Britton, Essential Mathematical Biology, Springer-Verlag (2003)
2. J.D.Murray, Mathematical Biology I. An Introduction, Springer-Verlag (2002) 3rd Edition.
3. J.D.Murray, Mathematical Biology II. Spatial Models and Biomedical Application, Springer-Verlag (2003) 3rd Edition.

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M.Sc./M.A. Course (Third Semester)
PAPER –IV (A)
Operations Research (I)

Max. Marks 80

Unit-I Operations Research and its Scope. Necessity of Operations Research in Industry. Linear Programming-Simplex Method. Theory of the Simplex Method.

Unit-II Duality and Sensitivity Analysis. Other Algorithms for Linear Programming-Dual Simplex Method.

Unit-III Parametric Linear Programming. Upper Bound Technique. Interior Point Algorithm. Linear Goal Programming.

Unit-IV Transportation and Assignment Problems.

Unit-V Network Analysis-Shortest Path Problem. Minimum Spanning Tree Probiem. Maximum Flow I Problem. Minimum Cost Flow Problem. Network Simplex Method. Project Planning and Control I with PERT-CPM.

Books Recommended :

1. F.S. Hillier and G.J. Ueberman. Introduction to Operations ResBareft (Sixth Edition), McGraw Hill International Edition, Industrial Engineering Series, 1995. (This book comes with a CD containing tutorial software).
2. G. Hadley, Linear Programming, Narosa Publishing House, 1995.
3. G. Hadly, Nonlinear and Dynamic Programming, Addison-Wesley, Reading Mass.
4. H.A. Taha, Operations Research -An introduction, Macmillan Publishing Co., Inc., New Yark.
5. Kanti Swarup, P.K. Gupta and Man Mohan, Operations Research, Sultan Chand & Sons, New Delhi
6. Mokhtar S. Bazaraa, John J. Jarvis and Hanif D. Sherali, Linear Programming and Network flows, John Wiley & Sons, New York, 1990.

References

1. S.S. Rao, Optimization Theory and Applications, Wiley Eastern Ltd., New Delhi.

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2. Prem Kumar Gupla and D.S. Hira, Operations Research-An Introduction. S. Cliand & Company Ltd., New Delhi.
3. N.S. Kambo, Mathematical Programming Techniques, Affiliated East-West Press Pvt. Ltd., New Delhi, Madras
4. R.K. Rathy, An Introduction to Fluid Dynamics, Oxford and IBH Publishing Company, New Delhi, 1976.
5. A.D. Young, Boundary Layers, AIAA Education Series, Washington DC, 1989.
6. S.W. Yuan, Foundations of Fluid Mechanics, Prentice Hall of India Private Limited, New Delhi, 1976.
7. UNDOSystems Products (Visit websHe htlp://www.Hndo.com/productsf.html)
   (i) UNDO (the linear programming solver)
   (ii) UNDO Callable Library (the premier optimisation engine)
   (iii) LINGO (the linear, non-linear, and integer programming solver with mathematical modelling language)
   (i) What's Best I (the spreadssheet add-in that solves linear, non-linear, and integer problems).

   All the above four products are bundled into one package to form the Solver Suite. For more details about any of the four products one has to click on its name.
   (i) Optimisation Modelling with UNDO (8" edition) by Linus Schrage.
   (ii) Optimisation Modelling with LINGO by Unus Schrage.
   More details available on the Related Book page York, 1979.

M.Sc./M.A. Course (Third Semester)
PAPER-IV (B)
Wavelets (I)

Max Marks – 80

Unit-I. Preliminaries-Different ways of constructing wavelets- Orthonormal bases generated by a single function: the Balian-Low theorem. Smooth projections on $L^2(R)$.

Unit-II. Local sine and cosine bases and the construction of some wavelets. The unitary folding operators and the smooth projections.

Unit-III. Multiresolution analysis and construction of wavelets. Construction of compactly supported wavelets and estimates for its smoothness. Band limited wavelets.

Unit-IV. Orthonormality. Completeness. Characterization of Lemarie-Meyer wavelets and some other characterizations. Franklin wavelets and Spline wavelets on the real line.

Unit-V. Orthonormal bases of piecewise linear continuous functions for L^2 (T). Orthonormal bases of periodic splines. Periodization of wavelets defined on the real line.

REFERENCES:

1. Eugenic HernBndez and Guido Weiss, A First Course on Wavelets, CRC Press, New York, 1996.
2. C.K. Chui, An Introduction to Wavelets, Academic Press, 1992.
3. I.Daubechies, Ten Lectures on Wavelets, CBS-NSF Regional Conferences in Applied Mathematics, 61, SIAM, I 1992.
4. Y.Meyer,Wavelets, algorithms and applications (Tran.by R.D. Rayan,SIAM, 1993.
5. M.V. Wickerhauser, Adapted wavelet analysis from theory to software, Wellesley, MA, A.K. Peters, 1994.

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M.Sc./M.A. Course (Third Semester)

PAPER –V (A)

Programming in C (with ANSI features) Theory and Practical (I)

Max. Marks. 100
(Theory-70 +Practical-30)

Unit-I An overview of programming. Programming language, Classification. C Essentials-Program Development. Functions. Anatomy of a C Function. Variables and Constants. Expressions. Assignment Statements. Formatting Source Files. Continuation Character. The Preprocessor.

Unit-II Scalar Data Types-Declarations, Different Types of Integers. Different kinds of Integer Constants. Floating-Point Types. Initialization. Mixing Types. Explicit Conversions-Casts. Enumeration Types. The Void Data Type. Typedefs. Finding the Address of an object. Pointers.

Unit-III Control Flow-Conditional Branching. The Switch Statement. Looping. Nested Loops. The break and continue Statements. The goto statement. Infinite Loops.

Unit-IV Operators and Expressions-Precedence and Associativity. Unary Plus and Minus operators. Binary Arithmetic Operators. Arithmetic Assignment Operators. Increment and Decrement Operators. Comma Operator. Relational Operators. Logical Operators. Bit - Manipulation Operators. Bitwise Assignment Operators. Cast Operator. Size of Operators. Conditional Operator. Memory Operators.

Unit-V Arrays -Declaring an Array. Arrays and Memory. Initializing Arrays. Encryption and Decryption.

Books Recommended :

1. Peter A. Darnell and Philip E. Margolis, C: A Software Engineering Approach, Narosa Publishing House (Springer International Student Edition) 1993.
2. Samuel P. Harkison and Gly L. Steele Jr., C : A Reference Manual, 2nd Edition, Prentice Hall, 1984.
3. Brian W. Kernighan & Dennis M. Ritchie, The C Programme Language, 2nd Edition (ANSI Features), Prentice Hall 1989.

Practical Examination Scheme

Max. Marks – 30	Time Duration – 3 Hrs.
Practical (two)	20 Marks(10 marks each)
Viva	05 Marks
Sessional	05 Marks

M.Sc./M.A. Course (Third Semester)
PAPER-V (B)
Graph theory (I)

Max. Marks - 80

Unit-I: Operations on graphs, matrices and vector spaces: Topological operations, Homeomerphism, homomorphism, contractions, derived graphs, Binary operations.

Unit-II: Matrices and vector spaces: Matrices and vector spaces : The adjacency matrix, The determinant and the spectrum, Spectrum properties, The incidence matrix, cycle space and Bond space, Cycle bases and cycle graphs.

Unit-III: Colouring packing and covering: Vertex coverings, critical graphs, Girth and chromatic number, uniquely colourable graphs, edge-colourings, Face colourings and Beyond, The achromatic and the Adjoint Numbers.

Unit-IV: Combinational formulations: Setting up of combinational formulations, the classic pair of duals, Gallai, Norman-Rabin Theorems, Clique parameters, The Rosenfeld Numbers.

Unit-V: Perfect Graphs: Introduction to the "SPGC", Triangulated (Chordal) graphs, Comparability graphs, Interval graphs, permutation graphs, circular arc graphs, split graphs, weakly triangulated graphs.

REFERENCES :

1. K.R.Parthasarathy, Basic graph theory, Tata Mc graw Hill publishing company limited , 1994.
2. R.J.Wilson, Introduction to graph theory, Longman Harlow, 1985.
3. John Clark, Derek Allon Holton, A first look at graph Theory, World Scientific Singapore, 1991.
4. Frank Hararary, Graph Theory Narosa, New Delhi, 1995.
5. Ronald Gould and Benjamin Cummins, Graph Theory, California.
6. Narsingh Deo, Graph Theory with applications to Engineering and Computer Science, Prentice-Hall of India Private Limited, New Delhi, 2002.

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Pt. Ravishankar Shukla University, Raipur

Scheme of Examination

M.A./M.Sc. (MATHEMATICS) (Semester-IV)

2019 - 20 (Examination – Dec. 2019) onwards

There shall be six papers. Two compulsory and three optional papers. Each paper shall have 100 marks. The paper which has theory and practical both, the theory part shall have 70 marks and practical part shall have 30 marks. **Overall tally of marks in theory and practical will be 500.**

Paper		Description	Theory	Sessional	Practical	Remark
Compulsory Papers						
I		Functional Analysis (II)	80	20	--	--
II		Partial Differential Equations & Mechanics (II)	80	20	--	--
Optional Papers						
III	A	Operating System and Database Management System	70	--	30	For regular students only
	B	Fuzzy Set Theory & Its Applications (II)	80	20	--	--
	C	Mathematical Biology(II)	80	20	--	--
IV	A	Operations Research (II)	80	20	-	--
	B	Wavelets (II)	80	20	-	--
V	A	Programming in C (with ANSI Features) (II)	70	--	30	For regular students only
	B	Graph Theory (II)	80	20	--	

M.Sc./M.A. Course (Fourth Semester)
PAPER -I
Functional Analysis (II)

Max. Marks 80

Unit-I Uniform boundedness theorem and some of its consequences. Open mapping and closed graph theorems.

Unit-II Hahn-Banach theorem for real linear spaces, complex linear spaces and normed linear spaces. Reflexive spaces. Weak Sequential Compactness. Compact Operators. Solvability of linear equations in Banach spaces. The closed Range Theorem.

Unit-III Inner product spaces. Hilbert spaces. Orthonormal Sets. Bessel's inequality. Complete orthonormal sets and Parseval's identity.

Unit-IV Structure of Hilbert spaces. Projection theorem. Riesz representation theorem. Adjoint of an operator on a Hilbert space. Reflexivity of Hilbert spaces.

Unit-V Self-adjoint operators, Positive, projection, normal and unitary operators. Abstract variational boundary-value problem. The generalized Lax-Milgram theorem.

Books Recommended :

1. B.Choudhary and S.Nanda, Functional Analysis with Applications. Wiley Eastern Ltd. 1989.
2. H.L. Royden, Real Analysis, Macmillan Publishing Co. Inc., New York, 4'h Edition, 1993.

References

1. Serge Lang, Analysis I & II, Addison-Wesley Publishing Company, Inc. 1967.
2. Walter Rudin, Real & Complex Analysis, Tata McGraw-Hill Publishing.
3. Edwin Hewitt and Korl Stromberg, Real and Abstract Analysis, Springer-Verlag, New York.
4. Edwin Hewitt and Kenneth A. Ross, Abstract Harmonic Analysis, Vol. 1, Springer-Verlag, 1993.

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5. G. Bachman and L. Narici, Functional Analysis, Academic Press, 1966.
6. N. Dunford and J.T. Schwartz, Linear Operators, Part I, Interscience, New York, 1958.
7. R.E. Edwards, Functional Analysis, Holt Rinehart and Winston, New York, 1965.
8. C. Goffman and G. Pedrick, First Course in Functional Analysis, Prentice Hall of India, New Delhi, 1987.
9. P.K. Jain, O.P. Ahuja and Khalil Ahmad, Functional Analysis, New Age International (P) Ltd. & Wiley Eastern Ltd., New Delhi, 1997.
10. R.B. Holmes, Geometric Functional Analysis and its Applications, Springer-Verlag, 1975.
11. K.K. Jha, Functional Analysis, Students' Friends, 1986.
12. L.V. Kantorovich and G.P. Akilov, Functional Analysis, Pergamon Press, 1982.
13. E. Kreyszig, Introductory Functional Analysis with Applications, John Wiley & Sons, New York, 1978.
14. B.K. Lahiri, Elements of Functional Analysis, The World Press Pvt. Ltd., Calcutta, 1994.
15. A.H.Siddiqui, Functional Analysis with Applications, Tata McGraw-Hill Publishing Company Ltd. New Delhi
16. B.V. Limaye, Functional Analysis, Wiley Eastern Ltd.
17. L.A. Lustenik and V.J. Sobolev, Elements of Functional Analysis, Hindustan Publishing Corporation, New Delhi, 1971.
18. G.F. Simmons, Introduction to Topology and Modern Analysis, McGraw-Hill Book Company, New York, 1963.
19. A.E. Taylor, Introduction to Functional Analysis, John Wiley and Sons, New York, 1958.
20. K.Yosida, Functional Analysis, 3'" edition Springer-Verlag, New York, 1971.
21. J.B. Conway, A Course in Functional Analysis, Springer-Verlag, New York, 1990.
22. Walter Rudin, Functional Analysis, Tata McGraw-Hill Publishing Company Ltd., New Delhi, 1973.
23. A. Wilansky, Functional Analysis, Blaisdell Publishing Co., 1964.
24. J. Tinsley Oden & Leszek F. Dernkowicz, Applied Functional Analysis, CRC Press Inc., 1996.

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M.Sc./M.A. Course (Fourth Semester)
PAPER -II
Partial Differential Equations and Mechanics (II)

Max. Marks 80

Partial Differential Equations

Unit-I Nonlinear First Order PDE-Complete Integrals, Envelopes, Characteristics, HamiltonJacobi Equations (Calculus of Variations, Hamilton's ODE, Legendre Transform, Hopf-Lax Formula, Weak Solutions, Uniqueness), Conservation Laws (Shocks, Entropy Condtion, LaxOleinik formula, Weak Solutions, Uniqueness, Riemann's Problem, Long Time Behaviour)

Unit-II Representation of Solutions-Separation of Variables, Similarity Solutions (Plane and Travelling Waves, Solitons, Similarity under Scaling), Fourier and Laplace Transform, Hopf-Cole Transform, Hodograph and Legendre Transforms, Potential Functions.

Unit-III Asymptotics (Singular Perturbations, Laplace's Method, Geometric Optics, Stationary Phase, Homogenization), Power Series (Non-characteristic Surfaces, Real Analytic Functions, Cauchy-Kovalevskaya Theorem).

Analytical Dynamics:

Unit-IV Hamilton's Principle. Principle of least action. Poincare Cartan Integral invariant. Whittaker's equations. Jacobi's equations. Lee Hwa Chung's theorem, canonical transformations and properties of generating functions.

Unit-V Hamilton-Jacobi equation. Jacobi theorem. Method of separation of variables. Lagrange Brackets. Condition of canonical character of a transformation in terms of Lagrange brackets and Poisson brackets,

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invariance of Lagrange brackets and Poisson brackets under canonical transformations.

Books Recommended :

1. L.C. Evans, Partial Differential Equations, Graduate Studies in Mathematics, Volume 19, AMS, 1998.
2. F. Gantmacher, Lectures in Analytic Mechanics, MIR Publishers, Moscow, 1975.
3. R.C.Mondal, Classical Mechanics, Prentice Hall of India

References

1. Books on Partial differential equation by I.N. Sneddon, F. John, P. Prasad and R. Ravindran, Amarnath etc.
2. A.S. Ramsey, Dynamics Part II, The English Language Book Society and Cambridge University Press, 1972.
3. H. Goldstein, Classical Mechanics (2nd edition), Narosa Publishing House, New Delhi.
4. I.M. Gelfand and S.V. Fomin, Calculus of Variations, Prentice Hall.
5. Narayan Chandra Rana & Pramod Sharad Chandra Joag, Classical Mechanics, Tata McGraw Hill, 1991.
6. Louis N. Hand and Janet D. Finch, Analytical Mechanics, Cambridge University Press, 1998.

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M.Sc./M.A. Course (Fourth Semester)
PAPER-III (A)
Operating System and Database Management System - Theory and Practical

Max. Marks. 100
(Theory-70 +Practical-30)

Unit-I Database Systems-Role of database systems, database system architecture and data modeling.

Unit-II Introduction to relational algebra and relational calculus.

Unit-III Intoduction to SQL: Basic features including views; Integrity constraints; Database design-normalization up to BCNF.

Unit-IV Operating Systems- Overview of operating system, user interface, processor management, memory management.

Unit-V I/O management, concurrency and Security, network and distributed systems.

Books Recommended :

1. S.B. Lipman, J. Lajoi: C++ Primer, Addison Wesley.
2. B. Stroustrup; The C++ Programming Language, Addison Wesley.
3. C.J. Date : Introduction to Database Systems, Addison Wesley.
4. C. Ritehie: Operating Systems-Incorporating UNIX and Windows, BPB Publications.
5. M.A. Weiss, Data Structures and Algorithm Analysis in C++, Addison Wesley.

Practical Examination Scheme

Max. Marks – 30	Time Duration – 3 Hrs.
Practical (two)	20 Marks(10 marks each)
Viva	05 Marks
Sessional	05 Marks

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M.Sc./M.A. Course (Fourth Semester)
PAPER-III (B)
Fuzzy Set Theory & Its Applications (II)

Max Marks – 80

Unit-I Fuzzy Logic-An overview of classical logic, Multivalued logics, Fuzzy propositions. Fuzzy quantifiers. Linguistic variables and hedges. Inference from conditional fuzzy propositions, the compositional rule of inference.

Unit-II Approximate Reasoning-An overview of Fuzzy expert system. Fuzzy implications and their selection. Multiconditional approximate reasoning. The role of fuzzy relation equation.

Unit-III An introduction to Fuzzy Control-Fuzzy controllers. Fuzzy rule base. Fuzzy inference engine. Fuzzification.

Unit-IV Defuzzification and the various defuzzitication methods (the centre of area, the centre of maxima, and the mean of maxima methods).

Unit-V Decision Making in Fuzzy Environment-Individual decision making. Multiperson decision making. Multicriteria decision making. Multistage decision making. Fuzzy ranking methods. Fuzzy linear programming.

REFERENCES :

1. H.J. Zmmemann, Fuzzy set theory and its Applications, Allied Publishers Ltd. New Delhi, 1991.
2. G.J. Klir and B. Yuan- Fuzzy sets and fuzzy logic, Prentice-Hall ol India, New Delhi, 1995.

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M.Sc./M.A. Course (Fourth Semester)
PAPER-III (C)
Mathematical Biology (II)

Max. Marks - 80

Part-A: Population Models

UNIT-I

Models for population with age structure: Linear discrete models, linear continuous models, the method of characteristics, nonlinear continuous models.

UNIT-II

Models for population with spatial structure: A general metapopulation model, a metapopulation model with residence and travel, the diffusion equation, solution by separation of variables. Linear reaction-diffusion equations, nonlinear reaction-diffusion equations, two-species interactions, diffusion in two dimensions.

Part-B:Disease Transmission Models

UNIT-II

Epidemic models: Introduction to epidemic models, The logistic equation in epidemiology (1.3), simple Kermack-McKendrick epidemic model, network and compartmental epidemic models.

UNIT-IV

More complicated epidemic models: models with exposed period, treatments models, an influenza model, quarantine-isolation models.
An SIR model with a general infectious period, the age of infection epidemic model, models with disease deaths, a vaccination model, the next generation matrix.

UNIT-V

Models for endemic diseases: A model for diseases with no immunity, the SIR model with births and deaths, some applications: Herd immunity, age of infection, the inter-epidemic period, epidemic approach to endemic equilibrium, the SIS model with births and deaths, temporary immunity, diseases population control.

Text Book:

1. Fred Brauer, Carlos Castillo-Chavez, Mathematical Models in Population Biology and Epidemiology, Biology, Springer (2010)

Reference Books:

1. Nicholas F. Britton, Essential Mathematical Biology, Springer-Verlag (2003)
2. J.D.Murray, Mathematical Biology I. An Introduction, Springer-Verlag (2002) 3rd Edition.
3. J.D.Murray, Mathematical Biology II. Spatial Models and Biomedical Application, Springer-Verlag (2003) 3rd Edition.

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M.Sc./M.A. Course (Fourth Semester)
PAPER –IV (A)
Operations Research (II)

Max. Marks 80

Unit-I Dynamic Programming-Deterministic and Probabilistic Dynamic programming.

Unit-II Game Theory-Two-Person, Zero-Sum Games. Games with Mixed Strategies. Graphical . Solution. Solution by Linear Programming.

Unit-III Integer Programming-Pure and Mixed Integer Programming Problem, Gomory's All-I P.P. Method, Construction of Gomory's Constraints, Fractional Cut Method-All Integer LPP, Fractional Cut Method- Mixed Integer LPP, Branch and Bound Technique.

Unit-IV Queueing system: Deterministic Queueing system, probability distribution in Queueing, classification of Queueing models, Poission Queueing system.

Unit-V Nonlinear Programming-One/and Multi-Variable Unconstrained Optimization. Kuhn-Tucker Conditions for Constrained Optimization. Quadratic Programming. Separable Programming. I Convex Programming. Non-convex Programming.

Books Recommended :

1. F.S. Hillier and G.J. Ueberman. Introduction to Operations ResBareft (Sixth Edition), McGraw Hill International Edition, Industrial Engineering Series, 1995. (This book comes with a CD containing tutorial software).
2. G. Hadley, Linear Programming, Narosa Publishing House, 1995.
3. G. Hadly, Nonlinear and Dynamic Programming, Addison-Wesley, Reading Mass.
4. H.A. Taha, Operations Research -An introduction, Macmillan Publishing Co., Inc., New Yark.
5. Kanti Swarup, P.K. Gupta and Man Mohan, Operations Research, Sultan Chand & Sons, New Delhi
6. Mokhtar S. Bazaraa, John J. Jarvis and Hanif D. Sherali, Linear Programming and Network flows, John Wiley & Sons, New York, 1990.

References

1. S.S. Rao, Optimization Theory and Applications, Wiley Eastern Ltd., New Delhi.
2. Prem Kumar Gupla and D.S. Hira, Operations Research-An Introduction. S. Cliand & Company Ltd., New Delhi.
3. N.S. Kambo, Mathematical Programming Techniques, Affiliated East-West Press Pvt. Ltd., New Delhi, Madras
4. R.K. Rathy, An Introduction to Fluid Dynamics, Oxford and IBH Publishing Company, New Delhi, 1976.
5. A.D. Young, Boundary Layers, AIAA Education Series, Washington DC, 1989.
6. S.W. Yuan, Foundations of Fluid Mechanics, Prentice Hall of India Private Limited, New Delhi, 1976.
7. UNDOSystems Products (Visit websHe htlp://www.Hndo.com/productsf.html)
   (i) UNDO (the linear programming solver)
   (ii) UNDO Callable Library (the premier optimisation engine)
   (iii) LINGO (the linear, non-linear, and integer programming solver with mathematical modelling language)
   (i) What's Best I (the spreadssheet add-in that solves linear, non-linear, and integer problems).

   All the above four products are bundled into one package to form the Solver Suite. For more details about any of the four products one has to click on its name.
   (i) Optimisation Modelling with UNDO (8" edition) by Linus Schrage.
   (ii) Optimisation Modelling with LINGO by Unus Schrage.
   More details available on the Related Book page York, 1979.

M.Sc./M.A. Course (Fourth Semester)
PAPER-IV (B)
Wavelets (II)

Max Marks – 80

Unit-I Characterizations in the theory of wavelets-The basic equations and some of its applications.

Unit-II Characaterizations of MRA wavelets, low-pass filters and scaling functions. Non- existence of smooth wavelets in $H^2(R)$.

Unit-III Frames - The reconstruction formula and the Batian-Low theorem for frames. Frames from translations and dilations. Smooth frames for $H^2(R)$.

Unit-IV Discrete transforms and algorithms-The discrete and the fast Fourier transforms. The discrete and the fast cosine transforms.

Unit-IV The discrete version of the local sine and cosine bases. Decomposition and reconstruction algorithms for wavelets.

REFERENCES:

1. Eugenic HernBndez and Guido Weiss, A First Course on Wavelets, CRC Press, New York, 1996.
2. C.K. Chui, An Introduction to Wavelets, Academic Press, 1992.
3. I.Daubechies, Ten Lectures on Wavelets, CBS-NSF Regional Conferences in Applied Mathematics, 61, SIAM, I 1992.
4. Y.Meyer,Wavelets, algorithms and applications (Tran.by R.D. Rayan,SIAM, 1993.
5. M.V. Wickerhauser, Adapted wavelet analysis from theory to software, Wellesley, MA, A.K. Peters, 1994.

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M.Sc./M.A. Course (Fourth Semester)
PAPER –V (A)
Programming in C (with ANSI features) (II)
Theory and Practical

Max. Marks. 100
(Theory-70 +Practical-30)

Unit-I Storage Classes-Fixed vs. Automatic Duration. Scope. Global variables. The register Specifier. ANSI rules for the syntax and Semantics of the storage-class keywords.

Unit-II Pointers Pointer Arithmetic. Passing Pointers as Function Arguments. Accessing Array Elements through Pointers. Passing Arrays as Function Arguments. Sorting Algorithms. Strings. Multidimensional Arrays. Arrays of Pointers. Pointers to Pointers.

Unit-III Functions-Passing Arguments. Declarations and Calls. Pointers to Functions. Recursion. The main Function. Complex Declarations.The C Preprocessor-Macro Substitution. Conditional Compilation. Include Facility. Line Control.

Unit-IV Structures and Unions-Structures. Dynamic Memory Allocation. Linked Lists. Unions, enum Declarations.

Unit-V Input and Output-Streams, Buffering. The <Stdio.h> Header File. Error Handling. Opening and Closing a File. Reading and Writing Data. Selecting an I/O Method. Unbuffered I/O Random Access. The standard library for Input/Output.

Books Recommended :

1. Peter A. Darnell and Philip E. Margolis, C: A Software Engineering Approach, Narosa Publishing House (Springer International Student Edition) 1993.
2. Samuel P. Harkison and Gly L. Steele Jr., C : A Reference Manual, 2nd Edition, Prentice Hall, 1984.
3. Brian W. Kernighan & Dennis M. Ritchie, The C Programme Language, 2nd Edition (ANSI Features), Prentice Hall 1989.

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Practical Examination Scheme

Max. Marks – 30	Time Duration – 3 Hrs.
Practical (two)	20 Marks(10 marks each)
Viva	05 Marks
Sessional	05 Marks

M.Sc./M.A. Course (Fourth Semester)
PAPER-V (B)
Graph theory-II

Max. Marks - 80

Unit-I: Ramsey Theory: Perpectness-preserving operations, Forbidden Subgraph orientations, Ramsey numbers and Ramsey graphs.

Unit-II: Groups: Permutation groups, The automorphism group, graphs with given group, symmetry concepts, pseudo-similarity and stability, spectral studies of the Automorphism group.

Unit-III: Polynomials and Graph Enumeration: The colour polynomials, The chromatic polynomial, The bivariate colouring polynomials.

Unit-IV: Graph Enumeration: Co-chromatic (co-dichromatic) graphs and chromatically unique graphs, Graph Enumeration.

Unit-V: Digraphs & Networks: Digraphs, Types of connectedness, Flows in Networks, Menger's and Konig's Theorem, Degree sequences.

REFERENCES :

1. K.R.Parthasarathy, Basic graph theory, Tata Mc graw Hill publishing company limited , 1994.
2. R.J.Wilson, Introduction to graph theory, Longman Harlow, 1985.
3. John Clark, Derek Allon Holton, A first look at graph Theory, World Scientific Singapore, 1991.
4. Frank Hararary, Graph Theory Narosa, New Delhi, 1995.
5. Ronald Gould and Benjamin Cummins, Graph Theory, California.
6. Narsingh Deo, Graph Theory with applications to Engineering and Computer Science, Prentice-Hall of India Private Limited, New Delhi, 2002.

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Pt. Ravishankar Shukla University, Raipur
Ph.D. Course Work (Mathematics)
2019-20 & Onward

Scheme of Examination

There shall two papers, one theory paper and one project work. Each of 100 marks.

S.No.	Particulars		Max. Marks	
1	Theory Paper	Research Methodology, Quantitative techniques and Computers	100	100
2	Project Work	Dissertation/Project Script	50	100
		Seminar	20	
		Viva Voce	30	
Grand Total				200

Details of Syllabus

Paper I

Research Methodology, Quantitative techniques and Computers

M.M. 100

Unit I – Research Methodology:

Introduction to research methodology, Meaning, objectives, types, significance of Research. Identification, Selection of Research problem, Formulation of research objectives, Research design, components, importance and typology, Quantitative and qualitative methodology, hypotheses. Research ethics.

Unit II - Scientific Writing : Importance of Science Writing , Meaning and nature of Scientific Style , Writing effective scientific prose, Effective word selection in Science writing, Common mathematical functions and their abbreviations, Symbols, Operators Commonly used in Mathematics, Greek, Roman letters used in mathematics, Mathematical Theorems and properties, Mathematics Journals and their abbreviations.

Unit III - Style and Usage for Mathematics :

Review : Mathematics Subject Classifications (MSC). Mathematical Review, MathSciNet and other E-Resources.

Manuscript Preparation :

Structure of a Standard Mathematics Paper (in brief), Other Forms of Mathematics Manuscripts.

Usage : Mathematical Expressions, Alphabets used in Mathematical Expressions, Bracketing, Limits, Fractions, Multiplication, Vectors, Tensors, and n-forms, Summations, Products, Unions, and Integrals.

Unit IV - Typesetting Mathematical Text with LATEX :

Sample Document, Type Style, Environments, Lists, Centering, Tables, Verbatim, Vertical and Horizontal Spacing. Equation Environments, Fonts, Hats, and Underlining, Braces, Arrays and Matrices, Customized Commands, Theorem-like Environments, Math Styles, Document Classes and the Overall Structure, Titles for Documents, Sectioning Commands, Packages, Inputting Files, Inputting Pictures, Making a Bibliography, Making an Index, Slides.

Unit V - MATLAB :

Arithmetic Operations, built-in-MATH functions, scalar variables, Creating Arrays, built-in-functions for handling arrays, Mathematical Operations with Arrays, Script Files, Two dimensional plots, programming in MATLAB, Polynomial, curve fitting, and interpolation, Three-dimensional plots.

Books recommended :

1. C.R.Kothari, Research Methodology, New Age International Publishers (2004)
2. Michael Davis : Ethics and the University. Routledge (1999)
3. Harold Rabinowitz, Suzanne Vogel : The Manual of Scientific Style. Academic Press (2009)
4. Laslie Lamport : LATEX. Addison Wesley Publication Company (1994)
5. David F. Griffiths, Desmond J. Higham : Learning LATEX. Society for Industrial and Applied Mathematics, Philadelphia (1997)
6. Amos Gilat : MATLAB : An Introduction with Applications. John Wiley & Sons, INC (2004)

Paper II
Project Work

M.M. 100

This paper will consist of three components

(i)	Dissertation/Project work leading to Ph.D. Work	50
(ii)	Seminars (two)	20
(iii)	Viva-Voce on Dissertation	30

Pharmacy Council of India
New Delhi

Rules & Syllabus for the Bachelor of Pharmacy (B. Pharm) Course

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[Framed under Regulation 6, 7 & 8 of the Bachelor of Pharmacy (B. Pharm) course regulations 2014]

CHAPTER- I: REGULATIONS

1. Short Title and Commencement

These regulations shall be called as "The Revised Regulations for the B. Pharm. Degree Program (CBCS)of the Pharmacy Council of India, New Delhi". They shall come into effect from the Academic Year 2016-17. The regulations framed are subject to modifications from time to time by Pharmacy Council of India.

2. Minimum qualification for admission

2.1 First year B. Pharm:

Candidate shall have passed 10+2 examination conducted by the respective state/central government authorities recognized as equivalent to 10+2 examination by the Association of Indian Universities (AIU) with English as one of the subjects and Physics, Chemistry, Mathematics (P.C.M) and or Biology (P.C.B / P.C.M.B.) as optional subjects individually. Any other qualification approved by the Pharmacy Council of India as equivalent to any of the above examinations.

2.2. B. Pharm lateral entry (to third semester):

A pass in D. Pharm. course from an institution approved by the Pharmacy Council of India under section 12 of the Pharmacy Act.

3. Duration of the program

The course of study for B.Pharm shall extend over a period of eight semesters (four academic years) and six semesters (three academic years) for lateral entry students. The curricula and syllabi for the program shall be prescribed from time to time by Pharmacy Council of India, New Delhi.

4. Medium of instruction and examinations

Medium of instruction and examination shall be in English.

5. Working days in each semester

Each semestershall consist of not less than 100 working days. The odd semesters shall be conducted from the month of June/July to November/December and the even semesters shall be conducted from December/January to May/June in every calendar year.

6. Attendance and progress

A candidate is required to put in at least 80% attendance in individual courses considering theory and practical separately. The candidate shall complete the prescribed course satisfactorily to be eligible to appear for the respective examinations.

7. Program/Course credit structure

As per the philosophy of Credit Based Semester System, certain quantum of academic work viz. theory classes, tutorial hours, practical classes, etc. are measured in terms of credits. On satisfactory completion of the courses, a candidate earns credits. The amount of credit associated with a course is dependent upon the number of hours of instruction per week in that course. Similarly, the credit associated with any of the other academic, co/extra-curricular activities is dependent upon the quantum of work expected to be put in for each of these activities per week.

7.1. Credit assignment

7.1.1. Theory and Laboratory courses

Courses are broadly classified as Theory and Practical. Theory courses consist of lecture (L) and /or tutorial (T) hours, and Practical (P) courses consist of hours spent in the laboratory. Credits (C) for a course is dependent on the number of hours of instruction per week in that course, and is obtained by using a multiplier of one (1) for lecture and tutorial hours, and a multiplier of half (1/2) for practical (laboratory) hours. Thus, for example, a theory course having three lectures and one tutorial per week throughout the semester carries a credit of 4. Similarly, a practical having four laboratory hours per week throughout semester carries a credit of 2.

7.2. Minimum credit requirements

The minimum credit points required for award of a B. Pharm. degree is 208. These credits are divided into Theory courses, Tutorials, Practical, Practice School and Projectover the duration of eight semesters. The credits are distributed semester-wise as shown in Table IX. Courses generally progress in sequences, building competencies and their positioning indicates certain academic maturity on the part of the learners. Learners are expected to follow the semester-wise schedule of courses given in the syllabus.

The lateral entry students shall get 52 credit points transferred from their D. Pharm program. Such students shall take up additional remedial courses of 'Communication Skills' (Theory and Practical) and 'Computer Applications in Pharmacy' (Theory and Practical) equivalent to 3 and 4 credit points respectively, a total of 7 credit points to attain 59 credit points, the maximum of I and II semesters.

8. Academic work

A regular record of attendance both in Theory and Practical shall be maintained by the teaching staff of respective courses.

9. Course of study

The course of study for B. Pharm shall include Semester Wise Theory & Practical as given in Table – I to VIII. The number of hours to be devoted to each theory, tutorial and practical course in any semester shall not be less than that shown in Table – I to VIII.

Table-I: Course of study for semester I

Course code	Name of the course	No. of hours	Tutorial	Credit points
BP101T	Human Anatomy and Physiology I– Theory	3	1	4
BP102T	Pharmaceutical Analysis I – Theory	3	1	4
BP103T	Pharmaceutics I – Theory	3	1	4
BP104T	Pharmaceutical Inorganic Chemistry – Theory	3	1	4
BP105T	Communication skills – Theory *	2	-	2
BP106RBT BP106RMT	Remedial Biology/ Remedial Mathematics – Theory*	2	-	2
BP107P	Human Anatomy and Physiology – Practical	4	-	2
BP108P	Pharmaceutical Analysis I – Practical	4	-	2
BP109P	Pharmaceutics I – Practical	4	-	2
BP110P	Pharmaceutical Inorganic Chemistry – Practical	4	-	2
BP111P	Communication skills – Practical*	2	-	1
BP112RBP	Remedial Biology – Practical*	2	-	1
	Total	**32/34$^{\$}$/36$^{\#}$**	**4**	**27/29$^{\$}$/30$^{\#}$**

$^{\#}$Applicable ONLY for the students who have studied Mathematics / Physics / Chemistry at HSC and appearing for Remedial Biology (RB)course.

$^{\$}$Applicable ONLY for the students who have studied Physics / Chemistry / Botany / Zoology at HSC and appearing for Remedial Mathematics (RM)course.

* Non University Examination (NUE)

Table-II: Course of study for semester II

Course Code	Name of the course	No. of hours	Tutorial	Credit points
BP201T	Human Anatomy and Physiology II – Theory	3	1	4
BP202T	Pharmaceutical Organic Chemistry I – Theory	3	1	4
BP203T	Biochemistry – Theory	3	1	4
BP204T	Pathophysiology – Theory	3	1	4
BP205T	Computer Applications in Pharmacy – Theory *	3	-	3
BP206T	Environmental sciences – Theory *	3	-	3
BP207P	Human Anatomy and Physiology II –Practical	4	-	2
BP208P	Pharmaceutical Organic Chemistry I– Practical	4	-	2
BP209P	Biochemistry – Practical	4	-	2
BP210P	Computer Applications in Pharmacy – Practical*	2	-	1
	Total	**32**	**4**	**29**

*Non University Examination (NUE)

Table-III: Course of study for semester III

Course code	Name of the course	No. of hours	Tutorial	Credit points
BP301T	Pharmaceutical Organic Chemistry II – Theory	3	1	4
BP302T	Physical Pharmaceutics I – Theory	3	1	4
BP303T	Pharmaceutical Microbiology – Theory	3	1	4
BP304T	Pharmaceutical Engineering – Theory	3	1	4
BP305P	Pharmaceutical Organic Chemistry II – Practical	4	-	2
BP306P	Physical Pharmaceutics I – Practical	4	-	2
BP307P	Pharmaceutical Microbiology – Practical	4	-	2
BP 308P	Pharmaceutical Engineering –Practical	4	-	2
	Total	**28**	**4**	**24**

Table-IV: Course of study for semester IV

Course code	Name of the course	No. of hours	Tutorial	Credit points
BP401T	Pharmaceutical Organic Chemistry III– Theory	3	1	4
BP402T	Medicinal Chemistry I – Theory	3	1	4
BP403T	Physical Pharmaceutics II – Theory	3	1	4
BP404T	Pharmacology I – Theory	3	1	4
BP405T	Pharmacognosy and Phytochemistry I– Theory	3	1	4
BP406P	Medicinal Chemistry I – Practical	4	-	2
BP407P	Physical Pharmaceutics II – Practical	4		2
BP408P	Pharmacology I – Practical	4	-	2
BP409P	Pharmacognosy and Phytochemistry I – Practical	4	-	2
	Total	**31**	**5**	**28**

Table-V: Course of study for semester V

Course code	Name of the course	No. of hours	Tutorial	Credit points
BP501T	Medicinal Chemistry II – Theory	3	1	4
BP502T	Industrial PharmacyI– Theory	3	1	4
BP503T	Pharmacology II – Theory	3	1	4
BP504T	Pharmacognosy and Phytochemistry II– Theory	3	1	4
BP505T	Pharmaceutical Jurisprudence – Theory	3	1	4
BP506P	Industrial PharmacyI – Practical	4	-	2
BP507P	Pharmacology II – Practical	4	-	2
BP508P	Pharmacognosy and Phytochemistry II – Practical	4	-	2
	Total	**27**	**5**	**26**

Table-VI: Course of study for semester VI

Course code	Name of the course	No. of hours	Tutorial	Credit points
BP601T	Medicinal Chemistry III – Theory	3	1	4
BP602T	Pharmacology III – Theory	3	1	4
BP603T	Herbal Drug Technology – Theory	3	1	4
BP604T	Biopharmaceutics and Pharmacokinetics – Theory	3	1	4
BP605T	Pharmaceutical Biotechnology – Theory	3	1	4
BP606T	Quality Assurance –Theory	3	1	4
BP607P	Medicinal chemistry III – Practical	4	-	2
BP608P	Pharmacology III – Practical	4	-	2
BP609P	Herbal Drug Technology – Practical	4	-	2
	Total	**30**	**6**	**30**

Table-VII: Course of study for semester VII

Course code	Name of the course	No. of hours	Tutorial	Credit points
BP701T	Instrumental Methods of Analysis – Theory	3	1	4
BP702T	Industrial PharmacyII – Theory	3	1	4
BP703T	Pharmacy Practice – Theory	3	1	4
BP704T	Novel Drug Delivery System – Theory	3	1	4
BP705P	Instrumental Methods of Analysis – Practical	4	-	2
BP706PS	Practice School*	12	-	6
	Total	**28**	**5**	**24**

* Non University Examination (NUE)

Table-VIII: Course of study for semester VIII

Course code	Name of the course	No. of hours	Tutorial	Credit points
BP801T	Biostatistics and Research Methodology	3	1	4
BP802T	Social and Preventive Pharmacy	3	1	4
BP803ET	Pharma Marketing Management	3 + 3 = 6	1 + 1 = 2	4 + 4 = 8
BP804ET	Pharmaceutical Regulatory Science			
BP805ET	Pharmacovigilance			
BP806ET	Quality Control and Standardization of Herbals			
BP807ET	Computer Aided Drug Design			
BP808ET	Cell and Molecular Biology			
BP809ET	Cosmetic Science			
BP810ET	Experimental Pharmacology			
BP811ET	Advanced Instrumentation Techniques			
BP812ET	Dietary Supplements and Nutraceuticals			
BP813PW	Project Work	12	-	6
	Total	**24**	**4**	**22**

Table-IX: Semester wise credits distribution

Semester	Credit Points
I	**27/29$/30#**
II	29
III	26
IV	28
V	26
VI	26
VII	24
VIII	22
Extracurricular/ Co curricular activities	01*
Total credit points for the program	**209/211$/212#**

* The credit points assigned for extracurricular and or co-curricular activities shall be given by the Principals of the colleges and the same shall be submitted to the University. The criteria to acquire this credit point shall be defined by the colleges from time to time.

$Applicable ONLY for the students studied Physics / Chemistry / Botany / Zoology at HSC and appearing for Remedial Mathematics course.

#Applicable ONLY for the students studied Mathematics / Physics / Chemistry at HSC and appearing for Remedial Biology course.

Tables-X: Schemes for internal assessments and end semester examinations semester wise

Semester I

Course code	Name of the course	Internal Assessment				End Semester Exams		Total Marks
		Continuous Mode	Sessional Exams		Total	Marks	Duration	
			Marks	Duration				
BP101T	Human Anatomy and Physiology I– Theory	10	15	1 Hr	25	75	3 Hrs	100
BP102T	Pharmaceutical Analysis I – Theory	10	15	1 Hr	25	75	3 Hrs	100
BP103T	Pharmaceutics I – Theory	10	15	1 Hr	25	75	3 Hrs	100
BP104T	Pharmaceutical Inorganic Chemistry – Theory	10	15	1 Hr	25	75	3 Hrs	100
BP105T	Communication skills – Theory *	5	10	1 Hr	15	35	1.5 Hrs	50
BP106RBT BP106RMT	Remedial Biology/ Mathematics – Theory*	5	10	1 Hr	15	35	1.5 Hrs	50
BP107P	Human Anatomy and Physiology – Practical	5	10	4 Hrs	15	35	4 Hrs	50
BP108P	Pharmaceutical Analysis I – Practical	5	10	4 Hrs	15	35	4 Hrs	50
BP109P	Pharmaceutics I – Practical	5	10	4 Hrs	15	35	4 Hrs	50
BP110P	Pharmaceutical Inorganic Chemistry – Practical	5	10	4 Hrs	15	35	4 Hrs	50
BP111P	Communication skills – Practical*	5	5	2 Hrs	10	15	2 Hrs	25
BP112RBP	Remedial Biology – Practical*	5	5	2 Hrs	10	15	2 Hrs	25
	Total	**70/75$/80#**	**115/125$/130#**	**23/24$/26# Hrs**	**185/200$/210#**	**490/525$/ 540#**	**31.5/33$/ 35# Hrs**	**675/725$/ 750#**

#Applicable ONLY for the students studied Mathematics / Physics / Chemistry at HSC and appearing for Remedial Biology (RB)course.

$Applicable ONLY for the students studied Physics / Chemistry / Botany / Zoology at HSC and appearing for Remedial Mathematics (RM)course.

* Non University Examination (NUE)

10. Program Committee

1. The B. Pharm. program shall have a Program Committee constituted by the Head of the institution in consultation with all the Heads of the departments.

2. The composition of the Program Committee shall be as follows:

   A senior teacher shall be the Chairperson; One Teacher from each department handling B.Pharm courses; and four student representatives of the program (one from each academic year), nominated by the Head of the institution.

3. Duties of the Program Committee:

   i. Periodically reviewing the progress of the classes.
   ii. Discussing the problems concerning curriculum, syllabus and the conduct of classes.
   iii. Discussing with the course teachers on the nature and scope of assessment for the course and the same shall be announced to the students at the beginning of respective semesters.
   iv. Communicating its recommendation to the Head of the institution on academic matters.
   v. The Program Committee shall meet at least thrice in a semester preferably at the end of each Sessionalexam (Internal Assessment) and before the end semester exam.

11. Examinations/Assessments

The scheme for internal assessment and end semester examinations is given in Table – X.

11.1. End semester examinations

The End Semester Examinations for each theory and practical coursethrough semesters I to VIII shall beconducted by the university except for the subjects with asterix symbol (*) in table I and II for which examinations shall be conducted by the subject experts at college level and the marks/grades shall be submitted to the university.

Semester II

Course code	Name of the course	Internal Assessment				End Semester Exams		Total Marks
		Continuous Mode	Sessional Exams		Total	Marks	Duration	
			Marks	Duration				
BP201T	Human Anatomy and Physiology II – Theory	10	15	1 Hr	25	75	3 Hrs	100
BP202T	Pharmaceutical Organic Chemistry I – Theory	10	15	1 Hr	25	75	3 Hrs	100
BP203T	Biochemistry – Theory	10	15	1 Hr	25	75	3 Hrs	100
BP204T	Pathophysiology – Theory	10	15	1 Hr	25	75	3 Hrs	100
BP205T	Computer Applications in Pharmacy – Theory*	10	15	1 Hr	25	50	2 Hrs	75
BP206T	Environmental sciences – Theory*	10	15	1 Hr	25	50	2 Hrs	75
BP207P	Human Anatomy and Physiology II –Practical	5	10	4 Hrs	15	35	4 Hrs	50
BP208P	Pharmaceutical Organic Chemistry I– Practical	5	10	4 Hrs	15	35	4 Hrs	50
BP209P	Biochemistry – Practical	5	10	4 Hrs	15	35	4 Hrs	50
BP210P	Computer Applications in Pharmacy – Practical*	5	5	2 Hrs	10	15	2 Hrs	25
	Total	**80**	**125**	**20 Hrs**	**205**	**520**	**30 Hrs**	**725**

* The subject experts at college level shall conduct examinations

Semester III

Course code	Name of the course	Internal Assessment				End Semester Exams		Total Marks
		Continuous Mode	Sessional Exams		Total	Marks	Duration	
			Marks	Duration				
BP301T	Pharmaceutical Organic Chemistry II – Theory	10	15	1 Hr	25	75	3 Hrs	100
BP302T	PhysicalPharmaceuticsI –Theory	10	15	1 Hr	25	75	3 Hrs	100
BP303T	Pharmaceutical Microbiology – Theory	10	15	1 Hr	25	75	3 Hrs	100
BP304T	Pharmaceutical Engineering – Theory	10	15	1 Hr	25	75	3 Hrs	100
BP305P	Pharmaceutical Organic Chemistry II – Practical	5	10	4 Hr	15	35	4 Hrs	50
BP306P	Physical Pharmaceutics I – Practical	5	10	4 Hr	15	35	4 Hrs	50
BP307P	Pharmaceutical Microbiology – Practical	5	10	4 Hr	15	35	4 Hrs	50
BP308P	Pharmaceutical Engineering – Practical	5	10	4 Hr	15	35	4 Hrs	50
Total		**60**	**100**	**20**	**160**	**440**	**28Hrs**	**600**

11/6/18

Semester IV

Course code	Name of the course	Internal Assessment				End Semester Exams		Total Marks
		Continuous Mode	Sessional Exams		Total	Marks	Duration	
			Marks	Duration				
BP401T	Pharmaceutical Organic Chemistry III– Theory	10	15	1 Hr	25	75	3 Hrs	100
BP402T	Medicinal Chemistry I – Theory	10	15	1 Hr	25	75	3 Hrs	100
BP403T	Physical Pharmaceutics II – Theory	10	15	1 Hr	25	75	3 Hrs	100
BP404T	Pharmacology I – Theory	10	15	1 Hr	25	75	3 Hrs	100
BP405T	Pharmacognosy I – Theory	10	15	1 Hr	25	75	3 Hrs	100
BP406P	Medicinal Chemistry I – Practical	5	10	4 Hr	15	35	4 Hrs	50
BP407P	Physical Pharmaceutics II – Practical	5	10	4 Hrs	15	35	4 Hrs	50
BP408P	Pharmacology I – Practical	5	10	4 Hrs	15	35	4 Hrs	50
BP409P	Pharmacognosy I – Practical	5	10	4 Hrs	15	35	4 Hrs	50
	Total	**70**	**115**	**21 Hrs**	**185**	**515**	**31 Hrs**	**700**

Semester V

Course code	Name of the course	Internal Assessment				End Semester Exams		Total Marks
		Continuous Mode	Sessional Exams		Total	Marks	Duration	
			Marks	Duration				
BP501T	Medicinal Chemistry II – Theory	10	15	1 Hr	25	75	3 Hrs	100
BP502T	Industrial PharmacyI– Theory	10	15	1 Hr	25	75	3 Hrs	100
BP503T	Pharmacology II – Theory	10	15	1 Hr	25	75	3 Hrs	100
BP504T	Pharmacognosy II – Theory	10	15	1 Hr	25	75	3 Hrs	100
BP505T	Pharmaceutical Jurisprudence – Theory	10	15	1 Hr	25	75	3 Hrs	100
BP506P	Industrial PharmacyI– Practical	5	10	4 Hr	15	35	4 Hrs	50
BP507P	Pharmacology II – Practical	5	10	4 Hr	15	35	4 Hrs	50
BP508P	Pharmacognosy II – Practical	5	10	4 Hr	15	35	4 Hrs	50
	Total	**65**	**105**	**17 Hr**	**170**	**480**	**27 Hrs**	**650**

Semester VI

Course code	Name of the course	Internal Assessment				End Semester Exams		Total Marks
		Continuous Mode	Sessional Exams		Total	Marks	Duration	
			Marks	Duration				
BP601T	Medicinal Chemistry III – Theory	10	15	1 Hr	25	75	3 Hrs	100
BP602T	Pharmacology III – Theory	10	15	1 Hr	25	75	3 Hrs	100
BP603T	Herbal Drug Technology – Theory	10	15	1 Hr	25	75	3 Hrs	100
BP604T	Biopharmaceutics and Pharmacokinetics – Theory	10	15	1 Hr	25	75	3 Hrs	100
BP605T	Pharmaceutical Biotechnology– Theory	10	15	1 Hr	25	75	3 Hrs	100
BP606T	Quality Assurance– Theory	10	15	1 Hr	25	75	3 Hrs	100
BP607P	Medicinal chemistry III – Practical	5	10	4 Hrs	15	35	4 Hrs	50
BP608P	Pharmacology III – Practical	5	10	4 Hrs	15	35	4 Hrs	50
BP609P	Herbal Drug Technology – Practical	5	10	4 Hrs	15	35	4 Hrs	50
	Total	**75**	**120**	**18 Hrs**	**195**	**555**	**30 Hrs**	**750**

Semester VII

Course code	Name of the course	Internal Assessment				End Semester Exams		Total Marks
		Continuous Mode	Sessional Exams		Total	Marks	Duration	
			Marks	Duration				
BP701T	Instrumental Methods of Analysis – Theory	10	15	1 Hr	25	75	3 Hrs	100
BP702T	Industrial Pharmacy – Theory	10	15	1 Hr	25	75	3 Hrs	100
BP703T	Pharmacy Practice – Theory	10	15	1 Hr	25	75	3 Hrs	100
BP704T	Novel Drug Delivery System – Theory	10	15	1 Hr	25	75	3 Hrs	100
BP705 P	Instrumental Methods of Analysis – Practical	5	10	4 Hrs	15	35	4 Hrs	50
BP706 PS	Practice School*	25	-	-	25	125	5 Hrs	150
	Total	**70**	**70**	**8Hrs**	**140**	**460**	**21 Hrs**	**600**

* The subject experts at college level shall conduct examinations

Semester VIII

Course code	Name of the course	Internal Assessment				End Semester Exams		Total Marks
		Continuous Mode	Sessional Exams		Total	Marks	Duration	
			Marks	Duration				
BP801T	Biostatistics and Research Methodology – Theory	10	15	1 Hr	25	75	3 Hrs	100
BP802T	Social and Preventive Pharmacy – Theory	10	15	1 Hr	25	75	3 Hrs	100
BP803ET	Pharmaceutical Marketing – Theory	10 + 10 = 20	15 + 15 = 30	1 + 1 = 2 Hrs	25 + 25 = 50	75 + 75 = 150	3 + 3 = 6 Hrs	100 + 100 = 200
BP804ET	Pharmaceutical Regulatory Science – Theory							
BP805ET	Pharmacovigilance – Theory							
BP806ET	Quality Control and Standardization of Herbals – Theory							
BP807ET	Computer Aided Drug Design – Theory							
BP808ET	Cell and Molecular Biology – Theory							
BP809ET	Cosmetic Science – Theory							
BP810ET	Experimental Pharmacology – Theory							
BP811ET	Advanced Instrumentation Techniques – Theory							
BP812PW	Project Work	-	-	-	-	150	4 Hrs	150
Total		**40**	**60**	**4 Hrs**	**100**	**450**	**16 Hrs**	**550**

11.2. Internal assessment: Continuous mode

The marks allocated for Continuous mode of Internal Assessment shall be awarded as per the scheme given below.

Table-XI:Scheme for awarding internal assessment: Continuous mode

Theory		
Criteria	**Maximum Marks**	
Attendance (Refer Table – XII)	4	2
Academic activities (Average of any 3 activities e.g. quiz, assignment, open book test, field work, group discussion and seminar)	3	1.5
Student – Teacher interaction	3	1.5
Total	**10**	**5**
Practical		
Attendance (Refer Table – XII)	2	
Based on Practical Records, Regular viva voce, etc.	3	
Total	**5**	

Table- XII: Guidelines for the allotment of marks for attendance

Percentage of Attendance	Theory	Practical
95 – 100	4	2
90 – 94	3	1.5
85 – 89	2	1
80 – 84	1	0.5
Less than 80	0	0

11.2.1. Sessional Exams

Two Sessional exams shall be conducted for each theory / practical course as per the schedule fixed by the college(s). The scheme of question paper for theory and practical Sessional examinations is given below. The average marks of two Sessional exams shall be computed for internal assessment as per the requirements given in tables – X.

Sessional exam shall be conducted for 30 marks for theory and shall be computed for 15 marks. Similarly Sessional exam for practical shall be conducted for 40 marks and shall be computed for 10 marks.

Question paper pattern for theory Sessional examinations

For subjects having University examination

I. Multiple Choice Questions (MCQs)	=	10 x 1 = 10
OR		OR
Objective Type Questions (5 x 2)	=	05 x 2 = 10
(Answer all the questions)		
I. Long Answers (Answer 1 out of 2)	=	1 x 10 = 10
II. Short Answers (Answer 2 out of 3)	=	2 x 5 = 10
	Total =	30 marks

For subjects having Non University Examination

I. Long Answers (Answer 1 out of 2)	=	1 x 10 = 10
II. Short Answers (Answer 4 out of 6)	=	4 x 5 = 20
	Total =	30 marks

Question paper pattern for practical sessional examinations

I. Synopsis	=	10
II. Experiments	=	25
III. Viva voce	=	05
	Total =	40 marks

12. Promotion and award of grades

A student shall be declared PASSand eligible for getting gradein a course of B.Pharm.program if he/she secures at least 50% marks in that particular course including internal assessment.For example, to be declared as PASS and to get grade, the student has to secure a minimum of 50 marks for the total of 100 including continuous mode of assessment and end semester theory examination and has to secure a minimum of 25 marks for the total 50 including internal assessment and end semester practical examination.

13. Carry forward of marks

In case a studentfails to secure the minimum 50% in any Theory or Practical course as specified in 12,then he/she shall reappear for the end semester examinationof that course. However his/her marks of the Internal Assessmentshallbe carried overand he/she shall be entitled for grade obtained by him/her on passing.

14. Improvement of internal assessment

A studentshall have the opportunity to improvehis/her performance only oncein the Sessional exam component of the internal assessment. The re-conduct of the Sessional exam shall be completed before the commencement of next end semester theory examinations.

15. Re-examination of end semester examinations

Reexamination ofend semester examinationshall be conducted as per the schedule given in table XIII. The exact dates of examinations shall be notified from time to time.

Table-XIII: Tentative schedule of end semester examinations

Semester	For Regular Candidates	For Failed Candidates
I, III, V and VII	November / December	May / June
II, IV, VI and VIII	May / June	November / December

Question paper pattern for end semester theory examinations

For 75 marks paper

I. Multiple Choice Questions(MCQs) = 20 x 1 = 20
OR
Objective Type Questions (10 x 2) = 10 x 2 = 20
(Answer all the questions)
II. Long Answers (Answer 2 out of 3) = 2 x 10 = 20
III. Short Answers (Answer 7 out of 9) = 7 x 5 = 35

Total = 75 marks

For 50 marks paper

I. Long Answers (Answer 2 out of 3) = 2 x 10 = 20
II. Short Answers (Answer 6 out of 8) = 6 x 5 = 30

Total = 50 marks

For 35 marks paper

I. Long Answers (Answer 1 out of 2) = 1 x 10 = 10
II. Short Answers (Answer 5 out of 7) = 5 x 5 = 25

Total = 35 marks

Question paper pattern for end semester practical examinations

I. Synopsis = 5
II. Experiments = 25
III. Viva voce = 5

Total = 35 marks

16. Academic Progression:

No student shall be admitted to any examination unless he/she fulfills the norms given in 6. Academic progression rules are applicable as follows:

A student shall be eligible to carry forward all the courses of I, II and III semesters till the IV semester examinations. However, he/she shall not be eligible to attend the courses of V semester until all the courses of I and II semesters are successfully completed.

A student shall be eligible to carry forward all the courses of III, IV and V semesters till the VI semester examinations. However, he/she shall not be eligible to attend the courses of VII semester until all the courses of I, II, III and IV semesters are successfully completed.

A student shall be eligible to carry forward all the courses of V, VI and VII semesters till the VIII semester examinations. However, he/she shall not be eligible to get the course completion certificate until all the courses of I, II, III, IV, V and VI semesters are successfully completed.

A student shall be eligible to get his/her CGPA upon successful completion of the courses of I to VIII semesters within the stipulated time period as per the norms specified in 26.

A lateral entry student shall be eligible to carry forward all the courses of III, IV and V semesters till the VI semester examinations. However, he/she shall not be eligible to attend the courses of VII semester until all the courses of III and IV semesters are successfully completed.

A lateral entry student shall be eligible to carry forward all the courses of V, VI and VII semesters till the VIII semester examinations. However, he/she shall not be eligible to get the course completion certificate until all the courses of III, IV, V and VI semesters are successfully completed.

A lateral entry student shall be eligible to get his/her CGPA upon successful completion of the courses of III to VIII semesters within the stipulated time period as per the norms specified in 26.

Any student who hasgiven more than 4 chances for successful completion of I / III semester courses and more than 3 chances for successful completion of II / IV semester courses shall be permitted to attend V / VII semester classes ONLY during the subsequent academic year as the case may be. In simpler terms there shall NOT be any ODD BATCH for any semester.

Note: Grade ABshould be considered as failed and treated as one head for deciding academic progression. Such rules are also applicable for those students who fail to register for examination(s) of any course in any semester.

17. Grading of performances

17.1. Letter grades and grade points allocations:

Based on the performances, each student shall be awarded a final letter grade at the end of the semester for each course.The letter grades and their corresponding grade points are given in Table – XII.

Table – XII: Letter grades and grade points equivalent to Percentage of marks and performances

Percentage of Marks Obtained	Letter Grade	Grade Point	Performance
90.00 – 100	O	10	Outstanding
80.00 – 89.99	A	9	Excellent
70.00 – 79.99	B	8	Good
60.00 – 69.99	C	7	Fair
50.00 – 59.99	D	6	Average
Less than 50	F	0	Fail
Absent	AB	0	Fail

A learner who remains absent for any end semester examination shall be assigned a letter grade of ABand a corresponding grade point of zero. He/she should reappear for the said evaluation/examination in due course.

18. The Semester grade point average (SGPA)

The performance of a student in a semester is indicated by a number called 'Semester Grade Point Average' (SGPA). The SGPA is the weighted average of the grade points obtainedin all the courses by the student during the semester. For example, if a student takes five courses(Theory/Practical) in a semester with credits C1, C2, C3, C4 and C5 and the student's grade pointsin these courses are G1, G2, G3, G4 and G5, respectively, and then students' SGPA is equal to:

$$\text{SGPA} = \frac{C_1G_1 + C_2G_2 + C_3G_3 + C_4G_4 + C_5G_5}{C_1 + C_2 + C_3 + C_4 + C_5}$$

The SGPA is calculated to two decimal points.It should be noted that, the SGPA for any semester shall take into consideration the F and ABSgrade awarded in that semester. For example if a learner has a F or ABS grade in course 4, theSGPA shall then be computed as:

$$SGPA = \frac{C_1G_1 + C_2G_2 + C_3G_3 + C_4 * ZERO + C_5G_5}{C_1 + C_2 + C_3 + C_4 + C_5}$$

19. Cumulative Grade Point Average (CGPA)

The CGPA is calculated with the SGPA of all the VIII semesters to two decimal points and is indicated in final grade report card/final transcript showing the grades of all VIII semesters and their courses. The CGPA shall reflect the failed statusin case of F grade(s),till the course(s) is/are passed. When the course(s)is/are passedby obtaining a pass grade on subsequent examination(s) theCGPA shall only reflect the new grade and not the fail grades earned earlier.The CGPA is calculated as:

$$CGPA = \frac{C_1S_1 + C_2S_2 + C_3S_3 + C_4S_4 + C_5S_5 + C_6S_6 + C_7S_7 + C_8S_8}{C_1 + C_2 + C_3 + C_4 + C_5 + C_6 + C_7 + C_8}$$

where $C_1, C_2, C_3,\ldots$ is the total number of credits for semester I,II,III,.... and $S_1,S_2, S_3,\ldots$is the SGPA of semester I,II,III,.... .

20. Declaration of class

The class shall be awarded on the basis of CGPA as follows:

First Class with Distinction	= CGPA of. 7.50 and above
First Class	= CGPA of 6.00 to 7.49
Second Class	= CGPA of 5.00 to 5.99

21. Project work

All the students shall undertake a projectunder the supervision of a teacher and submit a report. The area of the project shall directly relate any one of the elective subject opted by the student in semester VIII. The project shall be carried out in group not exceeding 5 in number. The project report shall be submitted in triplicate (typed & bound copy not less than 25 pages).

The internal and external examiner appointed by the University shall evaluate the project at the time of the Practical examinations of other semester(s). Students shall be evaluated in groups for four hours (i.e., about half an hour for a group of five students). The projects shall be evaluated as per the criteria given below.

Evaluation of Dissertation Book:

Objective(s) of the work done	15 Marks
Methodology adopted	20 Marks
Results and Discussions	20 Marks
Conclusions and Outcomes	20 Marks
Total	**75 Marks**

Evaluation of Presentation:

Presentation of work	25 Marks
Communication skills	20 Marks
Question and answer skills	30 Marks
Total	**75 Marks**

Explanation: The 75 marks assigned to the dissertation book shall be same for all the students in a group. However, the 75 marks assigned for presentation shall be awarded based on the performance of individual students in the given criteria.

22. Industrial training (Desirable)

Every candidate shall be required to work for at least 150 hours spread over four weeks in a Pharmaceutical Industry/Hospital. It includes Production unit, Quality Control department, Quality Assurance department, Analytical laboratory, Chemical manufacturing unit, Pharmaceutical R&D, Hospital (Clinical Pharmacy), Clinical Research Organization, Community Pharmacy, etc. After the Semester – VI and before the commencement of Semester – VII, and shall submit satisfactory report of such work and certificate duly signed by the authority of training organization to the head of the institute.

23. Practice School

In the VII semester, every candidate shall undergo practice school for a period of 150 hours evenly distributed throughout the semester. The student shall opt any one of the domains for practice school declared by the program committee from time to time.

At the end of the practice school, every student shall submit a printed report (in triplicate) on the practice school he/she attended (not more than 25 pages). Along with the exams of semester VII, the report submitted by the student, knowledge and skills acquired by the student through practice school shall be evaluated by the subject experts at college leveland grade point shall be awarded.

24. Award of Ranks

Ranks and Medals shall be awarded on the basis of final CGPA. However, candidates who fail in one or more courses during the B.Pharm program shall not be eligible for award of ranks.Moreover, the candidates should have completed the B. Pharm program in minimum prescribed number of years, (four years) for the award of Ranks.

25. Award of degree

Candidates who fulfill the requirements mentioned above shall be eligible for award of degree during the ensuing convocation.

26. Duration for completion of the program of study

The duration for the completion of the program shall be fixed as double the actual duration of the program and the students have to pass within the said period, otherwise they have to get fresh Registration.

27. Re-admission after break of study

Candidate who seeks re-admission to the program after break of study has to get the approval from the university by paying a condonation fee.

No condonation is allowed for the candidate who has more than 2 years of break up period and he/she has to rejoin the program by paying the required fees.

CHAPTER - II: SYLLABUS

Semester I

BP101T. HUMAN ANATOMY AND PHYSIOLOGY-I (Theory)

45 Hours

Scope: This subject is designed to impart fundamental knowledge on the structure and functions of the various systems of the human body. It also helps in understanding both homeostatic mechanisms. The subject provides the basic knowledge required to understand the various disciplines of pharmacy.

Objectives: Upon completion of this course the student should be able to

1. Explain the gross morphology, structure and functions of various organs of the human body.
2. Describe the various homeostatic mechanisms and their imbalances.
3. Identify the various tissues and organs of different systems of human body.
4. Perform the various experiments related to special senses and nervous system.
5. Appreciate coordinated working pattern of different organs of each system

Course Content:

Unit I **10 hours**

- **Introduction to human body**
  Definition and scope of anatomy and physiology, levels of structural organization and body systems, basic life processes, homeostasis, basic anatomical terminology.
- **Cellular level of organization**
  Structure and functions of cell, transport across cell membrane, cell division, cell junctions. General principles of cell communication, intracellular signaling pathway activation by extracellular signal molecule, Forms of intracellular signaling: a) Contact-dependent b) Paracrine c) Synaptic d) Endocrine
- **Tissue level of organization**
  Classification of tissues, structure, location and functions of epithelial, muscular and nervous and connective tissues.

Unit II **10 hours**

- **Integumentary system**
  Structure and functions of skin
- **Skeletal system**
  Divisions of skeletal system, types of bone, salient features and functions of bones of axial and appendicular skeletal system
  Organization of skeletal muscle, physiology of muscle contraction, neuromuscular junction

- **Joints**
  Structural and functional classification, types of joints movements and its articulation

Unit III **10 hours**

- **Body fluids and blood**
- Body fluids, composition and functions of blood, hemopoeisis, formation of hemoglobin, anemia, mechanisms of coagulation, blood grouping, Rh factors, transfusion, its significance and disorders of blood, Reticulo endothelial system.
- **Lymphatic system**

  Lymphatic organs and tissues, lymphatic vessels, lymph circulation and functions of lymphatic system

Unit IV **08 hours**

Peripheral nervous system:
Classification of peripheral nervous system: Structure and functions of sympathetic and parasympathetic nervous system.
Origin and functions of spinal and cranial nerves.

- **Special senses**
  Structure and functions of eye, ear, nose and tongue and their disorders.

Unit V **07 hours**

- **Cardiovascular system**
  Heart – anatomy of heart, blood circulation, blood vessels, structure and functions of artery, vein and capillaries, elements of conduction system of heart and heart beat, its regulation by autonomic nervous system, cardiac output, cardiac cycle. Regulation of blood pressure, pulse, electrocardiogram and disorders of heart.

BP107P. HUMAN ANATOMY AND PHYSIOLOGY (Practical)

4 Hours/week

Practical physiology is complimentary to the theoretical discussions in physiology. Practicals allow the verification of physiological processes discussed in theory classes through experiments on living tissue, intact animals or normal human beings. This is helpful for developing an insight on the subject.

1. Study of compound microscope.
2. Microscopic study of epithelial and connective tissue
3. Microscopic study of muscular and nervous tissue
4. Identification of axial bones
5. Identification of appendicular bones

6. Introduction to hemocytometry.
7. Enumeration of white blood cell (WBC) count
8. Enumeration of total red blood corpuscles (RBC) count
9. Determination of bleeding time
10. Determination of clotting time
11. Estimation of hemoglobin content
12. Determination of blood group.
13. Determination of erythrocyte sedimentation rate (ESR).
14. Determination of heart rate and pulse rate.
15. Recording of blood pressure.

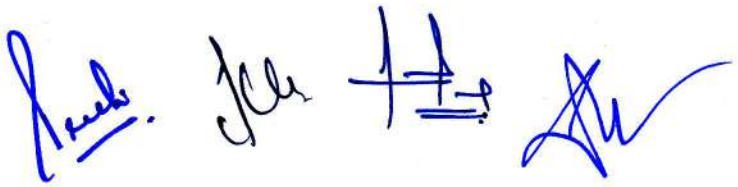
Recommended Books (Latest Editions)

1. Essentials of Medical Physiology by K. Sembulingam and P. Sembulingam. Jaypee brothers medical publishers, New Delhi.
2. Anatomy and Physiology in Health and Illness by Kathleen J.W. Wilson, Churchill Livingstone, New York
3. Physiological basis of Medical Practice-Best and Tailor. Williams & Wilkins Co,Riverview,MI USA
4. Text book of Medical Physiology- Arthur C,Guyton andJohn.E. Hall. Miamisburg, OH, U.S.A.
5. Principles of Anatomy and Physiology by Tortora Grabowski. Palmetto, GA, U.S.A.

6. Textbook of Human Histology by Inderbir Singh, Jaypee brother's medical publishers, New Delhi.
7. Textbook of Practical Physiology by C.L. Ghai, Jaypee brother's medical publishers, New Delhi.
8. Practical workbook of Human Physiology by K. Srinageswari and Rajeev Sharma, Jaypee brother's medical publishers, New Delhi.

Reference Books (Latest Editions)

1. Physiological basis of Medical Practice-Best and Tailor. Williams & Wilkins Co, Riverview, MI USA
2. Text book of Medical Physiology- Arthur C, Guyton and John. E. Hall. Miamisburg, OH, U.S.A.
3. Human Physiology (vol 1 and 2) by Dr. C.C. Chatterrje ,Academic Publishers Kolkata



BP102T. PHARMACEUTICAL ANALYSIS (Theory)

45 Hours

Scope: This course deals with the fundamentals of analytical chemistry and principles of electrochemical analysis of drugs

Objectives: Upon completion of the course student shall be able to

- understand the principles of volumetric and electro chemical analysis
- carryout various volumetric and electrochemical titrations
- develop analytical skills

Course Content:

UNIT-I **10 Hours**

(a) Pharmaceutical analysis- Definition and scope

i) Different techniques of analysis

ii) Methods of expressing concentration

iii) Primary and secondary standards.

iv) Preparation and standardization of various molar and normal solutions- Oxalic acid, sodium hydroxide, hydrochloric acid, sodium thiosulphate, sulphuric acid, potassium permanganate and ceric ammonium sulphate

(b)Errors: Sources of errors, types of errors, methods of minimizing errors, accuracy, precision and significant figures

(c)Pharmacopoeia, Sources of impurities in medicinal agents,limit tests.

UNIT-II **10 Hours**

- **Acid base titration**: Theories of acid base indicators, classification of acid base titrations and theory involved in titrations of strong, weak, and very weak acids and bases, neutralization curves
- **Non aqueous titration**: Solvents, acidimetry and alkalimetry titration and estimation of Sodium benzoate and Ephedrine HCl

UNIT-III **10 Hours**

- **Precipitation titrations**: Mohr's method, Volhard's, Modified Volhard's, Fajans method, estimation of sodium chloride.
- **Complexometric titration**: Classification, metal ion indicators, masking and demasking reagents, estimation of Magnesium sulphate, and calcium gluconate.
- **Gravimetry**: Principle and steps involved in gravimetric analysis. Purity of the precipitate: co-precipitation and post precipitation, Estimation of barium sulphate.
- Basic Principles,methods and application of diazotisation titration.

UNIT-IV **08 Hours**

Redox titrations

(a) Concepts of oxidation and reduction

(b) Types of redox titrations (Principles and applications)

Cerimetry, Iodimetry, Iodometry, Bromatometry, Dichrometry, Titration with potassium iodate

UNIT-V **07 Hours**

- **Electrochemical methods of analysis**
  - **Conductometry**- Introduction, Conductivity cell, Conductometric titrations, applications.
  - **Potentiometry** - Electrochemical cell, construction and working of reference (Standard hydrogen, silver chloride electrode and calomel electrode) and indicator electrodes (metal electrodes and glass electrode), methods to determine end point of potentiometric titration and applications.
  - **Polarography** - Principle, Ilkovic equation, construction and working of dropping mercury electrode and rotating platinum electrode, applications

BP108P. PHARMACEUTICAL ANALYSIS (Practical)

4 Hours / Week

I **Limit Test of the following**
- (1) Chloride
- (2) Sulphate
- (3) Iron
- (4) Arsenic

II **Preparation and standardization of**
- (1) Sodium hydroxide
- (2) Sulphuric acid
- (3) Sodium thiosulfate
- (4) Potassium permanganate
- (5) Ceric ammonium sulphate

III **Assay of the following compounds along with Standardization of Titrant**
- (1) Ammonium chloride by acid base titration
- (2) Ferrous sulphate by Cerimetry
- (3) Copper sulphate by Iodometry
- (4) Calcium gluconate by complexometry
- (5) Hydrogen peroxide by Permanganometry
- (6) Sodium benzoate by non-aqueous titration
- (7) Sodium Chloride by precipitation titration

IV **Determination of Normality by electro-analytical methods**
- (1) Conductometric titration of strong acid against strong base
- (2) Conductometric titration of strong acid and weak acid against strong base
- (3) Potentiometric titration of strong acid against strong base

Recommended Books: (Latest Editions)

1. A.H. Beckett & J.B. Stenlake's, Practical Pharmaceutical Chemistry Vol I & II, Stahlone Press of University of London
2. A.I. Vogel, Text Book of Quantitative Inorganic analysis
3. P. Gundu Rao, Inorganic Pharmaceutical Chemistry
4. Bentley and Driver's Textbook of Pharmaceutical Chemistry
5. John H. Kennedy, Analytical chemistry principles
6. Indian Pharmacopoeia.

BP103T. PHARMACEUTICS- I (Theory)

45 Hours

Scope: This course is designed to impart a fundamental knowledge on the preparatory pharmacy with arts and science of preparing the different conventional dosage forms.

Objectives: Upon completion of this course the student should be able to:

- Know the history of profession of pharmacy
- Understand the basics of different dosage forms, pharmaceutical incompatibilities and pharmaceutical calculations
- Understand the professional way of handling the prescription
- Preparation of various conventional dosage forms

Course Content:

UNIT – I

10 Hours

- **Historical background and development of profession of pharmacy**: History of profession of Pharmacy in India in relation to pharmacy education, industry and organization, Pharmacy as a career, Pharmacopoeias: Introduction to IP, BP, USP and Extra Pharmacopoeia.
- **Dosage forms:** Introduction to dosage forms, classification and definitions
- **Prescription:** Definition, Parts of prescription, handling of Prescription and Errors in prescription.
- **Posology:** Definition, Factors affecting posology. Pediatric dose calculations based on age, body weight and body surface area.

UNIT – II

10 Hours

- **Pharmaceutical calculations**: Weights and measures – Imperial & Metric system, Calculations involving percentage solutions, alligation, proof spirit and isotonic solutions based on freezing point and molecular weight.

- **Powders:** Definition, classification, advantages and disadvantages,Simple & compound powders – official preparations, dusting powders, effervescent, efflorescent and hygroscopic powders, eutectic mixtures. Geometric dilutions.

- **Liquid dosage forms:** Advantages and disadvantages of liquid dosage forms. Excipients used in formulation of liquid dosage forms. Solubility enhancement techniques

UNIT – III **08 Hours**

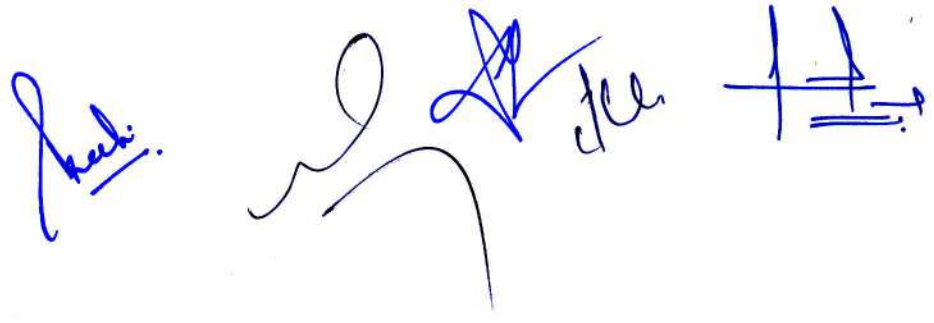
- **Monophasic liquids:** Definitions and preparations of Gargles, Mouthwashes, Throat Paint, Eardrops, Nasal drops, Enemas, Syrups, Elixirs, Liniments and Lotions.
- **Biphasic liquids:**
- **Suspensions:** Definition, advantages and disadvantages, classifications, Preparation of suspensions; Flocculated and Deflocculated suspension & stability problems and methods to overcome.
- **Emulsions:** Definition, classification, emulsifying agent, test for the identification of type ofEmulsion, Methods of preparation & stability problems and methods to overcome.

UNIT – IV **08 Hours**

- **Suppositories**: Definition, types, advantages and disadvantages, types of bases, methods of preparations. Displacement value & its calculations, evaluation of suppositories.
- **Pharmaceutical incompatibilities**: Definition, classification, physical, chemical and therapeutic incompatibilities with examples.

UNIV – V **07 Hours**

- **Semisolid dosage forms:** Definitions, classification, mechanisms and factors influencing dermal penetration of drugs. Preparation of ointments, pastes, creams and gels. Excipients used in semi solid dosage forms. Evaluation of semi solid dosages forms



BP109P. PHARMACEUTICSI (Practical)

3 Hours / week

1 . Syrups

a) Syrup IP'66

b) Compound syrup of Ferrous Phosphate BPC'68

2. Elixirs a) Piperazine citrate elixir

b) Paracetamol pediatric elixir

3.Linctus a) Terpin Hydrate Linctus IP'66

b) Iodine Throat Paint (Mandles Paint)

4. Solutions

a) Strong solution of ammonium acetate

b) Cresol with soap solution

c) Lugol's solution

5. Suspensions

a) Calamine lotion

b) Magnesium Hydroxide mixture

c) Aluminimum Hydroxide gel

6. Emulsions a) Turpentine Liniment

b) Liquid paraffin emulsion

7. Powders and Granules

a) ORS powder (WHO)

b) Effervescent granules

c)Dusting powder

d)Divded powders

8. Suppositories

a) Glycero gelatin suppository

b) Coca butter suppository

c) Zinc Oxide suppository

8. Semisolids

a) Sulphur ointment

b) Non staining-iodine ointment with methyl salicylate

c) Carbopal gel

9. Gargles and Mouthwashes

a) Iodine gargle

b) Chlorhexidine mouthwash

Recommended Books: (Latest Editions)

1. H.C. Ansel et al., Pharmaceutical Dosage Form and Drug Delivery System, Lippincott Williams and Walkins, New Delhi.
2. Carter S.J., Cooper and Gunn's-Dispensing for Pharmaceutical Students, CBS publishers, New Delhi.
3. M.E. Aulton, Pharmaceutics, The Science& Dosage Form Design, Churchill Livingstone, Edinburgh.
4. Indian pharmacopoeia.
5. British pharmacopoeia.
6. Lachmann. Theory and Practice of Industrial Pharmacy,Lea& Febiger Publisher, The University of Michigan.
7. Alfonso R. Gennaro Remington. The Science and Practice of Pharmacy, Lippincott Williams, New Delhi.
8. Carter S.J., Cooper and Gunn's. Tutorial Pharmacy, CBS Publications, New Delhi.
9. E.A. Rawlins, Bentley's Text Book of Pharmaceutics, English Language Book Society, Elsevier Health Sciences, USA.
10. Isaac Ghebre Sellassie: Pharmaceutical Pelletization Technology, Marcel Dekker, INC, New York.
11. Dilip M. Parikh: Handbook of Pharmaceutical Granulation Technology, Marcel Dekker, INC, New York.
12. Francoise Nieloud and Gilberte Marti-Mestres: Pharmaceutical Emulsions and Suspensions, Marcel Dekker, INC, New York.

Bicarbonate*, Aluminum hydroxide gel, Magnesium hydroxide mixture

Cathartics: Magnesium sulphate, Sodium orthophosphate, Kaolin and Bentonite

Antimicrobials: Mechanism, classification, Potassium permanganate, Boric acid, Hydrogen peroxide*, Chlorinated lime*, Iodine and its preparations

UNIT IV **08 Hours**

- **Miscellaneous compounds**

  Expectorants: Potassium iodide, Ammonium chloride*.

  Emetics: Copper sulphate*, Sodium potassium tartarate

  Haematinics: Ferrous sulphate*, Ferrous gluconate

  Poison and Antidote: Sodium thiosulphate*, Activated charcoal, Sodium nitrite333

  Astringents: Zinc Sulphate, Potash Alum

UNIT V **07 Hours**

- **Radiopharmaceuticals**: Radio activity, Measurement of radioactivity, Properties of α, β, γ radiations, Half life, radio isotopes and study of radio isotopes - Sodium iodide I^{131}, Storage conditions, precautions & pharmaceutical application of radioactive substances.

BP104T. PHARMACEUTICAL INORGANIC CHEMISTRY (Theory)

45 Hours

Scope: This subject deals with the monographs of inorganic drugs and pharmaceuticals.

Objectives: Upon completion of course student shall be able to

- know the sources of impurities and methods to determine the impurities in inorganic drugs and pharmaceuticals
- understand the medicinal and pharmaceutical importance of inorganic compounds

Course Content:

UNIT I **10 Hours**

- **Impurities in pharmaceutical substances:** History of Pharmacopoeia, Sources and types of impurities, principle involved in the limit test for Chloride, Sulphate, Iron, Arsenic, Lead and Heavy metals, modified limit test for Chloride and Sulphate

  General methods of preparation, assay for the compounds superscripted with **asterisk (*),** properties and medicinal uses of inorganic compounds belonging to the following classes

UNIT II **10 Hours**

- **Acids, Bases and Buffers:** Buffer equations and buffer capacity in general, buffers in pharmaceutical systems, preparation, stability, buffered isotonic solutions, measurements of tonicity, calculations and methods of adjusting isotonicity.
- **Major extra and intracellular electrolytes**: Functions of major physiological ions, Electrolytes used in the replacement therapy: Sodium chloride*, Potassium chloride, Calcium gluconate* and Oral Rehydration Salt (ORS), Physiological acid base balance.
- **Dental products**: Dentifrices, role of fluoride in the treatment of dental caries, Desensitizing agents, Calcium carbonate, Sodium fluoride, and Zinc eugenol cement.

UNIT III **10 Hours**

- **Gastrointestinal agents**

  Acidifiers: Ammonium chloride* and Dil. HCl

  Antacid: Ideal properties of antacids, combinations of antacids, Sodium

BP110P. PHARMACEUTICAL INORGANIC CHEMISTRY (Practical)

4 Hours / Week

I **Limit tests for following ions**
- Limit test for Chlorides and Sulphates
- Modified limit test for Chlorides and Sulphates
- Limit test for Iron
- Limit test for Heavy metals
- Limit test for Lead
- Limit test for Arsenic

II **Identification test**
- Magnesium hydroxide
- Ferrous sulphate
- Sodium bicarbonate
- Calcium gluconate
- Copper sulphate

III **Test for purity**
- Swelling power of Bentonite
- Neutralizing capacity of aluminum hydroxide gel
- Determination of potassium iodate and iodine in potassium Iodide

IV **Preparation of inorganic pharmaceuticals**
- Boric acid
- Potash alum
- Ferrous sulphate

Recommended Books (Latest Editions)

1. A.H. Beckett & J.B. Stenlake's, Practical Pharmaceutical Chemistry Vol I & II, Stahlone Press of University of London, 4th edition.
2. A.I. Vogel, Text Book of Quantitative Inorganic analysis
3. P. Gundu Rao, Inorganic Pharmaceutical Chemistry, 3rd Edition
4. M.L Schroff, Inorganic Pharmaceutical Chemistry
5. Bentley and Driver's Textbook of Pharmaceutical Chemistry
6. Anand & Chatwal, Inorganic Pharmaceutical Chemistry
7. Indian Pharmacopoeia

UNIT – III **07 Hours**

- **Basic Listening Skills:** Introduction, Self-Awareness, Active Listening, Becoming an Active Listener, Listening in Difficult Situations
- **Effective Written Communication:** Introduction, When and When Not to Use Written Communication - Complexity of the Topic, Amount of Discussion' Required, Shades of Meaning, Formal Communication
- **Writing Effectively:** Subject Lines, Put the Main Point First, Know Your Audience, Organization of the Message

UNIT – IV **05 Hours**

- **Interview Skills:** Purpose of an interview, Do's and Dont's of an interview
- **Giving Presentations:** Dealing with Fears, Planning your Presentation, Structuring Your Presentation, Delivering Your Presentation, Techniques of Delivery

UNIT – V **04 Hours**

- **Group Discussion:** Introduction, Communication skills in group discussion, Do's and Dont's of group discussion

BP111P.COMMUNICATION SKILLS (Practical)

2 Hours / week

Thefollowing learning modules are to be conducted using wordsworth® English language lab software

Basic communication covering the following topics

Meeting People

Asking Questions

Making Friends

What did you do?

Do's and Dont's

Pronunciations covering the following topics

Pronunciation (Consonant Sounds)

Pronunciation and Nouns

Pronunciation (Vowel Sounds)

Advanced Learning

Listening Comprehension / Direct and Indirect Speech

Figures of Speech

Effective Communication

Writing Skills

Effective Writing

Interview Handling Skills

E-Mail etiquette

Presentation Skills

Recommended Books: (Latest Edition)

1. Basic communication skills for Technology, Andreja. J. Ruther Ford, 2nd Edition, Pearson Education, 2011
2. Communication skills, Sanjay Kumar, Pushpalata, 1st Edition, Oxford Press, 2011
3. Organizational Behaviour, Stephen .P. Robbins, 1st Edition, Pearson, 2013
4. Brilliant- Communication skills, Gill Hasson, 1st Edition, Pearson Life, 2011
5. The Ace of Soft Skills: Attitude, Communication and Etiquette for success, Gopala Swamy Ramesh, 5th Edition, Pearson, 2013
6. Developing your influencing skills, Deborah Dalley, Lois Burton, Margaret, Green hall, 1st Edition Universe of Learning LTD, 2010
7. Communication skills for professionals, Konar nira, 2nd Edition, New arrivals – PHI, 2011
8. Personality development and soft skills, Barun K Mitra, 1st Edition, Oxford Press, 2011
9. Soft skill for everyone, Butter Field, 1st Edition, Cengage Learning india pvt.ltd, 2011
10. Soft skills and professional communication, Francis Peters SJ, 1st Edition, Mc Graw Hill Education, 2011
11. Effective communication, John Adair, 4th Edition, Pan Mac Millan,2009
12. Bringing out the best in people, Aubrey Daniels, 2nd Edition, Mc Graw Hill, 1999

BP 106RBT.REMEDIAL BIOLOGY (Theory)

30 Hours

Scope: To learn and understand the components of living world, structure and functional system of plant and animal kingdom.

Objectives: Upon completion of the course, the student shall be able to

- know the classification and salient features of five kingdoms of life
- understand the basic components of anatomy & physiology of plant
- know understand the basic components of anatomy & physiology animal with special reference to human

UNIT I

07 Hours

Living world:

- Definition and characters of living organisms
- Diversity in the living world
- Binomial nomenclature
- Five kingdoms of life and basis of classification. Salient features of Monera, Potista, Fungi, Animalia and Plantae, Virus,

Morphology of Flowering plants

- Morphology of different parts of flowering plants – Root, stem, inflorescence, flower, leaf, fruit, seed.
- General Anatomy of Root, stem, leaf of monocotyledons & Dicotylidones.

UNIT II

07 Hours

Body fluids and circulation

- Composition of blood, blood groups, coagulation of blood
- Composition and functions of lymph
- Human circulatory system
- Structure of human heart and blood vessels
- Cardiac cycle, cardiac output and ECG

Digestion and Absorption

- Human alimentary canal and digestive glands
- Role of digestive enzymes
- Digestion, absorption and assimilation of digested food

Breathing and respiration

- Human respiratory system
- Mechanism of breathing and its regulation
- Exchange of gases, transport of gases and regulation of respiration
- Respiratory volumes

UNIT III **07 Hours**

Excretory products and their elimination

- Modes of excretion
- Human excretory system- structure and function
- Urine formation
- Rennin angiotensin system

Neural control and coordination

- Definition and classification of nervous system
- Structure of a neuron
- Generation and conduction of nerve impulse
- Structure of brain and spinal cord
- Functions of cerebrum, cerebellum, hypothalamus and medulla oblongata

Chemical coordination and regulation

- Endocrine glands and their secretions
- Functions of hormones secreted by endocrine glands

Human reproduction

- Parts of female reproductive system
- Parts of male reproductive system
- Spermatogenesis and Oogenesis
- Menstrual cycle

UNIT IV **05 Hours**

Plants and mineral nutrition:

- Essential mineral, macro and micronutrients
- Nitrogen metabolism, Nitrogen cycle, biological nitrogen fixation

Photosynthesis

- Autotrophic nutrition, photosynthesis, Photosynthetic pigments, Factors affecting photosynthesis.

UNIT V **04 Hours**

Plant respiration: Respiration, glycolysis, fermentation (anaerobic).

Plant growth and development

- Phases and rate of plant growth, Condition of growth,Introduction to plant growth regulators

Cell - The unit of life

- Structure and functions of cell and cell organelles.Cell division

Tissues

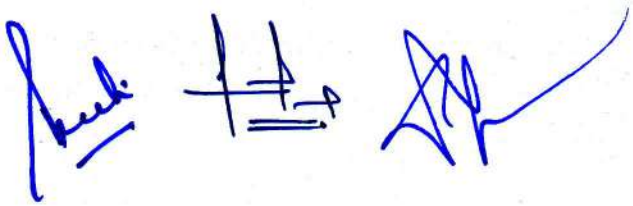
- Definition, types of tissues, location and functions.

Text Books

a. Text book of Biology by S. B. Gokhale
b. A Text book of Biology by Dr. Thulajappa and Dr. Seetaram.

Reference Books

a. A Text book of Biology by B.V. Sreenivasa Naidu
b. A Text book of Biology by Naidu and Murthy
c. Botany for Degree students By A.C.Dutta.
d.Outlines of Zoology by M. Ekambaranatha ayyer and T. N. Ananthakrishnan.
e. A manual for pharmaceutical biology practical by S.B. Gokhale and C. K. Kokate



BP112RBP.REMEDIAL BIOLOGY (Practical)

30 Hours

1. Introduction to experiments in biology
   a) Study of Microscope
   b) Section cutting techniques
   c) Mounting and staining
   d) Permanent slide preparation
2. Study of cell and its inclusions
3. Study of Stem, Root, Leaf, seed, fruit, flower and their modifications
4. Detailed study of frog by using computer models
5. Microscopic study and identification of tissues pertinent to Stem, Root Leaf, seed, fruit and flower
6. Identification of bones
7. Determination of blood group
8. Determination of blood pressure
9. Determination of tidal volume

Reference Books

1. Practical human anatomy and physiology. by S.R.Kale and R.R.Kale.
2. A Manual of pharmaceutical biology practical by S.B.Gokhale, C.K.Kokate and S.P.Shriwastava.
3. Biology practical manual according to National core curriculum .Biology forum of Karnataka. Prof .M.J.H.Shafi

BP 106RMT.REMEDIAL MATHEMATICS (Theory)

30 Hours

Scope: This is an introductory course in mathematics. This subject deals with the introduction to Partial fraction, Logarithm, matrices and Determinant, Analytical geometry, Calculus, differential equation and Laplace transform.

Objectives: Upon completion of the course the student shall be able to:-

1. Know the theory and their application in Pharmacy
2. Solve the different types of problems by applying theory
3. Appreciate the important application of mathematics in Pharmacy

Course Content:

06 Hours

UNIT – I

- **Partial fraction**

Introduction, Polynomial, Rational fractions, Proper and Improper fractions, Partial fraction , Resolving into Partial fraction, Application of Partial Fraction in Chemical Kinetics and Pharmacokinetics

- **Logarithms**

Introduction, Definition, Theorems/Properties of logarithms, Common logarithms, Characteristic and Mantissa, worked examples, application of logarithm to solve pharmaceutical problems.

- **Function**

Real Valued function, Classification of real valued functions,

- **Limits and continuity** :

Introduction , Limit of a function, Definition of limit of a function ($\in$ - δ definition) , $\lim_{x \to a} \frac{x^n - a^n}{x - a} = na^{n-1}$, $\lim_{\theta \to 0} \frac{\sin\theta}{\theta} = 1$,

06 Hours

UNIT –II

- **Matrices and Determinant:**

Introduction matrices, Types of matrices, Operation on matrices, Transpose of a matrix, Matrix Multiplication, Determinants, Properties of determinants , Product of determinants, Minors and co-Factors, Adjoint or adjugate of a square matrix , Singular and non-singular matrices, Inverse of a matrix, Solution of system of linear of equations using matrix method, Cramer's rule, Characteristic equation and roots of a square matrix, Cayley–Hamilton theorem,Applicationof Matrices in solving Pharmacokinetic equations

UNIT – III **06 Hours**

- **Calculus**

Differentiation : Introductions, Derivative of a function, Derivative of a constant, Derivative of a product of a constant and a function , Derivative of the sum or difference of two functions, Derivative of the product of two functions (product formula), Derivative of the quotient of two functions (Quotient formula) – **Without Proof**, Derivative of x^n, where is any rational number, Derivative of e^x, Derivative of log, Derivative of x^x, Derivative of trigonometric functions from first principles **(without Proof)**, Successive Differentiation, Conditions for a function to be a maximum or a minimum at a point. Application

UNIT – IV **06 Hours**

- **Analytical Geometry**

Introduction: Signs of the Coordinates, Distance formula,

Straight Line : Slope or gradient of a straight line, Conditions for parallelism and perpendicularity of two lines, Slope of a line joining two points, Slope – intercept form of a straight line

Integration:

Introduction, Definition, Standard formulae, Rules of integration , Method of substitution, Method of Partial fractions, Integration by parts, definite integrals, application

UNIT-V **06 Hours**

- **Differential Equations** : Some basic definitions, Order and degree, Equations in separable form , Homogeneous equations, Linear Differential equations, Exact equations, **Application in solving Pharmacokinetic equations**
- **Laplace Transform** : Introduction, Definition, Properties of Laplace transform, Laplace Transforms of elementary functions, Inverse Laplace transforms, Laplace transform of derivatives, Application to solve Linear differential equations, **Application in solving Chemical kinetics and Pharmacokinetics equations**

Recommended Books (Latest Edition)

1. Differential Calculus by Shanthinarayan
2. Pharmaceutical Mathematics with application to Pharmacy by Panchaksharappa Gowda D.H.
3. Integral Calculus by Shanthinarayan
4. Higher Engineering Mathematics by Dr.B.S.Grewal

Semester II

BP 201T. HUMAN ANATOMY AND PHYSIOLOGY-II (Theory)

45 Hours

Scope: This subject is designed to impart fundamental knowledge on the structure and functions of the various systems of the human body. It also helps in understanding both homeostatic mechanisms. The subject provides the basic knowledge required to understand the various disciplines of pharmacy.

Objectives: Upon completion of this course the student should be able to:

1. Explain the gross morphology, structure and functions of various organs of the human body.
2. Describe the various homeostatic mechanisms and their imbalances.
3. Identify the various tissues and organs of different systems of human body.
4. Perform the hematological tests like blood cell counts, haemoglobin estimation, bleeding/clotting time etc and also record blood pressure, heart rate, pulse and respiratory volume.
5. Appreciate coordinated working pattern of different organs of each system
6. Appreciate the interlinked mechanisms in the maintenance of normal functioning (homeostasis) of human body.

Course Content:

Unit I **10 hours**

- **Nervous system**

Organization of nervous system, neuron, neuroglia, classification and properties of nerve fibre, electrophysiology, action potential, nerve impulse, receptors, synapse, neurotransmitters.

Central nervous system: Meninges, ventricles of brain and cerebrospinal fluid.structure and functions of brain (cerebrum, brain stem, cerebellum), spinal cord (gross structure, functions of afferent and efferent nerve tracts,reflex activity)

Unit II **06 hours**

- **Digestive system**

Anatomy of GI Tract with special reference to anatomy and functions of stomach, (Acid production in the stomach, regulation of acid production through parasympathetic nervous system, pepsin role in protein digestion) small intestine

and large intestine, anatomy and functions of salivary glands, pancreas and liver, movements of GIT, digestion and absorption of nutrients and disorders of GIT.

- **Energetics**

  Formation and role of ATP, Creatinine Phosphate and BMR.

Unit III

- **Respiratory system** **10 hours**

  Anatomy of respiratory system with special reference to anatomy of lungs, mechanism of respiration, regulation of respiration

  Lung Volumes and capacities transport of respiratory gases, artificial respiration, and resuscitation methods.

- **Urinary system**
  Anatomy of urinary tract with special reference to anatomy of kidney and nephrons, functions of kidney and urinary tract, physiology of urine formation, micturition reflex and role of kidneys in acid base balance, role of RAS in kidney and disorders of kidney.

Unit IV **10 hours**

- **Endocrine system**
  Classification of hormones, mechanism of hormone action, structure and functions of pituitary gland, thyroid gland, parathyroid gland, adrenal
  gland, pancreas, pineal gland, thymus and their disorders.

Unit V **09 hours**

- **Reproductive system**

  Anatomy of male and female reproductive system, Functions of male and female reproductive system, sex hormones, physiology of menstruation, fertilization, spermatogenesis, oogenesis, pregnancy and parturition

- **Introduction to genetics**

  Chromosomes, genes and DNA, protein synthesis, genetic pattern of inheritance

BP 207 P. HUMAN ANATOMY AND PHYSIOLOGY (Practical)

4 Hours/week

Practical physiology is complimentary to the theoretical discussions in physiology. Practicals allow the verification of physiological processes discussed in theory classes through experiments on living tissue, intact animals or normal human beings. This is helpful for developing an insight on the subject.

1. To study the integumentary and special senses using specimen, models, etc.,
2. To study the nervous system using specimen, models, etc.,
3. To study the endocrine system using specimen, models, etc
4. To demonstrate the general neurological examination
5. To demonstrate the function of olfactory nerve
6. To examine the different types of taste.
7. To demonstrate the visual acuity
8. To demonstrate the reflex activity
9. Recording of body temperature
10. To demonstrate positive and negative feedback mechanism.
11. Determination of tidal volume and vital capacity.
12. Study of digestive, respiratory, cardiovascular systems, urinary and reproductive systems with the help of models, charts and specimens.
13. Recording of basal mass index
14. Study of family planning devices and pregnancy diagnosis test.
15. Demonstration of total blood count by cell analyser
16. Permanent slides of vital organs and gonads.

Recommended Books (Latest Editions)

1. Essentials of Medical Physiology by K. Sembulingam and P. Sembulingam. Jaypee brothers medical publishers, New Delhi.
2. Anatomy and Physiology in Health and Illness by Kathleen J.W. Wilson, Churchill Livingstone, New York
3. Physiological basis of Medical Practice-Best and Tailor. Williams & Wilkins Co,Riverview,MI,USA

4. Text book of Medical Physiology- Arthur C,Guyton andJohn.E. Hall. Miamisburg, OH, U.S.A.
5. Principles of Anatomy and Physiology by Tortora Grabowski. Palmetto, GA, U.S.A.
6. Textbook of Human Histology by Inderbir Singh, Jaypee brothers medical publishers, New Delhi.
7. Textbook of Practical Physiology by C.L. Ghai, Jaypee brothers medical publishers, New Delhi.
8. Practical workbook of Human Physiology by K. Srinageswari and Rajeev Sharma, Jaypee brother's medical publishers, New Delhi.

Reference Books:

1. Physiological basis of Medical Practice-Best and Tailor. Williams & Wilkins Co, Riverview, MI USA
2. Text book of Medical Physiology- Arthur C, Guyton and John. E. Hall. Miamisburg, OH, U.S.A.
3. Human Physiology (vol 1 and 2) by Dr. C.C. Chatterrje ,Academic Publishers Kolkata

BP202T. PHARMACEUTICAL ORGANIC CHEMISTRY –I (Theory)

45 Hours

Scope: This subject deals with classification and nomenclature of simple organic compounds, structural isomerism, intermediates forming in reactions, important physical properties, reactions and methods of preparation of these compounds. The syllabus also emphasizes on mechanisms and orientation of reactions.

Objectives: Upon completion of the course the student shall be able to

1. write the structure, name and the type of isomerism of the organic compound
2. write the reaction, name the reaction and orientation of reactions
3. account for reactivity/stability of compounds,
4. identify/confirm the identification of organic compound

Course Content:

General methods of preparation and reactions of compounds superscripted with asterisk (*) to be explained

To emphasize on definition, types, classification, principles/mechanisms, applications, examples and differences

UNIT-I **07 Hours**

- **Classification, nomenclature and isomerism**

  Classification of Organic Compounds

  Common and IUPAC systems of nomenclature of organic compounds

  (up to 10 Carbons open chain and carbocyclic compounds)

Structural isomerisms in organic compounds

UNIT-II10 Hours

- **Alkanes*, Alkenes* and Conjugated dienes***

  SP^3 hybridization in alkanes, Halogenation of alkanes, uses of paraffins.

  Stabilities of alkenes, SP^2 hybridization in alkenes

  E_1 and E_2 reactions – kinetics, order of reactivity of alkyl halides, rearrangement of carbocations, Saytzeffs orientation and evidences. E_1 verses E_2 reactions, Factors affecting E_1 and E_2 reactions. Ozonolysis, electrophilic addition reactions of alkenes, Markownikoff's orientation, free radical addition reactions of alkenes, Anti Markownikoff's orientation.

  Stability of conjugated dienes, Diel-Alder, electrophilic addition, free radical addition reactions of conjugated dienes, allylic rearrangement

UNIT-III10 Hours

- **Alkyl halides***

  SN_1 and SN_2 reactions - kinetics, order of reactivity of alkyl halides, stereochemistry and rearrangement of carbocations.

  SN_1 versus SN_2 reactions, Factors affecting SN_1 and SN_2 reactions

  Structure and uses of ethylchloride, Chloroform, trichloroethylene, tetrachloroethylene, dichloromethane, tetrachloromethane and iodoform.

- **Alcohols*-** Qualitative tests, Structure and uses of Ethyl alcohol, Methyl alcohol, chlorobutanol, Cetosteryl alcohol, Benzyl alcohol, Glycerol, Propylene glycol

UNIT-IV10 Hours

- **Carbonyl compounds* (Aldehydes and ketones)**

  Nucleophilic addition, Electromeric effect, aldol condensation, Crossed Aldol condensation, Cannizzaro reaction, Crossed Cannizzaro reaction, Benzoin condensation, Perkin condensation, qualitative tests, Structure and uses of Formaldehyde, Paraldehyde, Acetone, Chloral hydrate, Hexamine, Benzaldehyde, Vanilin, Cinnamaldehyde.

UNIT-V

- **Carboxylic acids*** **08 Hours**

  Acidity of carboxylic acids, effect of substituents on acidity, inductive effect and qualitative tests for carboxylic acids ,amide and ester

  Structure and Uses of Acetic acid, Lactic acid, Tartaric acid, Citric acid, Succinic acid. Oxalic acid, Salicylic acid, Benzoic acid, Benzyl benzoate, Dimethyl phthalate, Methyl salicylate and Acetyl salicylic acid

- **Aliphatic amines*** - Basicity, effect of substituent on Basicity. Qualitative test, Structure and uses of Ethanolamine, Ethylenediamine, Amphetamine

- **Alkyl halides***

  SN_1 and SN_2 reactions - kinetics, order of reactivity of alkyl halides, stereochemistry and rearrangement of carbocations.

  SN_1 versus SN_2 reactions, Factors affecting SN_1 and SN_2 reactions

  Structure and uses of ethylchloride, Chloroform, trichloroethylene, tetrachloroethylene, dichloromethane, tetrachloromethane and iodoform.

- **Alcohols*-** Qualitative tests, Structure and uses of Ethyl alcohol, Methyl alcohol, chlorobutanol, Cetosteryl alcohol, Benzyl alcohol, Glycerol, Propylene glycol

UNIT-IV10 Hours

- **Carbonyl compounds* (Aldehydes and ketones)**

  Nucleophilic addition, Electromeric effect, aldol condensation, Crossed Aldol condensation, Cannizzaro reaction, Crossed Cannizzaro reaction, Benzoin condensation, Perkin condensation, qualitative tests, Structure and uses of Formaldehyde, Paraldehyde, Acetone, Chloral hydrate, Hexamine, Benzaldehyde, Vanilin, Cinnamaldehyde.

UNIT-V **08 Hours**

- **Carboxylic acids***

  Acidity of carboxylic acids, effect of substituents on acidity, inductive effect and qualitative tests for carboxylic acids ,amide and ester

  Structure and Uses of Acetic acid, Lactic acid, Tartaric acid, Citric acid, Succinic acid. Oxalic acid, Salicylic acid, Benzoic acid, Benzyl benzoate, Dimethyl phthalate, Methyl salicylate and Acetyl salicylic acid

- **Aliphatic amines*** - Basicity, effect of substituent on Basicity. Qualitative test, Structure and uses of Ethanolamine, Ethylenediamine, Amphetamine

BP208P. PHARMACEUTICAL ORGANIC CHEMISTRY -I (Practical)

4 Hours / week

1. Systematic qualitative analysis of unknown organic compounds like
    1. Preliminary test: Color, odour, aliphatic/aromatic compounds, saturation and unsaturation, etc.
    2. Detection of elements like Nitrogen, Sulphur and Halogen by Lassaigne's test
    3. Solubility test
    4. Functional group test like Phenols, Amides/ Urea, Carbohydrates, Amines, Carboxylic acids, Aldehydes and Ketones, Alcohols, Esters, Aromatic and Halogenated Hydrocarbons, Nitro compounds and Anilides.
    5. Melting point/Boiling point of organic compounds
    6. Identification of the unknown compound from the literature using melting point/ boiling point.
    7. Preparation of the derivatives and confirmation of the unknown compound by melting point/ boiling point.
    8. Minimum 5 unknown organic compounds to be analysed systematically.
2. Preparation of suitable solid derivatives from organic compounds
3. Construction of molecular models

Recommended Books (Latest Editions)

1. Organic Chemistry by Morrison and Boyd
2. Organic Chemistry by I.L. Finar , Volume-I
3. Textbook of Organic Chemistry by B.S. Bahl & Arun Bahl.
4. Organic Chemistry by P.L.Soni
5. Practical Organic Chemistry by Mann and Saunders.
6. Vogel's text book of Practical Organic Chemistry
7. Advanced Practical organic chemistry by N.K.Vishnoi.
8. Introduction to Organic Laboratory techniques by Pavia, Lampman and Kriz.
9. Reaction and reaction mechanism by Ahluwaliah/Chatwal.

Oxidative phosphorylation & its mechanism and substrate level phosphorylation

Inhibitors ETC and oxidative phosphorylation/Uncouplers

UNIT III **10 Hours**

- **Lipid metabolism**

  β-Oxidation of saturated fatty acid (Palmitic acid)

Formation and utilization of ketone bodies; ketoacidosis

De novo synthesis of fatty acids (Palmitic acid)

Biological significance of cholesterol and conversion of cholesterol into bile acids, steroid hormone and vitamin D

Disorders of lipid metabolism: Hypercholesterolemia, atherosclerosis, fatty liver and obesity.

- **Amino acid metabolism**

  General reactions of amino acid metabolism: Transamination, deamination & decarboxylation, urea cycle and its disorders

  Catabolism of phenylalanine and tyrosine and their metabolic disorders (Phenyketonuria, Albinism, alkeptonuria, tyrosinemia)

  Synthesis and significance of biological substances; 5-HT, melatonin, dopamine, noradrenaline, adrenaline

  Catabolism of heme; hyperbilirubinemia and jaundice

UNIT IV **10 Hours**

- **Nucleic acid metabolism and genetic information transfer**

  Biosynthesis of purine and pyrimidine nucleotides

  Catabolism of purine nucleotides and Hyperuricemia and Gout disease

  Organization of mammalian genome

  Structure of DNA and RNA and their functions

  DNA replication (semi conservative model)

  Transcription or RNA synthesis

  Genetic code, Translation or Protein synthesis and inhibitors

UNIT V

07 Hours

- **Enzymes**

  Introduction, properties, nomenclature and IUB classification of enzymes

  Enzyme kinetics (Michaelis plot, Line Weaver Burke plot)

  Enzyme inhibitors with examples

  Regulation of enzymes: enzyme induction and repression, allosteric enzymes regulation

  Therapeutic and diagnostic applications of enzymes and isoenzymes

  Coenzymes –Structure and biochemical functions

BP 209 P. BIOCHEMISTRY (Practical)

4 Hours / Week

1. Qualitative analysis of carbohydrates (Glucose, Fructose, Lactose, Maltose, Sucrose and starch)
2. Identification tests for Proteins (albumin and Casein)
3. Quantitative analysis of reducing sugars (DNSA method) and Proteins (Biuret method)
4. Qualitative analysis of urine for abnormal constituents
5. Determination of blood creatinine
6. Determination of blood sugar
7. Determination of serum total cholesterol
8. Preparation of buffer solution and measurement of pH
9. Study of enzymatic hydrolysis of starch
10. Determination of Salivary amylase activity
11. Study the effect of Temperature on Salivary amylase activity.
12. Study the effect of substrate concentration on salivary amylase activity.

BP203 T. BIOCHEMISTRY (Theory)

45 Hours

Scope: Biochemistry deals with complete understanding of the molecular levels of the chemical process associated with living cells. The scope of the subject is providing biochemical facts and the principles to understand metabolism of nutrient molecules in physiological and pathological conditions. It is also emphasizing on genetic organization of mammalian genome and hetero & autocatalytic functions of DNA.

Objectives: Upon completion of course student shell able to

1. Understand the catalytic role of enzymes, importance of enzyme inhibitors in design of new drugs, therapeutic and diagnostic applications of enzymes.
2. Understand the metabolism of nutrient molecules in physiological and pathological conditions.
3. Understand the genetic organization of mammalian genome and functions of DNA in the synthesis of RNAs and proteins.

Course Content:

UNIT I **08 Hours**

- **Biomolecules**

  Introduction, classification, chemical nature and biological role of carbohydrate, lipids, nucleic acids, amino acids and proteins.

- **Bioenergetics**

  Concept of free energy, endergonic and exergonic reaction, Relationship between free energy, enthalpy and entropy; Redox potential.

  Energy rich compounds; classification; biological significances of ATP and cyclic AMP

UNIT II **10 Hours**

- **Carbohydrate metabolism**

  Glycolysis – Pathway, energetics and significance

  Citric acid cycle- Pathway, energetics and significance

  HMP shunt and its significance; Glucose-6-Phosphate dehydrogenase (G6PD) deficiency

  Glycogen metabolism Pathways and glycogen storage diseases (GSD)

  Gluconeogenesis- Pathway and its significance

  Hormonal regulation of blood glucose level and Diabetes mellitus

- **Biological oxidation**

  Electron transport chain (ETC) and its mechanism.

- **Basic mechanism involved in the process of inflammation and repair:** Introduction, Clinical signs of inflammation, Different types of Inflammation,Mechanism of Inflammation – Alteration in vascular permeability and blood flow, migration of WBC's,Mediators of inflammation,Basic principles of wound healing in the skin,Pathophysiology of Atherosclerosis

Unit II **10Hours**

- **Cardiovascular System:** Hypertension, congestive heart failure, ischemic heart disease (angina,myocardial infarction, atherosclerosis and arteriosclerosis)
- **Respiratory system:**Asthma, Chronic obstructive airways diseases.
- **Renal system:**Acute and chronic renal failure .

Unit II **10Hours**

- **Haematological Diseases:** Iron deficiency, megaloblastic anemia (Vit B12 and folic acid), sickle cell anemia, thalasemia, hereditary acquired anemia, hemophilia
- **Endocrine system:** Diabetes, thyroid diseases, disorders of sex hormones
- **Nervous system:** Epilepsy, Parkinson's disease, stroke, psychiatric disorders: depression, schizophrenia and Alzheimer's disease.
- **Gastrointestinal system:** Peptic Ulcer
-

Unit IV **8 Hours**

- Inflammatory bowel diseases, jaundice, hepatitis (A,B,C,D,E,F) alcoholic liver disease.
- **Disease of bones and joints:** Rheumatoid arthritis, osteoporosis and gout
- **Principles of cancer:** classification, etiology and pathogenesis of cancer
- **Diseases of bones and joints:**Rheumatoid Arthritis, Osteoporosis,Gout

- **Principles of Cancer:** Classification, etiology and pathogenesis of Cancer

Unit V **7 Hours**

- **Infectious diseases:**Meningitis,Typhoid, Leprosy, Tuberculosis

Urinary tract infections

- **Sexually transmitted diseases:**AIDS, Syphilis, Gonorrhea

Recommended Books (Latest Editions)

Recommended Books (Latest Editions)

1. Principles of Biochemistry by Lehninger.
2. Harper's Biochemistry by Robert K. Murry, Daryl K. Granner and Victor W. Rodwell.
3. Biochemistry by Stryer.
4. Biochemistry by D. Satyanarayan and U.Chakrapani
5. Textbook of Biochemistry by Rama Rao.
6. Textbook of Biochemistry by Deb.
7. Outlines of Biochemistry by Conn and Stumpf
8. Practical Biochemistry by R.C. Gupta and S. Bhargavan.
9. Introduction of Practical Biochemistry by David T. Plummer. (3rd Edition)
10. Practical Biochemistry for Medical students by Rajagopal and Ramakrishna.
11. Practical Biochemistry by Harold Varley.

BP 204T.PATHOPHYSIOLOGY (THEORY)

45Hours

Scope: Pathophysiology is the study of causes of diseases and reactions of the body to such disease producing causes.This course is designed to impart a thorough knowledge of the relevant aspects of pathology of various conditions with reference to its pharmacological applications, and understanding of basic pathophysiological mechanisms. Hence it will not only help to study the syllabus of pathology, but also to get baseline knowledge required to practice medicine safely, confidently, rationally and effectively.

Objectives: Upon completion of the subject student shall be able to –

1. Describe the etiology and pathogenesis of the selected disease states;
2. Name the signs and symptoms of the diseases; and
3. Mention the complications of the diseases.

Course content:

Unit I **10Hours**

- **Basic principles of Cell injury and Adaptation:**
  Introduction, definitions, Homeostasis, Components and Types of Feedback systems, Causes of cellular injury,Pathogenesis (Cell membrane damage, Mitochondrial damage, Ribosome damage, Nuclear damage),Morphology of cell injury – Adaptive changes (Atrophy, Hypertrophy, hyperplasia, Metaplasia, Dysplasia),Cell swelling, Intra cellular accumulation, Calcification, Enzyme leakage and Cell Death Acidosis &Alkalosis,Electrolyte imbalance

1. Vinay Kumar, Abul K. Abas, Jon C. Aster; Robbins &Cotran Pathologic Basis of Disease; South Asia edition; India; Elsevier; 2014.
2. Harsh Mohan; Text book of Pathology; 6th edition; India; Jaypee Publications; 2010.
3. Laurence B, Bruce C, Bjorn K. ; Goodman Gilman's The Pharmacological Basis of Therapeutics; 12th edition; New York; McGraw-Hill; 2011.
4. Best, Charles Herbert 1899-1978; Taylor, Norman Burke 1885-1972; West, John B (John Burnard); Best and Taylor's Physiological basis of medical practice; 12th ed; united states;
5. William and Wilkins, Baltimore;1991 [1990 printing].
6. Nicki R. Colledge, Brian R. Walker, Stuart H. Ralston;Davidson's Principles and Practice of Medicine; 21st edition; London; ELBS/Churchill Livingstone; 2010.
7. Guyton A, John .E Hall; Textbook of Medical Physiology; 12th edition; WB Saunders Company; 2010.
8. Joseph DiPiro, Robert L. Talbert, Gary Yee, Barbara Wells, L. Michael Posey; Pharmacotherapy: A Pathophysiological Approach; 9th edition; London; McGraw-Hill Medical; 2014.
9. V. Kumar, R. S. Cotran and S. L. Robbins; Basic Pathology; 6th edition; Philadelphia; WB Saunders Company; 1997.
10. Roger Walker, Clive Edwards; Clinical Pharmacy and Therapeutics; 3rd edition; London; Churchill Livingstone publication; 2003.

Recommended Journals

1. The Journal of Pathology. ISSN: 1096-9896 (Online)
2. The American Journal of Pathology. ISSN: 0002-9440
3. Pathology. 1465-3931 (Online)
4. International Journal of Physiology, Pathophysiology and Pharmacology. ISSN: 1944-8171 (Online)
5. Indian Journal of Pathology and Microbiology. ISSN-0377-4929.

BP205 T. COMPUTER APPLICATIONS IN PHARMACY (Theory)

30 Hrs (2 Hrs/Week)

Scope: This subject deals with the introduction Database, Database Management system, computer application in clinical studies and use of databases.

Objectives: Upon completion of the course the student shall be able to

1. know the various types of application of computers in pharmacy
2. know the various types of databases
3. know the various applications of databases in pharmacy

Course content:

UNIT – I **06 hours**

Number system: Binary number system, Decimal number system, Octal number system, Hexadecimal number systems, conversion decimal to binary, binary to decimal, octal to binary etc, binary addition, binary subtraction – One's complement ,Two's complement method, binary multiplication, binary division

Concept of Information Systems and Software : Information gathering, requirement and feasibility analysis, data flow diagrams, process specifications, input/output design, process life cycle, planning and managing the project

UNIT –II **06 hours**

Web technologies:Introduction to HTML, XML,CSS and Programming languages, introduction to web servers and Server Products

Introduction to databases, MYSQL, MS ACCESS, Pharmacy Drug database

UNIT – III **06 hours**

Application of computers in Pharmacy – Drug information storage and retrieval, Pharmacokinetics, Mathematical model in Drug design, Hospital and Clinical Pharmacy, Electronic Prescribing and discharge (EP) systems, barcode medicine identification and automated dispensing of drugs, mobile technology and adherence monitoring

Diagnostic System, Lab-diagnostic System, Patient Monitoring System, Pharma Information System

UNIT – IV **06 hours**

Bioinformatics: Introduction, Objective of Bioinformatics, Bioinformatics Databases, Concept of Bioinformatics, Impact of Bioinformatics in Vaccine Discovery

UNIT-V **06 hours**

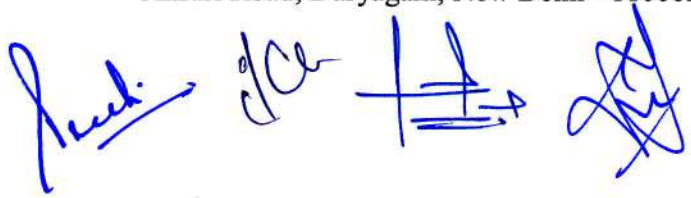
Computers as data analysis in Preclinical development:
Chromatographic dada analysis(CDS), Laboratory Information management System (LIMS) and Text Information Management System(TIMS)

BP210P. COMPUTER APPLICATIONS IN PHARMACY (Practical)

1. Design a questionnaire using a word processing package to gather information about a particular disease.
2. Create a HTML web page to show personal information.
3. Retrieve the information of a drug and its adverse effects using online tools
4. Creating mailing labels Using Label Wizard , generating label in MS WORD
5. Create a database in MS Access to store the patient information with the required fields Using access
6. Design a form in MS Access to view, add, delete and modify the patient record in the database
7. Generating report and printing the report from patient database
8. Creating invoice table using – MS Access
9. Drug information storage and retrieval using MS Access
10. Creating and working with queries in MS Access
11. Exporting Tables, Queries, Forms and Reports to web pages
12. Exporting Tables, Queries, Forms and Reports to XML pages

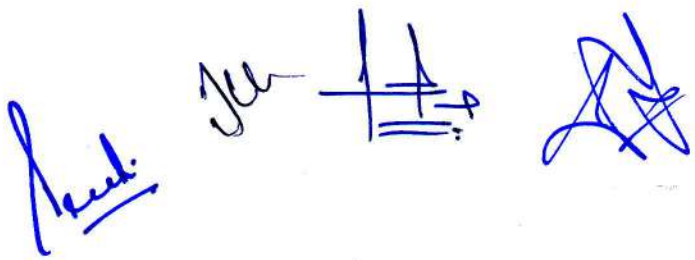
Recommended books (Latest edition):

1. Computer Application in Pharmacy – William E.Fassett –Lea and Febiger, 600 South Washington Square, USA, (215) 922-1330.
2. Computer Application in Pharmaceutical Research and Development –Sean Ekins – Wiley-Interscience, A John Willey and Sons, INC., Publication, USA
3. Bioinformatics (Concept, Skills and Applications) – S.C.Rastogi-CBS Publishers and Distributors, 4596/1- A, 11 Darya Gani, New Delhi – 110 002(INDIA)
4. Microsoft office Access - 2003, Application Development Using VBA, SQL Server, DAP and Infopath – Cary N.Prague – Wiley Dreamtech India (P) Ltd., 4435/7, Ansari Road, Daryagani, New Delhi - 110002



Recommended Books (Latest edition):

1. Y.K. Sing, Environmental Science, New Age International Pvt, Publishers, Bangalore
2. Agarwal, K.C. 2001 Environmental Biology, Nidi Publ. Ltd. Bikaner.
3. Bharucha Erach, The Biodiversity of India, Mapin Pu blishing Pvt. Ltd., Ahmedabad – 380 013, India,
4. Brunner R.C., 1989, Hazardous Waste Incineration, McGraw Hill Inc. 480p
5. Clark R.S., Marine Pollution, Clanderson Press Oxford
6. Cunningham, W.P. Cooper, T.H. Gorhani, E & Hepworth, M.T. 2001, Environmental Encyclopedia, Jaico Publ. House, Mumbai, 1196p
7. De A.K., Environmental Chemistry, Wiley Eastern Ltd.
8. Down of Earth, Centre for Science and Environment



BP 206 T. ENVIRONMENTAL SCIENCES (Theory)

30 hours

Scope: Environmental Sciences is the scientific study of the environmental system and the status of its inherent or induced changes on organisms. It includes not only the study of physical and biological characters of the environment but also the social and cultural factors and the impact of man on environment.

Objectives: Upon completion of the course the student shall be able to:

1. Create the awareness about environmental problems among learners.
2. Impart basic knowledge about the environment and its allied problems.
3. Develop an attitude of concern for the environment.
4. Motivate learner to participate in environment protection and environment improvement.
5. Acquire skills to help the concerned individuals in identifying and solving environmental problems.
6. Strive to attain harmony with Nature.

Course content:

Unit-I **10hours**

The Multidisciplinary nature of environmental studies

Natural Resources

Renewable and non-renewable resources:

Natural resources and associated problems

a) Forest resources; b) Water resources; c) Mineral resources; d) Food resources; e) Energy resources; f) Land resources: Role of an individual in conservation of natural resources.

Unit-II **10hours**

Ecosystems

- Concept of an ecosystem.
- Structure and function of an ecosystem.
- Introduction, types, characteristic features, structure and function of the ecosystems: Forest ecosystem; Grassland ecosystem; Desert ecosystem; Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries)

Unit- III **10hours**

Environmental Pollution: Air pollution; Water pollution; Soil pollution

SEMESTER III

BP301T. PHARMACEUTICAL ORGANIC CHEMISTRY –II (Theory)

45 Hours

Scope: This subject deals with general methods of preparation and reactions of some organic compounds. Reactivity of organic compounds are also studied here. The syllabus emphasizes on mechanisms and orientation of reactions. Chemistry of fats and oils are also included in the syllabus.

Objectives: Upon completion of the course the student shall be able to

1. write the structure, name and the type of isomerism of the organic compound
2. write the reaction, name the reaction and orientation of reactions
3. account for reactivity/stability of compounds,
4. prepare organic compounds

Course Content:

General methods of preparation and reactions of compounds superscripted with asterisk (*) to be explained

To emphasize on definition, types, classification, principles/mechanisms, applications, examples and differences

UNIT I **10 Hours**

- **Benzene and its derivatives**
  - **A.** Analytical, synthetic and other evidences in the derivation of structure of benzene, Orbital picture, resonance in benzene, aromatic characters, Huckel's rule
  - **B.** Reactions of benzene - nitration, sulphonation, halogenation-reactivity, Friedelcrafts alkylation- reactivity, limitations, Friedelcrafts acylation.
  - **C.** Substituents, effect of substituents on reactivity and orientation of mono substituted benzene compounds towards electrophilic substitution reaction
  - **D.** Structure and uses of DDT, Saccharin, BHC and Chloramine

UNIT II **10 Hours**

- **Phenols*** - Acidity of phenols, effect of substituents on acidity, qualitative tests, Structure and uses of phenol, cresols, resorcinol, naphthols
- **Aromatic Amines*** - Basicity of amines, effect of substituents on basicity, and synthetic uses of aryl diazonium salts
- **Aromatic Acids*** –Acidity, effect of substituents on acidity and important reactions of benzoic acid.

UNIT III

10 Hours

- **Fats and Oils**

a. Fatty acids – reactions.

b. Hydrolysis, Hydrogenation, Saponification and Rancidity of oils, Drying oils.

c. Analytical constants – Acid value, Saponification value, Ester value, Iodine value, Acetyl value, Reichert Meissl (RM) value – significance and principle involved in their determination.

UNIT IV **08 Hours**

- **Polynuclear hydrocarbons:**

a. Synthesis, reactions

b. Structure and medicinal uses of Naphthalene, Phenanthrene, Anthracene, Diphenylmethane, Triphenylmethane and their derivatives

UNIT V **07 Hours**

- **Cyclo alkanes***

Stabilities – Baeyer's strain theory, limitation of Baeyer's strain theory, Coulson and Moffitt's modification, Sachse Mohr's theory (Theory of strainless rings), reactions of cyclopropane and cyclobutane only

BP305P. PHARMACEUTICAL ORGANIC CHEMISTRY -II (Practical)

4 Hrs/week

I Experiments involving laboratory techniques

- Recrystallization
- Steam distillation

II Determination of following oil values (including standardization of reagents)

- Acid value
- Saponification value
- Iodine value

III **Preparation of compounds**

- Benzanilide/Phenyl benzoate/Acetanilide from Aniline/ Phenol /Aniline by acylation reaction.
- 2,4,6-Tribromo aniline/Para bromo acetanilide from Aniline/
- Acetanilide by halogenation (Bromination) reaction.
- 5-Nitro salicylic acid/Meta di nitro benzene from Salicylic acid / Nitro benzene by nitration reaction.
- Benzoic acid from Benzyl chloride by oxidation reaction.
- Benzoic acid/ Salicylic acid from alkyl benzoate/ alkyl salicylate by hydrolysis reaction.
- 1-Phenyl azo-2-napthol from Aniline by diazotization and coupling reactions.
- Benzil from Benzoin by oxidation reaction.
- Dibenzal acetone from Benzaldehyde by Claison Schmidt reaction
- Cinnammic acid from Benzaldehyde by Perkin reaction
- *P*-Iodo benzoic acid from *P*-amino benzoic acid

Recommended Books (Latest Editions)

1. Organic Chemistry by Morrison and Boyd
2. Organic Chemistry by I.L. Finar , Volume-I
3. Textbook of Organic Chemistry by B.S. Bahl & Arun Bahl.
4. Organic Chemistry by P.L.Soni
5. Practical Organic Chemistry by Mann and Saunders.
6. Vogel's text book of Practical Organic Chemistry
7. Advanced Practical organic chemistry by N.K.Vishnoi.

8. Introduction to Organic Laboratory techniques by Pavia, Lampman and Kriz.

BP302T. PHYSICAL PHARMACEUTICS-I (Theory)

45Hours

Scope: The course deals with the various physica and physicochemical properties, and principles involved in dosage forms/formulations. Theory and practical components of the subject help the student to get a better insight into various areas of formulation research and development, and stability studies of pharmaceutical dosage forms.

Objectives: Upon the completion of the course student shall be able to

1. Understand various physicochemical properties of drug molecules in the designing the dosage forms
2. Know the principles of chemical kinetics & to use them for stability testing nad determination of expiry date of formulations
3. Demonstrate use of physicochemical properties in the formulation development and evaluation of dosage forms.

Course Content:

UNIT-I

10 Hours

Solubility of drugs: Solubility expressions, mechanisms of solute solvent interactions, ideal solubility parameters, solvation & association, quantitative approach to the factors influencing solubility of drugs, diffusion principles in biological systems. Solubility of gas in liquids, solubility of liquids in liquids, (Binary solutions, ideal solutions) Raoult's law, real solutions. Partially miscible liquids, Critical solution temperature and applications. Distribution law, its limitations and applications

UNIT-II

10Hours

States of Matter and properties of matter: State of matter, changes in the state of matter, latent heats, vapour pressure, sublimation critical point, eutectic mixtures, gases, aerosols – inhalers, relative humidity, liquid complexes, liquid crystals, glassy states, solid-crystalline, amorphous & polymorphism.

Physicochemical properties of drug molecules: Refractive index, optical rotation, dielectric constant, dipole moment, dissociation constant, determinations and applications

UNIT-III

08 Hours

Surface and interfacial phenomenon: Liquid interface, surface & interfacial tensions,

surface free energy, measurement of surface & interfacial tensions, spreading coefficient, adsorption at liquid interfaces, surface active agents, HLB Scale, solubilisation, detergency, adsorption at solid interface.

UNIT-IV **08Hours**

Complexation and protein binding: Introduction, Classification of Complexation, Applications, methods of analysis, protein binding, Complexation and drug action, crystalline structures of complexes and thermodynamic treatment of stability constants.

UNIT-V **07 Hours**

pH, buffers and Isotonic solutions: Sorensen's pH scale, pH determination (electrometric and calorimetric), applications of buffers, buffer equation, buffer capacity, buffers in pharmaceutical and biological systems, buffered isotonic solutions.

BP306P. PHYSICAL PHARMACEUTICS – I (Practical)

4 Hrs/week

1. Determination the solubility of drug at room temperature
2. Determination of pKa value by Half Neutralization/ Henderson Hasselbalch equation.
3. Determination of Partition co- efficient of benzoic acid in benzene and water
4. Determination of Partition co- efficient of Iodine in CCl_4 and water
5. Determination of % composition of NaCl in a solution using phenol-water system by CST method
6. Determination of surface tension of given liquids by drop count and drop weight method
7. Determination of HLB number of a surfactant by saponification method
8. Determination of Freundlich and Langmuir constants using activated char coal
9. Determination of critical micellar concentration of surfactants
10. Determination of stability constant and donor acceptor ratio of PABA-Caffeine complex by solubility method
11. Determination of stability constant and donor acceptor ratio of Cupric-Glycine complex by pH titration method

Recommended Books: (Latest Editions)

1. Physical Pharmacy by Alfred Martin
2. Experimental Pharmaceutics by Eugene, Parott.
3. Tutorial Pharmacy by Cooper and Gunn.
4. Stocklosam J. Pharmaceutical Calculations, Lea &Febiger, Philadelphia.
5. Liberman H.A, Lachman C., Pharmaceutical Dosage forms, Tablets, Volume-1 to 3, MarcelDekkar Inc.
6. Liberman H.A, Lachman C, Pharmaceutical Dosage forms. Disperse systems, volume 1, 2, 3. Marcel Dekkar Inc.
7. Physical Pharmaceutics by Ramasamy C and ManavalanR.
8. Laboratory Manual of Physical Pharmaceutics, C.V.S. Subramanyam, J. Thimma settee
9. Physical Pharmaceutics by C.V.S. Subramanyam
10. Test book of Physical Phramacy, by Gaurav Jain & Roop K. Khar

BP 303 T. PHARMACEUTICAL MICROBIOLOGY (Theory)

45Hours

Scope:

- Study of all categories of microorganisims especially for the production of alchol antibiotics, vaccines, vitamins enzymes etc..

Objectives: Upon completion of the subject student shall be able to;

1. Understand methods of identification, cultivation and preservation of various microorganisms
2. To understand the importance and implementation of sterlization in pharmaceutical processing and industry
3. Learn sterility testing of pharmaceutical products.
4. Carried out microbiological standardization of Pharmaceuticals.
5. Understand the cell culture technology and its applications in pharmaceutical industries.

Course content:

Unit I **10 Hours**

Introduction, history of microbiology, its branches, scope and its importance.
Introduction to Prokaryotes and Eukaryotes
Study of ultra-structure and morphological classification of bacteria, nutritional requirements, raw materials used for culture media and physical parameters for growth, growth curve, isolation and preservation methods for pure cultures, cultivation of anaerobes, quantitative measurement of bacterial growth (total & viable count).
Study of different types of phase constrast microscopy, dark field microscopy and electron microscopy.

Unit II **10 Hours**

Identification of bacteria using staining techniques (simple, Gram's &Acid fast staining) and biochemical tests (IMViC).

Study of principle, procedure, merits, demerits and applications of physical, chemical gaseous,radiation and mechanical method of sterilization.

Evaluation of the efficiency of sterilization methods.

BP 303 T. PHARMACEUTICAL MICROBIOLOGY (Theory)

45Hours

Scope:

- Study of all categories of microorganisims especially for the production of alchol antibiotics, vaccines, vitamins enzymes etc..

Objectives: Upon completion of the subject student shall be able to;

1. Understand methods of identification, cultivation and preservation of various microorganisms
2. To understand the importance and implementation of sterlization in pharmaceutical processing and industry
3. Learn sterility testing of pharmaceutical products.
4. Carried out microbiological standardization of Pharmaceuticals.
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Course content:

Unit I **10 Hours**

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Introduction to Prokaryotes and Eukaryotes
Study of ultra-structure and morphological classification of bacteria, nutritional requirements, raw materials used for culture media and physical parameters for growth, growth curve, isolation and preservation methods for pure cultures, cultivation of anaerobes, quantitative measurement of bacterial growth (total & viable count).
Study of different types of phase constrast microscopy, dark field microscopy and electron microscopy.

Unit II **10 Hours**

Identification of bacteria using staining techniques (simple, Gram's &Acid fast staining) and biochemical tests (IMViC).

Study of principle, procedure, merits, demerits and applications of physical, chemical gaseous,radiation and mechanical method of sterilization.

Evaluation of the efficiency of sterilization methods.

Equipments employed in large scale sterilization.

Sterility indicators.

Unit III **10 Hours**

Study of morphology, classification, reproduction/replication and cultivation of Fungi and Viruses.

Classification and mode of action of disinfectants

Factors influencing disinfection, antiseptics and their evaluation. For bacteriostatic and bactericidal actions

Evaluation of bactericidal & Bacteriostatic.

Sterility testing of products (solids, liquids, ophthalmic and other sterile products) according to IP, BP and USP.

Unit IV **08 Hours**

Designing of aseptic area, laminar flow equipments; study of different sources of contamination in an aseptic area and methods of prevention, clean area classification.
Principles and methods of different microbiological assay. Methods for standardization of antibiotics, vitamins and amino acids.
Assessment of a new antibiotic.

Unit V **07Hours**

Types of spoilage, factors affecting the microbial spoilage of pharmaceutical products, sources and types of microbial contaminants, assessment of microbial contamination and spoilage.

Preservation of pharmaceutical products using antimicrobial agents, evaluation of microbial stability of formulations.

Growth of animal cells in culture, general procedure for cell culture, Primary, established and transformed cell cultures.

Application of cell cultures in pharmaceutical industry and research.

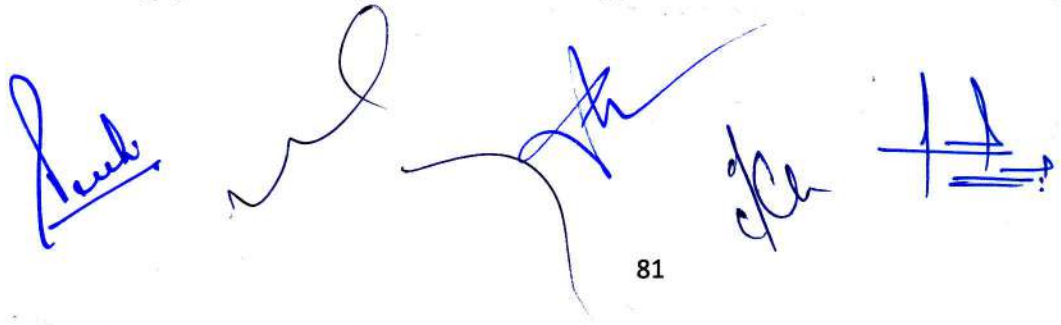
BP 307P.PHARMACEUTICAL MICROBIOLOGY (Practical)

4 Hrs/week

1. Introduction and study of different equipments and processing, e.g., B.O.D. incubator, laminar flow, aseptic hood, autoclave, hot air sterilizer, deep freezer, refrigerator, microscopes used in experimental microbiology.
2. Sterilization of glassware, preparation and sterilization of media.
3. Sub culturing of bacteria and fungus. Nutrient stabs and slants preparations.
4. Staining methods- Simple, Grams staining and acid fast staining (Demonstration with practical).
5. Isolation of pure culture of micro-organisms by multiple streak plate technique and other techniques.
6. Microbiological assay of antibiotics by cup plate method and other methods
7. Motility determination by Hanging drop method.
8. Sterility testing of pharmaceuticals.
9. Bacteriological analysis of water
10. Biochemical test.

Recommended Books (Latest edition)

1. W.B. Hugo and A.D. Russel: Pharmaceutical Microbiology, Blackwell Scientific publications, Oxford London.
2. Prescott and Dunn., Industrial Microbiology, 4th edition, CBS Publishers & Distributors, Delhi.
3. Pelczar, Chan Kreig, Microbiology, Tata McGraw Hill edn.
4. Malcolm Harris, Balliere Tindall and Cox: Pharmaceutical Microbiology.
5. Rose: Industrial Microbiology.
6. Probisher, Hinsdill et al: Fundamentals of Microbiology, 9th ed. Japan
7. Cooper and Gunn's: Tutorial Pharmacy, CBS Publisher and Distribution.
8. Peppler: Microbial Technology.
9. I.P., B.P., U.S.P.- latest editions.
10. Ananthnarayan : Text Book of Microbiology, Orient-Longman, Chennai
11. Edward: Fundamentals of Microbiology.
12. N.K.Jain: Pharmaceutical Microbiology, Vallabh Prakashan, Delhi
13. Bergeys manual of systematic bacteriology, Williams and Wilkins- A Waverly company



- **Evaporation:** Objectives, applications and factors influencing evaporation, differences between evaporation and other heat process. principles, construction, working, uses, merits and demerits of Steam jacketed kettle, horizontal tube evaporator, climbing film evaporator, forced circulation evaporator, multiple effect evaporator& Economy of multiple effect evaporator.

- **Distillation:** Basic Principles and methodology of simple distillation,flash distillation, fractional distillation, distillation under reduced pressure, steam distillation & molecular distillation

UNIT- III **08 Hours**

- **Drying:** Objectives, applications & mechanism of drying process, measurements & applications of Equilibrium Moisture content, rate of drying curve. principles, construction, working, uses, merits and demerits of Tray dryer, drum dryer spray dryer, fluidized bed dryer, vacuum dryer, freeze dryer.

- **Mixing:** Objectives, applications & factors affecting mixing, Difference between solid and liquid mixing, mechanism of solid mixing, liquids mixing and semisolids mixing. Principles, Construction, Working, uses, Merits and Demerits of Double cone blender, twin shell blender, ribbon blender, Sigma blade mixer, planetary mixers, Propellers, Turbines, Paddles & Silverson Emulsifier,

UNIT-IV **08 Hours**

- **Filtration:** Objectives, applications, Theories & Factors influencing filtration, filter aids, filter medias. Principle, Construction, Working, Uses, Merits and demerits of plate & frame filter, filter leaf, rotary drum filter, Meta filter & Cartridge filter, membrane filters and Seidtz filter.
- **Centrifugation:** Objectives, principle & applications of Centrifugation, principles, construction, working, uses, merits and demerits of Perforated basket centrifuge, Non-perforated basket centrifuge, semi continuous centrifuge & super centrifuge.

UNIT- V **07 Hours**

- **Materials of pharmaceutical plant construction, Corrosion and its prevention:** Factors affecting during materials selected for Pharmaceutical plant construction, Theories of corrosion, types of corrosion and there prevention. Ferrous and nonferrous metals, inorganic and organic non metals, basic of material handling systems.

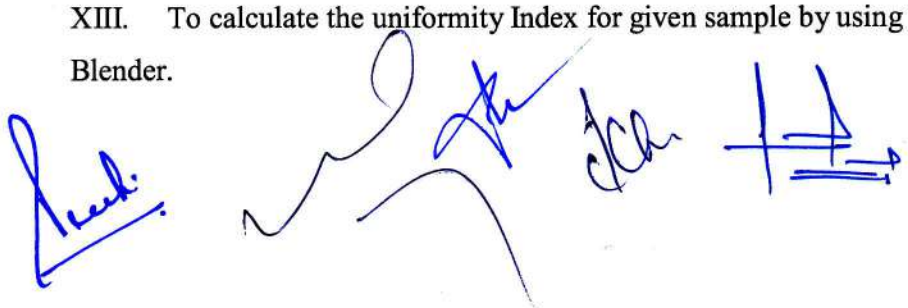
Recommended Books: (Latest Editions)

1. Introduction to chemical engineering – Walter L Badger & Julius Banchero, Latest edition.
2. Solid phase extraction, Principles, techniques and applications by Nigel J.K. Simpson- Latest edition.
3. Unit operation of chemical engineering – Mcabe Smith, Latest edition.
4. Pharmaceutical engineering principles and practices – C.V.S Subrahmanyam et al., Latest edition.
5. Remington practice of pharmacy- Martin, Latest edition.
6. Theory and practice of industrial pharmacy by Lachmann., Latest edition.
7. Physical pharmaceutics- C.V.S Subrahmanyam et al., Latest edition.
8. Cooper and Gunn's Tutorial pharmacy, S.J. Carter, Latest edition.

BP308P - PHARMACEUTICAL ENGINEERING (Practical)

4 Hours/week

I. Determination of radiation constant of brass, iron, unpainted and painted glass.
II. Steam distillation – To calculate the efficiency of steam distillation.
III. To determine the overall heat transfer coefficient by heat exchanger.
IV. Construction of drying curves (for calcium carbonate and starch).
V. Determination of moisture content and loss on drying.
VI. Determination of humidity of air – i) From wet and dry bulb temperatures –use of Dew point method.
VII. Description of Construction working and application of Pharmaceutical Machinery such as rotary tablet machine, fluidized bed coater, fluid energy mill, de humidifier.
VIII. Size analysis by sieving – To evaluate size distribution of tablet granulations – Construction of various size frequency curves including arithmetic andlogarithmic probability plots.
IX. Size reduction: To verify the laws of size reduction using ball mill and determining Kicks, Rittinger's, Bond's coefficients, power requirement and critical speed of Ball Mill.
X. Demonstration of colloid mill, planetary mixer, fluidized bed dryer, freeze dryer and such othermajor equipment.
XI. Factors affecting Rate of Filtration and Evaporation (Surface area, Concentration and Thickness/ viscosity
XII. To study the effect of time on the Rate of Crystallization.
XIII. To calculate the uniformity Index for given sample by using Double Cone Blender.



SEMESTER IV

BP401T. PHARMACEUTICAL ORGANIC CHEMISTRY –III (Theory)

45 Hours

Scope: This subject imparts knowledge on stereo-chemical aspects of organic compounds and organic reactions, important named reactions, chemistry of important hetero cyclic compounds. It also emphasizes on medicinal and other uses of organic compounds.

Objectives: At the end of the course, the student shall be able to

1. understand the methods of preparation and properties of organic compounds
2. explain the stereo chemical aspects of organic compounds and stereo chemical reactions
3. know the medicinal uses and other applications of organic compounds

Course Content:

Note: To emphasize on definition, types, mechanisms, examples, uses/applications

UNIT-I **10 Hours**

Stereo isomerism

Optical isomerism –

Optical activity, enantiomerism, diastereoisomerism, meso compounds

Elements of symmetry, chiral and achiral molecules

DL system of nomenclature of optical isomers, sequence rules, RS system of nomenclature of optical isomers

Reactions of chiral molecules

Racemic modification and resolution of racemic mixture.

Asymmetric synthesis: partial and absolute

UNIT-II **10 Hours**

Geometrical isomerism

Nomenclature of geometrical isomers (Cis Trans, EZ, Syn Anti systems)

Methods of determination of configuration of geometrical isomers.

Conformational isomerism in Ethane, n-Butane and Cyclohexane.

Stereo isomerism in biphenyl compounds (Atropisomerism) and conditions for optical activity.

Stereospecific and stereoselective reactions

UNIT-III **10 Hours**

Heterocyclic compounds:

Nomenclature and classification

Synthesis, reactions and medicinal uses of following compounds/derivatives

Pyrrole, Furan, and Thiophene

Relative aromaticity and reactivity of Pyrrole, Furan and Thiophene

UNIT-IV **8 Hours**

Synthesis, reactions and medicinal uses of following compounds/derivatives

Pyrazole, Imidazole, Oxazole and Thiazole.

Pyridine, Quinoline, Isoquinoline, Acridine and Indole. Basicity of pyridine

Synthesis and medicinal uses of Pyrimidine, Purine, azepines and their derivatives

UNIT-V **07 Hours**

Reactions of synthetic importance

Metal hydride reduction ($NaBH_4$ and $LiAlH_4$), Clemmensen reduction, Birch reduction, Wolff Kishner reduction.

Oppenauer-oxidation and Dakin reaction.

Beckmanns rearrangement and Schmidt rearrangement.

Claisen-Schmidt condensation

Recommended Books (Latest Editions)

1. Organic chemistry by I.L. Finar, Volume-I & II.
2. A text book of organic chemistry – Arun Bahl, B.S. Bahl.
3. Heterocyclic Chemistry by Raj K. Bansal
4. Organic Chemistry by Morrison and Boyd
5. Heterocyclic Chemistry by T.L. Gilchrist

BP402T. MEDICINAL CHEMISTRY – I (Theory)

45 Hours

Scope: This subject is designed to impart fundamental knowledge on the structure, chemistry and therapeutic value of drugs. The subject emphasizes on structure activity relationships of drugs, importance of physicochemical properties and metabolism of drugs. The syllabus also emphasizes on chemical synthesis of important drugs under each class.

Objectives: Upon completion of the course the student shall be able to

1. understand the chemistry of drugs with respect to their pharmacological activity
2. understand the drug metabolic pathways, adverse effect and therapeutic value of drugs
3. know the Structural Activity Relationship (SAR) of different class of drugs
4. write the chemical synthesis of some drugs

Course Content:

Study of the development of the following classes of drugs, Classification, mechanism of action, uses of drugs mentioned in the course, Structure activity relationship of selective class of drugs as specified in the course and synthesis of drugs superscripted (*)

UNIT- I **10 Hours**

Introduction to Medicinal Chemistry

History and development of medicinal chemistry

Physicochemical properties in relation to biological action

Ionization, Solubility, Partition Coefficient, Hydrogen bonding, Protein binding, Chelation, Bioisosterism, Optical and Geometrical isomerism.

Drug metabolism

Drug metabolism principles- Phase I and Phase II.

Factors affecting drug metabolism including stereo chemical aspects.

UNIT- II **10 Hours**

Drugs acting on Autonomic Nervous System

Adrenergic Neurotransmitters:

Biosynthesis and catabolism of catecholamine.

Adrenergic receptors (Alpha & Beta) and their distribution.

Sympathomimetic agents: SAR of Sympathomimetic agents

Direct acting: Nor-epinephrine, Epinephrine, Phenylephrine*, Dopamine,

Methyldopa, Clonidine, Dobutamine, Isoproterenol, Terbutaline, Salbutamol*, Bitolterol, Naphazoline, Oxymetazoline and Xylometazoline.

- Indirect acting agents: Hydroxyamphetamine, Pseudoephedrine, Propylhexedrine.
- Agents with mixed mechanism: Ephedrine, Metaraminol.

Adrenergic Antagonists:

Alpha adrenergic blockers: Tolazoline*, Phentolamine, Phenoxybenzamine, Prazosin, Dihydroergotamine, Methysergide.

Beta adrenergic blockers: SAR of beta blockers, Propranolol*, Metibranolol, Atenolol, Betazolol, Bisoprolol, Esmolol, Metoprolol, Labetolol, Carvedilol.

UNIT-III **10 Hours**

Cholinergic neurotransmitters:

Biosynthesis and catabolism of acetylcholine.

Cholinergic receptors (Muscarinic & Nicotinic) and their distribution.

Parasympathomimetic agents: SAR of Parasympathomimetic agents

Direct acting agents: Acetylcholine, Carbachol*, Bethanechol, Methacholine, Pilocarpine.

Indirect acting/ Cholinesterase inhibitors (Reversible & Irreversible): Physostigmine, Neostigmine*, Pyridostigmine, Edrophonium chloride, Tacrine hydrochloride, Ambenonium chloride, Isofluorphate, Echothiophate iodide, Parathione, Malathion.

Cholinesterase reactivator: Pralidoxime chloride.

Cholinergic Blocking agents: SAR of cholinolytic agents

Solanaceous alkaloids and analogues: Atropine sulphate, Hyoscyamine sulphate, Scopolamine hydrobromide, Homatropine hydrobromide, Ipratropium bromide*.

Synthetic cholinergic blocking agents: Tropicamide, Cyclopentolate hydrochloride, Clidinium bromide, Dicyclomine hydrochloride*, Glycopyrrolate, Methantheline bromide, Propantheline bromide, Benztropine mesylate, Orphenadrine citrate, Biperidine hydrochloride, Procyclidine hydrochloride*, Tridihexethyl chloride, Isopropamide iodide, Ethopropazine hydrochloride.

UNIT- IV **08 Hours**

Drugs acting on Central Nervous System

90

A. Sedatives and Hypnotics:

Benzodiazepines: SAR of Benzodiazepines, Chlordiazepoxide, Diazepam*, Oxazepam, Chlorazepate, Lorazepam, Alprazolam, Zolpidem

Barbiturtes: SAR of barbiturates, Barbital*, Phenobarbital, Mephobarbital, Amobarbital, Butabarbital, Pentobarbital, Secobarbital

Miscelleneous:

Amides & imides: Glutethmide.

Alcohol & their carbamate derivatives: Meprobomate, Ethchlorvynol.

Aldehyde & their derivatives: Triclofos sodium, Paraldehyde.

B. Antipsychotics

Phenothiazeines: SAR of Phenothiazeines - Promazine hydrochloride, Chlorpromazine hydrochloride*, Triflupromazine, Thioridazine hydrochloride, Piperacetazine hydrochloride, Prochlorperazine maleate, Trifluoperazine hydrochloride.

Ring Analogues of Phenothiazeines: Chlorprothixene, Thiothixene, Loxapine succinate, Clozapine.

Fluro buterophenones: Haloperidol, Droperidol, Risperidone.

Beta amino ketones: Molindone hydrochloride.

Benzamides: Sulpieride.

C. Anticonvulsants: SAR of Anticonvulsants, mechanism of anticonvulsant action

Barbiturates: Phenobarbitone, Methabarbital. **Hydantoins:**

Phenytoin*, Mephenytoin, Ethotoin **Oxazolidine diones:**

Trimethadione, Paramethadione **Succinimides:**

Phensuximide, Methsuximide, Ethosuximide* **Urea and**

monoacylureas: Phenacemide, Carbamazepine*

Benzodiazepines: Clonazepam

Miscellaneous: Primidone, Valproic acid , Gabapentin, Felbamate

UNIT – V **07 Hours**

Drugs acting on Central Nervous System

General anesthetics:

Inhalation anesthetics: Halothane*, Methoxyflurane, Enflurane, Sevoflurane, Isoflurane, Desflurane.

Ultra short acting barbitutrates: Methohexital sodium*, Thiamylal sodium, Thiopental sodium.

Dissociative anesthetics: Ketamine hydrochloride.*

Narcotic and non-narcotic analgesics

Morphine and related drugs: SAR of Morphine analogues, Morphine sulphate, Codeine, Meperidine hydrochloride, Anilerdine hydrochloride, Diphenoxylate hydrochloride, Loperamide hydrochloride, Fentanyl citrate*, Methadone hydrochloride*, Propoxyphene hydrochloride, Pentazocine, Levorphanol tartarate.

Narcotic antagonists: Nalorphine hydrochloride, Levallorphan tartarate, Naloxone hydrochloride.

Anti-inflammatory agents: Sodium salicylate, Aspirin, Mefenamic acid*, Meclofenamate, Indomethacin, Sulindac, Tolmetin, Zomepriac, Diclofenac, Ketorolac, Ibuprofen*, Naproxen, Piroxicam, Phenacetin, Acetaminophen, Antipyrine, Phenylbutazone.

BP406P. MEDICINAL CHEMISTRY – I (Practical)

4 Hours/Week

I	**Preparation of drugs/ intermediates**
1	1,3-pyrazole
2	1,3-oxazole
3	Benzimidazole
4	Benztriazole
5	2,3- diphenyl quinoxaline
6	Benzocaine
7	Phenytoin
8	Phenothiazine
9	Barbiturate
II	**Assay of drugs**
1	Chlorpromazine
2	Phenobarbitone
3	Atropine
4	Ibuprofen
5	Aspirin
6	Furosemide
III	**Determination of Partition coefficient for any two drugs**

Recommended Books (Latest Editions)

1. Wilson and Giswold's Organic medicinal and Pharmaceutical Chemistry.
2. Foye's Principles of Medicinal Chemistry.
3. Burger's Medicinal Chemistry, Vol I to IV.
4. Introduction to principles of drug design- Smith and Williams.
5. Remington's Pharmaceutical Sciences.
6. Martindale's extra pharmacopoeia.

7. Organic Chemistry by I.L. Finar, Vol. II.
8. The Organic Chemistry of Drug Synthesis by Lednicer, Vol. 1-5.
9. Indian Pharmacopoeia.
10. Text book of practical organic chemistry- A.I.Vogel.

BP 403 T. PHYSICAL PHARMACEUTICS-II (Theory)

45Hours

Scope: The course deals with the various physica and physicochemical properties, and principles involved in dosage forms/formulations. Theory and practical components of the subject help the student to get a better insight into various areas of formulation research and development, and stability studies of pharmaceutical dosage forms.

Objectives: Upon the completion of the course student shall be able to

1. Understand various physicochemical properties of drug molecules in the designing the dosage forms
2. Know the principles of chemical kinetics & to use them for stability testing nad determination of expiry date of formulations
3. Demonstrate use of physicochemical properties in the formulation development and evaluation of dosage forms.

Course Content:

UNIT-I **07 Hours**

Colloidal dispersions: Classification of dispersed systems & their general characteristics, size & shapes of colloidal particles, classification of colloids & comparative account of their general properties. Optical, kinetic & electrical properties. Effect of electrolytes, coacervation, peptization& protective action.

UNIT-II **10 Hours**

Rheology: Newtonian systems, law of flow, kinematic viscosity, effect of temperature, non-Newtonian systems, pseudoplastic, dilatant, plastic, thixotropy, thixotropy in formulation, determination of viscosity, capillary, falling Sphere, rotational viscometers

Deformation of solids: Plastic and elastic deformation, Heckel equation, Stress, Strain, Elastic Modulus

UNIT-III **10 Hours**

Coarse dispersion: Suspension, interfacial properties of suspended particles, settling in suspensions, formulation of flocculated and deflocculated suspensions. Emulsions and theories of emulsification, microemulsion and multiple emulsions; Stability of emulsions, preservation of emulsions, rheological properties of emulsions and emulsion formulation by HLB method.

UNIT-IV **10Hours**

Micromeretics: Particle size and distribution, mean particle size, number and weight distribution, particle number, methods for determining particle size by different methods, counting and separation method, particle shape, specific surface, methods for determining surface area, permeability, adsorption, derived properties of powders, porosity, packing arrangement, densities, bulkiness & flow properties.

UNIT-V **10 Hours**

Drug stability: Reaction kinetics: zero, pseudo-zero, first & second order, units of basic rate constants, determination of reaction order. Physical and chemical factors influencing the chemical degradation of pharmaceutical product: temperature, solvent, ionic strength, dielectric constant, specific & general acid base catalysis, Simple numerical problems. Stabilization of medicinal agents against common reactions like hydrolysis & oxidation. Accelerated stability testing in expiration dating of pharmaceutical dosage forms. Photolytic degradation and its prevention

BP 407P. PHYSICAL PHARMACEUTICS- II (Practical)

3 Hrs/week

1. Determination of particle size, particle size distribution using sieving method
2. Determination of particle size, particle size distribution using Microscopic method
3. Determination of bulk density, true density and porosity
4. Determine the angle of repose and influence of lubricant on angle of repose
5. Determination of viscosity of liquid using Ostwald's viscometer
6. Determination sedimentation volume with effect of different suspending agent
7. Determination sedimentation volume with effect of different concentration of single suspending agent
8. Determination of viscosity of semisolid by using Brookfield viscometer
9. Determination of reaction rate constant first order.
10. Determination of reaction rate constant second order
11. Accelerated stability studies

Recommended Books: (Latest Editions)

1. Physical Pharmacy by Alfred Martin, Sixth edition
2. Experimental pharmaceutics by Eugene, Parott.
3. Tutorial pharmacy by Cooper and Gunn.
4. Stocklosam J. Pharmaceutical calculations, Lea & Febiger, Philadelphia.
5. Liberman H.A, Lachman C., Pharmaceutical Dosage forms, Tablets, Volume-1 to 3, Marcel Dekkar Inc.
6. Liberman H.A, Lachman C, Pharmaceutical dosage forms. Disperse systems, volume 1, 2, 3. Marcel Dekkar Inc.
7. Physical Pharmaceutics by Ramasamy C, and Manavalan R.

BP 404 T. PHARMACOLOGY-I (Theory)

45 Hrs

Scope: The main purpose of the subject is to understand what drugs do to the living organisms and how their effects can be applied to therapeutics. The subject covers the information about the drugs like, mechanism of action, physiological and biochemical effects (pharmacodynamics) as well as absorption, distribution, metabolism and excretion (pharmacokinetics) along with the adverse effects, clinical uses, interactions, doses, contraindications and routes of administration of different classes of drugs.

Objectives: Upon completion of this course the student should be able to

1. Understand the pharmacological actions of different categories of drugs
2. Explain the mechanism of drug action at organ system/sub cellular/ macromolecular levels.
3. Apply the basic pharmacological knowledge in the prevention and treatment of various diseases.
4. Observe the effect of drugs on animals by simulated experiments
5. Appreciate correlation of pharmacology with other bio medical sciences

Course Content:

UNIT-I **08 hours**

1. General Pharmacology

a. Introduction to Pharmacology- Definition, historical landmarks and scope of pharmacology, nature and source of drugs, essential drugs concept and routes of drug administration, Agonists, antagonists(competitive and non competitive), spare receptors, addiction, tolerance, dependence, tachyphylaxis, idiosyncrasy, allergy.

b. Pharmacokinetics- Membrane transport, absorption, distribution, metabolism and excretion of drugs .Enzyme induction, enzyme inhibition, kinetics of elimination

UNIT-II **12 Hours**

General Pharmacology

a. Pharmacodynamics- Principles and mechanisms of drug action. Receptor theories and classification of receptors, regulation of receptors. drug receptors interactions signal transduction mechanisms, G-protein–coupled receptors, ion channel receptor, transmembrane enzyme linked receptors, transmembrane JAK-STAT binding receptor and receptors that regulate transcription factors, dose response relationship, therapeutic index, combined effects of drugs and factors modifying drug action.
b. Adverse drug reactions.
c. Drug interactions (pharmacokinetic and pharmacodynamic)
d. Drug discovery and clinical evaluation of new drugs -Drug discovery phase, preclinical evaluation phase, clinical trial phase, phases of clinical trials and pharmacovigilance.

UNIT-III **10 Hours**

2. Pharmacology of drugs acting on peripheral nervous system

a. Organization and function of ANS.

b.Neurohumoral transmission,co-transmission and classification of neurotransmitters.

c. Parasympathomimetics, Parasympatholytics, Sympathomimetics, sympatholytics.

d. Neuromuscular blocking agents and skeletal muscle relaxants (peripheral).

e. Local anesthetic agents.

f. Drugs used in myasthenia gravis and glaucoma

UNIT-IV **08 Hours**

3. Pharmacology of drugs acting on central nervous system

a. Neurohumoral transmission in the C.N.S.special emphasis on importance of various neurotransmitters like with GABA, Glutamate, Glycine, serotonin, dopamine.

b. General anesthetics and pre-anesthetics.

c. Sedatives, hypnotics and centrally acting muscle relaxants.

d. Anti-epileptics

e. Alcohols and disulfiram

UNIT-V **07 Hours**

3. Pharmacology of drugs acting on central nervous system

a. Psychopharmacological agents: Antipsychotics, antidepressants, anti-anxiety agents, anti-manics and hallucinogens.

b. Drugs used in Parkinsons disease and Alzheimer's disease.

c. CNS stimulants and nootropics.

d. Opioid analgesics and antagonists

e. Drug addiction, drug abuse, tolerance and dependence.

BP 408 P.PHARMACOLOGY-I (Practical)

4Hrs/Week

1. Introduction to experimental pharmacology.
2. Commonly used instruments in experimental pharmacology.
3. Study of common laboratory animals.
4. Maintenance of laboratory animals as per CPCSEA guidelines.
5. Common laboratory techniques. Blood withdrawal, serum and plasma separation, anesthetics and euthanasia used for animal studies.
6. Study of different routes of drugs administration in mice/rats.
7. Study of effect of hepatic microsomal enzyme inducers on the phenobarbitone sleeping time in mice.
8. Effect of drugs on ciliary motility of frog oesophagus
9. Effect of drugs on rabbit eye.
10. Effects of skeletal muscle relaxants using rota-rod apparatus.
11. Effect of drugs on locomotor activity using actophotometer.
12. Anticonvulsant effect of drugs by MES and PTZ method.
13. Study of stereotype and anti-catatonic activity of drugs on rats/mice.
14. Study of anxiolytic activity of drugs using rats/mice.
15. Study of local anesthetics by different methods

Recommended Books (Latest Editions)

1. Rang H. P., Dale M. M., Ritter J. M., Flower R. J., Rang and Dale's Pharmacology,.Churchil Livingstone Elsevier
2. Katzung B. G., Masters S. B., Trevor A. J., Basic and clinical pharmacology, Tata Mc Graw-Hill
3. Goodman and Gilman's, The Pharmacological Basis of Therapeutics
4. Marry Anne K. K., Lloyd Yee Y., Brian K. A., Robbin L.C., Joseph G. B., Wayne A. K., Bradley R.W., Applied Therapeutics, The Clinical use of Drugs, The Point Lippincott Williams & Wilkins
5. Mycek M.J, Gelnet S.B and Perper M.M. Lippincott's Illustrated Reviews-Pharmacology

6. K.D.Tripathi. Essentials of Medical Pharmacology, JAYPEE Brothers Medical Publishers (P) Ltd, New Delhi.

7. Sharma H. L., Sharma K. K., Principles of Pharmacology, Paras medical publisher

8. Modern Pharmacology with clinical Applications, by Charles R.Craig& Robert,

9. Ghosh MN. Fundamentals of Experimental Pharmacology. Hilton & Company, Kolkata.

10. Kulkarni SK. Handbook of experimental pharmacology. VallabhPrakashan,

BP 405 T.PHARMACOGNOSY AND PHYTOCHEMISTRY I (Theory)

45 Hours

Scope: The subject involves the fundamentals of Pharmacognosy like scope, classification of crude drugs, their identification and evaluation, phytochemicals present in them and their medicinal properties.

Objectives: Upon completion of the course, the student shall be able

1. to know the techniques in the cultivation and production of crude drugs
2. to know the crude drugs, their uses and chemical nature
3. know the evaluation techniques for the herbal drugs
4. to carry out the microscopic and morphological evaluation of crude drugs

Course Content:

UNIT-I **10 Hours**

Introduction to Pharmacognosy:

(a) Definition, history, scope and development of Pharmacognosy

(b) Sources of Drugs – Plants, Animals, Marine & Tissue culture

(c) Organized drugs, unorganized drugs (dried latex, dried juices, dried extracts, gums and mucilages, oleoresins and oleo- gum -resins).

Classification of drugs:

Alphabetical, morphological, taxonomical, chemical, pharmacological, chemo and sero taxonomical classification of drugs

Quality control of Drugs of Natural Origin:

Adulteration of drugs of natural origin. Evaluation by organoleptic, microscopic, physical, chemical and biological methods and properties.

Quantitative microscopy of crude drugs including lycopodium spore method, leafconstants, camera lucida and diagrams of microscopic objects to scale with camera lucida.

UNIT-II **10 Hours**

Cultivation, Collection, Processing and storage of drugs of natural origin:

Cultivation and Collection of drugs of natural origin

Factors influencing cultivation of medicinal plants.

Plant hormones and their applications.

Polyploidy, mutation and hybridization with reference to medicinal plants

Conservation of medicinal plants

UNIT-III **07 Hours**

Plant tissue culture:

Historical development of plant tissue culture, types of cultures, Nutritional requirements, growth and their maintenance.

Applications of plant tissue culture in pharmacognosy.

Edible vaccines

UNIT IV **10 Hours**

Pharmacognosy in various systems of medicine:

Role of Pharmacognosy in allopathy and traditional systems of medicine namely, Ayurveda, Unani, Siddha, Homeopathy and Chinese systems of medicine.

Introduction to secondary metabolites:

Definition, classification, properties and test for identification of Alkaloids, Glycosides, Flavonoids, Tannins, Volatile oil and Resins

UNIT V **08 Hours**

Study of biological source, chemical nature and uses of drugs of natural origin containing following drugs

Plant Products:

Fibers - Cotton, Jute, Hemp

Hallucinogens, Teratogens, Natural allergens

Primary metabolites:

General introduction, detailed study with respect to chemistry, sources, preparation, evaluation, preservation, storage, therapeutic used and commercial utility as Pharmaceutical Aids and/or Medicines for the following Primary metabolites:

Carbohydrates: Acacia, Agar, Tragacanth, Honey

Proteins and Enzymes : Gelatin, casein, proteolytic enzymes (Papain, bromelain, serratiopeptidase, urokinase, streptokinase, pepsin).

Lipids(Waxes, fats, fixed oils) : Castor oil, Chaulmoogra oil, Wool Fat, Bees Wax

Marine Drugs:

Novel medicinal agents from marine sources

BP408 P. PHARMACOGNOSY AND PHYTOCHEMISTRY I (Practical)

4 Hours/Week

1. Analysis of crude drugs by chemical tests: (i)Tragaccanth (ii) Acacia (iii)Agar (iv) Gelatin (v) starch (vi) Honey (vii) Castor oil
2. Determination of stomatal number and index
3. Determination of vein islet number, vein islet termination and paliside ratio.
4. Determination of size of starch grains, calcium oxalate crystals by eye piece micrometer
5. Determination of Fiber length and width
6. Determination of number of starch grains by Lycopodium spore method
7. Determination of Ash value
8. Determination of Extractive values of crude drugs
9. Determination of moisture content of crude drugs
10. Determination of swelling index and foaming

Recommended Books: (Latest Editions)

1. W.C.Evans, Trease and Evans Pharmacognosy, 16th edition, W.B. Sounders & Co., London, 2009.
2. Tyler, V.E., Brady, L.R. and Robbers, J.E., Pharmacognosy, 9th Edn., Lea and Febiger, Philadelphia, 1988.
3. Text Book of Pharmacognosy by T.E. Wallis
4. Mohammad Ali. Pharmacognosy and Phytochemistry, CBS Publishers & Distribution, New Delhi.
5. Text book of Pharmacognosy by C.K. Kokate, Purohit, Gokhlae (2007), 37th Edition, Nirali Prakashan, New Delhi.
6. Herbal drug industry by R.D. Choudhary (1996), Ist Edn, Eastern Publisher, New Delhi.
7. Essentials of Pharmacognosy, Dr.SH.Ansari, IInd edition, Birla publications, New Delhi, 2007
8. Practical Pharmacognosy: C.K. Kokate, Purohit, Gokhlae
9. Anatomy of Crude Drugs by M.A. Iyengar

SEMESTER V

BP501T. MEDICINAL CHEMISTRY – II (Theory)

45 Hours

Scope: This subject is designed to impart fundamental knowledge on the structure, chemistry and therapeutic value of drugs. The subject emphasizes on structure activity relationships of drugs, importance of physicochemical properties and metabolism of drugs. The syllabus also emphasizes on chemical synthesis of important drugs under each class.

Objectives: Upon completion of the course the student shall be able to

1. Understand the chemistry of drugs with respect to their pharmacological activity
2. Understand the drug metabolic pathways, adverse effect and therapeutic value of drugs
3. Know the Structural Activity Relationship of different class of drugs
4. Study the chemical synthesis of selected drugs

Course Content:

Study of the development of the following classes of drugs, Classification, mechanism of action, uses of drugs mentioned in the course, Structure activity relationship of selective class of drugs as specified in the course and synthesis of drugs superscripted (*)

UNIT- I **10 Hours**

Antihistaminic agents: Histamine, receptors and their distribution in the humanbody

H_1–antagonists: Diphenhydramine hydrochloride*, Dimenhydrinate, Doxylamines cuccinate, Clemastine fumarate, Diphenylphyraline hydrochloride, Tripelenamine hydrochloride, Chlorcyclizine hydrochloride, Meclizine hydrochloride, Buclizine hydrochloride, Chlorpheniramine maleate, Triprolidine hydrochloride*, Phenidamine tartarate, Promethazine hydrochloride*, Trimeprazine tartrate, Cyproheptadine hydrochloride, Azatidine maleate, Astemizole, Loratadine, Cetirizine, Levocetrazine Cromolyn sodium

H_2-antagonists: Cimetidine*, Famotidine, Ranitidin.

Gastric Proton pump inhibitors: Omeprazole, Lansoprazole, Rabeprazole, Pantoprazole

Anti-neoplastic agents:

Alkylating agents: Meclorethamine*, Cyclophosphamide, Melphalan,

Chlorambucil, Busulfan, Thiotepa

Antimetabolites: Mercaptopurine*, Thioguanine, Fluorouracil, Floxuridine, Cytarabine, Methotrexate*, Azathioprine

Antibiotics: Dactinomycin, Daunorubicin, Doxorubicin, Bleomycin

Plant products: Etoposide, Vinblastin sulphate, Vincristin sulphate

Miscellaneous: Cisplatin, Mitotane.

UNIT – II **10 Hours**

Anti-anginal:

Vasodilators: Amyl nitrite, Nitroglycerin*, Pentaerythritol tetranitrate, Isosorbide dinitrite*, Dipyridamole.

Calcium channel blockers: Verapamil, Bepridil hydrochloride, Diltiazem hydrochloride, Nifedipine, Amlodipine, Felodipine, Nicardipine, Nimodipine.

Diuretics:

Carbonic anhydrase inhibitors: Acetazolamide*, Methazolamide, Dichlorphenamide.

Thiazides: Chlorthiazide*, Hydrochlorothiazide, Hydroflumethiazide, Cyclothiazide,

Loop diuretics: Furosemide*, Bumetanide, Ethacrynic acid.

Potassium sparing Diuretics: Spironolactone, Triamterene, Amiloride.

Osmotic Diuretics: Mannitol

Anti-hypertensive Agents: Timolol, Captopril, Lisinopril, Enalapril, Benazepril hydrochloride, Quinapril hydrochloride, Methyldopate hydrochloride,* Clonidine hydrochloride, Guanethidine monosulphate, Guanabenz acetate, Sodium nitroprusside, Diazoxide, Minoxidil, Reserpine, Hydralazine hydrochloride.

UNIT- III **10 Hours**

Anti-arrhythmic Drugs: Quinidine sulphate, Procainamide hydrochloride, Disopyramide phosphate*, Phenytoin sodium, Lidocaine hydrochloride, Tocainide hydrochloride, Mexiletine hydrochloride, Lorcainide hydrochloride, Amiodarone, Sotalol.

Anti-hyperlipidemic agents: Clofibrate, Lovastatin, Cholesteramine and Cholestipol

Coagulant & Anticoagulants: Menadione, Acetomenadione, Warfarin*, Anisindione, clopidogrel

Drugs used in Congestive Heart Failure: Digoxin, Digitoxin, Nesiritide, Bosentan, Tezosentan.

UNIT- IV **08 Hours**

Drugs acting on Endocrine system

Nomenclature, Stereochemistry and metabolism of steroids

Sex hormones: Testosterone, Nandralone, Progestrones, Oestriol, Oestradiol, Oestrione, Diethyl stilbestrol.
Drugs for erectile dysfunction: Sildenafil, Tadalafil.
Oral contraceptives: Mifepristone, Norgestril, Levonorgestrol
Corticosteroids: Cortisone, Hydrocortisone, Prednisolone, Betamethasone, Dexamethasone
Thyroid and antithyroid drugs: L-Thyroxine, L-Thyronine, Propylthiouracil, Methimazole.

UNIT – V **07 Hours**

Antidiabetic agents:

Insulin and its preparations

Sulfonyl ureas: Tolbutamide*, Chlorpropamide, Glipizide, Glimepiride.

Biguanides: Metformin.

Thiazolidinediones: Pioglitazone, Rosiglitazone.

Meglitinides: Repaglinide, Nateglinide.

Glucosidase inhibitors: Acrabose, Voglibose.

Local Anesthetics: SAR of Local anesthetics

Benzoic Acid derivatives; Cocaine, Hexylcaine, Meprylcaine, Cyclomethycaine, Piperocaine.

Amino Benzoic acid derivatives: Benzocaine*, Butamben, Procaine*, Butacaine, Propoxycaine, Tetracaine, Benoxinate.

Lidocaine/Anilide derivatives: Lignocaine, Mepivacaine, Prilocaine, Etidocaine.

Miscellaneous: Phenacaine, Diperodon, Dibucaine.*

Recommended Books (Latest Editions)

1. Wilson and Giswold's Organic medicinal and Pharmaceutical Chemistry.
2. Foye's Principles of Medicinal Chemistry.
3. Burger's Medicinal Chemistry, Vol I to IV.
4. Introduction to principles of drug design- Smith and Williams.
5. Remington's Pharmaceutical Sciences.
6. Martindale's extra pharmacopoeia.
7. Organic Chemistry by I.L. Finar, Vol. II.
8. The Organic Chemistry of Drug Synthesis by Lednicer, Vol. 1to 5.
9. Indian Pharmacopoeia.
10. Text book of practical organic chemistry- A.I.Vogel.

BP 502 T. Industrial PharmacyI (Theory)

45 Hours

Scope: Course enables the student to understand and appreciate the influence of pharmaceutical additives and various pharmaceutical dosage forms on the performance of the drug product.

Objectives: Upon completion of the course the student shall be able to

1. Know the various pharmaceutical dosage forms and their manufacturing techniques.
2. Know various considerations in development of pharmaceutical dosage forms
3. Formulate solid, liquid and semisolid dosage forms and evaluate them for their quality

Course content:

3 hours/ week

UNIT-I **07 Hours**

Preformulation Studies: Introduction to preformulation, goals and objectives, study of physicochemical characteristics of drug substances.

a. Physical properties: Physical form (crystal & amorphous), particle size, shape, flow properties, solubility profile (pKa, pH, partition coefficient), polymorphism

b. Chemical Properties: Hydrolysis, oxidation, reduction, racemisation, polymerization

BCS classification of drugs & its significant

Application of preformulation considerations in the development of solid, liquid oral and parenteral dosage forms and its impact on stability of dosage forms.

UNIT-II **10 Hours**

Tablets:

a. Introduction, ideal characteristics of tablets, classification of tablets. Excipients, Formulation of tablets, granulation methods, compression and processing problems. Equipments and tablet tooling.

b. Tablet coating: Types of coating, coating materials, formulation of coating composition, methods of coating, equipment employed and defects in coating.

c. Quality control tests: In process and finished product tests

Liquid orals: Formulation and manufacturing consideration of syrups and elixirs suspensions and emulsions; Filling and packaging; evaluation of liquid orals official in pharmacopoeia

UNIT-III **08 Hours**

Capsules:

a. ***Hard gelatin capsules:*** Introduction, Production of hard gelatin capsule shells. size of capsules, Filling, finishing and special techniques of formulation of hard gelatin capsules, manufacturing defects. In process and final product quality control tests for capsules.

b. ***Soft gelatin capsules:*** Nature of shell and capsule content, size of capsules,importance of base adsorption and minim/gram factors, production, in process and final product quality control tests. Packing, storage and stability testing of soft gelatin capsules and their applications.

Pellets: Introduction, formulation requirements, pelletization process, equipments for manufacture of pellets

UNIT-IV **10 Hours**

Parenteral Products:

a. Definition, types, advantages and limitations. Preformulation factors and essential requirements, vehicles, additives, importance of isotonicity

b. Production procedure, production facilities and controls,
aseptic processing

c. Formulation of injections, sterile powders, large volume parenterals and lyophilized products.

d. Containers and closures selection, filling and sealing of ampoules, vials and infusion fluids. Quality control tests of parenteral products.

Ophthalmic Preparations: Introduction, formulation considerations; formulation of eye drops, eye ointments and eye lotions; methods of preparation; labeling, containers; evaluation of ophthalmic preparations

UNIT-V **10 Hours**

Cosmetics: Formulation and preparation of the following cosmetic preparations: lipsticks, shampoos, cold cream and vanishing cream, tooth pastes, hair dyes and sunscreens.

Pharmaceutical Aerosols: Definition, propellants, containers, valves, types of aerosol systems; formulation and manufacture of aerosols; Evaluation of aerosols; Quality control and stability studies.

Packaging Materials Science: Materials used for packaging of pharmaceutical products, factors influencing choice of containers, legal and official requirements for containers, stability aspects of packaging materials, quality control tests.

BP 506 P. Industrial PharmacyI (Practical)

4 Hours/week

1. Preformulation studies on paracetamol/asparin/or any other drug
2. Preparation and evaluation of Paracetamol tablets
3. Preparation and evaluation of Aspirin tablets
4. Coating of tablets- film coating of tables/granules
5. Preparation and evaluation of Tetracycline capsules
6. Preparation of Calcium Gluconate injection
7. Preparation of Ascorbic Acid injection
8. Qulaity control test of (as per IP) marketed tablets and capsules
9. Preparation of Eye drops/ and Eye ointments
10. Preparation of Creams (cold / vanishing cream)
11. Evaluation of Glass containers (as per IP)

Recommended Books: (Latest Editions)

1. Pharmaceutical dosage forms - Tablets, volume 1 -3 by H.A. Liberman, Leon Lachman &J.B.Schwartz
2. Pharmaceutical dosage form - Parenteral medication vol- 1&2 by Liberman & Lachman
3. Pharmaceutical dosage form disperse system VOL-1 by Liberman & Lachman
4. Modern Pharmaceutics by Gilbert S. Banker & C.T. Rhodes, 3rd Edition
5. Remington: The Science and Practice of Pharmacy, 20th edition Pharmaceutical Science (RPS)
6. Theory and Practice of Industrial Pharmacy by Liberman & Lachman
7. Pharmaceutics- The science of dosage form design by M.E.Aulton, Churchill livingstone, Latest edition
8. Introduction to Pharmaceutical Dosage Forms by H. C.Ansel, Lea &Febiger, Philadelphia, 5th edition, 2005
9. Drug stability - Principles and practice by Cartensen & C.J. Rhodes, 3rd Edition, Marcel Dekker Series, Vol 107.

BP503.T. PHARMACOLOGY-II (Theory)

45 Hours

Scope: This subject is intended to impart the fundamental knowledge on various aspects (classification, mechanism of action, therapeutic effects, clinical uses, side effects and contraindications) of drugs acting on different systems of body and in addition,emphasis on the basic concepts of bioassay.

Objectives: Upon completion of this course the student should be able to

1. Understand the mechanism of drug action and its relevance in the treatment of different diseases
2. Demonstrate isolation of different organs/tissues from the laboratory animals by simulated experiments
3. Demonstrate the various receptor actions using isolated tissue preparation
4. Appreciate correlation of pharmacology with related medical sciences

Course Content:

10hours

UNIT-I

1. Pharmacology of drugs acting on cardio vascular system

a. Introduction to hemodynamic and electrophysiology of heart.
b. Drugs used in congestive heart failure
c. Anti-hypertensive drugs.
d. Anti-anginal drugs.
e. Anti-arrhythmic drugs.
f. Anti-hyperlipidemic drugs.

10hours

UNIT-II

1. Pharmacology of drugs acting on cardio vascular system

a. Drug used in the therapy of shock.
b. Hematinics, coagulants and anticoagulants.
c. Fibrinolytics and anti-platelet drugs
d. Plasma volume expanders

2. Pharmacology of drugs acting on urinary system

a. Diuretics
b. Anti-diuretics.

10hours

UNIT-III

3. Autocoids and related drugs

a. Introduction to autacoids and classification
b. Histamine, 5-HT and their antagonists.
c. Prostaglandins, Thromboxanes and Leukotrienes.
d. Angiotensin, Bradykinin and Substance P.
e. Non-steroidal anti-inflammatory agents
f. Anti-gout drugs
g. Antirheumatic drugs

UNIT-IV **08hours**

5. Pharmacology of drugs acting on endocrine system

a. Basic concepts in endocrine pharmacology.
b. Anterior Pituitary hormones- analogues and their inhibitors.
c. Thyroid hormones- analogues and their inhibitors.
d. Hormones regulating plasma calcium level- Parathormone, Calcitonin and Vitamin-D.
d. Insulin, Oral Hypoglycemic agents and glucagon.
e. ACTH and corticosteroids.

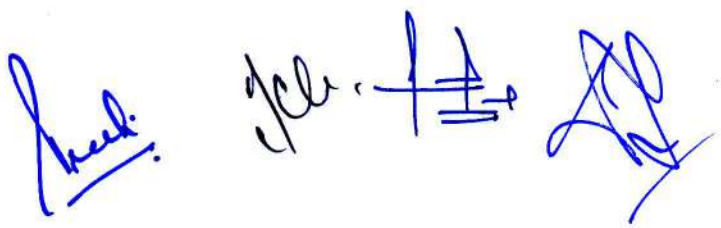
UNIT-V **07hours**

5. Pharmacology of drugs acting on endocrine system

a. Androgens and Anabolic steroids.
b. Estrogens, progesterone and oral contraceptives.
c. Drugs acting on the uterus.

6. Bioassay

a. Principles and applications of bioassay.
b.Types of bioassay
c. Bioassay of insulin, oxytocin, vasopressin, ACTH,d-tubocurarine,digitalis, histamine and 5-HT



BP 507 P. PHARMACOLOGY-II (Practical)

4Hrs/Week

1. Introduction to pharmacology and physiological salt solutions
2. Effect of drugs on isolated frog heart.
3. Effect of drugs on blood pressure and heart rate of dog.
4. Study of diuretic activity of drugs using rats/mice.
5. DRC of acetylcholine using frog rectus abdominis muscle.
6. Effect of physostigmine and atropine on DRC of acetylcholine using frog rectus abdominis muscle and rat ileum respectively.
7. Bioassay of histamine using guinea pig ileum by matching method.
8. Bioassay of oxytocin using rat uterine horn by interpolation method.
9. Bioassay of serotonin using rat fundus strip by three point bioassay.
10. Bioassay of acetylcholine using rat ileum/colon by four point bioassay.
11. Determination of PA_2 value of prazosin using rat anococcygeus muscle (by Schilds plot method).
12. Determination of PD_2 value using guinea pig ileum.
13. Effect of spasmogens and spasmolytics using rabbit jejunum.
14. Anti-inflammatory activity of drugs using carrageenan induced paw-edema model.
15. Analgesic activity of drug using central and peripheral methods

Recommended Books (Latest Editions)

1. Rang H. P., Dale M. M., Ritter J. M., Flower R. J., Rang and Dale's Pharmacology, Churchil Livingstone Elsevier
2. Katzung B. G., Masters S. B., Trevor A. J., Basic and clinical pharmacology, Tata Mc Graw-Hill.
3. Goodman and Gilman's, The Pharmacological Basis of Therapeutics
4. Marry Anne K. K., Lloyd Yee Y., Brian K. A., Robbin L.C., Joseph G. B., Wayne A. K., Bradley R.W., Applied Therapeutics, The Clinical use of Drugs, The Point Lippincott Williams & Wilkins.
5. Mycek M.J, Gelnet S.B and Perper M.M. Lippincott's Illustrated Reviews-Pharmacology.
6. K.D.Tripathi. Essentials of Medical Pharmacology, , JAYPEE Brothers Medical Publishers (P) Ltd, New Delhi.
7. Sharma H. L., Sharma K. K., Principles of Pharmacology, Paras medical publisher
8. Modern Pharmacology with clinical Applications, by Charles R.Craig& Robert.
9. Ghosh MN. Fundamentals of Experimental Pharmacology. Hilton & Company, Kolkata.
10. Kulkarni SK. Handbook of experimental pharmacology. Vallabh Prakashan.

BP504 T. PHARMACOGNOSY AND PHYTOCHEMISTRY II (Theory)

45Hours

Scope: The main purpose of subject is to impart the students the knowledge of how the secondary metabolites are produced in the crude drugs, how to isolate and identify and produce them industrially. Also this subject involves the study of producing the plants and phytochemicals through plant tissue culture, drug interactions and basic principles of traditional system of medicine

Objectives: Upon completion of the course, the student shall be able

1. to know the modern extraction techniques, characterization and identification of the herbal drugs and phytoconstituents
2. to understand the preparation and development of herbal formulation.
3. to understand the herbal drug interactions
4. to carryout isolation and identification of phytoconstituents

Course Content:

UNIT-I **7 Hours**

Metabolic pathways in higher plants and their determination

a) Brief study of basic metabolic pathways and formation of different secondary metabolites through these pathways- Shikimic acid pathway, Acetate pathways and Amino acid pathway.
b) Study of utilization of radioactive isotopes in the investigation of Biogenetic studies.

UNIT-II **14 Hours**

General introduction, composition, chemistry & chemical classes, biosources, therapeutic uses and commercial applications of following
secondary metabolites:

Alkaloids: Vinca, Rauwolfia, Belladonna, Opium,
Phenylpropanoids and Flavonoids: Lignans, Tea, Ruta
Steroids, Cardiac Glycosides & Triterpenoids: Liquorice, Dioscorea, Digitalis
Volatile oils: Mentha, Clove, Cinnamon, Fennel, Coriander,
Tannins: Catechu, Pterocarpus
Resins: Benzoin, Guggul, Ginger, Asafoetida, Myrrh, Colophony
Glycosides: Senna, Aloes, Bitter Almond
Iridoids, Other terpenoids & Naphthaquinones: Gentian, Artemisia, taxus, carotenoids

UNIT-III **06 Hours**

Isolation, Identification and Analysis of Phytoconstituents

a) Terpenoids: Menthol, Citral, Artemisin
b) Glycosides: Glycyrhetinic acid & Rutin
c) Alkaloids: Atropine,Quinine,Reserpine,Caffeine
d) Resins: Podophyllotoxin, Curcumin

UNIT-IV **10 Hours**

Industrial production, estimation and utilization of the following phytoconstituents: Forskolin, Sennoside, Artemisinin, Diosgenin, Digoxin, Atropine, Podophyllotoxin, Caffeine, Taxol, Vincristine and Vinblastine

UNIT V **8 Hours**

Basics of Phytochemistry

Modern methods of extraction, application of latest techniques like Spectroscopy, chromatography and electrophoresis in the isolation, purification and identification of crude drugs.

BP 508 P. PHARMACOGNOSY AND PHYTOCHEMISTRY II (Practical)

4 Hours/Week

1. Morphology, histology and powder characteristics & extraction & detection of: Cinchona, Cinnamon, Senna, Clove, Ephedra, Fennel and Coriander
2. Exercise involving isolation & detection of active principles
   a. Caffeine - from tea dust.
   b. Diosgenin from Dioscorea
   c. Atropine from Belladonna
   d. Sennosides from Senna
3. Separation of sugars by Paper chromatography
4. TLC of herbal extract
5. Distillation of volatile oils and detection of phytoconstitutents by TLC
6. Analysis of crude drugs by chemical tests: (i) Asafoetida (ii) Benzoin (iii) Colophony (iv) Aloes (v) Myrrh

Recommended Books: (Latest Editions)

1. W.C.Evans, Trease and Evans Pharmacognosy, 16th edition, W.B. Sounders & Co., London, 2009.
2. Mohammad Ali. Pharmacognosy and Phytochemistry, CBS Publishers & Distribution, New Delhi.
3. Text book of Pharmacognosy by C.K. Kokate, Purohit, Gokhlae (2007), 37th Edition, Nirali Prakashan, New Delhi.
4. Herbal drug industry by R.D. Choudhary (1996), Ist Edn, Eastern Publisher, New Delhi.
5. Essentials of Pharmacognosy, Dr.SH.Ansari, IInd edition, Birla publications, New Delhi, 2007
6. Herbal Cosmetics by H.Pande, Asia Pacific Business press, Inc, New Delhi.
7. A.N. Kalia, Textbook of Industrial Pharmacognosy, CBS Publishers, New Delhi, 2005.
8. R Endress, Plant cell Biotechnology, Springer-Verlag, Berlin, 1994.
9. Pharmacognosy & Pharmacobiotechnology. James Bobbers, Marilyn KS, VE Tylor.
10. The formulation and preparation of cosmetic, fragrances and flavours.
11. Remington's Pharmaceutical sciences.
12. Text Book of Biotechnology by Vyas and Dixit.
13. Text Book of Biotechnology by R.C. Dubey.

BP 508 P. PHARMACOGNOSY AND PHYTOCHEMISTRY II (Practical)

4 Hours/Week

1. Morphology, histology and powder characteristics & extraction & detection of: Cinchona, Cinnamon, Senna, Clove, Ephedra, Fennel and Coriander
2. Exercise involving isolation & detection of active principles
   a. Caffeine - from tea dust.
   b. Diosgenin from Dioscorea
   c. Atropine from Belladonna
   d. Sennosides from Senna
3. Separation of sugars by Paper chromatography
4. TLC of herbal extract
5. Distillation of volatile oils and detection of phytoconstitutents by TLC
6. Analysis of crude drugs by chemical tests: (i) Asafoetida (ii) Benzoin (iii) Colophony (iv) Aloes (v) Myrrh

Recommended Books: (Latest Editions)

1. W.C.Evans, Trease and Evans Pharmacognosy, 16th edition, W.B. Sounders & Co., London, 2009.
2. Mohammad Ali. Pharmacognosy and Phytochemistry, CBS Publishers & Distribution, New Delhi.
3. Text book of Pharmacognosy by C.K. Kokate, Purohit, Gokhlae (2007), 37th Edition, Nirali Prakashan, New Delhi.
4. Herbal drug industry by R.D. Choudhary (1996), Ist Edn, Eastern Publisher, New Delhi.
5. Essentials of Pharmacognosy, Dr.SH.Ansari, IInd edition, Birla publications, New Delhi, 2007
6. Herbal Cosmetics by H.Pande, Asia Pacific Business press, Inc, New Delhi.
7. A.N. Kalia, Textbook of Industrial Pharmacognosy, CBS Publishers, New Delhi, 2005.
8. R Endress, Plant cell Biotechnology, Springer-Verlag, Berlin, 1994.
9. Pharmacognosy & Pharmacobiotechnology. James Bobbers, Marilyn KS, VE Tylor.
10. The formulation and preparation of cosmetic, fragrances and flavours.
11. Remington's Pharmaceutical sciences.
12. Text Book of Biotechnology by Vyas and Dixit.
13. Text Book of Biotechnology by R.C. Dubey.

BP 505 T. PHARMACEUTICAL JURISPRUDENCE (Theory)

45 Hours

Scope: This course is designed to impart basic knowledge on important legislations related to the profession of pharmacy in India.

Objectives: Upon completion of the course, the student shall be able to understand:

1. The Pharmaceutical legislations and their implications in the development and marketing of pharmaceuticals.
2. Various Indian pharmaceutical Acts and Laws
3. The regulatory authorities and agencies governing the manufacture and sale of pharmaceuticals
4. The code of ethics during the pharmaceutical practice

Course Content:

UNIT-I **10 Hours**

Drugs and Cosmetics Act, 1940 and its rules 1945:

Objectives, Definitions, Legal definitions of schedules to the Act and Rules

Import of drugs – Classes of drugs and cosmetics prohibited from import, Import under license or permit. Offences and penalties.

Manufacture of drugs – Prohibition of manufacture and sale of certain drugs,

Conditions for grant of license and conditions of license for manufacture of drugs, Manufacture of drugs for test, examination and analysis, manufacture of new drug, loan license and repacking license.

UNIT-II **10 Hours**

Drugs and Cosmetics Act, 1940 and its rules 1945.

Detailed study of Schedule G, H, M, N, P,T,U, V, X, Y, Part XII B, Sch F & DMR (OA)

Sale of Drugs – Wholesale, Retail sale and Restricted license. Offences and penalties

Labeling & Packing of drugs- General labeling requirements and specimen labels for drugs and cosmetics, List of permitted colors. Offences and penalties.

Administration of the Act and Rules – Drugs Technical Advisory Board, Central drugs Laboratory, Drugs Consultative Committee, Government drug analysts, Licensing authorities, controlling authorities, Drugs Inspectors

UNIT-III **10 Hours**

- **Pharmacy Act –1948**: Objectives, Definitions, Pharmacy Council of India; its constitution and functions, Education Regulations, State and Joint state pharmacy councils; constitution and functions, Registration of Pharmacists, Offences and

Penalties

- **Medicinal and Toilet Preparation Act –1955**: Objectives, Definitions, Licensing, Manufacture In bond and Outside bond, Export of alcoholic preparations, Manufacture of Ayurvedic, Homeopathic, Patent & Proprietary Preparations. Offences and Penalties.
- **Narcotic Drugs and Psychotropic substances Act-1985 and Rules**: Objectives, Definitions, Authorities and Officers, Constitution and Functions of narcotic & Psychotropic Consultative Committee, National Fund for Controlling the Drug Abuse, Prohibition, Control and Regulation, opium poppy cultivation and production of poppy straw, manufacture, sale and export of opium, Offences and Penalties

UNIT-IV **08 Hours**

- **Study of Salient Features of Drugs and Magic Remedies Act and its rules:** Objectives, Definitions, Prohibition of certain advertisements, Classes of Exempted advertisements, Offences and Penalties
- **Prevention of Cruelty to animals Act-1960:** Objectives, Definitions, Institutional Animal Ethics Committee, CPCSEA guidelines for Breeding and Stocking of Animals, Performance of Experiments, Transfer and acquisition of animals for experiment, Records, Power to suspend or revoke registration, Offences and Penalties
- **National Pharmaceutical Pricing Authority:** Drugs Price Control Order (DPCO)-2013. Objectives, Definitions, Sale prices of bulk drugs, Retail price of formulations, Retail price and ceiling price of scheduled formulations, National List of Essential Medicines (NLEM)

UNIT-V **07 Hours**

- **Pharmaceutical Legislations** – A brief review, Introduction, Study of drugs enquiry committee, Health survey and development committee, Hathi committee and Mudaliar committee
- **Code of Pharmaceutical ethics** D efinition, Pharmacist in relation to his job, trade, medical profession and his profession, Pharmacist's oath
- **Medical Termination of Pregnancy Act**
- **Right to Information Act**
- **Introduction to Intellectual Property Rights (IPR)**

Recommended books: (Latest Edition)

1. Forensic Pharmacy by B. Suresh

2. Text book of Forensic Pharmacy by B.M. Mithal
3. Hand book of drug law-by M.L. Mehra
4. A text book of Forensic Pharmacy by N.K. Jain
5. Drugs and Cosmetics Act/Rules by Govt. of India publications.
6. Medicinal and Toilet preparations act 1955 by Govt. of India publications.
7. Narcotic drugs and psychotropic substances act by Govt. of India publications
8. Drugs and Magic Remedies act by Govt. of India publication
9.Bare Acts of the said laws published by Government. Reference books (Theory)

SEMESTER VI

BP601T. MEDICINAL CHEMISTRY – III (Theory)

45 Hours

Scope: This subject is designed to impart fundamental knowledge on the structure, chemistry and therapeutic value of drugs. The subject emphasis on modern techniques of rational drug design like quantitative structure activity relationship (QSAR), Prodrug concept, combinatorial chemistry and Computer aided drug design (CADD). The subject also emphasizes on the chemistry, mechanism of action, metabolism, adverse effects, Structure Activity Relationships (SAR), therapeutic uses and synthesis of important drugs.

Objectives: Upon completion of the course student shall be able to

1. Understand the importance of drug design and different techniques of drug design.
2. Understand the chemistry of drugs with respect to their biological activity.
3. Know the metabolism, adverse effects and therapeutic value of drugs.
4. Know the importance of SAR of drugs.

Course Content:

Study of the development of the following classes of drugs, Classification, mechanism of action, uses of drugs mentioned in the course, Structure activity relationship of selective class of drugs as specified in the course and synthesis of drugs superscripted by (*)

UNIT – I **10 Hours**

Antibiotics

Historical background, Nomenclature, Stereochemistry, Structure activity relationship, Chemical degradation classification and important products of the following classes.

β-Lactam antibiotics: Penicillin, Cepholosporins, β- Lactamase inhibitors, Monobactams

Aminoglycosides: Streptomycin, Neomycin, Kanamycin

Tetracyclines: Tetracycline,Oxytetracycline, Chlortetracycline, Minocycline, Doxycycline

UNIT – II **10 Hours**

Antibiotics

Historical background, Nomenclature, Stereochemistry, Structure activity relationship, Chemical degradation classification and important products of the following classes.

Macrolide: Erythromycin Clarithromycin, Azithromycin.

Miscellaneous: Chloramphenicol*, Clindamycin.

Prodrugs: Basic concepts and application of prodrugs design.

Antimalarials: Etiology of malaria.

Quinolines: SAR, Quinine sulphate, Chloroquine*, Amodiaquine, Primaquine phosphate, Pamaquine*, Quinacrine hydrochloride, Mefloquine.

Biguanides and dihydro triazines: Cycloguanil pamoate, Proguanil.

Miscellaneous: Pyrimethamine, Artesunete, Artemether, Atovoquone.

UNIT – III **10 Hours**

Anti-tubercular Agents

Synthetic anti tubercular agents: Isoniozid*, Ethionamide, Ethambutol, Pyrazinamide, Para amino salicylic acid.*

Anti tubercular antibiotics: Rifampicin, Rifabutin, Cycloserine Streptomycine, Capreomycin sulphate.

Urinary tract anti-infective agents

Quinolones: SAR of quinolones, Nalidixic Acid,Norfloxacin, Enoxacin, Ciprofloxacin*, Ofloxacin, Lomefloxacin, Sparfloxacin, Gatifloxacin, Moxifloxacin

Miscellaneous: Furazolidine, Nitrofurantoin*, Methanamine.

Antiviral agents:

Amantadine hydrochloride, Rimantadine hydrochloride, Idoxuridine trifluoride, Acyclovir*, Gancyclovir, Zidovudine, Didanosine, Zalcitabine, Lamivudine, Loviride, Delavirding, Ribavirin, Saquinavir, Indinavir, Ritonavir.

UNIT – IV **08 Hours**

Antifungal agents:

Antifungal antibiotics: Amphotericin-B, Nystatin, Natamycin, Griseofulvin.

Synthetic Antifungal agents: Clotrimazole, Econazole, Butoconazole, Oxiconazole Tioconozole, Miconazole*, Ketoconazole, Terconazole, Itraconazole, Fluconazole, Naftifine hydrochloride, Tolnaftate*.

Anti-protozoal Agents: Metronidazole*, Tinidazole, Ornidazole, Diloxanide, Iodoquinol, Pentamidine Isethionate, Atovaquone, Eflornithine.

Anthelmintics: Diethylcarbamazine citrate*, Thiabendazole, Mebendazole*, Albendazole, Niclosamide, Oxamniquine, Praziquantal, Ivermectin.

Sulphonamides and Sulfones

Historical development, chemistry, classification and SAR of Sulfonamides: Sulphamethizole, Sulfisoxazole, Sulphamethizine, Sulfacetamide*, Sulphapyridine, Sulfamethoxaole*, Sulphadiazine, Mefenide acetate, Sulfasalazine.

Folate reductase inhibitors: Trimethoprim*, Cotrimoxazole.

Sulfones: Dapsone*.

UNIT – V **07 Hours**

Introduction to Drug Design

Various approaches used in drug design.

Physicochemical parameters used in quantitative structure activity relationship (QSAR) such as partition coefficient, Hammet's electronic parameter, Tafts steric parameter and Hansch analysis.

Pharmacophore modeling and docking techniques.

Combinatorial Chemistry: Concept and applications of combinatorial chemistry: solid phase and solution phase synthesis.

BP607P. MEDICINAL CHEMISTRY- III (Practical)

4 Hours / week

I Preparation of drugs and intermediates

1 Sulphanilamide

2 7-Hydroxy, 4-methyl coumarin

3 Chlorobutanol

4 Triphenyl imidazole

5 Tolbutamide

6 Hexamine

II Assay of drugs

1 Isonicotinic acid hydrazide

2 Chloroquine

3 Metronidazole

4 Dapsone

5 Chlorpheniramine maleate

6 Benzyl penicillin

III Preparation of medicinally important compounds or intermediates by Microwave irradiation technique

IV Drawing structures and reactions using chem draw®

V Determination of physicochemical properties such as logP, clogP, MR, Molecular weight, Hydrogen bond donors and acceptors for class of drugs course content using drug design software Drug likeliness screening (Lipinskies RO5)

Recommended Books (Latest Editions)

1. Wilson and Giswold's Organic medicinal and Pharmaceutical Chemistry.
2. Foye's Principles of Medicinal Chemistry.
3. Burger's Medicinal Chemistry, Vol I to IV.
4. Introduction to principles of drug design- Smith and Williams.
5. Remington's Pharmaceutical Sciences.
6. Martindale's extra pharmacopoeia.

7. Organic Chemistry by I.L. Finar, Vol. II.
8. The Organic Chemistry of Drug Synthesis by Lednicer, Vol. 1-5.
9. Indian Pharmacopoeia.
10. Text book of practical organic chemistry- A.I.Vogel.

BP602 T. PHARMACOLOGY-III (Theory)

45 Hours

Scope: This subject is intended to impart the fundamental knowledge on various aspects (classification, mechanism of action, therapeutic effects, clinical uses, side effects and contraindications) of drugs acting on respiratory and gastrointestinal system, infectious diseases, immuno-pharmacology and in addition,emphasis on the principles of toxicology and chronopharmacology.

Objectives: Upon completion of this course the student should be able to:

1. understand the mechanism of drug action and its relevance in the treatment of different infectious diseases
2. comprehend the principles of toxicology and treatment of various poisoningsand
3. appreciate correlation of pharmacology with related medical sciences.

Course Content:

UNIT-I **10hours**

1. Pharmacology of drugs acting on Respiratory system

a. Anti -asthmatic drugs
b. Drugs used in the management of COPD
c. Expectorants and antitussives
d. Nasal decongestants
e. Respiratory stimulants

2. Pharmacology of drugs acting on the Gastrointestinal Tract

a. Antiulcer agents.
b. Drugs for constipation and diarrhoea.
c. Appetite stimulants and suppressants.
d. Digestants and carminatives.
e. Emetics and anti-emetics.

UNIT-II **10hours**

3. Chemotherapy

a. General principles of chemotherapy.
b. Sulfonamides and cotrimoxazole.
c. Antibiotics- Penicillins, cephalosporins, chloramphenicol, macrolides, quinolones and fluoroquinolins, tetracycline and aminoglycosides

UNIT-III **10hours**

3. Chemotherapy

a. Antitubercular agents
b. Antileprotic agents

c. Antifungal agents

d. Antiviral drugs

e.Anthelmintics

f. Antimalarial drugs

g. Antiamoebic agents

UNIT-IV **08hours**

3. Chemotherapy

l. Urinary tract infections and sexually transmitted diseases.

m. Chemotherapy of malignancy.

4. Immunopharmacology

a. Immunostimulants

b. Immunosuppressant

Protein drugs, monoclonal antibodies, target drugs to antigen, biosimilars

UNIT-V **07hours**

5. Principles of toxicology

a. Definition and basic knowledge of acute, subacute and chronic toxicity.

b. Definition and basic knowledge of genotoxicity, carcinogenicity, teratogenicity and mutagenicity

c. General principles of treatment of poisoning

d. Clinical symptoms and management of barbiturates, morphine, organophosphosphorus compound and lead, mercury and arsenic poisoning.

6. Chronopharmacology

a. Definition of rhythm and cycles.

b. Biological clock and their significance leading to chronotherapy.

BP 608 P. PHARMACOLOGY-III (Practical)

4Hrs/Week

1. Dose calculation in pharmacological experiments
2. Antiallergic activity by mast cell stabilization assay
3. Study of anti-ulcer activity of a drug using pylorus ligand (SHAY) rat model and NSAIDS induced ulcer model.
4. Study of effect of drugs on gastrointestinal motility
5. Effect of agonist and antagonists on guinea pig ileum
6. Estimation of serum biochemical parameters by using semi- autoanalyser
7. Effect of saline purgative on frog intestine
8. Insulin hypoglycemic effect in rabbit
9. Test for pyrogens (rabbit method)
10. Determination of acute oral toxicity (LD50) of a drug from a given data
11. Determination of acute skin irritation / corrosion of a test substance
12. Determination of acute eye irritation / corrosion of a test substance
13. Calculation of pharmacokinetic parameters from a given data
14. Biostatistics methods in experimental pharmacology(student's t test, ANOVA)
15. Biostatistics methods in experimental pharmacology (Chi square test, Wilcoxon Signed Rank test)

**Experiments are demonstrated by simulated experiments/videos*

Recommended Books (Latest Editions)

1. Rang H. P., Dale M. M., Ritter J. M., Flower R. J., Rang and Dale's Pharmacology, Churchil Livingstone Elsevier
2. Katzung B. G., Masters S. B., Trevor A. J., Basic and clinical pharmacology, Tata Mc Graw-Hill
3. Goodman and Gilman's, The Pharmacological Basis of Therapeutics
4. Marry Anne K. K., Lloyd Yee Y., Brian K. A., Robbin L.C., Joseph G. B., Wayne A. K., Bradley R.W., Applied Therapeutics, The Clinical use of Drugs. The Point Lippincott Williams & Wilkins
5. Mycek M.J, Gelnet S.B and Perper M.M. Lippincott's Illustrated Reviews-Pharmacology
6. K.D.Tripathi. Essentials of Medical Pharmacology, , JAYPEE Brothers Medical Publishers (P) Ltd, New Delhi.
7. Sharma H. L., Sharma K. K., Principles of Pharmacology, Paras medical publisher Modern Pharmacology with clinical Applications, by Charles R.Craig& Robert,
8. Ghosh MN. Fundamentals of Experimental Pharmacology. Hilton & Company, Kolkata,
9. Kulkarni SK. Handbook of experimental pharmacology. VallabhPrakashan,
10. N.Udupa and P.D. Gupta, Concepts in Chronopharmacology.

BP 603 T. HERBAL DRUG TECHNOLOGY (Theory)

45 hours

Scope: This subject gives the student the knowledge of basic understanding of herbal drug industry, the quality of raw material, guidelines for quality of herbal drugs, herbal cosmetics, natural sweeteners, nutraceutical etc. The subject also emphasizes on Good Manufacturing Practices (GMP), patenting and regulatory issues of herbal drugs

Objectives: Upon completion of this course the student should be able to:

1. understand raw material as source of herbal drugs from cultivation to herbal drug product
2. know the WHO and ICH guidelines for evaluation of herbal drugs
3. know the herbal cosmetics, natural sweeteners, nutraceuticals
4. appreciate patenting of herbal drugs, GMP .

Course content:

UNIT-I **11 Hours**

Herbs as raw materials

Definition of herb, herbal medicine, herbal medicinal product, herbal drug preparation
Source of Herbs
Selection, identification and authentication of herbal materials
Processing of herbal raw material

Biodynamic Agriculture

Good agricultural practices in cultivation of medicinal plants including Organic farming.
Pest and Pest management in medicinal plants: Biopesticides/Bioinsecticides.

Indian Systems of Medicine

a) Basic principles involved in Ayurveda, Siddha, Unani and Homeopathy
b) Preparation and standardization of Ayurvedic formulations viz Aristas and Asawas, Ghutika,Churna, Lehya and Bhasma.

UNIT-II **7 Hours**

Nutraceuticals

General aspects, Market, growth, scope and types of products available in the market. Health benefits and role of Nutraceuticals in ailments like Diabetes, CVS diseases, Cancer, Irritable bowel syndrome and various Gastro intestinal diseases.
Study of following herbs as health food: Alfaalfa, Chicory, Ginger, Fenugreek, Garlic, Honey, Amla, Ginseng, Ashwagandha, Spirulina

Herbal-Drug and Herb-Food Interactions: General introduction to interaction and classification. Study of following drugs and their possible side effects and interactions: Hypercium, kava-kava, Ginkobiloba, Ginseng, Garlic, Pepper & Ephedra.

UNIT-III **10 Hours**

Herbal Cosmetics

Sources and description of raw materials of herbal origin used via, fixed oils, waxes, gums colours, perfumes, protective agents, bleaching agents, antioxidants in products such as skin care, hair care and oral hygiene products.

Herbal excipients:
Herbal Excipients – Significance of substances of natural origin as excipients – colorants, sweeteners, binders, diluents, viscosity builders, disintegrants, flavors & perfumes.

Herbal formulations :
Conventional herbal formulations like syrups, mixtures and tablets and Novel dosage forms like phytosomes

UNIT- IV **10 Hours**

Evaluation of Drugs WHO & ICH guidelines for the assessment of herbal drugs
Stability testing of herbal drugs.

Patenting and Regulatory requirements of natural products:
a) Definition of the terms: Patent, IPR, Farmers right, Breeder's right, Bioprospecting and Biopiracy
b) Patenting aspects of Traditional Knowledge and Natural Products. Case study of Curcuma & Neem.

Regulatory Issues - Regulations in India (ASU DTAB, ASU DCC), Regulation of manufacture of ASU drugs - Schedule Z of Drugs & Cosmetics Act for ASU drugs.

UNIT-V **07 Hours**

General Introduction to Herbal Industry
Herbal drugs industry: Present scope and future prospects.
A brief account of plant based industries and institutions involved in work on medicinal and aromatic plants in India.

Schedule T – Good Manufacturing Practice of Indian systems of medicine
Components of GMP (Schedule – T) and its objectives
Infrastructural requirements, working space, storage area, machinery and equipments, standard operating procedures, health and hygiene, documentation and records.

BP 609 P. HERBAL DRUG TECHNOLOGY (Practical)

4 hours/ week

1. To perform preliminary phytochemical screening of crude drugs.
2. Determination of the alcohol content of Asava and Arista
3. Evaluation of excipients of natural origin
4. Incorporation of prepared and standardized extract in cosmetic formulations like creams, lotions and shampoos and their evaluation.
5. Incorporation of prepared and standardized extract in formulations like syrups, mixtures and tablets and their evaluation as per Pharmacopoeial requirements.
6. Monograph analysis of herbal drugs from recent Pharmacopoeias
7. Determination of Aldehyde content
8. Determination of Phenol content
9. Determination of total alkaloids

Recommended Books: (Latest Editions)

1. Textbook of Pharmacognosy by Trease & Evans.
2. Textbook of Pharmacognosy by Tyler, Brady & Robber.
3. Pharmacognosy by Kokate, Purohit and Gokhale
4. Essential of Pharmacognosy by Dr.S.H.Ansari
5. Pharmacognosy & Phytochemistry by V.D.Rangari
6. Pharmacopoeal standards for Ayurvedic Formulation (Council of Research in Indian Medicine & Homeopathy)
7. Mukherjee, P.W. Quality Control of Herbal Drugs: An Approach to Evaluation of Botanicals. Business Horizons Publishers, New Delhi, India, 2002.

BP 604 T. BIOPHARMACEUTICS AND PHARMACOKINETICS
(Theory)

45 Hours

Scope: This subject is designed to impart knowledge and skills of Biopharmaceutics and pharmacokinetics and their applications in pharmaceutical development, design of dose and dosage regimen and in solving the problems arised therein.

Objectives: Upon completion of the course student shall be able to:

1. Understand the basic concepts in biopharmaceutics and pharmacokinetics and their significance.
2. Use of plasma drug concentration-time data to calculate the pharmacokinetic parameters to describe the kinetics of drug absorption, distribution, metabolism, excretion, elimination.
3. To understand the concepts of bioavailability and bioequivalence of drug products and their significance.

4. Understand various pharmacokinetic parameters, their significance & applications.

Course Content:

UNIT-I **10 Hours**

Introduction to Biopharmaceutics

Absorption; Mechanisms of drug absorption through GIT, factors influencing drug absorption though GIT, absorption of drug from Non per oral extra-vascular routes, **Distribution** Tissue permeability of drugs, binding of drugs, apparent, volume of drug distribution, plasma and tissue protein binding of drugs, factors affecting protein-drug binding. Kinetics of protein binding, Clinical significance of protein binding of drugs

UNIT- II **10 Hours**

Elimination: Drug metabolism and basic understanding metabolic pathways renal excretion of drugs, factors affecting renal excretion of drugs, renal clearance, Non renal routes of drug excretion of drugs

Bioavailability and Bioequivalence: Definition and Objectives of bioavailability, absolute and relative bioavailability, measurement of bioavailability, drug dissolution models, - correlations, bioequivalence studies, methods to enhance the dissolution rates and bioavailability of poorly soluble drugs.

UNIT- III **10 Hours**

Pharmacokinetics: Definition and introduction to Pharmacokinetics, Compartment models, Non compartment models, physiological models, One compartment open model. (a). Intravenous Injection (Bolus) (b). Intravenous infusion and (c) Extra vascular administrations. Pharmacokinetics parameters - K_E ,t1/2,Vd,AUC,Ka, Clt and CL_R- definitions methods of eliminations, understanding of their significance and application

UNIT- IV **08 Hours**

Two compartment open model, IV bolus

Kinetics of multiple dosing, steady state drug levels, calculation of loading and mainetnance doses and their significance in clinical settins.

UNIT- V **07 Hours**

Nonlinear Pharmacokinetics: a. Introduction, b. Factors causing Non-linearity.
c. Michaelis-menton method of estimating parameters, Explanation with example of drugs.

Recommended Books: (Latest Editions)

1. Biopharmaceutics and Clinical Pharmacokinetics by, Milo Gibaldi.
2. Biopharmaceutics and Pharmacokinetics; By Robert F Notari
3. Applied biopharmaceutics and pharmacokinetics, Leon Shargel and Andrew B.C.YU 4th edition,Prentice-Hall Inernational edition.USA
4. Bio pharmaceutics and Pharmacokinetics-A Treatise, By D. M. Brahmankar and Sunil B.Jaiswal,Vallabh Prakashan Pitampura, Delhi
5. Pharmacokinetics: By Milo Glbaldi Donald, R. Mercel Dekker Inc.
6. Hand Book of Clinical Pharmacokinetics, By Milo Gibaldi and Laurie Prescott by ADIS Health Science Press.
7. Biopharmaceutics; By Swarbrick
8. Clinical Pharmacokinetics, Concepts and Applications: By Malcolm Rowland and
9. Thomas, N. Tozen, Lea and Febrger, Philadelphia, 1995.
10. Dissolution, Bioavailability and Bioequivalence, By Abdou H.M, Mack, Publishing Company,Pennsylvania 1989.
11. Biopharmaceutics and Clinical Pharmacokinetics-An introduction 4th edition Revised and expanded by Rebort F Notari Marcel Dekker Inn, New York and Basel, 1987.
12. Remington's Pharmaceutical Sciences, By Mack Publishing Company, Pennsylvnia

BP 605 T. PHARMACEUTICAL BIOTECHNOLOGY (Theory)

45 Hours

Scope:

- Biotechnology has a long promise to revolutionize the biological sciences and technology.
- Scientific application of biotechnology in the field of genetic engineering, medicine and fermentation technology makes the subject interesting.
- Biotechnology is leading to new biological revolutions in diagnosis, prevention and cure of diseases, new and cheaper pharmaceutical drugs.
- Biotechnology has already produced transgenic crops and animals and the future promises lot more.
- It is basically a research-based subject.

Objectives: Upon completion of the subject student shall be able to;

1. Understanding the importance of Immobilized enzymes in Pharmaceutical Industries
2. Genetic engineering applications in relation to production of pharmaceuticals
3. Importance of Monoclonal antibodies in Industries
4. Appreciate the use of microorganisms in fermentation technology

Unit I **10 Hours**

a) Brief introduction to Biotechnology with reference to Pharmaceutical Sciences.

b) Enzyme Biotechnology- Methods of enzyme immobilization and applications.

c) Biosensors- Working and applications of biosensors in Pharmaceutical Industries.

d) Brief introduction to Protein Engineering.

e) Use of microbes in industry. Production of Enzymes- General consideration - Amylase, Catalase, Peroxidase, Lipase, Protease, Penicillinase.

f) Basic principles of genetic engineering.

Unit II **10 Hours**

a) Study of cloning vectors, restriction endonucleases and DNA ligase.

b) Recombinant DNA technology. Application of genetic engineering in medicine.

c) Application of r DNA technology and genetic engineering in the production of:

i) Interferon ii) Vaccines- hepatitis- B iii) Hormones-Insulin.

d) Brief introduction to PCR

Unit III **10 Hours**

Types of immunity- humoral immunity, cellular immunity

a) Structure of Immunoglobulins
b) Structure and Function of MHC
c) Hypersensitivity reactions, Immune stimulation and Immune suppressions.
d) General method of the preparation of bacterial vaccines, toxoids, viral vaccine, antitoxins, serum-immune blood derivatives and other products relative to immunity.
e) Storage conditions and stability of official vaccines
f) Hybridoma technology- Production, Purification and Applications
g) Blood products and Plasma Substituties.

Unit IV **08Hours**

a) Immuno blotting techniques- ELISA, Western blotting, Southern blotting.
b) Genetic organization of Eukaryotes and Prokaryotes
c) Microbial genetics including transformation, transduction, conjugation, plasmids and transposons.
d) Introduction to Microbial biotransformation and applications.
e) Mutation: Types of mutation/mutants.

Unit V **07 Hours**

a) Fermentation methods and general requirements, study of media, equipments, sterilization methods, aeration process, stirring.
b) Large scale production fermenter design and its various controls.
c) Study of the production of - penicillins, citric acid, Vitamin B12, Glutamic acid, Griseofulvin,
d) Blood Products: Collection, Processing and Storage of whole human blood, dried human plasma, plasma Substituties.

Recommended Books (Latest edition):

1. B.R. Glick and J.J. Pasternak: Molecular Biotechnology: Principles and Applications of RecombinantDNA: ASM Press Washington D.C.
2. RA Goldshy et. al., : Kuby Immunology.
3. J.W. Goding: Monoclonal Antibodies.
4. J.M. Walker and E.B. Gingold: Molecular Biology and Biotechnology by Royal

Society of Chemistry.
5. Zaborsky: Immobilized Enzymes, CRC Press, Degraland, Ohio.
6. S.B. Primrose: Molecular Biotechnology (Second Edition) Blackwell Scientific Publication.
7. Stanbury F., P., Whitakar A., and Hall J., S., Principles of fermentation technology, 2nd edition, Aditya books Ltd., New Delhi

BP606TPHARMACEUTICAL QUALITY ASSURANCE (Theory)

45 Hours

Scope: This course deals with the various aspects of quality control and quality assurance aspects of pharmaceutical industries. It deals with the important aspects like cGMP, QC tests, documentation, quality certifications and regulatory affairs.

Objectives: Upon completion of the course student shall be able to:

- understand the cGMP aspects in a pharmaceutical industry
- appreciate the importance of documentation
- understand the scope of quality certifications applicable to pharmaceutical industries
- understand the responsibilities of QA & QC departments

Course content:

UNIT – I **10 Hours**

Quality Assurance and Quality Management concepts: Definition and concept of Quality control, Quality assurance and GMP

Total Quality Management (TQM): Definition, elements, philosophies

ICH Guidelines: purpose, participants, process of harmonization, Brief overview of QSEM, with special emphasis on Q-series guidelines, ICH stability testing guidelines

Quality by design (QbD): Definition, overview, elements of QbD program, tools

ISO 9000 & ISO14000: Overview, Benefits, Elements, steps for registration

NABL accreditation : Principles and procedures

UNIT - II **10 Hours**

Organization and personnel: Personnel responsibilities, training, hygiene and personal records.

Premises: Design, construction and plant layout, maintenance, sanitation, environmental control, utilities and maintenance of sterile areas, control of contamination.

Equipments and raw materials: Equipment selection, purchase specifications, maintenance, purchase specifications and maintenance of stores for raw materials.

UNIT – III **10 Hours**

Quality Control: Quality control test for containers, rubber closures and secondary packing

materials.

Good Laboratory Practices: General Provisions, Organization and Personnel, Facilities, Equipment, Testing Facilities Operation, Test and Control Articles, Protocol for Conduct of a Nonclinical Laboratory Study, Records and Reports, Disqualification of Testing Facilities

UNIT – IV **08 Hours**

Complaints: Complaints and evaluation of complaints, Handling of return good, recalling and waste disposal.

Document maintenance in pharmaceutical industry: Batch Formula Record, Master Formula Record, SOP, Quality audit, Quality Review and Quality documentation, Reports and documents, distribution records.

UNIT – V **07 Hours**

Calibration and Validation: Introduction, definition and general principles of calibration, qualification and validation, importance and scope of validation, types of validation, validation master plan. Calibration of pH meter, Qualification of UV-Visible spectrophotometer, General principles of Analytical method Validation.

Warehousing: Good warehousing practice, materials management

Recommended Books: (Latest Edition)

1. Quality Assurance Guide by organization of Pharmaceutical Products of India.
2. Good Laboratory Practice Regulations, 2nd Edition, Sandy Weinberg Vol. 69.
3. Quality Assurance of Pharmaceuticals- A compendium of Guide lines and Related materials Vol I WHO Publications.
4. A guide to Total Quality Management- Kushik Maitra and Sedhan K Ghosh
5. How to Practice GMP's – P P Sharma.
6. ISO 9000 and Total Quality Management – Sadhank G Ghosh
7. The International Pharmacopoeia – Vol I, II, III, IV- General Methods of Analysis and Quality specification for Pharmaceutical Substances, Excipients and Dosage forms
8. Good laboratory Practices – Marcel Deckker Series
9. ICH guidelines, ISO 9000 and 14000 guidelines

SEMESTER VII

BP701T. INSTRUMENTAL METHODS OF ANALYSIS (Theory)

45 Hours

Scope: This subject deals with the application of instrumental methods in qualitative and quantitative analysis of drugs. This subject is designed to impart a fundamental knowledge on the principles and instrumentation of spectroscopic and chromatographic technique. This also emphasizes on theoretical and practical knowledge on modern analytical instruments that are used for drug testing.

Objectives: Upon completion of the course the student shall be able to

1. Understand the interaction of matter with electromagnetic radiations and its applications in drug analysis
2. Understand the chromatographic separation and analysis of drugs.
3. Perform quantitative & qualitative analysis of drugs using various analytical instruments.

Course Content:

UNIT –I **10 Hours**

UV Visible spectroscopy

Electronic transitions, chromophores, auxochromes, spectral shifts, solvent effect on absorption spectra, Beer and Lambert's law, Derivation and deviations.

Instrumentation - Sources of radiation, wavelength selectors, sample cells, detectors- Photo tube, Photomultiplier tube, Photo voltaic cell, Silicon Photodiode.

Applications - Spectrophotometric titrations, Single component and multi component analysis

Fluorimetry

Theory, Concepts of singlet, doublet and triplet electronic states, internal and external conversions, factors affecting fluorescence, quenching, instrumentation and applications

UNIT –II **10 Hours**

IR spectroscopy

Introduction, fundamental modes of vibrations in poly atomic molecules, sample handling, factors affecting vibrations

Instrumentation - Sources of radiation, wavelength selectors, detectors - Golay cell, Bolometer, Thermocouple, Thermister, Pyroelectric detector and applications

Flame Photometry-Principle, interferences, instrumentation and applications

Atomic absorption spectroscopy- Principle, interferences, instrumentation and applications

Nepheloturbidometry- Principle, instrumentation and applications

UNIT –III **10 Hours**

Introduction to chromatography

Adsorption and partition column chromatography-Methodology, advantages, disadvantages and applications.

Thin layer chromatography- Introduction, Principle, Methodology, Rf values, advantages, disadvantages and applications.

Paper chromatography-Introduction, methodology, development techniques, advantages, disadvantages and applications

Electrophoresis– Introduction, factors affecting electrophoretic mobility, Techniques of paper, gel, capillary electrophoresis, applications

UNIT –IV **08 Hours**

Gas chromatography - Introduction, theory, instrumentation, derivatization, temperature programming, advantages, disadvantages and applications

High performance liquid chromatography (HPLC)-Introduction, theory, instrumentation, advantages and applications.

UNIT –V **07 Hours**

Ion exchange chromatography- Introduction, classification, ion exchange resins, properties, mechanism of ion exchange process, factors affecting ion exchange, methodology and applications

Gel chromatography- Introduction, theory, instrumentation and applications

Affinity chromatography- Introduction, theory, instrumentation and applications

BP705P. INSTRUMENTAL METHODS OF ANALYSIS (Practical)

4 Hours/Week

1. Determination of absorption maxima and effect of solvents on absorption maxima of organic compounds
2. Estimation of dextrose by colorimetry
3. Estimation of sulfanilamide by colorimetry
4. Simultaneous estimation of ibuprofen and paracetamol by UV spectroscopy
5. Assay of paracetamol by UV- Spectrophotometry
6. Estimation of quinine sulfate by fluorimetry
7. Study of quenching of fluorescence
8. Determination of sodium by flame photometry
9. Determination of potassium by flame photometry
10. Determination of chlorides and sulphates by nephelo turbidometry
11. Separation of amino acids by paper chromatography
12. Separation of sugars by thin layer chromatography
13. Separation of plant pigments by column chromatography
14. Demonstration experiment on HPLC
15. Demonstration experiment on Gas Chromatography

Recommended Books (Latest Editions)

1. Instrumental Methods of Chemical Analysis by B.K Sharma
2. Organic spectroscopy by Y.R Sharma
3. Text book of Pharmaceutical Analysis by Kenneth A. Connors
4. Vogel's Text book of Quantitative Chemical Analysis by A.I. Vogel
5. Practical Pharmaceutical Chemistry by A.H. Beckett and J.B. Stenlake
6. Organic Chemistry by I. L. Finar
7. Organic spectroscopy by William Kemp
8. Quantitative Analysis of Drugs by D. C. Garrett
9. Quantitative Analysis of Drugs in Pharmaceutical Formulations by P. D. Sethi
10. Spectrophotometric identification of Organic Compounds by Silverstein

BP 702 T. INDUSTRIAL PHARMACYII (Theory)

45 Hours

Scope: This course is designed to impart fundamental knowledge on pharmaceutical product development and translation from laboratory to market

Objectives: Upon completion of the course, the student shall be able to:

1. Know the process of pilot plant and scale up of pharmaceutical dosage forms
2. Understand the process of technology transfer from lab scale to commercial batch
3. Know different Laws and Acts that regulate pharmaceutical industry
4. Understand the approval process and regulatory requirements for drug products

Course Content:

10 Hours

UNIT-I

Pilot plant scale up techniques: General considerations - including significance of personnel requirements, space requirements, raw materials, Pilot plant scale up considerations for solids, liquid orals, semi solids and relevant documentation, SUPAC guidelines, Introduction to platform technology

10 Hours

UNIT-II

Technology development and transfer: WHO guidelines for Technology Transfer(TT): Terminology, Technology transfer protocol, Quality risk management, Transfer from R & D to production (Process, packaging and cleaning), Granularity of TT Process (API, excipients, finished products, packaging materials) Documentation, Premises and equipments, qualification and validation, quality control, analytical method transfer, Approved regulatory bodies and agencies, Commercialization - practical aspects and problems (case studies), TT agencies in India - APCTD, NRDC, TIFAC, BCIL, TBSE / SIDBI; TT related documentation - confidentiality agreement, licensing, MoUs, legal issues

10 Hours

UNIT-III

Regulatory affairs: Introduction, Historical overview of Regulatory Affairs, Regulatory authorities, Role of Regulatory affairs department, Responsibility of Regulatory Affairs Professionals

Regulatory requirements for drug approval: Drug Development Teams, Non-Clinical Drug Development, Pharmacology, Drug Metabolism and Toxicology, General considerations of Investigational New Drug (IND) Application, Investigator's Brochure (IB) and New Drug Application (NDA), Clinical research / BE studies, Clinical Research Protocols, Biostatistics in Pharmaceutical Product Development, Data Presentation for FDA Submissions, Management of Clinical Studies.

UNIT-IV **08 Hours**

Quality management systems: Quality management & Certifications: Concept of Quality, Total Quality Management, Quality by Design (QbD), Six Sigma concept, Out of Specifications (OOS), Change control, Introduction to ISO 9000 series of quality systems standards, ISO 14000, NABL, GLP

UNIT-V **07 Hours**

Indian Regulatory Requirements: Central Drug Standard Control Organization (CDSCO) and State Licensing Authority: Organization, Responsibilities, Certificate of Pharmaceutical Product (COPP), Regulatory requirements and approval procedures for New Drugs.

Recommended Books: (Latest Editions)

1. Regulatory Affairs from Wikipedia, the free encyclopedia modified on 7th April available at http,//en.wikipedia.org/wiki/Regulatory_ Affairs.
2. International Regulatory Affairs Updates, 2005. available at http://www.iraup.com/about.php
3. Douglas J Pisano and David S. Mantus. Text book of FDA Regulatory Affairs A Guide for Prescription Drugs, Medical Devices, and Biologics' Second Edition.
4. Regulatory Affairs brought by learning plus, inc. available at http.//www.cgmp.com/ra.htm.

BP 703T. PHARMACY PRACTICE (Theory)

45 Hours

Scope: In the changing scenario of pharmacy practice in India, for successful practice of Hospital Pharmacy, the students are required to learn various skills like drug distribution, drug information, and therapeutic drug monitoring for improved patient care. In community pharmacy, students will be learning various skills such as dispensing of drugs, responding to minor ailments by providing suitable safe medication, patient counselling for improved patient care in the community set up.

Objectives: Upon completion of the course, the student shall be able to

1. know various drug distribution methods in a hospital
2. appreciate the pharmacy stores management and inventory control
3. monitor drug therapy of patient through medication chart review and clinical review
4. obtain medication history interview and counsel the patients
5. identify drug related problems
6. detect and assess adverse drug reactions
7. interpret selected laboratory results (as monitoring parameters in therapeutics) of specific disease states
8. know pharmaceutical care services
9. do patient counseling in community pharmacy;
10. appreciate the concept of Rational drug therapy.

Unit I: **10 Hours**

a) Hospital and it's organization

Definition, Classification of hospital- Primary, Secondary and Tertiary hospitals, Classification based on clinical and non- clinical basis, Organization Structure of a Hospital, and Medical staffs involved in the hospital and their functions.

b) Hospital pharmacy and its organization

Definition, functions of hospital pharmacy, Organization structure, Location, Layout and staff requirements, and Responsibilities and functions of hospital pharmacists.

c) Adverse drug reaction

Classifications - Excessive pharmacological effects, secondary pharmacological effects, idiosyncrasy, allergic drug reactions, genetically determined toxicity, toxicity following sudden withdrawal of drugs, Drug interaction- beneficial interactions, adverse interactions, and pharmacokinetic drug interactions, Methods for detecting

drug interactions, spontaneous case reports and record linkage studies, and Adverse drug reaction reporting and management.

d) Community Pharmacy

Organization and structure of retail and wholesale drug store, types and design, Legal requirements for establishment and maintenance of a drug store, Dispensing of proprietary products, maintenance of records of retail and wholesale drug store.

Unit II: **10 Hours**

a) Drug distribution system in a hospital

Dispensing of drugs to inpatients, types of drug distribution systems, charging policy and labelling, Dispensing of drugs to ambulatory patients, and Dispensing of controlled drugs.

b) Hospital formulary

Definition, contents of hospital formulary, Differentiation of hospital formulary and Drug list, preparation and revision, and addition and deletion of drug from hospital formulary.

c) Therapeutic drug monitoring

Need for Therapeutic Drug Monitoring, Factors to be considered during the Therapeutic Drug Monitoring, and Indian scenario for Therapeutic Drug Monitoring.

d) Medication adherence

Causes of medication non-adherence, pharmacist role in the medication adherence, and monitoring of patient medication adherence.

e) Patient medication history interview

Need for the patient medication history interview, medication interview forms.

f) Community pharmacy management

Financial, materials, staff, and infrastructure requirements.

Unit III: **10 Hours**

a) Pharmacy and therapeutic committee

Organization, functions, Policies of the pharmacy and therapeutic committee in including drugs into formulary, inpatient and outpatient prescription, automatic stop order, and emergency drug list preparation.

b) Drug information services

Drug and Poison information centre, Sources of drug information, Computerised services, and storage and retrieval of information.

c) Patient counseling

Definition of patient counseling; steps involved in patient counseling, and Special cases that require the pharmacist

d) Education and training program in the hospital

Role of pharmacist in the education and training program, Internal and external training program, Services to the nursing homes/clinics, Code of ethics for community pharmacy, and Role of pharmacist in the interdepartmental communication and community health education.

e) Prescribed medication order and communication skills

Prescribed medication order- interpretation and legal requirements, and Communication skills- communication with prescribers and patients.

Unit IV **8 Hours**

a) Budget preparation and implementation

Budget preparation and implementation

b) Clinical Pharmacy

Introduction to Clinical Pharmacy, Concept of clinical pharmacy, functions and responsibilities of clinical pharmacist, Drug therapy monitoring - medication chart review, clinical review, pharmacist intervention, Ward round participation, Medication history and Pharmaceutical care.

Dosing pattern and drug therapy based on Pharmacokinetic & disease pattern.

c) Over the counter (OTC) sales

Introduction and sale of over the counter, and Rational use of common over the counter medications.

Unit V **7 Hours**

a) Drug store management and inventory control

Organisation of drug store, types of materials stocked and storage conditions, Purchase and inventory control: principles, purchase procedure, purchase order, procurement and stocking, Economic order quantity, Reorder quantity level, and Methods used for the analysis of the drug expenditure

b) Investigational use of drugs

Description, principles involved, classification, control, identification, role of hospital pharmacist, advisory committee.

c) Interpretation of Clinical Laboratory Tests

Blood chemistry, hematology, and urinalysis

Recommended Books (Latest Edition):

1. Merchant S.H. and Dr. J.S.Quadry. 4th ed. Ahmadabad: B.S. Shah Prakakshan; 2001.
2. Parthasarathi G, Karin Nyfort-Hansen, Milap C Nahata. 1st ed. Chennai: Orient Longman Private Limited; 2004.
3. William E. Hassan. 5th ed. Philadelphia: Lea & Febiger; 1986.
4. Tipnis Bajaj. 1st ed. Maharashtra: Career Publications; 2009.
5. Scott LT. 4th ed. American Society of Health System Pharmacists Inc; 2009.
6. Parmar N.S. 18th ed. Indian GDS Publishers & Distributers; 2008.

Journals:

1. Therapeutic drug monitoring. ISSN: 0163-4356
2. Journal of pharmacy practice. ISSN : 0974-8326
3. American journal of health system pharmacy. ISSN: 1535-2900 (online)
4. Pharmacy times (Monthly magazine)

BP 704T: NOVEL DRUG DELIVERY SYSTEMS (Theory)

45 Hours

Scope: This subject is designed to impart basic knowledge on the area of novel drug delivery systems.

Objectives: Upon completion of the course student shall be able

1. To understand various approaches for development of novel drug delivery systems.
2. To understand the criteria for selection of drugs and polymers for the development of Novel drug delivery systems, their formulation and evaluation

Course content:

Unit-I **10 Hours**

Controlled drug delivery systems: Introduction, terminology/definitions and rationale, advantages, disadvantages, selection of drug candidates.Approaches to design controlled release formulations based on diffusion, dissolution and ion exchange principles. Physicochemical and biological properties of drugs relevant to controlled release formulations

Polymers: Introduction, classification, properties, advantages and application of polymers in formulation of controlled release drug delivery systems.

Unit-II **10 Hours**

Microencapsulation: Definition, advantages and disadvantages, microspheres /microcapsules, microparticles, methods of microencapsulation, applications

Mucosal Drug Delivery system: Introduction, Principles of bioadhesion / mucoadhesion, concepts, advantages and disadvantages, transmucosal permeability and formulation considerations of buccal delivery systems

Implantable Drug Delivery Systems: Introduction, advantages and disadvantages, concept of implantsand osmotic pump

Unit-III **10 Hours**

Transdermal Drug Delivery Systems: Introduction, Permeation through skin, factors affecting permeation, permeation enhancers, basic components of TDDS, formulation approaches

Gastroretentive drug delivery systems: Introduction, advantages, disadvantages, approaches for GRDDS – Floating, high density systems, inflatable and gastroadhesive systems and their applications

Nasopulmonary drug delivery system: Introduction to Nasal and Pulmonary routes of drug delivery, Formulation of Inhalers (dry powder and metered dose), nasal sprays, nebulizers

Unit-IV **08 Hours**

Targeted drug Delivery: Concepts and approaches advantages and disadvantages, introduction to liposomes, niosomes, nanoparticles, monoclonal antibodies and their applications

Unit-V **07 Hours**

Ocular Drug Delivery Systems: Introduction, intra ocular barriers and methods to overcome –Preliminary study, ocular formulations and ocuserts

Intrauterine Drug Delivery Systems: Introduction, advantages and disadvantages, development of intra uterine devices (IUDs) and applications

Recommended Books: (Latest Editions)

1. Y W. Chien, Novel Drug Delivery Systems, 2nd edition, revised and expanded, Marcel Dekker, Inc., New York, 1992.
2. Robinson, J. R., Lee V. H. L, Controlled Drug Delivery Systems, Marcel Dekker, Inc., New York, 1992.
3. Encyclopedia of Controlled Delivery. Edith Mathiowitz, Published by Wiley Interscience Publication, John Wiley and Sons, Inc, New York. Chichester/Weinheim
4. N.K. Jain, Controlled and Novel Drug Delivery, CBS Publishers & Distributors, New Delhi, First edition 1997 (reprint in 2001).
5. S.P. Vyas and R.K. Khar, Controlled Drug Delivery -concepts and advances, Vallabh Prakashan, New Delhi, First edition 2002.

Journals

1. Indian Journal of Pharmaceutical Sciences (IPA)
2. Indian Drugs (IDMA)
3. Journal of Controlled Release (Elsevier Sciences)
4. Drug Development and Industrial Pharmacy (Marcel & Decker)
5. International Journal of Pharmaceutics (Elsevier Sciences)

SEMESTER VIII

BP801T. BIOSTATISITCS AND RESEARCH METHODOLOGY (Theory)

45 Hours

Scope: To understand the applications of Biostatics in Pharmacy. This subject deals with descriptive statistics, Graphics, Correlation, Regression, logistic regression Probability theory, Sampling technique, Parametric tests, Non Parametric tests, ANOVA, Introduction to Design of Experiments, Phases of Clinical trials and Observational and Experimental studies, SPSS, R and MINITAB statistical software's, analyzing the statistical data using Excel.

Objectives: Upon completion of the course the student shall be able to

- Know the operation of M.S. Excel, SPSS, R and MINITAB®, DoE (Design of Experiment)
- Know the various statistical techniques to solve statistical problems
- Appreciate statistical techniques in solving the problems.

Course content:

Unit-I **10 Hours**

Introduction: Statistics, Biostatistics, Frequency distribution

Measures of central tendency: Mean, Median, Mode- Pharmaceutical examples

Measures of dispersion: Dispersion, Range, standard deviation, Pharmaceutical problems

Correlation: Definition, Karl Pearson's coefficient of correlation, Multiple correlation - Pharmaceuticals examples

Unit-II **10 Hours**

Regression: Curve fitting by the method of least squares, fitting the lines y= a + bx and x = a + by, Multiple regression, standard error of regression– Pharmaceutical Examples

Probability: Definition of probability, Binomial distribution, Normal distribution, Poisson's distribution, properties - problems

Sample, Population, large sample, small sample, Null hypothesis, alternative hypothesis, sampling, essence of sampling, types of sampling, Error-I type, Error-II type, Standard error of mean (SEM) - Pharmaceutical examples

Parametric test: t-test(Sample, Pooled or Unpaired and Paired) , ANOVA, (One way and Two way), Least Significance difference

Unit-III **10 Hours**

Non Parametric tests: Wilcoxon Rank Sum Test, Mann-Whitney U test, Kruskal-Wallis test, Friedman Test

Introduction to Research: Need for research, Need for design of Experiments, Experiential Design Technique, plagiarism

Graphs: Histogram, Pie Chart, Cubic Graph, response surface plot, Counter Plot graph

Designing the methodology: Sample size determination and Power of a study, Report writing and presentation of data, Protocol, Cohorts studies, Observational studies, Experimental studies, Designing clinical trial, various phases.

Unit-IV **8 Hours**

Blocking and confounding system for Two-level factorials

Regression modeling: Hypothesis testing in Simple and Multiple regressionmodels

Introduction to Practical components of Industrial and Clinical Trials Problems: Statistical Analysis Using Excel, SPSS, MINITAB®, DESIGN OF EXPERIMENTS, R - Online Statistical Software's to Industrial and Clinical trial approach

Unit-V **7Hours**

Design and Analysis of experiments:

Factorial Design: Definition, 2^2, 2^3design. Advantage of factorial design

Response Surface methodology: Central composite design, Historical design, Optimization Techniques

Recommended Books (Latest edition):

1. Pharmaceutical statistics- Practical and clinical applications, Sanford Bolton, publisher Marcel Dekker Inc. NewYork.
2. Fundamental of Statistics – Himalaya Publishing House- S.C.Guptha
3. Design and Analysis of Experiments –PHI Learning Private Limited, R. Pannerselvam,
4. Design and Analysis of Experiments – Wiley Students Edition, Douglas and C. Montgomery

BP 802T SOCIAL AND PREVENTIVE PHARMACY

Hours: 45

Scope:

The purpose of this course is to introduce to students a number of health issues and their challenges. This course also introduced a number of national health programmes. The roles of the pharmacist in these contexts are also discussed.

Objectives:

After the successful completion of this course, the student shall be able to:

- Acquire high consciousness/realization of current issuesrelated to health and pharmaceutical problems within the country and worldwide.
- Have a critical way of thinking based on current healthcare development.
- Evaluate alternative ways of solving problems related tohealth and pharmaceutical issues

Course content:

Unit I: **10 Hours**

Concept of health and disease: Definition, concepts and evaluation of public health. Understanding the concept of prevention and control of disease, social causes of diseases and social problems of the sick.

Social and health education: Food in relation to nutrition and health, Balanced diet, Nutritional deficiencies, Vitamin deficiencies, Malnutrition and its prevention.

Sociology and health: Socio cultural factors related to health and disease, Impact of urbanization on health and disease, Poverty and health

Hygiene and health: personal hygiene and health care; avoidable habits

Unit II: **10 Hours**

Preventive medicine: General principles of prevention and control of diseases such as cholera, SARS, Ebola virus, influenza, acute respiratory infections, malaria, chicken guinea, dengue, lymphatic filariasis, pneumonia, hypertension, diabetes mellitus, cancer, drug addiction-drug substance abuse

Unit III: **10 Hours**

National health programs, its objectives, functioning and outcome of the following: HIV AND AIDS control programme, TB, Integrated disease surveillance program (IDSP), National leprosy control programme, National mental health program, National

BP803ET. PHARMA MARKETING MANAGEMENT (Theory)

45 Hours

Scope:

The pharmaceutical industry not only needs highly qualified researchers, chemists and, technical people, but also requires skilled managers who can take the industry forward by managing and taking the complex decisions which are imperative for the growth of the industry. The Knowledge and Know-how of marketing management groom the people for taking a challenging role in Sales and Product management.

Course Objective: The course aims to provide an understanding of marketing concepts and techniques and their applications in the pharmaceutical industry.

Unit I **10 Hours**

Marketing:

Definition, general concepts and scope of marketing; Distinction between marketing & selling; Marketing environment; Industry and competitive analysis; Analyzing consumer buying behavior; industrial buying behavior.

Pharmaceutical market:

Quantitative and qualitative aspects; size and composition of the market; demographic descriptions and socio-psychological characteristics of the consumer; market segmentation& targeting.Consumer profile; Motivation and prescribing habits of the physician; patients' choice of physician and retail pharmacist.Analyzing the Market;Role of market research.

Unit II **10 Hours**

Product decision:

Classification, product line and product mix decisions, product life cycle,product portfolio analysis; product positioning; New product decisions; Product branding, packaging and labeling decisions, Product management in pharmaceutical industry.

Unit III **10 Hours**

Promotion:

Methods, determinants of promotional mix, promotional budget; An overview of personal selling, advertising, direct mail, journals, sampling, retailing, medical exhibition, public relations, online promotional techniques for OTC Products.

Unit IV **10 Hours**

Pharmaceutical marketing channels:

Designing channel, channel members, selecting the appropriate channel, conflict in channels, physical distribution management: Strategic importance, tasks in physical distribution management.

Professional sales representative (PSR):

Duties of PSR, purpose of detailing, selection and training, supervising, norms for customer calls, motivating, evaluating, compensation and future prospects of the PSR.

Unit V **10 Hours**

Pricing:

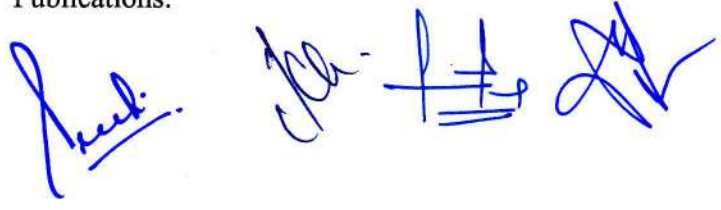
Meaning, importance, objectives, determinants of price; pricing methods and strategies, issues in price management in pharmaceutical industry. An overview of DPCO (Drug Price Control Order)and NPPA (National Pharmaceutical Pricing Authority).

Emerging concepts in marketing:

Vertical & Horizontal Marketing; RuralMarketing; Consumerism; Industrial Marketing; Global Marketing.

Recommended Books: (Latest Editions)

1. Philip Kotler and Kevin Lane Keller: Marketing Management, Prentice Hall of India, New Delhi
2. Walker, Boyd and Larreche : Marketing Strategy- Planning and Implementation, Tata MC GrawHill, New Delhi.
3. Dhruv Grewal and Michael Levy: Marketing, Tata MC Graw Hill
4. Arun Kumar and N Menakshi: Marketing Management, Vikas Publishing, India
5. Rajan Saxena: Marketing Management; Tata MC Graw-Hill (India Edition)
6. Ramaswamy, U.S & Nanakamari, S: Marketing Managemnt:Global Perspective, IndianContext,Macmilan India, New Delhi.
7. Shanker, Ravi: Service Marketing, Excell Books, New Delhi
8. Subba Rao Changanti, Pharmaceutical Marketing in India (GIFT – Excel series) Excel Publications.



BP804 ET: PHARMACEUTICAL REGULATORY SCIENCE (Theory)

45Hours

Scope: This course is designed to impart the fundamental knowledge on the regulatory requirements for approval of new drugs, and drug products in regulated markets of India & other countries like US, EU, Japan, Australia,UK etc. It prepares the students to learn in detail on the regulatory requirements, documentation requirements, and registration procedures for marketing the drug products.

Objectives: Upon completion of the subject student shall be able to;

1. Know about the process of drug discovery and development
2. Know the regulatory authorities and agencies governing the manufacture and sale of pharmaceuticals
3. Know the regulatory approval process and their registration in Indian and international markets

Course content:

10Hours

Unit I

New Drug Discovery and development

Stages of drug discovery, Drug development process, pre-clinical studies, non-clinical activities, clinical studies, Innovator and generics, Concept of generics, Generic drug product development.

10Hours

Unit II

Regulatory Approval Process

Approval processes and timelines involved in Investigational New Drug (IND), New Drug Application (NDA), Abbreviated New Drug Application (ANDA). Changes to an approved NDA / ANDA.

Regulatory authorities and agencies

Overview of regulatory authorities of India, United States, European Union, Australia, Japan, Canada (Organization structure and types of applications)

10Hours

Unit III

Registration of Indian drug product in overseas market

Procedure for export of pharmaceutical products, Technical documentation, Drug Master Files (DMF), Common Technical Document (CTD), electronic Common Technical

Document (eCTD), ASEAN Common Technical Document (ACTD)research.

Unit IV **08Hours**

Clinical trials

Developing clinical trial protocols, Institutional Review Board / Independent Ethics committee - formation and working procedures, Informed consent process and procedures, GCP obligations of Investigators, sponsors & Monitors, Managing and Monitoring clinical trials, Pharmacovigilance - safety monitoring in clinical trials

Unit V **07Hours**

Regulatory Concepts

Basic terminology, guidance, guidelines, regulations, Laws and Acts, Orange book, Federal Register, Code of Federal Regulatory, Purple book

Recommended books (Latest edition):

1. Drug Regulatory Affairs by Sachin Itkar, Dr. N.S. Vyawahare, Nirali Prakashan.
2. The Pharmaceutical Regulatory Process, Second Edition Edited by Ira R. Berry and Robert P. Martin, Drugs and the Pharmaceutical Sciences,Vol.185. Informa Health care Publishers.
3. New Drug Approval Process: Accelerating Global Registrations By Richard A Guarino, MD, 5th edition, Drugs and the Pharmaceutical Sciences,Vol.190.
4. Guidebook for drug regulatory submissions / Sandy Weinberg. By John Wiley & Sons. Inc.
5. FDA Regulatory Affairs: a guide for prescription drugs, medical devices, and biologics /edited by Douglas J. Pisano, David Mantus.
6. Generic Drug Product Development, Solid Oral Dosage forms, Leon Shargel and Isader Kaufer, Marcel Dekker series, Vol.143
7. Clinical Trials and Human Research: A Practical Guide to Regulatory Compliance By Fay A. Rozovsky and Rodney K. Adams
8. Principles and Practices of Clinical Research, Second Edition Edited by John I. Gallin and Frederick P. Ognibene
9. Drugs: From Discovery to Approval, Second Edition By Rick Ng

BP 805T: PHARMACOVIGILANCE (Theory)

45 hours

Scope: This paper will provide an opportunity for the student to learn about development of pharmacovigilance as a science, basic terminologies used in pharmacovigilance, global scenario of Pharmacovigilance, train students on establishing pharmacovigilance programme in an organization, various methods that can be used to generate safety data and signal detection. This paper also develops the skills of classifying drugs, diseases and adverse drug reactions.

Objectives:

1. Why drug safety monitoring is important?
2. History and development of pharmacovigilance
3. National and international scenario of pharmacovigilance
4. Dictionaries, coding and terminologies used in pharmacovigilance
5. Detection of new adverse drug reactions and their assessment
6. International standards for classification of diseases and drugs
7. Adverse drug reaction reporting systems and communication in pharmacovigilance
8. Methods to generate safety data during pre clinical, clinical and post approval phases of drugs' life cycle
9. Drug safety evaluation in paediatrics, geriatrics, pregnancy and lactation
10. Pharmacovigilance Program of India (PvPI) requirement for ADR reporting in India
11. ICH guidelines for ICSR, PSUR, expedited reporting, pharmacovigilance planning
12. CIOMS requirements for ADR reporting
13. Writing case narratives of adverse events and their quality.

Course Content

Unit I **10 Hours**

Introduction to Pharmacovigilance

- History and development of Pharmacovigilance
- Importance of safety monitoring of Medicine
- WHO international drug monitoring programme
- Pharmacovigilance Program of India(PvPI)

Introduction to adverse drug reactions

- Definitions and classification of ADRs
- Detection and reporting
- Methods in Causality assessment
- Severity and seriousness assessment
- Predictability and preventability assessment
- Management of adverse drug reactions

Basic terminologies used in pharmacovigilance

- Terminologies of adverse medication related events
- Regulatory terminologies

Unit II **10 hours**

Drug and disease classification

- Anatomical, therapeutic and chemical classification of drugs
- International classification of diseases
- Daily defined doses
- International Non proprietary Names for drugs

Drug dictionaries and coding in pharmacovigilance

- WHO adverse reaction terminologies
- MedDRA and Standardised MedDRA queries
- WHO drug dictionary
- Eudravigilance medicinal product dictionary

Information resources in pharmacovigilance

- Basic drug information resources
- Specialised resources for ADRs

Establishing pharmacovigilance programme

- Establishing in a hospital
- Establishment & operation of drug safety department in industry
- Contract Research Organisations (CROs)
- Establishing a national programme

Unit III **10 Hours**

Vaccine safety surveillance

- Vaccine Pharmacovigilance
- Vaccination failure
- Adverse events following immunization

Pharmacovigilance methods

- Passive surveillance – Spontaneous reports and case series
- Stimulated reporting
- Active surveillance – Sentinel sites, drug event monitoring and registries
- Comparative observational studies – Cross sectional study, case control study and cohort study
- Targeted clinical investigations

Communication in pharmacovigilance

- Effective communication in Pharmacovigilance
- Communication in Drug Safety Crisis management
- Communicating with Regulatory Agencies, Business Partners, Healthcare facilities & Media

Unit IV **8 Hours**

Safety data generation

- Pre clinical phase
- Clinical phase
- Post approval phase (PMS)

ICH Guidelines for Pharmacovigilance

- Organization and objectives of ICH
- Expedited reporting
- Individual case safety reports
- Periodic safety update reports
- Post approval expedited reporting
- Pharmacovigilance planning
- Good clinical practice in pharmacovigilance studies

Unit V **7 hours**

Pharmacogenomics of adverse drug reactions

- Genetics related ADR with example focusing PK parameters.

Drug safety evaluation in special population

- Paediatrics
- Pregnancy and lactation
- Geriatrics

CIOMS

- CIOMS Working Groups
- CIOMS Form

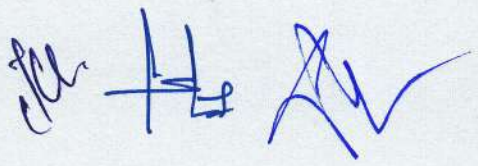
CDSCO (India) and Pharmacovigilance

- D&C Act and Schedule Y
- Differences in Indian and global pharmacovigilance requirements

Recommended Books (Latest edition):

1. Textbook of Pharmacovigilance: S K Gupta, Jaypee Brothers, Medical Publishers.
2. Practical Drug Safety from A to Z By Barton Cobert, Pierre Biron, Jones and Bartlett Publishers.
3. Mann's Pharmacovigilance:Elizabeth B. Andrews, Nicholas, Wiley Publishers.
4. Stephens' Detection of New Adverse Drug Reactions: John Talbot, Patrick Walle, Wiley Publishers.
5. An Introduction to Pharmacovigilance: Patrick Waller,Wiley Publishers.
6. Cobert's Manual of Drug Safety and Pharmacovigilance: Barton Cobert,Jones& Bartlett Publishers.
7. Textbook of Pharmacoepidemiolog edited by Brian L. Strom, Stephen E Kimmel, Sean Hennessy,Wiley Publishers.
8. A Textbook of Clinical Pharmacy Practice -Essential Concepts and Skills:G. Parthasarathi, Karin NyfortHansen,Milap C. Nahata
9. National Formulary of India
10. Text Book of Medicine by Yashpal Munjal

11. Text book of Pharmacovigilance: concept and practice by GP Mohanta and PK Manna



12. http://www.whoumc.org/DynPage.aspx?id=105825&mn1=7347&mn2=7259&mn3=7297
13. http://www.ich.org/
14. http://www.cioms.ch/
15. http://cdsco.nic.in/
16. http://www.who.int/vaccine_safety/en/
17. http://www.ipc.gov.in/PvPI/pv_home.html

BP 806 ET. QUALITY CONTROL AND STANDARDIZATION OF HERBALS (Theory)

Scope: In this subject the student learns about the various methods and guidelines for evaluation and standardization of herbs and herbal drugs. The subject also provides an opportunity for the student to learn cGMP, GAP and GLP in traditional system of medicines.

Objectives: Upon completion of the subject student shall be able to;

1. know WHO guidelines for quality control of herbal drugs
2. know Quality assurance in herbal drug industry
3. know the regulatory approval process and their registration in Indian and international markets
4. appreciate EU and ICH guidelines for quality control of herbal drugs

Unit I **10 hours**

Basic tests for drugs – Pharmaceutical substances, Medicinal plants materials and dosage forms

WHO guidelines for quality control of herbal drugs.

Evaluation of commercial crude drugs intended for use

Unit II **10 hours**

Quality assurance in herbal drug industry of cGMP, GAP, GMP and GLP in traditional system of medicine.

WHO Guidelines on current good manufacturing Practices (cGMP) for Herbal Medicines

WHO Guidelines on GACP for Medicinal Plants.

Unit III **10 hours**

EU and ICH guidelines for quality control of herbal drugs.

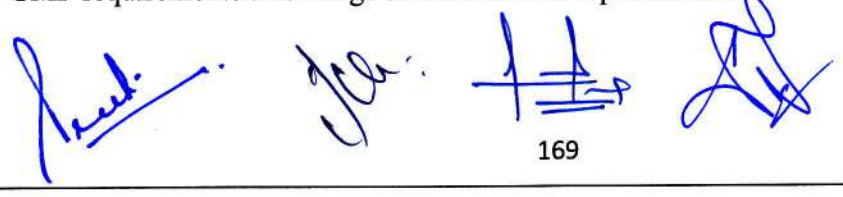
Research Guidelines for Evaluating the Safety and Efficacy of Herbal Medicines

Unit IV **08 hours**

Stability testing of herbal medicines.Application of various chromatographic techniques in standardization of herbal products.

Preparation of documents for new drug application and export registration

GMP requirements and Drugs & Cosmetics Act provisions.



Unit V **07 hours**

Regulatory requirements for herbal medicines.

WHO guidelines on safety monitoring of herbal medicines in pharmacovigilance systems

Comparison of various Herbal Pharmacopoeias.

Role of chemical and biological markers in standardization of herbal products

Recommended Books: (Latest Editions

1. Pharmacognosy by Trease and Evans
2. Pharmacognosy by Kokate, Purohit and Gokhale
3. Rangari, V.D., Text book of Pharmacognosy and Phytochemistry Vol. I , Carrier Pub., 2006.
4. Aggrawal, S.S., Herbal Drug Technology. Universities Press, 2002.
5. EMEA. Guidelines on Quality of Herbal Medicinal Products/Traditional Medicinal Products,
6. Mukherjee, P.W. Quality Control of Herbal Drugs: An Approach to Evaluation of Botanicals. Business Horizons Publishers, New Delhi, India, 2002.
7. Shinde M.V., Dhalwal K., Potdar K., Mahadik K. Application of quality control principles to herbal drugs. International Journal of Phytomedicine 1(2009); p. 4-8.
8. WHO. Quality Control Methods for Medicinal Plant Materials, World Health Organization, Geneva, 1998. WHO. Guidelines for the Appropriate Use of Herbal Medicines. WHO Regional Publications, Western Pacific Series No 3, WHO Regional office for the Western Pacific, Manila, 1998.
9. WHO. The International Pharmacopeia, Vol. 2: Quality Specifications, 3rd edn. World Health Organization, Geneva, 1981.
10. WHO. Quality Control Methods for Medicinal Plant Materials. World Health Organization, Geneva, 1999.
11. WHO. WHO Global Atlas of Traditional, Complementary and Alternative Medicine. 2 vol. set. Vol. 1 contains text and Vol. 2, maps. World Health Organization, Geneva, 2005.
12. WHO. Guidelines on Good Agricultural and Collection Practices (GACP) for Medicinal Plants. World Health Organization, Geneva, 2004.

BP 807 ET. COMPUTER AIDED DRUG DESIGN (Theory)

45 Hours

Scope: This subject is designed to provide detailed knowledge of rational drug design process and various techniques used in rational drug design process.

Objectives: Upon completion of the course, the student shall be able to understand

- Design and discovery of lead molecules
- The role of drug design in drug discovery process
- The concept of QSAR and docking
- Various strategies to develop new drug like molecules.
- The design of new drug molecules using molecular modeling software

Course Content:

10 Hours

UNIT-I

Introduction to Drug Discovery and Development

Stages of drug discovery and development

Lead discovery and Analog Based Drug Design

Rational approaches to lead discovery based on traditional medicine, Random screening, Non-random screening, serendipitous drug discovery, lead discovery based on drug metabolism, lead discovery based on clinical observation.

Analog Based Drug Design: Bioisosterism, Classification, Bioisosteric replacement. Any three case studies

10 Hours

UNIT-II

Quantitative Structure Activity Relationship (QSAR)

SAR versus QSAR, History and development of QSAR, Types of physicochemical parameters, experimental and theoretical approaches for the determination of physicochemical parameters such as Partition coefficient, Hammet's substituent constant and Tafts steric constant. Hansch analysis, Free Wilson analysis, 3D-QSAR approaches like COMFA and COMSIA.

10 Hours

UNIT-III

Molecular Modeling and virtual screening techniques

Virtual Screening techniques: Drug likeness screening, Concept of pharmacophore mapping and pharmacophore based Screening,

Molecular docking: Rigid docking, flexible docking, manual docking, Docking based screening. drug design

UNIT-IV **08 Hours**

Informatics & Methods in drug design

Introduction to Bioinformatics, chemoinformatics. ADME databases, chemical, biochemical and pharmaceutical databases.

UNIT-V **07 Hours**

Molecular Modeling: Introduction to molecular mechanics and quantum mechanics.Energy Minimization methods and Conformational Analysis, global conformational minima determination.

Recommended Books (Latest Editions)

1. Robert GCK, ed., "Drug Action at the Molecular Level" University Prak Press Baltimore.
2. Martin YC. "Quantitative Drug Design" Dekker, New York.
3. Delgado JN, Remers WA eds "Wilson & Gisvolds's Text Book of Organic Medicinal & Pharmaceutical Chemistry" Lippincott, New York.
4. Foye WO "Principles of Medicinal chemistry 'Lea & Febiger.
5. Koro lkovas A, Burckhalter JH. "Essentials of Medicinal Chemistry" Wiley Interscience.
6. Wolf ME, ed "The Basis of Medicinal Chemistry, Burger's Medicinal Chemistry" John Wiley & Sons, New York.
7. Patrick Graham, L., An Introduction to Medicinal Chemistry, Oxford University Press.
8. Smith HJ, Williams H, eds, "Introduction to the principles of Drug Design" Wright Boston.
9. Silverman R.B. "The organic Chemistry of Drug Design and Drug Action" Academic Press New York.

BP808ET: CELL AND MOLECULAR BIOLOGY (Elective subject)

45 Hours

Scope:

- Cell biology is a branch of biology that studies cells – their physiological properties, their structure, the organelles they contain, interactions with their environment, their life cycle, division, death and cell function.
- This is done both on a microscopic and molecular level.
- Cell biology research encompasses both the great diversity of single-celled organisms like bacteria and protozoa, as well as the many specialized cells in multi-cellular organismssuch as humans, plants, and sponges.

Objectives: Upon completion of the subject student shall be able to;

- Summarize cell and molecular biology history.
- Summarize cellular functioning and composition.
- Describe the chemical foundations of cell biology.
- Summarize the DNA properties of cell biology.
- Describe protein structure and function.
- Describe cellular membrane structure and function.
- Describe basic molecular genetic mechanisms.
- Summarize the Cell Cycle

Course content:

Unit I **10Hours**

a) Cell and Molecular Biology: Definitions theory and basics and Applications.
b) Cell and Molecular Biology: History and Summation.
c) Properties of cells and cell membrane.
d) Prokaryotic versus Eukaryotic
e) Cellular Reproduction
f) Chemical Foundations – an Introduction and Reactions (Types)

Unit II **10 Hours**

a) DNA and the Flow of Molecular Information
b) DNA Functioning
c) DNA and RNA
d) Types of RNA
e) Transcription and Translation

Unit III **10 Hours**

a) Proteins: Defined **and** Amino Acids
b) Protein Structure

c) Regularities in Protein Pathways
d) Cellular Processes
e) Positive Control and significance of Protein Synthesis

Unit IV **08 Hours**

a) Science of Genetics
b) Transgenics and Genomic Analysis
c) Cell Cycle analysis
d) Mitosis and Meiosis
e) Cellular Activities and Checkpoints

Unit V **07 Hours**

a) Cell Signals: Introduction
b) Receptors for Cell Signals
c) Signaling Pathways: Overview
d) Misregulation of Signaling Pathways
e) Protein-Kinases: Functioning

Recommended Books (latest edition):

1. W.B. Hugo and A.D. Russel: Pharmaceutical Microbiology, Blackwell Scientific publications, Oxford London.
2. Prescott and Dunn., Industrial Microbiology, 4th edition, CBS Publishers & Distributors, Delhi.
3. Pelczar, Chan Kreig, Microbiology, Tata McGraw Hill edn.
4. Malcolm Harris, Balliere Tindall and Cox: Pharmaceutical Microbiology.
5. Rose: Industrial Microbiology.
6. Probisher, Hinsdill et al: Fundamentals of Microbiology, 9th ed. Japan
7. Cooper and Gunn's: Tutorial Pharmacy, CBS Publisher and Distribution.
8. Peppler: Microbial Technology.
9. Edward: Fundamentals of Microbiology.
10. N.K.Jain: Pharmaceutical Microbiology, Vallabh Prakashan, Delhi
11. Bergeys manual of systematic bacteriology, Williams and Wilkins- A Waverly company
12. B.R. Glick and J.J. Pasternak: Molecular Biotechnology: Principles and Applications of RecombinantDNA: ASM Press Washington D.C.
13. RA Goldshy et. al., : Kuby Immunology.

BP809ET. COSMETIC SCIENCE(Theory)

45Hours

UNIT I **10Hours**

Classification of cosmetic and cosmeceutical products

Definition of cosmetics as per Indian and EU regulations, Evolution of cosmeceuticals from cosmetics, cosmetics as quasi and OTC drugs

Cosmetic excipients: Surfactants, rheology modifiers, humectants, emollients, preservatives. Classification and application

Skin: Basic structure and function of skin.

Hair: Basic structure of hair. Hair growth cycle.

Oral Cavity: Common problem associated with teeth and gums.

UNIT II **10 Hours**

Principles of formulation and building blocks of skin care products:

Face wash,

Moisturizing cream, Cold Cream, Vanishing cream and their advantages and disadvantages.Application of these products in formulation of cosmecuticals.

Antiperspants & deodorants- Actives & mechanism of action.

Principles of formulation and building blocks of Hair care products:

Conditioning shampoo, Hair conditioner,anti-dandruff shampoo.

Hair oils.

Chemistry and formulation of Para-phylene diamine based hair dye.

Principles of formulation and building blocks of oral care products:

Toothpaste for bleeding gums, sensitive teeth. Teeth whitening, Mouthwash.

UNIT III **10 Hours**

Sun protection, Classification of Sunscreens and SPF.

Role of herbs in cosmetics:

Skin Care: Aloe and turmeric

Hair care: Henna and amla.

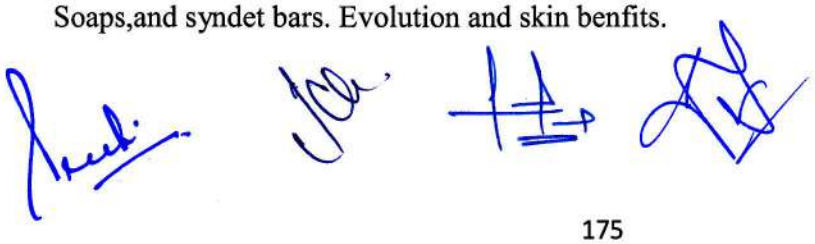
Oral care: Neem and clove

Analytical cosmetics: BIS specification and analytical methods for shampoo, skin-cream and toothpaste.

UNIT IV **08 Hours.**

Principles of Cosmetic Evaluation:Principles of sebumeter, corneometer. Measurement of TEWL, Skin Color, Hair tensile strength, Hair combing properties

Soaps,and syndet bars. Evolution and skin benfits.



UNIT V

07 Hours

Oily and dry skin, causes leading to dry skin, skin moisturisation. Basic understanding of the terms Comedogenic, dermatitis.

Cosmetic problems associated with Hair and scalp: Dandruff, Hair fall causes

Cosmetic problems associated with skin: blemishes, wrinkles, acne, prickly heat and body odor.

Antiperspirants and Deodorants- Actives and mechanism of action

References

1) Harry's Cosmeticology, Wilkinson, Moore, Seventh Edition, George Godwin.
2) Cosmetics – Formulations, Manufacturing and Quality Control, P.P. Sharma, 4th Edition, Vandana Publications Pvt. Ltd., Delhi.
3) Text book of cosmelicology by Sanju Nanda & Roop K. Khar, Tata Publishers.

BP810 ET. PHARMACOLOGICAL SCREENING METHODS

45 Hours

Scope: This subject is designed to impart the basic knowledge of preclinical studies in experimental animals including design, conduct and interpretations of results.

Objectives

Upon completion of the course the student shall be able to,

- Appreciate the applications of various commonly used laboratory animals.
- Appreciate and demonstrate the various screening methods used in preclinical research
- Appreciate and demonstrate the importance of biostatistics and researchmethodology
- Design and execute a research hypothesis independently

Unit –I	**08 Hours**
Laboratory Animals: Study of CPCSEA and OECD guidelines for maintenance, breeding and conduct of experiments on laboratory animals, Common lab animals: Description and applications of different species and strains of animals. Popular transgenic and mutant animals. Techniques for collection of blood and common routes of drug administration in laboratory animals, Techniques of blood collection and euthanasia.	
Unit –II	**10 Hours**
Preclinical screening models a. Introduction: Dose selection, calculation and conversions, preparation of drug solution/suspensions, grouping of animals and importance of sham negative and positive control groups. Rationale for selection of animal species and sex for the study. b. **Study of screening animal models for** Diuretics, nootropics, anti-Parkinson's,antiasthmatics, **Preclinical screening models:** for CNS activity- analgesic, antipyretic,anti-inflammatory, general anaesthetics, sedative and hypnotics, antipsychotic, antidepressant, antiepileptic, antiparkinsonism, alzheimer's disease	

Unit –III **Preclinical screening models:** for ANS activity, sympathomimetics, sympatholytics, parasympathomimetics, parasympatholytics, skeletal muscle relaxants, drugs acting on eye, local anaethetics	
Unit –IV **Preclinical screening models:** for CVS activity- antihypertensives, diuretics, antiarrhythmic, antidyslepidemic, anti aggregatory, coagulants, and anticoagulants Preclinical screening models for other important drugs like antiulcer, antidiabetic, anticancer and antiasthmatics.	
Research methodology and Bio-statistics Selection of research topic, review of literature, research hypothesis and study design Pre-clinical data analysis and interpretation using Students 't' test and One-way ANOVA. Graphical representation of data	**05 Hours**

Recommended Books (latest edition):

1. Fundamentals of experimental Pharmacology-by M.N.Ghosh
2. Hand book of Experimental Pharmacology-S.K.Kulakarni
3. CPCSEA guidelines for laboratory animal facility.
4. Drug discovery and Evaluation by Vogel H.G.
5. Drug Screening Methods by Suresh Kumar Gupta and S. K. Gupta
6. Introduction to biostatistics and research methods by PSS Sundar Rao and J Richard

BP 811 ET. ADVANCED INSTRUMENTATION TECHNIQUES

45 Hours

Scope: This subject deals with the application of instrumental methods in qualitative and quantitative analysis of drugs. This subject is designed to impart advanced knowledge on the principles and instrumentation of spectroscopic and chromatographic hyphenated techniques. This also emphasizes on theoretical and practical knowledge on modern analytical instruments that are used for drug testing.

Objectives: Upon completion of the course the student shall be able to

- understand the advanced instruments used and its applications in drug analysis
- understand the chromatographic separation and analysis of drugs.
- understand the calibration of various analytical instruments
- know analysis of drugs using various analytical instruments.

Course Content:

UNIT-I **10 Hours**

Nuclear Magnetic Resonance spectroscopy

Principles of H-NMR and C-NMR, chemical shift, factors affecting chemical shift, coupling constant, Spin - spin coupling, relaxation, instrumentation and applications

Mass Spectrometry- Principles, Fragmentation, Ionization techniques – Electron impact, chemical ionization, MALDI, FAB, Analyzers-Time of flight and Quadrupole, instrumentation, applications

UNIT-II **10 Hours**

Thermal Methods of Analysis: Principles, instrumentation and applications of ThermogravimetricAnalysis (TGA), Differential Thermal Analysis (DTA), Differential Scanning Calorimetry (DSC)

X-Ray Diffraction Methods: Origin of X-rays, basic aspects of crystals, X-ray

Crystallography, rotating crystal technique, single crystal diffraction,powder diffraction, structural elucidation and applications.

UNIT-III **10 Hours**

Calibration and validation-as per ICH and USFDA guidelines

Calibration of following Instruments

Electronic balance, UV-Visible spectrophotometer, IR spectrophotometer,

b) Dietary fibres and complex carbohydrates as functional food ingredients..

UNIT IV **10 hours**

a) Free radicals in Diabetes mellitus, Inflammation, Ischemic reperfusion injury, Cancer, Atherosclerosis, Free radicals in brain metabolism and pathology, kidney damage, muscle damage. Free radicals involvement in other disorders. Free radicals theory of ageing.

b) Antioxidants: Endogenous antioxidants – enzymatic and nonenzymatic antioxidant defence, Superoxide dismutase, catalase, Glutathione peroxidase, Glutathione Vitamin C, Vitamin E, α- Lipoic acid, melatonin
Synthetic antioxidants: Butylated hydroxy Toluene, Butylated hydroxy Anisole.

c) Functional foods for chronic disease prevention

UNIT V **06 hours**

a) Effect of processing, storage and interactions of various environmental factors on the potential of nutraceuticals.

b) Regulatory Aspects; FSSAI, FDA, FPO, MPO, AGMARK. HACCP and GMPs on Food Safety. Adulteration of foods.

c) Pharmacopoeial Specifications for dietary supplements and nutraceuticals.

References:

1. Dietetics by Sri Lakshmi
2. Role of dietary fibres and neutraceuticals in preventing diseases by K.T Agusti and P.Faizal: BSPunblication.
3. Advanced Nutritional Therapies by Cooper. K.A., (1996).
4. The Food Pharmacy by Jean Carper, Simon & Schuster, UK Ltd., (1988).
5. Prescription for Nutritional Healing by James F.Balch and Phyllis A.Balch 2nd Edn., Avery Publishing Group, NY (1997).
6. G. Gibson and C.williams Editors
7. Goldberg, I.
8. Labuza, T.P. 2000 Functional Foods and Dietary Supplements: Safety, Good Manufacturing Practice (GMPs) and Shelf Life Testing in
M.K. Sachmidl and T.P. Labuza eds. Aspen Press
9. Handbook of Nutraceuticals and Functional Foods, Third Edition (Modern Nutrition)
10. Shils, ME, Olson, JA, Shike, M. 1994 Eighth edition. Lea and Febiger

Semester VIII – Elective course on Pharmaceutical Product Development

No of Hours: 3 Tutorial:1 Credit points:4

Unit-I **10 Hours**

Introduction to pharmaceutical product development, objectives, regulations related to preformulation, formulation development, stability assessment, manufacturing and quality control testing of different types of dosage forms

Unit-II **10 Hours**

An advanced study of Pharmaceutical Excipients in pharmaceutical product development with a special reference to the following categories

i. Solvents and solubilizers
ii. Cyclodextrins and their applications
iii. Non - ionic surfactants and their applications
iv. Polyethylene glycols and sorbitols
v. Suspending and emulsifying agents
vi. Semi solid excipients

Unit-III **10 Hours**

An advanced study of Pharmaceutical Excipients in pharmaceutical product development with a special reference to the following categories

i. Tablet and capsule excipients
ii. Directly compressible vehicles
iii. Coat materials
iv. Excipients in parenteral and aerosols products
v. Excipients for formulation of NDDS

Selection and application of excipients in pharmaceutical formulations with specific industrial applications

Unit-IV **08 Hours**

Optimization techniques in pharmaceutical product development.A study of various optimization techniques for pharmaceutical product development with specific examples.Optimization by factorial designs and their applications.A study of QbD and its application in pharmaceutical product development.

Unit-V **07 Hours**

Selection and quality control testing of packaging materials for pharmaceutical product development- regulatory considerations.

Fluorimeter, Flame Photometer, HPLC and GC

UNIT-IV **08 Hours**

Radio immune assay: Importance, various components, Principle, different methods, Limitation and Applications of Radio immuno assay

Extraction techniques:General principle and procedure involved in the solid phase extraction and liquid-liquid extraction

UNIT-V **07 Hours**

Hyphenated techniques-LC-MS/MS, GC-MS/MS, HPTLC-MS.

Recommended Books (Latest Editions)

1. Instrumental Methods of Chemical Analysis by B.K Sharma
2. Organic spectroscopy by Y.R Sharma
3. Text book of Pharmaceutical Analysis by Kenneth A. Connors
4. Vogel's Text book of Quantitative Chemical Analysis by A.I. Vogel
5. Practical Pharmaceutical Chemistry by A.H. Beckett and J.B. Stenlake
6. Organic Chemistry by I. L. Finar
7. Organic spectroscopy by William Kemp
8. Quantitative Analysis of Drugs by D. C. Garrett
9. Quantitative Analysis of Drugs in Pharmaceutical Formulations by P. D. Sethi
10. Spectrophotometric identification of Organic Compounds by Silverstein

BP 812 ET. DIETARY SUPPLEMENTS AND NUTRACEUTICALS

No. of hours :3 **Tutorial:1** **Credit point:4**

Scope :

This subject covers foundational topic that are important for understanding the need and requirements of dietary supplements among different groups in the population.

Objective:

This module aims to provide an understanding of the concepts behind the theoretical applications of dietary supplements. By the end of the course, students should be able to :

1. Understand the need of supplements by the different group of people to maintain healthy life.
2. Understand the outcome of deficiencies in dietary supplements.
3. Appreciate the components in dietary supplements and the application.
4. Appreciate the regulatory and commercial aspects of dietary supplements including health claims.

UNIT I **07 hours**

a. Definitions of Functional foods, Nutraceuticals and Dietary supplements. Classification of Nutraceuticals, Health problems and diseases that can be prevented or cured by Nutraceuticals i.e. weight control, diabetes, cancer, heart disease, stress, osteoarthritis, hypertension etc.

b. Public health nutrition, maternal and child nutrition, nutrition and ageing, nutrition education in community.

c. Source, Name of marker compounds and their chemical nature, Medicinal uses and health benefits of following used as nutraceuticals/functional foods: Spirulina, Soyabean, Ginseng, Garlic, Broccoli, Gingko, Flaxseeds

UNIT II **15 hours**

Phytochemicals as nutraceuticals: Occurrence and characteristic features(chemical nature medicinal benefits) of following

a) Carotenoids- α and β-Carotene, Lycopene, Xanthophylls, leutin
b) Sulfides: Diallyl sulfides, Allyl trisulfide.
c) Polyphenolics: Reservetrol
d) Flavonoids- Rutin , Naringin, Quercitin, Anthocyanidins, catechins, Flavones
e) Prebiotics / Probiotics.: Fructo oligosaccharides, Lacto bacillum
f) Phyto estrogens : Isoflavones, daidzein, Geebustin, lignans
g) Tocopherols
h) Proteins, vitamins, minerals, cereal, vegetables and beverages as functional foods: oats, wheat bran, rice bran, sea foods, coffee, tea and the like.

UNIT III **07 hours**

a) Introduction to free radicals: Free radicals, reactive oxygen species, production of free radicals in cells, damaging reactions of free radicals on lipids, proteins, Carbohydrates, nucleic acids.

Recommended Books (Latest editions)

1. Pharmaceutical Statistics Practical and Clinical Applications by Stanford Bolton, CharlesBon; Marcel Dekker Inc.
2. Encyclopedia of Pharmaceutical Technology, edited by James swarbrick, Third Edition,Informa Healthcare publishers.
3. Pharmaceutical Dosage Forms, Tablets, Volume II, edited by Herbert A. Lieberman andLeon Lachman; Marcel Dekker, Inc.
4. The Theory and Practice of Industrial Pharmacy, Fourth Edition, edited by Roop kKhar, S P Vyas, Farhan J Ahmad, Gaurav K Jain; CBS Publishers and Distributors Pvt.Ltd. 2013.
5. Martin's Physical Pharmacy and Pharmaceutical Sciences, Fifth Edition, edited by Patrick J. Sinko, BI Publications Pvt. Ltd.
6. Targeted and Controlled Drug Delivery, Novel Carrier Systems by S. P. Vyas and R. K.Khar, CBS Publishers and Distributors Pvt. Ltd, First Edition 2012.
7. Pharmaceutical Dosage Forms and Drug Delivery Systems, Loyd V. Allen Jr., Nicholas B.Popovich, Howard C. Ansel, 9th Ed. 40
8. Aulton's Pharmaceutics – The Design and Manufacture of Medicines, Michael E. Aulton,3rd Ed.
9. Remington – The Science and Practice of Pharmacy, 20th Ed.
10. Pharmaceutical Dosage Forms – Tablets Vol 1 to 3, A. Liberman, Leon Lachman andJoseph B. Schwartz
11. Pharmaceutical Dosage Forms – Disperse Systems Vol 1 to 3, H.A. Liberman, Martin, M.R and Gilbert S. Banker.
12. Pharmaceutical Dosage Forms – Parenteral Medication Vol 1 & 2, Kenneth E. Avis andH.A. Libermann.
13. Advanced Review Articles related to the topics.

11/6/2018 11/6/2018 14/06/18

Pt. Ravishankar Shukla University,
Raipur (C.G.) 492 010

Master of Pharmacy

(Pharmaceutics)
(A Two Year Post-Graduate Degree Program)
(w.e.f. Academic Session 2019-2020)

Ordinance

&

Syllabus

(W. E. F. Academic Session **2019-2020)**

[Type text]
Approved in meeting of Board of Studies in Faculty of Technology, Sub: Pharmacy Dt. May15, 2019

15/5/19

15.5.19

CHAPTER – I: REGULATIONS

1. Short Title and Commencement

These regulations shall be called as "The Revised Regulations for the Master of Pharmacy (M. Pharm.)Degree Program - Credit Based Semester System (CBSS) of the Pharmacy Council of India, New Delhi". They shall come into effect from the Academic Year 2019-20. The regulations framed are subject to modifications from time to time by the authorities of the university.

2. Minimum qualification for admission

A Pass in the following examinations

a) B. Pharm Degree examination of an Indian university established by law in India from an institution approved by Pharmacy Council of India and has scored not less than 55 % of the maximum marks (aggregate of 4 years of B.Pharm.)

b) Every student, selected for admission to post graduate pharmacy program in any PCI approved institution should have obtained registration with the State Pharmacy Council or should obtain the same within one month from the date of his/her admission, failing which the admission of the candidate shall be cancelled.

Note: It is mandatory to submit a migration certificate obtained from the respective university where the candidate had passed his/her qualifying degree (B.Pharm.)

3. Duration of the program

The program of study for M.Pharm. shall extend over a period of four semesters (two academic years). The curricula and syllabi for the program shall be prescribed from time to time by Phamacy Council of India, New Delhi.

4. Medium of instruction and examinations

Medium of instruction and examination shall be in English.

5. Working days in each semester

Each semestershall consist of not less than 100 working days. The odd semesters shall be conducted from the month of June/July to November/December and the even semesters shall be conducted from the month of December/January to May/June in every calendar year.

Approved in meeting of Board of Studies in Faculty of Technology, Sub: Pharmacy Dt. May15, 2019

6. Attendance and progress

A candidate is required to put in at least 80% attendance in individual courses considering theory and practical separately. The candidate shall complete the prescribed course satisfactorily to be eligible to appear for the respective examinations.

7. Program/Course credit structure

As per the philosophy of Credit Based Semester System, certain quantum of academic work viz. theory classes, practical classes, seminars, assignments, etc. are measured in terms of credits. On satisfactory completion of the courses, a candidate earns credits. The amount of credit associated with a course is dependent upon the number of hours of instruction per week in that course. Similarly the credit associated with any of the other academic, co/extra-curricular activities is dependent upon the quantum of work expected to be put in for each of these activities per week/per activity.

7.1. Credit assignment

7.1.1. Theory and Laboratory courses

Courses are broadly classified as Theory and Practical. Theory courses consist of lecture (L) and Practical (P) courses consist of hours spent in the laboratory. Credits (C) for a course is dependent on the number of hours of instruction per week in that course, and is obtained by using a multiplier of one (1) for lecture and a multiplier of half (1/2) for practical (laboratory) hours.Thus, for example, a theory course having four lectures per week throughout the semester carries a credit of 4. Similarly, a practical having four laboratory hours per week throughout semester carries a credit of 2.

The contact hours of seminars, assignments and research work shall be treated as that of practical courses for the purpose of calculating credits. i.e., the contact hours shall be multiplied by 1/2. Similarly, the contact hours of journal club, research work presentations and discussions with the supervisor shall be considered as theory course and multiplied by 1.

7.2. Minimum credit requirements

The minimum credit points required for the award of M. Pharm. degree is 95. However based on the credit points earned by the students under the head of co-curricular activities, a student shall earn a maximum of 100 credit points. These credits are divided into Theory courses, Practical, Seminars, Assignments,Research work, Discussions with the supervisor, Journal club and Co-Curricular activities over the duration of four semesters. The credits are distributed semester-wise as shown in Table 1. Courses generally

progress in sequence, building competencies and their positioning indicates certain academic maturity on the part of the learners. Learners are expected to follow the semester-wise schedule of courses given in the syllabus.

8. Academic work

A regular record of attendance both in Theory, Practical, Seminar, Assignment, Journal club, Discussion with the supervisor, Research work presentation and Dissertation shall be maintained by the department / teaching staff of respective courses.

9. Course of study

The specializations in M.Pharm program is Pharmaceutics.

Table – 1: Course of study for M. Pharm. (Pharmaceutics)

Course Code	Course	Credit Hours	Credit Points	Hrs./wk	Marks
Semester I					
MPH101T	Modern Pharmaceutical Analytical Techniques	4	4	4	100
MPH102T	Drug Delivery System	4	4	4	100
MPH103T	Modern Pharmaceutics	4	4	4	100
MPH104T	Regulatory Affair	4	4	4	100
MPH105P	Pharmaceutics Practical I	12	6	12	150
-	Seminar/Assignment	7	4	7	100
Total		**35**	**26**	**35**	**650**
Semester II					
MPH201T	Molecular Pharmaceutics (Nano Tech and Targeted DDS)	4	4	4	100
MPH202T	Advanced Biopharmaceutics & Pharmacokinetics	4	4	4	100
MPH203T	Computer Aided Drug Delivery System	4	4	4	100
MPH204T	Cosmetic and Cosmeceuticals	4	4	4	100
MPH205P	Pharmaceutics Practical II	12	6	12	150
-	Seminar/Assignment	7	4	7	100
	Total	**35**	**26**	**35**	**650**

Table – 2: Course of study for M. Pharm. III Semester

Course Code	Course	Credit Hours	Credit Points
MRM 301T	Research Methodology and Biostatistics*	4	4
-	Journal club	1	1
-	Discussion / Presentation (Proposal Presentation)	2	2
-	Research Work	28	14
Total		35	21

* Non University Exam

Table – 3: Course of study for M. Pharm. IV Semester

Course Code	Course	Credit Hours	Credit Points
-	Journal Club	1	1
-	Research Work	31	16
-	Discussion/Final Presentation	3	3
Total		35	20

Table –4: Semester wise credits distribution

Semester	Credit Points
I	26
II	26
III	21
IV	20
Co-curricular Activities (Attending Conference, Scientific Presentations and Other Scholarly Activities)	Minimum=02 Maximum=07*
Total Credit Points	Minimum=95 Maximum=100*

*Credit Points for Co-curricular Activities

Table – 5: Guidelines for Awarding Credit Points for Co-curricular Activities

Name of the Activity	Maximum Credit Points Eligible / Activity
Participation in National Level Seminar/Conference/Workshop/Symposium/ Training Programs (related to the specialization of the student)	01
Participation in international Level Seminar/Conference/Workshop/Symposium/ Training Programs (related to the specialization of the student)	02
Academic Award/Research Award from State Level/National Agencies	01
Academic Award/Research Award from International Agencies	02
Research / Review Publication in National Journals (Indexed in Scopus / Web of Science)	01
Research / Review Publication in International Journals (Indexed in Scopus / Web of Science)	02

Note: International Conference: Held Outside India

International Journal: The Editorial Board Outside India

*The credit points assigned for extracurricular and or co-curricular activities shall be given by the Principals of the colleges and the same shall be submitted to the University. The criteria to acquire this credit point shall be defined by the colleges from time to time.

10. Program Committee

1. The M. Pharm. programme shall have a Programme Committee constituted by the Head of the institution in consultation with all the Heads of the departments.

2. The composition of the Programme Committee shall be as follows:
A teacher at the cadre of Professor shall be the Chairperson; One Teacher from eachM.Pharm specialization and four student representatives (two from each academic year), nominated by the Head of the institution.

3. Duties of the Programme Committee:
   i. Periodically reviewing the progress of the classes.
   ii. Discussing the problems concerning curriculum, syllabus and the conduct of classes.
   iii. Discussing with the course teachers on the nature and scope of assessment for the course and the same shall be announced to the students at the beginning of respective semesters.

iv. Communicating its recommendation to the Head of the institution on academic matters.

v. The Programme Committee shall meet at least twice in a semester preferably at the end of each sessionalexam and before the end semester exam.

11. Examinations/Assessments

The schemes for internal assessment and end semester examinations are given in Table – 6.

11.1. End semester examinations

The End Semester Examinations for each theory and practical coursethrough semesters I to IVshall beconducted by the respective university except for the subject with asterix symbol (*) in table I and II for which examinations shall be conducted by the subject experts at college level and the marks/grades shall be submitted to the university.

Tables – 6: Schemes for internal assessments and end semester examinations (Pharmaceutics- MPH)

Course Code	Course	Internal Assessment				End Semester Exams		Total Marks
		Continuous Mode	Sessional Exams		Total	Marks	Duration	
			Marks	Duration				
SEMESTER I								
MPH 101T	Modern Pharmaceutical Analytical Techniques	10	15	1 Hr	25	75	3 Hrs	100
MPH 102T	Drug Delivery System	10	15	1 Hr	25	75	3 Hrs	100
MPH 103T	Modern Pharmaceutics	10	15	1 Hr	25	75	3 Hrs	100
MPH 104T	Regulatory Affair	10	15	1 Hr	25	75	3 Hrs	100
MPH 105P	Pharmaceutics Practical I	20	30	6 Hrs	50	100	6 Hrs	150
-	Seminar /Assignment	-	-	-	-	-	-	100
Total								650
SEMESTER II								
MPH 201T	Molecular Pharmaceutics(Nano Tech and Targeted DDS)	10	15	1 Hr	25	75	3 Hrs	100
MPH 202T	Advanced Biopharmaceutics & Pharmacokinetics	10	15	1 Hr	25	75	3 Hrs	100
MPH 203T	Computer Aided Drug Delivery System	10	15	1 Hr	25	75	3 Hrs	100
MPH	Cosmetic	10	15	1 Hr	25	75	3 Hrs	100

204T	and Cosmeceutic als							
MPH 205P	Pharmaceuti cs Practical I	20	30	6 Hrs	50	100	6 Hrs	150
-	Seminar /Assignment	-	-	-	-	-	-	100
Total								650

Tables – 7: Schemes for internal assessments and end semester examinations (Semester III& IV)

Course Code	Course	Internal Assessment				End Semester Exams		Total Marks
		Continuous Mode	Sessional Exams		Total	Marks	Duration	
			Marks	Duration				
SEMESTER III								
MRM301T	Research Methodology and Biostatistics*	10	15	1 Hr	25	75	3 Hrs	100
-	Journal club	-	-	-	25	-	-	25
-	Discussion / Presentation (Proposal Presentation)	-	-	-	50	-	-	50
-	Research work*	-	-	-	-	350	1 Hr	350
Total								525
SEMESTER IV								
-	Journal club	-	-	-	25	-	-	25
-	Discussion / Presentation (Proposal Presentation)	-	-	-	75	-	-	75
-	Research work and Colloquium	-	-	-	-	400	1 Hr	400
Total								500

***Non University Examination**

11.2. Internal assessment: Continuous mode

The marks allocated for Continuous mode of Internal Assessment shall be awarded as per the scheme given below.

Table – 8: Scheme for awarding internal assessment: Continuous mode

Theory	
Criteria	**Maximum Marks**
Attendance (Refer Table – 28)	8
Student – Teacher interaction	2
Total	**10**
Practical	
Attendance (Refer Table – 28	10
Based on Practical Records, Regular viva voce, etc.	10
Total	**20**

Table – 9: Guidelines for the allotment of marks for attendance

Percentage of Attendance	Theory	Practical
95 – 100	8	10
90 – 94	6	7.5
85 – 89	4	5
80 – 84	2	2.5
Less than 80	0	0

11.2.1. Sessional Exams

Two sessional exams shall be conducted for each theory / practical course as per the schedule fixed by the college(s). The scheme of question paper for theory and practical sessional examinations is given in the table. The average marks of two sessional exams shall be computed for internal assessment as per the requirements given in tables.

12. Promotion and award of grades

A student shall be declared PASS and eligible for getting grade in a course of M.Pharm.programme if he/she secures at least 50% marks in that particular courseincluding internal assessment.

13. Carry forward of marks

In case a student fails to secure the minimum 50% in any Theory or Practical course as specified in 12, then he/she shall reappear for the end semester examination of that course. However his/her marks of the Internal Assessment shall be carried over and he/she shall be entitled for grade obtained by him/her on passing.

14. Improvement of internal assessment

A student shall have the opportunity to improve his/her performance only once in the sessional exam component of the internal assessment. The re-conduct of the sessional exam shall be completed before the commencement of next end semester theory examinations.

15. Reexamination of end semester examinations

Reexamination of end semester examination shall be conducted as per the schedule given in table 10 The exact dates of examinations shall be notified from time to time.

Table – 10: Tentative schedule of end semester examinations

Semester	For Regular Candidates	For Failed Candidates
I and III	November / December	May / June
II and IV	May / June	November / December

16. Allowed to keep terms (ATKT):

No student shall be admitted to any examination unless he/she fulfills the norms given in 6. ATKT rules are applicable as follows:

A student shall be eligible to carry forward all the courses of I and IIsemesters till the III semester examinations. However, he/she shall not be eligible to attend the courses of IV semester until all the courses of I, II and III semesters are successfully completed.

A student shall be eligible to get his/her CGPA upon successful completion of the courses of I to IV semesters within the stipulated time period as per the norms.

Note: Grade AB should be considered as failed and treated as one head for deciding ATKT. Such rules are also applicable for those students who fail to register for examination(s) of any course in any semester.

17. Grading of performances

17.1. Letter grades and grade points allocations:

Based on the performances, each student shall be awarded a final letter grade at the end of the semester for each course.The letter grades and their corresponding grade points are given in Table – 11

Table – 11: Letter grades and grade points equivalent to *Percentage of marks and performances*

Percentage of Marks Obtained	Letter Grade	Grade Point	Performance
90.00 – 100	O	10	Outstanding
80.00 – 89.99	A	9	Excellent
70.00 – 79.99	B	8	Good
60.00 – 69.99	C	7	Fair
50.00 – 59.99	D	6	Average
Less than 50	F	0	Fail
Absent	AB	0	Fail

A learner who remains absent for any end semester examination shall be assigned a letter grade of AB and a corresponding grade point of zero. He/she should reappear for the said evaluation/examination in due course.

18. The Semester grade point average (SGPA)

The performance of a student in a semester is indicated by a number called 'Semester Grade Point Average' (SGPA). The SGPA is the weighted average of the grade points obtainedin all the courses by the student during the semester. For example, if a student takes five courses (Theory/Practical) in a semester with credits C1, C2, C3 and C4 and the student's grade points in these courses are G1, G2, G3 and G4, respectively, and then students' SGPA is equal to:

$$SGPA = \frac{C_1G_1 + C_2G_2 + C_3G_3 + C_4G_4}{C_1 + C_2 + C_3 + C_4}$$

The SGPA is calculated to two decimal points. It should be noted that, the SGPA for any semester shall take into consideration the F and ABS grade awarded in that semester. For example if a learner has a F or ABS grade in course 4, theSGPA shall then be computed as:

$$SGPA = \frac{C_1G_1 + C_2G_2 + C_3G_3 + C_4 * ZERO}{C_1 + C_2 + C_3 + C_4}$$

19. Cumulative Grade Point Average (CGPA)

The CGPA is calculated with the SGPA of all the IV semesters to two decimal points and is indicated in final grade report card/final transcript showing the grades of all IV semesters and their courses. The CGPA shall reflect the failed statusin case of F grade(s), till the course(s) is/are passed. When the course(s) is/are passedby obtaining a pass grade on subsequent examination(s) theCGPA

shall only reflect the new grade and not the fail grades earned earlier.The CGPA is calculated as:

$$CGPA = \frac{C_1S_1 + C_2S_2 + C_3S_3 + C_4S_4}{C_1 + C_2 + C_3 + C_4}$$

where C_1, C_2, C_3,.... is the total number of credits for semester I,II,III,.... and S_1,S_2, S_3,....is the SGPA of semester I,II,III,.... .

20. Declaration of class

The class shall be awarded on the basis of CGPA as follows:

First Class with Distinction	= CGPA of. 7.50 and above
First Class	= CGPA of 6.00 to 7.49
Second Class	= CGPA of 5.00 to 5.99

21. Project work

All the students shall undertake a project under the supervision of a teacher in Semester III to IV and submit a report. 4 copies of the project report shall be submitted (typed & bound copy not less than 75 pages).

The internal and external examiner appointed by the University shall evaluate the project at the time of the Practical examinations of other semester(s). The projects shall be evaluated as per the criteria given below.

Evaluation of Dissertation Book:

Objective(s) of the work done	50 Marks
Methodology adopted	150 Marks
Results and Discussions	250 Marks
Conclusions and Outcomes	50 Marks
Total	**500 Marks**

Evaluation of Presentation:

Presentation of work	100 Marks
Communication skills	50 Marks
Question and answer skills	100 Marks
Total	**250 Marks**

22. Award of Ranks

Ranks and Medals shall be awarded on the basis of final CGPA. However, candidates who fail in one or more courses during the M.Pharm program shall not be eligible for award of ranks. Moreover, the candidates should have completed the M. Pharm program in minimum prescribed number of years, (two years) for the award of Ranks.

23. Award of degree

Candidates who fulfill the requirements mentioned above shall be eligible for award of degree during the ensuing convocation.

24. Duration for completion of the program of study

The duration for the completion of the program shall be fixed as double the actual duration of the program and the students have to pass within the said period, otherwise they have to get fresh Registration.

25. Revaluation / Retotaling of answer papers

There is no provision for revaluation of the answer papers in any examination. However, the candidates can apply for retotaling by paying prescribed fee.

26. Re-admission after break of study

Candidate who seeks re-admission to the program after break of study has to get the approval from the university by paying a condonation fee.

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PHARMACEUTICS (MPH)

MODERN PHARMACEUTICAL ANALYTICAL TECHNIQUES (MPH 101T)

Scope

This subject deals with various advanced analytical instrumental techniques for identification, characterization and quantification of drugs. Instruments dealt are NMR, Mass spectrometer, IR, HPLC, GC etc.

Objectives

After completion of course student is able to know,

- Chemicals and Excipients
- The analysis of various drugs in single and combination dosage forms
- Theoretical and practical skills of the instruments

THEORY ***60 HOURS***

1. a. **UV-Visible spectroscopy**: Introduction, Theory, Laws, Instrumentation associated with UV-Visible spectroscopy, Choice of solvents and solvent effect and Applications of UV-Visible spectroscopy. — 11 Hrs

   b. **IR spectroscopy**: Theory, Modes of Molecular vibrations, Sample handling, Instrumentation of Dispersive and Fourier - Transform IR Spectrometer, Factors affecting vibrational frequencies and Applications of IR spectroscopy

   c. **Spectroflourimetry:** Theory of Fluorescence, Factors affecting fluorescence, Quenchers, Instrumentation and Applications of fluorescence spectrophotometer.

   d. **Flame emission spectroscopy and Atomic absorption spectroscopy**: Principle, Instrumentation, Interferences and Applications.

2. **NMR spectroscopy**: Quantum numbers and their role in NMR, Principle, Instrumentation, Solvent requirement in NMR, Relaxation process, NMR signals in various compounds, Chemical shift, Factors influencing chemical shift, Spin-Spin coupling, Coupling constant, Nuclear magnetic double resonance, Brief outline of principles of FT-NMR and 13C NMR. Applications of NMR spectroscopy. — 11 Hrs

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3	**Mass Spectroscopy**: Principle, Theory, Instrumentation of Mass Spectroscopy, Different types of ionization like electron impact, chemical, field, FAB and MALDI, APCI, ESI, APPI Analyzers of Quadrupole and Time of Flight, Mass fragmentation and its rules, Meta stable ions, Isotopic peaks and Applications of Mass spectroscopy	11 Hrs
4	**Chromatography**: Principle, apparatus, instrumentation, chromatographic parameters, factors affecting resolution and applications of the following: a) Paper chromatography b) Thin Layer chromatography c) Ion exchange chromatography d) Column chromatography e) Gas chromatography f) High Performance Liquid chromatography g) Affinity chromatography	11 Hrs
5	a. **Electrophoresis**: Principle, Instrumentation, Working conditions, factors affecting separation and applications of the following: a) Paper electrophoresis b) Gel electrophoresis c) Capillary electrophoresis d) Zone electrophoresis e) Moving boundary electrophoresis f) Iso electric focusing **b. X ray Crystallography**: Production of X rays, Different X ray diffraction methods, Bragg's law, Rotating crystal technique, X ray powder technique, Types of crystals and applications of X-ray diffraction.	11 Hrs
6	**Immunological assays :** RIA (Radio immuno assay), ELISA, Bioluminescence assays.	5 Hrs

REFERENCES

1. Spectrometric Identification of Organic compounds - Robert M Silverstein, Sixth edition, John Wiley & Sons, 2004.
2. Principles of Instrumental Analysis - Doglas A Skoog, F. James Holler, Timothy A. Nieman, 5th edition, Eastern press, Bangalore, 1998.
3. Instrumental methods of analysis – Willards, 7th edition, CBS publishers.
4. Practical Pharmaceutical Chemistry – Beckett and Stenlake, Vol II, 4th edition, CBS Publishers, New Delhi, 1997.
5. Organic Spectroscopy - William Kemp, 3rd edition, ELBS, 1991.
6. Quantitative Analysis of Drugs in Pharmaceutical formulation - P D Sethi, 3rd Edition, CBS Publishers, New Delhi, 1997.
7. Pharmaceutical Analysis- Modern methods – Part B - J W Munson, Volume 11, Marcel Dekker Series

DRUG DELIVERY SYSTEMS
(MPH 102T)

SCOPE

This course is designed to impart knowledge on the area of advances in novel drug delivery systems.

OBJECTIVES

Upon completion of the course, student shall be able to understand

- The various approaches for development of novel drug delivery systems.
- The criteria for selection of drugs and polymers for the development of delivering system
- The formulation and evaluation of Novel drug delivery systems..

THEORY ***60 Hrs***

1.	**Sustained Release(SR) and Controlled Release (CR) formulations:** Introduction & basic concepts, advantages/ disadvantages, factors influencing, Physicochemical & biological approaches for SR/CR formulation, Mechanism of Drug Delivery from SR/CR formulation. Polymers: introduction, definition, classification, properties and application Dosage Forms for Personalized Medicine: Introduction, Definition, Pharmacogenetics, Categories of Patients for Personalized Medicines: Customized drug delivery systems, Bioelectronic Medicines, 3D printing of pharmaceuticals, Telepharmacy.	10 Hrs
2	**Rate Controlled Drug Delivery Systems:** Principles & Fundamentals, Types, Activation; Modulated Drug Delivery Systems;Mechanically activated, pH activated, Enzyme activated, and Osmotic activated Drug Delivery Systems Feedback regulated Drug Delivery Systems; Principles & Fundamentals.	10 Hrs
3	**Gastro-Retentive Drug Delivery Systems**: Principle, concepts advantages and disadvantages, Modulation of GI transit time approaches to extend GI transit. Buccal Drug Delivery Systems: Principle of muco adhesion, advantages and disadvantages, Mechanism of drug permeation, Methods of formulation and its evaluations.	10 Hrs
4	**Occular Drug Delivery Systems**: Barriers of drug permeation, Methods to overcome barriers.	06 Hrs

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5	**Transdermal Drug Delivery Systems:** Structure of skin and barriers, Penetration enhancers, Transdermal Drug Delivery Systems, Formulation and evaluation.	10 Hrs
6	**Protein and Peptide Delivery:** Barriers for protein delivery. Formulation and Evaluation of delivery systems of proteins and other macromolecules.	08 Hrs
7	**Vaccine delivery systems:** Vaccines, uptake of antigens, single shot vaccines, mucosal and transdermal delivery of vaccines.	06 Hrs

REFERENCES

1. Y W. Chien, Novel Drug Delivery Systems, 2nd edition, revised and expanded,
   Marcel Dekker, Inc., New York, 1992.
2. Robinson, J. R., Lee V. H. L, Controlled Drug Delivery Systems, Marcel Dekker,Inc., New York, 1992.
3. Encyclopedia of controlled delivery, Editor- Edith Mathiowitz, Published by WileyInterscience Publication, John Wiley and Sons, Inc, New York! Chichester/Weinheim
4. N.K. Jain, Controlled and Novel Drug Delivery, CBS Publishers & Distributors, New Delhi, First edition 1997 (reprint in 2001).
5. S.P.Vyas and R.K.Khar, Controlled Drug Delivery - concepts and advances, Vallabh Prakashan, New Delhi, First edition 2002

JOURNALS

1. Indian Journal of Pharmaceutical Sciences (IPA)
2. Indian drugs (IDMA)
3. Journal of controlled release (Elsevier Sciences) desirable
4. Drug Development and Industrial Pharmacy (Marcel & Decker) desirable

MODERN PHARMACEUTICS
(MPH 103T)

Scope

Course designed to impart advanced knowledge and skills required to learn various aspects and concepts at pharmaceutical industries

Objectives

Upon completion of the course, student shall be able to understand

- The elements of preformulation studies.
- The Active Pharmaceutical Ingredients and Generic drug Product development
- Industrial Management and GMP Considerations.
- Optimization Techniques & Pilot Plant Scale Up Techniques
- Stability Testing, sterilization process & packaging of dosage forms.

THEORY		*60 HRS*
1.	a. **Preformation Concepts** – Drug Excipient interactions - different methods, kinetics of stability, Stability testing. Theories of dispersion and pharmaceutical Dispersion (Emulsion and Suspension, SMEDDS) preparation and stability Large and small volume parental – physiological and formulation consideration, Manufacturing and evaluation.	10 Hrs
	b. **Optimization techniques in Pharmaceutical Formulation**: Concept and parameters of optimization, Optimization techniques in pharmaceutical formulation and processing. Statistical design, Response surface method, Contour designs, Factorial designs and application in formulation	10 Hrs
2	**Validation :** Introduction to Pharmaceutical Validation, Scope & merits of Validation, Validation and calibration of Master plan, ICH & WHO guidelines for calibration and validation of equipments, Validation of specific dosage form, Types of validation. Government regulation, Manufacturing Process Model, URS, DQ, IQ, OQ & P.Q. of facilities.	10 Hrs
3	**cGMP & Industrial Management**: Objectives and policies of current good manufacturing practices, layout of buildings, services, equipments and their maintenance Production management: Production organization, , materials management, handling and transportation, inventory management and control, production and planning control, Sales forecasting, budget and cost control, industrial and personal relationship. Concept of Total Quality Management.	10 Hrs

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4	**Compression and compaction**: Physics of tablet compression, compression, consolidation, effect of friction, distribution of forces, compaction profiles. Solubility.	10 Hrs
5	**Study of consolidation parameters**; Diffusion parameters, Dissolution parameters and Pharmacokinetic parameters, Heckel plots, Similarity factors – f2 and f1, Higuchi and Peppas plot, Linearity Concept of significance, Standard deviation , Chi square test, students T-test , ANOVA test.	10 Hrs

REFERENCES

1. Theory and Practice of Industrial Pharmacy By Lachmann and Libermann
2. Pharmaceutical dosage forms: Tablets Vol. 1-3 by Leon Lachmann.
3. Pharmaceutical Dosage forms: Disperse systems, Vol, 1-2; By Leon Lachmann.
4. Pharmaceutical Dosage forms: Parenteral medications Vol. 1-2; By Leon Lachmann.
5. Modern Pharmaceutics; By Gillbert and S. Banker.
6. Remington's Pharmaceutical Sciences.
7. Advances in Pharmaceutical Sciences Vol. 1-5; By H.S. Bean & A.H. Beckett.
8. Physical Pharmacy; By Alfred martin
9. Bentley's Textbook of Pharmaceutics – by Rawlins.
10. Good manufacturing practices for Pharmaceuticals: A plan for total quality control, Second edition; By Sidney H. Willig.
11. Quality Assurance Guide; By Organization of Pharmaceutical producers of India.
12. Drug formulation manual; By D.P.S. Kohli and D.H.Shah. Eastern publishers, New Delhi.
13. How to practice GMPs; By P.P.Sharma. Vandhana Publications, Agra.
14. Pharmaceutical Process Validation; By Fra. R. Berry and Robert A. Nash.
15. Pharmaceutical Preformulations; By J.J. Wells.
16. Applied production and operations management; By Evans, Anderson, Sweeney and Williams.
17. Encyclopaedia of Pharmaceutical technology, Vol I – III.

REGULATORY AFFAIRS
(MPH 104T)

Scope

Course designed to impart advanced knowledge and skills required to learn the concept of generic drug and their development, various regulatory filings in different countries, different phases of clinical trials and submitting regulatory documents : filing process of IND, NDA and ANDA

- To know the approval process of
- To know the chemistry, manufacturing controls and their regulatory importance
- To learn the documentation requirements for
- To learn the importance and

Objectives:

Upon completion of the course, it is expected that the students will be able to understand

- The Concepts of innovator and generic drugs, drug development process
- The Regulatory guidance's and guidelines for filing and approval process
- Preparation of Dossiers and their submission to regulatory agencies in different countries
- Post approval regulatory requirements for actives and drug products
- Submission of global documents in CTD/ eCTD formats
- Clinical trials requirements for approvals for conducting clinical trials
- Pharmacovigilence and process of monitoring in clinical trials.

THEORY ***60 Hrs***

1. a. **Documentation in Pharmaceutical industry**: Master formula record, DMF (Drug Master File), distribution records. Generic drugs product development Introduction , Hatch-Waxman act and amendments, CFR (CODE OF FEDERAL REGULATION) ,drug product performance, in-vitro, ANDA regulatory approval process, NDA approval process, BE and drug product assessment, in –vivo, scale up process approval changes, post marketing surveillance, outsourcing BA and BE to CRO. — 12 Hrs

   b. **Regulatory requirement for product approval**: API, biologics, novel, therapies obtaining NDA, ANDA for generic drugs ways and means of US registration for foreign drugs

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2	CMC, post approval regulatory affairs. Regulation for combination products and medical devices.CTD and ECTD format, industry and FDA liaison. ICH - Guidelines of ICH-Q, S E, M. Regulatory requirements of EU, MHRA, TGA and ROW countries.	12 Hrs
3	**Non clinical drug development:** Global submission of IND, NDA, ANDA. Investigation of medicinal products dossier, dossier (IMPD) and investigator brochure (IB).	12 Hrs
4	**Clinical trials:** Developing clinical trial protocols. Institutional review board/ independent ethics committee Formulation and working procedures informed Consent process and procedures. HIPAA- new, requirement to clinical study process, pharmacovigilance safety monitoring in clinical trials.	12 Hrs

REFERENCES

1. Generic Drug Product Development, Solid Oral Dosage forms, Leon Shargel and IsaderKaufer,Marcel Dekker series, Vol.143
2. The Pharmaceutical Regulatory Process, Second Edition Edited by Ira R. Berry and Robert P.Martin, Drugs and the Pharmaceutical Sciences,Vol.185, Informa Health care Publishers.
3. New Drug Approval Process: Accelerating Global Registrations By Richard A Guarino, MD,5th edition, Drugs and the Pharmaceutical Sciences,Vol.190.
4. Guidebook for drug regulatory submissions / Sandy Weinberg. By John Wiley & Sons.Inc.
5. FDA regulatory affairs: a guide for prescription drugs, medical devices, and biologics/edited By Douglas J. Pisano, David Mantus.
6. Clinical Trials and Human Research: A Practical Guide to Regulatory Compliance By Fay A.Rozovsky and Rodney K. Adams
7. www.ich.org/
8. www.fda.gov/
9. europa.eu/index_en.htm
10. https://www.tga.gov.au/tga-basics

PHARMACEUTICS PRACTICALS - I
(MPH 105P)

1. Analysis of pharmacopoeial compounds and their formulations by UV Vis spectrophotometer
2. Simultaneous estimation of multi component containing formulations by UV spectrophotometry
3. Experiments based on HPLC
4. Experiments based on Gas Chromatography
5. Estimation of riboflavin/quinine sulphate by fluorimetry
6. Estimation of sodium/potassium by flame photometry
7. To perform *In-vitro* dissolution profile of CR/ SR marketed formulation
8. Formulation and evaluation of sustained release matrix tablets
9. Formulation and evaluation osmotically controlled DDS
10. Preparation and evaluation of Floating DDS- hydro dynamically balanced DDS
11. Formulation and evaluation of Muco adhesive tablets.
12. Formulation and evaluation of trans dermal patches.
13. To carry out preformulation studies of tablets.
14. To study the effect of compressional force on tablets disintegration time.
15. To study Micromeritic properties of powders and granulation.
16. To study the effect of particle size on dissolution of a tablet.
17. To study the effect of binders on dissolution of a tablet.
18. To plot Heckal plot, Higuchi and peppas plot and determine similarity factors.

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MOLECULAR PHARMACEUTICS (NANO TECHNOLOGY & TARGETED DDS) (NTDS)
(MPH 201T)

Scope

This course is designed to impart knowledge on the area of advances in novel drug delivery systems.

Objectives

Upon completion of the course student shall be able to understand

- The various approaches for development of novel drug delivery systems.
- The criteria for selection of drugs and polymers for the development of NTDS
- The formulation and evaluation of novel drug delivery systems.

THEORY ***60 Hrs***

1.	**Targeted Drug Delivery Systems:** Concepts, Events and biological process involved in drug targeting. Tumor targeting and Brain specific delivery.	12 Hrs
2	**Targeting Methods**: introduction preparation and evaluation. Nano Particles & Liposomes: Types, preparation and evaluation.	12 Hrs
3	**Micro Capsules / Micro Spheres:** Types, preparation and evaluation , Monoclonal Antibodies ; preparation and application, preparation and application of Niosomes, Aquasomes, Phytosomes, Electrosomes.	12 Hrs
4	**Pulmonary Drug Delivery Systems** : Aerosols, propellents, ContainersTypes, preparation and evaluation, Intra Nasal Route Delivery systems; Types, preparation and evaluation.	12 Hrs
5	Nucleic acid based therapeutic delivery system : Gene therapy, introduction (ex-vivo & in-vivo gene therapy). Potential target diseases for gene therapy (inherited disorder and cancer). Gene expression systems (viral and nonviral gene transfer). Liposomal gene delivery systems. Biodistribution and Pharmacokinetics. knowledge of therapeutic antisense molecules and aptamers as drugs of future.	12 Hrs

REFERENCES

1. Y W. Chien, Novel Drug Delivery Systems, 2nd edition, revised and expanded,Marcel Dekker, Inc., New York, 1992.
2. S.P.Vyas and R.K.Khar, Controlled Drug Delivery - concepts and advances, VallabhPrakashan, New Delhi, First edition 2002.
3. N.K. Jain, Controlled and Novel Drug Delivery, CBS Publishers & Distributors, NewDelhi, First edition 1997 (reprint in 2001).

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ADVANCED BIOPHARMACEUTICS & PHARMACOKINETICS
(MPH 202T)

Scope

This course is designed to impart knowledge and skills necessary for dose calculations, dose adjustments and to apply biopharmaceutics theories in practical problem solving. Basic theoretical discussions of the principles of biopharmaceutics and pharmacokinetics are provided to help the students' to clarify the concepts.

Objectives

Upon completion of this course it is expected that students will be able understand,

- The basic concepts in biopharmaceutics and pharmacokinetics.
- The use raw data and derive the pharmacokinetic models and parameters the best describe the process of drug absorption, distribution, metabolism and elimination.
- The critical evaluation of biopharmaceutic studies involving drug product equivalency.
- The design and evaluation of dosage regimens of the drugs using pharmacokinetic and biopharmaceutic parameters.
- The potential clinical pharmacokinetic problems and application of basics of pharmacokinetic

THEORY *60 Hrs*

1. **Drug Absorption from the Gastrointestinal Tract**: Gastrointestinal tract, Mechanism of drug absorption, Factors affecting drug absorption, pH–partition theory of drug absorption. Formuulation and physicochemical factors: Dissolution rate, Dissolution process, Noyes–Whitney equation and drug dissolution, Factors affecting the dissolution rate. Gastrointestinal absorption: role of the dosage form: Solution (elixir, syrup and solution) as a dosage form ,Suspension as a dosage form, Capsule as a dosage form, Tablet as a dosage form ,Dissolution methods ,Formulation and processing factors, Correlation of in vivo data with in vitro dissolution data.Transport model: Permeability-Solubility-Charge State and the pH Partition Hypothesis, Properties of the Gastrointestinal Tract (GIT), pH Microclimate Intracellular pH Environment, Tight-Junction Complex. 12 Hrs

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2	**Biopharmaceutic considerations in drug product design and In Vitro Drug Product Performance:** Introduction, biopharmaceutic factors affecting drug bioavailability, rate-limiting steps in drug absorption, physicochemical nature of the drug formulation factors affecting drug product performance, *in vitro*: dissolution and drug release testing, compendial methods of dissolution, alternative methods of dissolution testing,meeting dissolution requirements,problems of variable control in dissolution testingperformance of drug products. *In vitro–in vivo* correlation, dissolution profile comparisons, drug product stability,considerations in the design of a drug product.	12 Hrs
3	**Pharmacokinetics:** Basic considerations, pharmacokinetic models, compartment modeling: one compartment model- IV bolus, IV infusion, extra-vascular. Multi compartment model:two compartment - model in brief, non-linear pharmacokinetics: cause of non-linearity, Michaelis – Menten equation, estimation of k_{max} and v_{max}. Drug interactions: introduction, the effect of protein-binding interactions,the effect of tissue-binding interactions,cytochrome p450-based drug interactions,drug interactions linked to transporters.	12 Hrs
4	**Drug Product Performance, In Vivo: Bioavailability and Bioequivalence**: drug product performance, purpose of bioavailability studies, relative and absolute availability. methods for assessing bioavailability, bioequivalence studies, design and evaluation of bioequivalence studies, study designs, crossover study designs, evaluation of the data, bioequivalence example, study submission and drug review process. biopharmaceutics classification system, methods. Permeability: In-vitro, in-situ and In-vivo methods.generic biologics (biosimilar drug products),clinical significance of bioequivalence studies, special concerns in bioavailability and bioequivalence studies, generic substitution.	12 Hrs
5	**Application of Pharmacokinetics:** Modified-Release Drug Products, Targeted Drug Delivery Systems and Biotechnological Products. Introduction to Pharmacokinetics and pharmacodynamic, drug interactions. Pharmacokinetics and pharmacodynamics of biotechnology drugs. Introduction, Proteins and peptides, Monoclonal antibodies, Oligonucleotides, Vaccines (immunotherapy), Gene therapies.	12 Hrs

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REFERENCES

1. Biopharmaceutics and Clinical Pharmacokinetics by Milo Gibaldi, 4th edition,Philadelphia, Lea and Febiger, 1991
2. Biopharmaceutics and Pharmacokinetics, A. Treatise, D .M. Brahmankar and Sunil B. Jaiswal., VallabPrakashan, Pitampura, Delhi
3. Applied Biopharmaceutics and Pharmacokinetics by Shargel. Land YuABC, 2nd edition, Connecticut Appleton Century Crofts, 1985
4. Textbook of Biopharmaceutics and Pharmacokinetics, Dr. Shobha Rani R. Hiremath,Prism Book
5. Pharmacokinetics by Milo Gibaldi and D. Perrier, 2nd edition, Marcel Dekker Inc.,New York, 1982
6. Current Concepts in Pharmaceutical Sciences: Biopharmaceutics, Swarbrick. J, Leaand Febiger, Philadelphia, 1970
7. Clinical Pharmacokinetics, Concepts and Applications 3rd edition by MalcolmRowland and Thom~ N. Tozer, Lea and Febiger, Philadelphia, 1995
8. Dissolution, Bioavailability and Bioequivalence, Abdou. H.M, Mack PublishingCompany, Pennsylvania 1989
9. Biopharmaceutics and Clinical Pharmacokinetics, An Introduction, 4th edition,revised and expande by Robert. E. Notari, Marcel Dekker Inc, New York and Basel,1987.
10. Biopharmaceutics and Relevant Pharmacokinetics by John. G Wagner and M.Pemarowski, 1st edition, Drug Intelligence Publications, Hamilton, Illinois, 1971.
11. Encyclopedia of Pharmaceutical Technology, Vol 13, James Swarbrick, James. G.Boylan, Marcel Dekker Inc, New York, 1996.
12. Basic Pharmacokinetics,1 st edition,Sunil S JambhekarandPhilip J Breen,pharmaceutical press, RPS Publishing,2009.
13. Absorption and Drug Development- Solubility, Permeability, and Charge State, Alex Avdeef, John Wiley & Sons, Inc,2003.

COMPUTER AIDED DRUG DEVELOPMENT
(MPH 203T)

Scope

This course is designed to impart knowledge and skills necessary for computer Applications in pharmaceutical research and development who want to understand the application of computers across the entire drug research and development process. Basic theoretical discussions of the principles of more integrated and coherent use of computerized information (informatics) in the drug development process are provided to help the students to clarify the concepts.

Objectives

Upon completion of this course it is expected that students will be able to understand,

- History of Computers in Pharmaceutical Research and Development
- Computational Modeling of Drug Disposition
- Computers in Preclinical Development
- Optimization Techniques in Pharmaceutical Formulation
- Computers in Market Analysis
- Computers in Clinical Development
- Artificial Intelligence (AI) and Robotics
- Computational fluid dynamics(CFD)

THEORY		***60 Hrs***
1.	a. **Computers in Pharmaceutical Research and Development**: A General Overview: History of Computers in Pharmaceutical Research and Development. Statistical modeling in Pharmaceutical research and development: Descriptive versus Mechanistic Modeling, Statistical Parameters, Estimation, Confidence Regions, Nonlinearity at the Optimum, Sensitivity Analysis, Optimal Design, Population Modeling b. **Quality-by-Design In Pharmaceutical Development:** Introduction, ICH Q8 guideline, Regulatory and industry views on QbD, Scientifically based QbD - examples of application.	12 Hrs
2	Computational Modeling Of Drug Disposition: Introduction ,Modeling Techniques: Drug Absorption, Solubility, Intestinal Permeation, Drug Distribution ,Drug Excretion, Active Transport; P-gp, BCRP, Nucleoside Transporters, hPEPT1, ASBT, OCT, OATP, BBB-Choline Transporter.	12 Hrs

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3	**Computer-aided formulation development::** Concept of optimization, Optimization parameters, Factorial design, Optimization technology & Screening design. Computers in Pharmaceutical Formulation: Development of pharmaceutical emulsions, microemulsion drug carriers Legal Protection of Innovative Uses of Computers in R&D, The Ethics of Computing in Pharmaceutical Research, Computers in Market analysis	12 Hrs
4	a. **Computer-aided biopharmaceutical characterization**: Gastrointestinal absorption simulation. Introduction, Theoretical background, Model construction, Parameter sensitivity analysis, Virtual trial, Fed vs. fasted state, In vitro dissolution and *in vitro-in vivo* correlation, Biowaiver considerations b. **Computer Simulations in Pharmacokinetics and Pharmacodynamics:** Introduction, Computer Simulation: Whole Organism, Isolated Tissues, Organs, Cell, Proteins and Genes. c. **Computers in Clinical Development**: Clinical Data Collection and Management, Regulation of Computer Systems	12 Hrs
5	**Artificial Intelligence (AI), Robotics and Computational fluid dynamics:** General overview, Pharmaceutical Automation, Pharmaceutical applications, Advantages and Disadvantages. Current Challenges and Future Directions.	12 Hrs

REFERENCES

1. Computer Applications in Pharmaceutical Research and Development, Sean Ekins, 2006, John Wiley & Sons.
2. Computer-Aided Applications in Pharmaceutical Technology, 1st Edition, Jelena Djuris, Woodhead Publishing
3. Encyclopedia of Pharmaceutical Technology, Vol 13, James Swarbrick, James. G.Boylan, Marcel Dekker Inc, New York, 1996.

COSMETICS AND COSMECEUTICALS
(MPH 204T)

Scope

This course is designed to impart knowledge and skills necessary forthefundamental need for cosmetic and cosmeceutical products.

Objectives

Upon completion of the course, the students shall be able to understand

- Key ingredients used in cosmetics and cosmeceuticals.
- Key building blocks for various formulations.
- Current technologies in the market
- Various key ingredients and basic science to develop cosmetics and cosmeceuticals
- Scientific knowledge to develop cosmetics and cosmeceuticals with desired Safety, stability, and efficacy.

THEORY		*60 Hrs*
1.	**Cosmetics – Regulatory :** Definition of cosmetic products as per Indian regulation. Indian regulatory requirements for labeling of cosmetics Regulatory provisions relating to import of cosmetics., Misbranded and spurious cosmetics. Regulatory provisions relating to manufacture of cosmetics – Conditions for obtaining license, prohibition of manufacture and sale of certain cosmetics, loan license, offences and penalties.	12 Hrs
2	**Cosmetics - Biological aspects :** Structure of skin relating to problems like dry skin, acne, pigmentation, prickly heat, wrinkles and body odor. Structure of hair and hair growth cycle. Common problems associated with oral cavity. Cleansing and care needs for face, eye lids, lips, hands, feet, nail, scalp, neck, body and under-arm.	12 Hrs
3	**Formulation Building blocks:** Building blocks for different product formulations of cosmetics/cosmeceuticals. Surfactants – Classification and application. Emollients, rheological additives: classification and application. Antimicrobial used as preservatives, their merits and demerits. Factors affecting microbial preservative efficacy. Building blocks for formulation of a moisturizing cream, vanishing cream, cold cream, shampoo and toothpaste. Soaps and syndetbars. **Perfumes**; Classification of perfumes. Perfume ingredients listed as allergens in EU regulation. **Controversial ingredients:** Parabens, formaldehyde liberators,	12 Hrs

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dioxane.

4	**Design of cosmeceutical products:** Sun protection, sunscreens classification and regulatory aspects. Addressing dry skin, acne, sun-protection, pigmentation, prickly heat, wrinkles, body odor., dandruff, dental cavities, bleeding gums, mouth odor and sensitive teeth through cosmeceutical formulations.	12 Hrs
5	**Herbal Cosmetics :** Herbal ingredients used in Hair care, skin care and oral care. Review of guidelines for herbal cosmetics by private bodies like cosmos with respect to preservatives, emollients, foaming agents, emulsifiers and rheology modifiers. Challenges in formulating herbal cosmetics.	12 Hrs

REFERENCES

1. Harry's Cosmeticology. 8th edition.
2. Poucher'sperfumecosmeticsandSoaps,10th edition.
3. Cosmetics - Formulation, Manufacture and quality control, PP.Sharma,4th edition
4. Handbook of cosmetic science and Technology A.O.Barel, M.Paye and H.I. Maibach. 3rd edition
5. Cosmetic and Toiletries recent suppliers catalogue.
6. CTFA directory.

PHARMACEUTICS PRACTICALS - II
(MPH 205P)

1. To study the effect of temperature change , non solvent addition, incompatible polymer addition in microcapsules preparation
2. Preparation and evaluation of Alginate beads
3. Formulation and evaluation of gelatin /albumin microspheres
4. Formulation and evaluation of liposomes/niosomes
5. Formulation and evaluation of spherules
6. Improvement of dissolution characteristics of slightly soluble drug by Solid dispersion technique.
7. Comparison of dissolution of two different marketed products /brands
8. Protein binding studies of a highly protein bound drug & poorly protein bound drug
9. Bioavailability studies of Paracetamol in animals.
10. Pharmacokinetic and IVIVC data analysis by Winnoline^{R} software
11. *In vitro* cell studies for permeability and metabolism
12. DoE Using Design Expert® Software
13. Formulation data analysis Using Design Expert® Software
14. Quality-by-Design in Pharmaceutical Development
15. Computer Simulations in Pharmacokinetics and Pharmacodynamics
16. Computational Modeling Of Drug Disposition
17. To develop Clinical Data Collection manual
18. To carry out Sensitivity Analysis, and Population Modeling.
19. Development and evaluation of Creams
20. Development and evaluation of Shampoo and Toothpaste base
21. To incorporate herbal and chemical actives to develop products
22. To address Dry skin, acne, blemish, Wrinkles, bleeding gums and dandruff

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Semester III
MRM 301T - Research Methodology & Biostatistics

UNIT – I

General Research Methodology: Research, objective, requirements, practical difficulties, review of literature, study design, types of studies, strategies to eliminate errors/bias, controls, randomization, crossover design, placebo, blinding techniques.

UNIT – II

Biostatistics: Definition, application, sample size, importance of sample size, factors influencing sample size, dropouts, statistical tests of significance, type of significance tests, parametric tests(students "t" test, ANOVA, Correlation coefficient, regression), non-parametric tests (wilcoxan rank tests, analysis of variance, correlation, chi square test), null hypothesis, P values, degree of freedom, interpretation of P values.

UNIT – III

Medical Research: History, values in medical ethics, autonomy, beneficence, non-maleficence, double effect, conflicts between autonomy and beneficence/non-maleficence, euthanasia, informed consent, confidentiality, criticisms of orthodox medical ethics, importance of communication, control resolution, guidelines, ethics committees, cultural concerns, truth telling, online business practices, conflicts of interest, referral, vendor relationships, treatment of family members, sexual relationships, fatality.

UNIT – IV

CPCSEA guidelines for laboratory animal facility: Goals, veterinary care, quarantine, surveillance, diagnosis, treatment and control of disease, personal hygiene, location of animal facilities to laboratories, anesthesia, euthanasia, physical facilities, environment, animal husbandry, record keeping, SOPs, personnel and training, transport of lab animals.

UNIT – V

Declaration of Helsinki: History, introduction, basic principles for all medical research, and additional principles for medical research combined with medical care.

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Ph.D. Course Work Syllabus in Pharmaceutical Sciences (2016-17)
One Semester

Paper I Advanced Research Methodology
Paper II Review of Literature, Advanced Research Tools & Seminar

Paper I: Advanced Research Methodology			
1	**RESEARCH**		
	Definition of research, Applications of research and types, Research process and steps.	6L	10
	Literature review: Importance of literature review, methods and sources of literature review, Review the literature selected, Development of a theoretical and conceptual framework, writing up the review.		
2	**RESEARCH DESIGN**		
	Design of Experiments: Objectives, strategies, Experimental design, Simple Comparative Experiments-Basic statistical concepts, sample mean and variance, random variable, correlation and regression, standard normal distribution, statistical hypothesis, degrees of freedom, Two sample *t*-test, *F*-test, *Chi-square* test, *P*-value, Confidence Intervals, Paired *t*-test.	12L	20
	Single Factor Experiment: Analysis of Variance (ANOVA) for fixed effect model; ANOVA for Randomized complete block design to control effects of nuisance factors.		
	Two Factor Factorial Design: Basic definitions and principles, main effect and interaction, response surface and contour plots, General arrangement for a two-factor factorial design; Models-Effects, means and regression.		
3	**RESEARCH PROPOSAL**		
	An Introduction: Preamble, problem, objectives, hypothesis to be tested, design of study, measurement procedures, analysis of data, organization of report, Displaying data tables, graphs and charts	12L	20
	Writing a research report: General consideration, Prewriting considerations, Thesis writing, Formats of report writing, Formats of publications in Research journals		
4	**DRUG REGULATORY AFFAIRS**		
	Indian Patent Act 1970, its amendments, concepts of IPR, criteria for granting patents and filing a Indian patent, Introduction to Patent Search.	12L	20
	. ICH guidelines, GMP, GLP, USFDA, CTD, ISO 9000, TQM, OECD guidelines		
	WHO guidelines for standardization of raw material and finished products including herbal products.		
5	**PHARMACEUTICAL ANALYSIS**		
	Principles and applications of the following: Absorption spectroscopy (UV, visible and IR). Principles of NMR, ESR, Mass spectroscopy, X-ray diffraction analysis, malditof and different chromatographic techniques and methods, Thermal Techniques. Microscopy Techniques.	12L	20
6	**COMPUTATIONAL ANALYSIS**		
	Introduction to the creation and advancement of databases, algorithms, computational and statistical techniques for data analysis.	6L	10
	Applications of Microsoft excel for quantitative and statistical data analysis, Power point, Introduction to Internet database surfing.		
	Advanced Research Tools– Exposure to SPSS, Design expert, Systat, SigmaPlot, WinNonlin, Kinetica and Pk analyst software.		

Note: Lecture – 1 Hour (preferably through ICT)

Approved in meeting of Board of Studies in Faculty of Technology, Sub: Pharmacy Dt. June 07, 2016

7/6/2016 7/6/16 7/6/16

Paper II	Review of Literature, Advanced Research Tools & Seminar		
1.	Review of Literature – Writing review of literature in the area of the proposed Ph.D. program	24 L	40
2.	Advanced Research Tools- Exposure to design expert, Systat, Sigma Plot and Kinetica	12 L	20
3.	Seminar – Based on the review of literature;	24 L	40

Note: The candidate must obtain 50% or more marks to qualify in the course work.

CURRICULUM FRAMEWORK: TWO-YEARB.P.ED.PROGRAMME

Preamble: Bachelor of Physical Education (B. P. Ed.) two years (Four Semesters Choice Based Credit System) programme is a professional programme meant for preparing teachers of physical education in classes VI to X and for conducting physical education and sports activities in classes XI and XII.

B. P. Ed. programme shall be designed to integrate the study of childhood, social context of Physical Education, subject knowledge, pedagogical knowledge, aim of Physical Education and communication skills. The programme comprises of compulsory and optional theory as well as practical courses and compulsory school internship.

R. B.P.Ed. 3. The CBCS System:

All Programmes shall run on Choice Based Credit System (CBCS). It is an instructional package developed to suit the needs of students, to keep pace with the developments in higher

education and the quality assurance expected of it in the light of liberalization and globalization in higher education.

R. B.P.Ed 4. Course:

The term course usually referred to, as 'papers' is a component of a programme. All courses need not carry the same weight. The courses should define learning objectives and learning outcomes. A course may be designed to comprise Lectures/ tutorials/laboratory work/ field work/ outreach activities/ project work/ vocational training/viva/ seminars/ term papers/assignments/ presentations/ self-study etc. or a combination of some of these.

R. B.P.Ed. 5. Courses of Programme:

The B.P.Ed. Programme consists of a number of courses, the term 'Course' applied to indicate a logical part of subject matter of the programme and is invariably equivalent to the subject matter of a "paper" in the conventional sense. The following are the various categories of courses suggested for the B.P.Ed. Programme.

Theory:

Core Course:

Elective Course:

Practicum:

Teaching Practices:

R. B.P.Ed.6. Semesters:

An academic year is divided into two semesters. Each semester will consist of 17-20 weeks of academic work equivalent to 100 actual teaching days. The odd semester may be scheduled from May/June to November/Decemberand even semester from November / December to May/June. The institution shall work for a minimum of 36 working hours in a week (five or six days a week).

R. B.P.Ed.7. Working days:

There shall be at least 200 working days per year exclusive of admission and examination processes etc.

R. B.P.Ed 8. Credits:

The term 'Credit' refers to a unit by which the programme is measured. It determines the number of hours of instructions required per week. One credit is equivalent to one hour of teaching (lecture or tutorial) or one and half / two hours of practical work/field work per week.The term 'Credit' refers to the weight given to a course, usually in relation to the instructional hours assigned to it. The total minimum credits, required for completing a B.P.Ed. Programme is 90 credits and for each semester 20 credits.

Semester - I

PartA:TheoreticalCourse						
Course Code	Title of the Papers	Total Hours	Credit	Internal Marks	External Marks	Total Marks
CoreCourse						
CC-101	History, Principles and foundation of Physical Education	4	4	30	70	100
CC-102	Anatomy and Physiology	4	4	30	70	100
CC-103	Health Education and Environmental Studies	4	4	30	70	100
Elective Course (Anyone)						
EC-101	Olympic Movement	4	4	30	70	100
EC-102	Officiating and Coaching					
Part–B PracticalCourse						
PC-101	Track and Field (Running Events)	**6**	**4**	30	70	100
PC-102	Swimming/Gymnastics/ Shooting	**6**	**4**	30	70	100
PC-103	Indigenous Sports: Kabaddi / Malkhambh/ lezim / March past	**6**	**4**	30	70	100
PC - 104	Mass Demonstration Activities: Kho-Kho / dumbbells / tipri / wands / hoop /umbrella	**6**	**4**	30	70	100
Total		40	32	240	560	800

Note: Total Number of hours required to earn 4 credits for each Theory Course are 68-80 hours per semester whereas 102-120 hours for each Practicum Course.

Semester - II

PartA:TheoreticalCourse						
Course Code	TitleofthePapers	Total Hours	Credit	Internal Marks	External Marks	Total Marks
CoreCourse						
CC-201	Yoga Education	4	4	30	70	100
CC-202	Educational Technology and Methods of Teaching in Physical Education	4	4	30	70	100
CC-203	Organization and Administration	4	4	30	70	100
Elective Course (Anyone)						
EC-201	Contemporary issues in physical education, fitness and wellness	4	4	30	70	100
EC-202	Sports Nutrition and Weight Management					
Part–B PracticalCourse						
PC-201	Track and Field (Jumping Events)	**6**	**4**	30	70	100
PC-202	Yoga/Aerobics/ Gymnastics/ Swimming	**6**	**4**	30	70	100
PC-203	Racket Sports: Badminton/ Table Tennis/ Squash/ Tennis	**6**	**4**	30	70	100
Part – C Teaching Practices						
TP - 201	Teaching Practices (05lessons in class room teaching and 05 lessons in outdoor activities)	**6**	**4**	30	70	100
Total		40	32	240	560	800

Note: Total Number of hours required to earn 4 credits for each Theory Course are 68-80 hours per semester whereas 102-120 hours for each Practicum Course.

Semester - III

PartA:Theoretical Course						
Course Code	TitleofthePapers	Total Hours	Credit	Internal Marks	External Marks	Total Marks
CoreCourse						
CC-301	Sports Training	4	4	30	70	100
CC-302	Computer Applications in Physical Education	4	4	30	70	100
CC-303	Sports Psychology and Sociology	4	4	30	70	100
Elective Course (Anyone)						
EC-301	Sports Medicine, Physiotherapy and Rehabilitation	4	4	30	70	100
EC-302	Curriculum Design					
Part–B Practical Course						
PC-301	Track and Field (Throwing Events)	**6**	**4**	30	70	100
PC-302	Combative Sports: Martial Art/ Karate/ Judo/ Fencing/ Boxing/ Taekwondo/ Wrestling (Any two out of these)	**6**	**4**	30	70	100
PC-303	Team Games: Baseball/ Cricket/ Football/ Hockey/ Softball/ Volleyball/ Handball/ Basketball/ Netball (Any two of these)	**6**	**4**	30	70	100
Part – C Teaching Practices						
TP - 301	Teaching Practice: (Teaching Lesson Plans for Racket Sport/ Team Games/Indigenous Sports) (out of 10 lessons 5 internal and 5 external at practicing school)	**6**	**4**	30	70	100
Total		40	32	240	560	800

Note: Total Number of hours required to earn 4 credits for each Theory Course are 68-80 hours per semester whereas 102-120 hours for each Practicum Course.

Semester - IV

PartA:TheoreticalCourse						
Course Code	TitleofthePapers	Total Hours	Credit	Internal Marks	External Marks	Total Marks
Core Course						
CC-401	Measurement and Evaluation in Physical Education	4	4	30	70	100
CC-402	Kinesiology and Biomechanics	4	4	30	70	100
CC-403	Research and Statistics in Physical Education	4	4	30	70	100
Elective Course (Anyone)						
EC-401	Theory of sports and game	4	4	30	70	100
EC-402	Sports Management					
Part–B Practical Course						
PC-401	Track and Field / Swimming / Gymnastics (Any one out of three)	**6**	**4**	30	70	100
PC-402	Kabaddi/ Kho-Kho/ Baseball/ Cricket/ Football/Hockey/Softball/ Volleyball/ Handball/ Basketball/ Netball/ Badminton/ Table Tennis/ Squash/ Tennis (Any Two of these)	**6**	**4**	30	70	100
Part – C Teaching Practices						
TP-401	Sports specialization: Coaching lessons Plans (One for Sports 5 lessons)	**6**	4	30	70	100
TP-402	Games specialization: Coaching lessons Plans (One for Games 5 lessons)	**6**	4	30	70	100
Total		40	32	240	560	800
		160	128	960	2240	3200

Note: Total Number of hours required to earn 4 credits for each Theory Course are 68-80 hours per semester whereas 102-120 hours for each Practicum Course.

SCHEME OF EXAMINATION
SEMESTER - I

Paper	Subject	Internal	External	Total Marks
	THEORY (400)			
CC-101	History, Principles and foundation of Physical Education	30	70	100
CC-102	Anatomy and Physiology	30	70	100
CC-103	Health Education and Environmental Studies	30	70	100
EC-101/102	Olympic Movement/Officiating and Coaching (Elective)	30	70	100
	PRACTICAL (400)			
PC-101	Track and Field (Running Events)	30	70	100
PC-102	Swimming/Gymnastics/Shooting	30	70	100
PC-103	Indigenous Sports: Kabaddi/ Malkhambh/ lezim / March past (Any of one out of these)	30	70	100
PC-104	Mass Demonstration Activities: Kho-Kho / dumbbells / tipri / wands / hoop /umbrella (Any one out of these)	30	70	100
	Total	**240**	**560**	**800**

SEMESTER -II

Paper	Subject	Internal	External	Total Marks
	THEORY (400)			
CC-201	Yoga Education	30	70	100
CC-202	Educational Technology and Methods of Teaching in Physical Education	30	70	100
CC-203	Organization and Administration	30	70	100
EC-201/202	Contemporary issues in physical education, fitness and wellness/ Sports Nutrition and Weight Management (Elective)	30	70	100
	PRACTICAL (300)			
PC-201	Track and Field (Jumping Events)	30	70	100
PC-202	Yoga/Aerobics / Swimming / Gymnastics (Any of the two out of these)	30	70	100
PC-203	Racket Sports: Badminton/ Table Tennis/ Squash/ Tennis (Any of the two out of these)	30	70	100
	TEACHING PRACTICE (100)			
TP-201	Teaching Practice (Classroom and outdoor)	30	70	100
	Total	**240**	**560**	**800**

SEMESTER –III

Paper	Subject	Internal	External	Total Marks
	THEORY (400)			
CC-301	Sports Training	30	70	100
CC-302	Computer Applications in Physical Education	30	70	100
CC-303	Sports Psychology and Sociology	30	70	100
EC-301/302	Sports Medicine, Physiotherapy and Rehabilitation/Curriculum Design (Elective)	30	70	100
	PRACTICAL (300)			
PC-301	Track and Field (Throwing Events)	30	70	100
PC-302	Combative Sports : Martial Art, Karate, Judo, Fencing, Boxing, Taekwondo, Wrestling (Any two out of these)	30	70	100
PC-303	Team Games: Baseball, Cricket, Football, Hockey, Softball, Volleyball, Handball, Basketball, Netball (Any two of these)	30	70	100
	TEACHING PRACTICE (100)			
TP-301	Teaching Practice (Teaching Lesson Plans for Racket Sport/ Team Games/Indigenous Sports)	30	70	100
	Total	**240**	**560**	**800**

SEMESTER -IV

Paper	**Subject**	**Internal**	**External**	**Total Marks**
	THEORY (400)			
CC-401	Measurement and Evaluation in Physical Education	30	70	100
CC-402	Kinesiology and Biomechanics	30	70	100
CC-403	Research and Statistics in Physical Education	30	70	100
EC-401/402	Theory of sports and games(Specifically sports and games specialization)/Sports Management (Elective)	30	70	100
	PRACTICAL (200)			
PC-401	Track and Field/Swimming /Gymnastics (Any of one out of these)	30	70	100
PC-402	Kabaddi/ Kho-Kho/ Baseball/ Cricket/ Football/Hockey/Softball/ Volleyball/ Handball/ Basketball/ Netball/ Badminton/ Table Tennis/ Squash/ Tennis (Any of one out of these)	30	70	100
	TEACHING PRACTICE (200)			
TP-401	Sports Specialization: Coaching lessons Plans Track and Field/Swimming /Gymnastics (Any of one out of these)	30	70	100
TP-402	Game specialization Coaching lessons: Kabaddi/ Kho-Kho/ Baseball/ Cricket/Football/Hockey /Softball/ Volleyball/ Handball/ Basketball/ Netball/ Badminton/ Table Tennis/ Squash/ Tennis (Any of one out of these)	30	70	100
	Total	**240**	**560**	**800**

B. P. Ed. – Outline of Syllabus

Semester – I

Theory Courses

CC-101 HISTORY, PRINCIPLES AND FOUNDATION OF PHYSICAL EDUCATION

STUDENT LEARNING OUTCOMES :

1. Become familiar with the history and development of physical education in India.
2. Discuss the philosophical foundation of Physical Education .
3. To understand principles of physical education.
4. To develop understanding of developing physical education program on the basis of principles and foundation of physical education.

Unit – 1: Introduction

- Meaning, Definition and Scope of Physical Education
- Aims and Objective of Physical Education
- Importance of Physical Education in present era.
- Misconceptions about Physical Education.
- Relationship of Physical Education with General Education.
- Physical Education as an Art and Science.

Unit- 2 – Historical Development of Physical Education in India

- Indus Valley Civilization Period. (3250 BC – 2500 BC)
- Vedic Period (2500 BC – 600 BC)
- Early Hindu Period (600 BC – 320 AD) and Later Hindu Period (320 AD – 1000 AD)
- Medieval Period (1000 AD – 1757 AD)
- British Period (Before 1947)
- Physical Education in India (After 1947)
- Contribution of Akhadas and Vyayamshals
- Y.M.C.A. and its contributions.

Unit- 3- Foundation of Physical Education

- Philosophical foundation:
- Idealism, Pragmatism, Naturalism, Realism, Humanism, Existentialism and Indian Philosophy and Culture.
- Fitness and wellness movement in the contemporary perspectives
- Sports for all and its role in the maintenance and promotion of fitness.

Unit-4- Principles of Physical Education

- Biological
    - Growth and development
    - Age and gender characteristics
    - Body Types
    - Anthropometric differences
- Psychological
    - Learning types, learning curve
    - Laws and principles of learning
    - Attitude, interest, cognition, emotions and sentiments

- Sociological
    - Society and culture
    - Social acceptance and recognition
    - Leadership
    - Social integration and cohesiveness

References:

Bucher, C. A. (n.d.) *Foundation of physical education.* St. Louis: The C.V. Mosby Co.

Deshpande, S. H. (2014). *Physical Education in Ancient India*. Amravati: Degree college of Physical education.

Mohan, V. M. (1969). *Principles of physical education.* Delhi: Metropolitan Book Dep.

Nixon, E. E. & Cozen, F.W. (1969). *An introduction to physical education*. Philadelphia: W.B. Saunders Co.

Obertuffer, (1970). *Delbert physical education*. New York: Harper & Brothers Publisher.

Sharman, J. R. (1964). *Introduction to physical education*. New York: A.S. Barnes & Co.

William, J. F. (1964). *The principles of physical education*. Philadelphia: W.B. Saunders Co.

Semester I

Theory Courses

CC-102 ANATOMY AND PHYSIOLOGY

UNIT-I

- Brief Introduction of Anatomy and physiology in the field of Physical Education.
- Introduction of Cell and Tissue.
- The arrangement of the skeleton – Function - of the skeleton – Ribs and Vertebral column and the extremities – joints of the body and their types
- Gender differences in the skeleton.
- Types of muscles.

UNIT-II

- **Blood and circulatory system:** Constituents of blood and their function –Blood groups and blood transfusion, clotting of blood, the structure of the heart-properties of the heart muscle, circulation of blood, cardiac cycle, blood pressure, Lymph and Lymphatic circulation. Cardiac output.
- **The Respiratory system:** The Respiratory passage – the lungs and their structure and exchange of gases in the lungs, mechanism of respiration (internal and external respiration) lung capacity, tidal volume.
- **The Digestive system:** structure and functions of the digestive system, Digestive organs, Metabolism,
- **The Excretory system:** Structure and functions of the kidneys and the skin.
- **The Endocrine glands:** Functions of glands pituitary, Thyroid, Parathyroid. Adrenal, Pancreatic and the sex glands.
- **Nervous systems:** Function of the Autonomic nervous system and Central nervous system. Reflex Action,
- **Sense organs:** A brief account of the structure and functions of the Eye and Ear.

UNIT-III

- Definition of physiology and its importance in the field of physical education and sports.
- Structure, Composition, Properties and functions of skeletal muscles.
- Nerve control of muscular activity:
  - Neuromuscular junction
  - Transmission of nerve impulse across it.
- Fuel for muscular activity
- Role of oxygen- physical training, oxygen debt, second wind, vital capacity.

UNIT-IV

- Effect of exercise and training on cardiovascular system.
- Effect of exercise and training on respiratory system.
- Effect of exercise and training on muscular system

- Physiological concept of physical fitness, warming up, conditioning and fatigue.
- Basic concept of balanced diet – Diet before, during and after competition.

References:

Gupta, A. P. (2010). *Anatomy and physiology.* Agra: SumitPrakashan.
Gupta, M. and Gupta, M. C. (1980). *Body and anatomical science.* Delhi: Swaran Printing Press.
Guyton, A.C. (1996). Textbook of Medical Physiology, 9th edition. Philadelphia: W.B. Saunders.
Karpovich, P. V. (n.d.). *Philosophy of muscular activity.* London: W.B. Saunders Co.
Lamb, G. S. (1982). Essentials of exercise physiology. Delhi: Surjeet Publication.
Moorthy, A. M. (2014). *Anatomy physiology and health education.*Karaikudi: Madalayam Publications.
Morehouse, L. E. & Miller, J. (1967). *Physiology of exercise*. St. Louis: The C.V. Mosby Co.
Pearce, E. C. (1962). *Anatomy and physiology for nurses.* London: Faber & Faber Ltd.
Sharma, R. D. (1979). *Health and physical education,* Gupta Prakashan.
Singh, S. (1979). *Anatomy of physiology and health education*. Ropar: Jeet Publications.

Semester I

Theory courses

CC-103 HEALTH EDUCATION AND ENVIRONMENTAL STUDIES

STUDENT LEARNING OUTCOMES :

1. To describe health , its aspects and components of Health Education and to become role model.
2. To learn health problems in India.
3. Key concepts in environmental studies, such as 'sustainable development and impact on development concerns.
4. Understand the complex relationships between mankind and the environment.

Unit – I Health Education

- Concept, Dimensions, Spectrum and Determinants of Health
- Definition of Health, Health Education, Health Instruction, Health Supervision
- Aim, objective and Principles of Health Education
- Health Service and guidance instruction in personal hygiene

Unit – II Health Problems in India

- Communicable and Non Communicable Diseases
- Obesity, Malnutrition, Adulteration in food, Environmental sanitation, Explosive Population,
- Personal and Environmental Hygiene for schools
- Objective of school health service, Role of health education in schools
- Health Services – Care of skin, Nails, Eye health service, Nutritional service, Health appraisal, Health record, Healthful school environment, first- aid and emergency care etc.

Unit – III Environmental Science

- Definition, Scope, Need and Importance of environmental studies.
- Concept of environmental education, Historical background of environmental education,
- Celebration of various days in relation with environment.
- Plastic recycling & probation of plastic bag / cover.
- Role of school in environmental conservation and sustainable development.

Unit – IVNatural Resources and related environmental issues:

- Water resources, food resources and Land resources
- Definition, effects and control measures of:
- Air Pollution, Water Pollution, Soil Pollution, Noise Pollution, Thermal Pollution
- Management of environment and Govt. policies , Role of pollution control board.

References:

Agrawal, K.C. (2001). *Environmental biology*.Bikaner: Nidhi publishers Ltd.

Frank, H. &Walter, H., (1976). *Turners school health education*. Saint Louis: The C.V.

Mosby Company.
Nemir, A. (n.d.). The school health education. New York:Harber and Brothers.
Odum, E.P. (1971). *Fundamental of ecology*. U.S.A.: W.B. Saunders Co.

Semester – I

Theory courses

EC-101 OLYMPIC MOVEMENT (ELECTIVE)

STUDENT LEARNING OUTCOMES :

1. The students will learn the educational and cultural values associated with Olympic movement.
2. The students knowledge will get enhanced regarding different kinds of Olympic games.
3. The students will gain knowledge regarding functions of International Olympic Committee.
4. The students will get basic structure and functions of National Olympic committee.
5. The students will get to know the laurels of Indian Olympic participants.

Unit – I Origin of Olympic Movement

- Philosophy of Olympic movement
- The early history of the Olympic movement
- The significant stages in the development of the modern Olympic movement
- Educational and cultural values of Olympic movement

Unit – IIModern Olympic Games

- Significance of Olympic Ideals, Olympic Rings, Olympic Flag
- Olympic Protocol for member countries
- Olympic Code of Ethics
- Olympism in action
- Sports for All

Unit – III Different Olympic Games

- Para Olympic Games
- Summer Olympics
- Winter Olympics
- Youth Olympic Games

Unit – IV Committees of Olympic Games

- International Olympic Committee - Structure and Functions
- National Olympic committees and their role in Olympic movement
- Olympic commission and their functions
- Olympic medal winners of India

Reference:

Osborne, M. P. (2004). *Magictree house fact tracker: ancient greece and the olympics: a nonfiction companion to magic tree house: hour of the Olympics. New York:* Random House Books for Young Readers.

Burbank, J. M., Andranovich, G. D. &Heying Boulder, C. H. (2001). Olympic dreams: the impact of mega-events on local politics: Lynne Rienner

Semester – I

Theory courses

EC-102 OFFICIATING AND COACHING (Elective)

Unit- I: Introduction of Officiating and coaching

- Concept of officiating and coaching
- Importance and principles of officiating
- Relation of official and coach with management, players and spectators
- Measures of improving the standards of officiating and coaching

Unit- II: Coach as a Mentor

- Duties of coach in general, pre, during and post game.
- Philosophy of coaching
- Responsibilities of a coach on and off the field
- Psychology of competition and coaching

Unit- III: Duties of Official

- Duties of official in general, pre, during and post game.
- Philosophy of officiating
- Mechanics of officiating – position, singles and movement etc.
- Ethics of officiating

Unit- IV: Qualities and Qualifications of Coach and Official

- Qualities and qualification of coach and official
- General rules of games and sports
- Eligibility rules of intercollegiate and inter-university tournaments, preparation of TA, DA bills
- Integrity and values of sports

Reference Books:

Bunn, J. W. (1968). *The art of officiating sports*. Englewood cliffs N.J. Prentice Hall.

Bunn, J. W. (1972). *Scientific principles of coaching.* Englewood cliffs N. J. Prentice Hall.

Dyson, G. H. (1963). *The mechanics of athletics*. London: University of London Press Ltd.

Dyson, G. H. (1963). *The mechanics of Athletics*. London: University of London Press Ltd.

Lawther, J.D. (1965). *Psychology of coaching.* New York: Pre. Hall.

Singer, R. N. (1972). *Coaching, athletic & psychology*.New York: M.C. Graw Hill.

Semester – II

Theory Courses

CC-201 YOGA EDUCATION

Unit – I: Introduction

- Meaning and Definition of Yoga
- Aims and Objectives of Yoga
- Yoga in Early Upanisads
- The Yoga Sutra: General Consideration
- Need and Importance of Yoga in Physical Education and Sports

Unit - II: Foundation of Yoga

- The Astanga Yoga: Yama, Niyama, Asana, Pranayama, Pratyahara, Dharana, Dhyana and Samadhi
- Yoga in the Bhagavadgita - Karma Yoga, Raja Yoga, Jnana Yoga and Bhakti Yoga

Unit - III Asanas

- Effect of Asanas and Pranayama on various system of the body
- Classification of asanas with special reference to physical education and sports
- Influences of relaxtive, meditative posture on various system of the body
- Types of Bandhas and mudras
- Type of kriyas

Unit – IVYoga Education

- Basic, applied and action research in Yoga
- Difference between yogic practices and physical exercises
- Yoga education centers in India and abroad
- Competitions in Yogasanas

References:

Brown, F. Y.(2000). *How to use yoga*. Delhi:Sports Publication.

Gharote, M. L. &Ganguly, H. (1988). *Teaching methods for yogic practices*.Lonawala: Kaixydahmoe.

Rajjan, S. M. (1985). *Yoga strenthening ofrelexation for sports man.* New Delhi:Allied Publishers.

Shankar,G.(1998). *Holistic approach of yoga.* New Delhi:Aditya Publishers.

Shekar,K. C. (2003). *Yoga for health*. Delhi: Khel Sahitya Kendra.

Semester – II

Theory Courses

CC-202 EDUCATIONAL TECHNOLOGY AND METHODS OF TEACHING N PHYSICAL EDUCATION

STUDENT LEARNING OUTCOMES :

1. To understand the concept of educational technology and methods of teaching.
2. To describe and use various teaching methods according to suitability.
3. To construct the lesion plans for various physical education activities.
4. To classify the types of presentation, techniques and technical preparations required for physical education lessons,
5. To understand the principles of class management and factors affecting class management.
6. To utilize effectively various teaching aids for conduct of physical education program.

Unit – I Introduction

- Education and Education Technology- Meaning and Definitions
- Types of Education- Formal, Informal and Non- Formal education.
- Educative Process
- Importance of Devices and Methods of Teaching.

Unit – II Teaching Technique

- Teaching Technique – Lecture method, Command method, Demonstration method, Imitation method, project method etc.
- Teaching Procedure – Whole method, whole – part – whole method, part – whole method.
- Presentation Technique – Personal and technical preparation
- Command- Meaning, Types and its uses in different situations.

Unit – III Teaching Aids

- Teaching Aids – Meaning, Importance and its criteria for selecting teaching aids.
- Teaching aids – Audio aids, Visual aids, Audio – visual aids, Verbal, Chalk board, Charts, Model, Slide projector, Motion picture etc
- Team Teaching – Meaning, Principles and advantage of team teaching.
- Difference between Teaching Methods and Teaching Aid.

Unit – IV Lesson Planning and Teaching Innovations

- Lesson Planning – Meaning, Type and principles of lesson plan.
- General and specific lesson plan.
- Micro Teaching – Meaning, Types and steps of micro teaching.
- Simulation Teaching - Meaning, Types and steps of simulation teaching.

Reference:

Bhardwaj, A. (2003). *New media of educational planning*.New Delhi:Sarup of Sons.

Bhatia,& Bhatia,(1959). *The principles and methods of teaching.*New Delhi: Doaba House.

Kochar, S.K. (1982). *Methods and techniques of teaching.*New Delhi: Sterling Publishers Pvt. Ltd.

Sampath, K.,Pannirselvam, A. &Santhanam, S. (1981). *Introduction to educational technology.*New Delhi: Sterling Publishers Pvt. Ltd.

Walia, J.S. (1999). *Principles and methods of education.*Jullandhar:Paul Publishers.

Semester – II

Theory Courses

CC-203 ORGANZATION AND ADMINISTRATION IN PHYSICAL EUCATION

STUDENT LEARNING OUTCOMES :

1. To understand the concept of organization and administration in physical education and sports.
2. To describe and use various organizational and administrative roles according to suitability.
3. To classify the types of organizational and administrative techniques required for physical education program.
4. To construct the programs of physical education and sports.

To understand the principles of organization and administration

Unit – I: Organization and administration

- Meaning and importance of Organization and Administration in physical education
- Qualification and Responsibilities of Physical Education teacher and pupil leader
- Planning and their basic principles,
- Program planning: Meaning, Importance, Principles of program planning in physical education.
- Functions of Planning, organizing, staffing, directing, communicating, co-ordination, controlling, evaluating and innovating.

Unit- II: Office Management, Record, Register & Budget

- Office Management: Meaning, definition, functions and kinds of office management
- Records and Registers: Maintenance of attendance Register, stock register, cash register, physical efficiency record, Medical examination Record.
- Budget: Meaning, Importance of Budget making,
- Criteria of a good Budget, Sources of Income, Expenditure, Preparation of Budget.

Unit-III: Facilities, & Time-Table Management

- Facilities and equipment management: Types of facilities Infrastructure-indoor, out door.
- Care of school building, Gymnasium, swimming pool, Play fields, Play grounds
- Equipment: Need, importance, purchase, care and maintenance.
- Time Table Management: Meaning, Need, Importance and Factor affecting time table.

Unit-IV:Competition Organization

- Importance of Tournament,
- Types of Tournament and its organization structure - Knock-out Tournaments, League or Round Robin Tournaments, Combination Tournament and challenge Tournament.
- Organization structure of Athletic Meet

- Sports Event Intramurals & Extramural Tournament planning

References:

Broyles, F. J. &Rober, H. D. (1979). *Administration of sports, Athletic programme: A Managerial Approach.* New York: Prentice hall Inc.

Bucher, C. A. (1983). *Administration of Physical Education and Athletic programme.*St. Lolis: The C.V. Hosby Co.

Kozman, H.C. Cassidly, R. & Jackson, C. (1960).*Methods in Physical Education*. London: W.B. Saunders Co.

Pandy, L.K. (1977). *Methods in Physical Education.*Delhe: Metropolitan Book Depo.

Sharma, V.M. & Tiwari, R.H.: (1979). *Teaching Methods in Physical Education.* Amaravati: Shakti Publication.

Thomas, J. P.(1967). *Organization & administration of Physical Education*. Madras: Gyanodayal Press.

Tirunarayanan, C. &Hariharan, S. (1969). *Methods in Physical Education.*Karaikudi: South India Press.

Voltmer, E. F. &Esslinger, A. A. (1979).*The organization and administration of Physical Education.* New York: Prentice Hall Inc.

Semester – II

Theory Courses

EC-201 CONTEMPORARY ISSUES IN PHYSICAL EDUCATION, FITNESS AND WELLNESS (ELECTIVE)

Unit – I Concept of Physical Education and Fitness

- Definition, Aims and Objectives of Physical Education, fitness and Wellness
- Importance and Scope of fitness and wellness
- Modern concept of Physical fitness and Wellness
- Physical Education and its Relevance in Inter Disciplinary Context.

Unit – II Fitness, Wellness and Lifestyle

- Fitness – Types of Fitness and Components of Fitness
- Understanding of Wellness
- Modern Lifestyle and Hypo kinetic Diseases – Prevention and Management
- Physical Activity and Health Benefits

Unit – III Principles of Exercise Program

- Means of Fitness development – aerobic and anaerobic exercises
- Exercises and Heart rate Zones for various aerobic exercise intensities
- Concept of free weight Vs Machine, Sets and Repetition etc
- Concept of designing different fitness training program for different age group.

Unit – IV Safety Education and Fitness Promotion

- Health and Safety in Daily Life
- First Aid and Emergency Care
- Common Injuries and their Management
- Modern Life Style and Hypo-kinetic Disease –Prevention and Management

References:

Difiore, J.(1998). *Complete guide to postnatal fitness.* London: A & C Black,.

Giam, C.K & The, K.C. (1994). *Sport medicine exercise and fitness.* Singapore: P.G. Medical Book.

Mcglynn, G., (1993). *Dynamics of fitness*. Madison: W.C.B Brown.

Sharkey, B. J.(1990). *Physiology of fitness*, Human Kinetics Book.

Semester II

Theory courses

EC-202 SPORTS NUTRITION AND WEIGHT MANAGEMENT (ELECTIVE)

STUDENT LEARNING OUTCOMES :

1. To understand specific nutritional requirement of sports person.
2. Describe role of macro and micronutrients
3. Be able to assess body composition
4. Develop insight in to role of exercise and diet in weight management by

Unit – I Introduction to Sports Nutrition

- Meaning and Definition of Sports Nutrition
- Basic Nutrition guidelines
- Role of nutrition in sports
- Factor to consider for developing nutrition plan

Unit – II Nutrients: Ingestion to energy metabolism

- Carbohydrates, Protein, Fat – Meaning, classification and its function
- Role of carbohydrates, Fat and protein during exercise
- Vitamins, Minerals, Water – Meaning, classification and its function
- Role of hydration during exercise, water balance, Nutrition – daily caloric requirement and expenditure.

Unit – III Nutrition and Weight Management

- Meaning of weight management Concept of weight management in modern era Factor affecting weight management and values of weight management
- Concept of BMI (Body mass index), Obesity and its hazard, Myth of Spot reduction, Dieting versus exercise for weight control, Common Myths about Weight Loss
- Obesity – Definition, meaning and types of obesity,
- Health Risks Associated with Obesity, Obesity - Causes and Solutions for Overcoming Obesity.

Unit – IV Steps of planning of Weight Management

- Nutrition – Daily calorie intake and expenditure, Determination of desirable body weight
- Balanced diet for Indian School Children, Maintaining a Healthy Lifestyle
- Weight management program for sporty child, Role of diet and exercise in weight management, Design diet plan and exercise schedule for weight gain and loss

References:

Bessesen, D. H. (2008). Update on obesity. *J ClinEndocrinolMetab.93*(6), 2027-2034.

Butryn, M.L., Phelan, S., &Hill, J. O.(2007). Consistent self-monitoring of weight: a key component of successful weight loss maintenance.*Obesity(Silver Spring)*. *15*(12), 3091-3096.

Chu, S.Y. & Kim, L. J. (2007). Maternal obesity and risk of stillbirth: a metaanalysis. *Am J ObstetGynecol*, *197*(3), 223-228.

DeMaria, E. J. (*2007).* Bariatric surgery for morbid obesity. *N Engl J Med,356*(21), 2176-2183.

Dixon, J.B., O'Brien, P.E., Playfair, J. (n.d.). Adjustable gastric banding and conventional therapy for type 2 diabetes: a randomized controlled trial. *JAMA. 299*(3), 316-323.

Semester – III

Theory Courses

CC-301 SPORTS TRAINING

STUDENT LEARNING OUTCOMES :

1. The students will gain knowledge of meaning and definition of sports training.
2. Principles of sports training will be learnt by the students.
3. Students will have proficient knowledge about means and methods to develop speed, endurance, coordination and flexibility.
4. The basics of training load will be added to students knowledge base.
5. Students expand their knowledge of training plan and program.

Unit – I Introduction to Sports Training

- Meaning and Definition of Sports Training
- Aim and Objective of Sports Training
- Principles of Sports Training
- System of Sports Training – Basic Performance, Good Performance and High Performance Training

Unit – II Training Components

- Strength – Mean and Methods of Strength Development
- Speed – Mean and Methods of Speed Development
- Endurance - Mean and Methods of Endurance Development
- Coordination – Mean and Methods of coordination Development
- Flexibility – Mean and Methods of Flexibility Development

Unit – III Training Process

- Training Load- Definition and Types of Training Load
- Principles of Intensity and Volume of stimulus
- Technical Training – Meaning and Methods of Technique Training
- Tactical Training – Meaning and Methods of Tactical Training

Unit – IV Training programming and planning

- Periodization – Meaning and types of Periodization
- Aim and Content of Periods – Preparatory, Competition, Transitional etc.
- Planning – Training session
- Talent Identification and Development

Reference:

Dick, W. F. (1980).*Sports training principles.*London: Lepus Books.

Harre, D.(1982).*Principles of sports training.*Berlin: Sporulated.

Jensen, R. C.& Fisher, A.G. (1979). *Scientific basis of athletic conditioning*. Philadelphia: Lea and Fibiger, 2nd Edn.

Matvyew, L.P. (1981).*Fundamental of sports training.* Moscow: Progress Publishers.

Singh, H. (1984).*Sports training, general theory and methods*.Patials: NSNIS.

Uppal, A.K., (1999).*Sports Training.*New Delhi: Friends Publication.

Semester III

Theory Courses

CC-302 COMPUTER APPLICATIONS IN PHYSICAL EDUCATION

STUDENT LEARNING OUTCOMES :

1. To understand the need and importance of communication technology (ICT).
2. To gain knowledge of the application of computer in Physical Education.
3. To acquaint the learner with different methods MS Office.
4. To understand Application of software used in Physical education and sports.
5. To correlate the of ICT & Education technology in physical education and sports concepts with the sports and athlete specific situations.

Unit – I: Introduction to Computer

- Meaning, need and importance of information and communication technology (ICT). Application of Computers in Physical Education
- Components of computer, input and output device
- Application software used in Physical Education and sports

Unit – II: MS Word

- Introduction to MS Word
- Creating, saving and opening a document
- Formatting Editing features Drawing table ,
- page setup, paragraph alignment, spelling and grammar check printing option, inserting page number, graph, footnote and notes

Unit – III: MS Excel

- Introduction to MS Excel
- Creating, saving and opening spreadsheet
- creating formulas
- Format and editing features adjusting columns width and row height understanding charts.

Unit – IV: MS Power Point

- Introduction to MS Power Point
- Creating, saving and opening a ppt. file
- format and editing features slide show , design , inserting slide number
- picture ,graph ,table
- Preparation of Power point presentations

Referances:

Irtegov, D. (2004). *Operating system fundamentals*. Firewall Media.
Marilyn, M.& Roberta, B.(n.d.).*Computers in your future*. 2nd edition, India: Prentice Hall.
Milke, M.(2007). *Absolute beginner's guide to computer basics*. Pearson Education Asia.
Sinha, P. K. & Sinha, P. (n.d.).*Computer fundamentals*. 4th edition, BPB Publication.

Semester – III

Theory Courses

CC-303 SPORTS PSYCHOLOGY AND SOCIOLOGY

STUDENT LEARNING OUTCOMES :

1. The students will acquire the knowledge regarding various stages of growth and development.
2. A. Students will come to know about psycho-social aspects of human behaviour in the context of physical education.
3. Students gain knowledge regarding the role of personality in sports performance.
4. The students will learn about various strategies such as focus, relaxation, imagery etc. about mental preparation
5. The student will become familiar with association of physical education with social science.

Unit -I: introduction

- Meaning, Importance and scope of Educational and Sports Psychology
- General characteristics of Various Stages of growth and development
- Types and nature of individual differences; Factors responsible -Heredity And environment
- Psycho-sociological aspects of Human behavior in relation to physical education and sports

Unit-II: Sports Psychology

- Nature of learning, theories of learning, Laws of learning,
- Plateau in Learning; & transfer of training
- Meaning and definition of personality, characteristics of personality,
- Dimension of personality, Personality and Sports performance
- Nature of motivation: Factors influencing motivation; Motivation and techniques and its impact on sports performance.
- Mental Preparation Strategies: Attention focus, Self- talk, Relaxation, Imaginary.
- Aggression and Sports, Meaning and nature of anxiety, Kinds of anxiety
- Meaning and nature of stress; Types of stress, Anxiety, Stress, Arousal and their effects on sports performance

Unit-III: Relation between Social Science and Physical Education.

- Orthodoxy, customs, Tradition and Physical Education.
- Festivals and Physical Education.
- Socialization through Physical Education.
- Social Group life, Social conglomeration and Social group, Primary group and Remote group.

Unit-4 Culture : Meaning and Importance.

- Features of culture,
- Importance of culture.
- Effects of culture on people life style.
- Different methods of studying Observation/ Inspection method, Questionnaire method, Interview method

References:

Ball, D. W. & Loy, J. W. (1975).*Sport and social order; Contribution to the sociology of sport.*London: Addison Wesley Publishing Co., Inc.

Blair, J.& Simpson, R.(1962). *Educational psychology*, New York:McMillan Co.

Cratty, B. J.(1968). *Psychology and physical activity*. Eaglewood Cliffs. Prentice Hall.

Kamlesh, M.L. (1998). *Psychology inphysical education and sport*. New Delhi:Metropolitan Book Co.

Loy, J. W., Kenyon, G. S. & McPherson, B. D. (1978). Sport and social system. London: Addison Wesley Publishing Company Inc.

Loy, J. W., Kenyon, G. S. & McPherson, B. D. (1981).*Sports culture and society.*Philadelphia: Lea &Febiger.

Mathur, S.S., (1962). *Educational psychology*. Agra.VinodPustakMandir.

Skinnner, C. E., (1984.). *Education psychology*. New Delhi: Prentice Hall of India.

William, F. O.&Meyer, F. N. (1979). A handbook of sociology. New Delhi: Eurasia Publishing House Pvt Ltd.

Semester – III

Theory Courses

EC-301 SPORTS MEDICINE, PHYSIOTHERAPY AND REHANLITATION (ELECTIVE)

STUDENT LEARNING OUTCOMES :

1. The course intends to provide advanced knowledge of the medical field related to physical activity and sports.
2. The course provides knowledge about how to prevent and rehabilitate physical exercise and sports injuries in sports persons.
3. The students learn about the principles of various muscle and skeleton injuries related to physical exercise and sports
4. The students learn about various methods of adequate examination and treatment of muscle and skeleton injuries related to physical exercise and sports.
5. The students learn about the importance of the diet when going in for sports and the importance of recovery in physical training, exercise and sports

Unit-I: - Sports Medicine:

- Sports Medicine: Meaning, Definition, Aims, Objectives, Modern Concepts and Importance.
- Athletes Care and Rehabilitation: Contribution of Physical Education Teachers and Coaches.
- Need and Importance of the study of sports injuries in the field of Physical Education
- Prevention of injuries in sports – Common sports injuries – Diagnosis –
- First Aid - Treatment - Laceration – Blisters – Contusion - Strain – Sprain – Fracture – Dislocation and Cramps – Bandages – Types of Bandages – trapping and supports.

Unit-II: Physiotherapy

- Definition – Guiding principles of physiotherapy, Importance of physiotherapy, Introduction and demonstration of treatments - Electrotherapy – infrared rays – Ultraviolet rays –short wave diathermy – ultrasonic rays.

Unit-III: Hydrotherapy:

- Introduction and demonstration of treatments of Cry therapy, Thermo therapy, Contrast Bath, Whirlpool Bath – Steam Bath – Sauna Bath – Hot Water Fomentation – Massage: History of Massage – Classification of Manipulation (Swedish System) physiological Effect of Massage.

Unit-IV: Therapeutic Exercise:

- Definition and Scope – Principles of Therapeutic Exercise – Classification, Effects and uses of Therapeutic exercise – passive Movements (Relaxed, Forced and passive -

stretching) – active movements (concentric, Eccentric and static) application of the therapeutic exercise: Free Mobility Exercise – Shoulder, Elbow – Wrist and Finger Joints – Hips, Knee, ankle and Foot joints – Trunk. Head and Neck exercises.

References:

Christine, M. D., (1999). *Physiology of sports and exercise*.USA: Human Kinetics.

Conley, M. (2000). *Bioenergetics of exercise training*. In T.R. Baechle, & R.W. Earle, (Eds.), Essentials of Strength Training and Conditioning (pp. 73-90). Champaign, IL: Human Kinetics.

David, R. M. (2005).*Drugs in sports,* (4th Ed). Routledge Taylor and Francis Group.

Hunter, M. D. (1979). A *dictionary for physical educators.* In H. M. Borrow & R. McGee, (Eds.), A Practical approach to measurement in Physical Education (pp. 573-74). Philadelphia: Lea &Febiger.

Jeyaprakash, C. S., Sports Medicine, J.P. Brothers Pub., New Delhi, 2003.
Khanna, G.L., (1990). *Exercise physiology & sports medicine*. Delhi:Lucky Enterprises.
Mathew, D.K. & Fox, E.L, (1971). *Physiological basis of physical education and athletics*. Philadelphia:W.B. Saunders Co.
Pandey, P.K., (1987). *Outline of sports medicine*, New Delhi: J.P. Brothers Pub.
Williams, J. G. P. (1962). *Sports medicine*. London: Edward Arnold Ltd.

Semester – III

Theory Courses

EC-302 CURRICULUM DESIGN (Elective)

UNIT-I Modern concept of the curriculum

- Need and importance of curriculum, Need and importance of curriculum development, the role of the teacher in curriculum development.
- Factors affecting curriculum - Social factors - Personnel qualifications - Climatic consideration - Equipment and facilities -Time suitability of hours.
- National and Professional policies, Research finding

UNIT-IIBasic Guide line for curriculum construction; contest (selection and expansion).

- Focalization
- Socialization
- Individualization
- Sequence and operation
- Steps in curriculum construction.

UNIT-IIICurriculum-Old and new concepts, Mechanics of curriculum planning.

- Basic principles of curriculum construction.
- Curriculum Design, Meaning, Importance and factors affecting curriculum design.
- Principles of Curriculum design according to the needs of the students and state and national level policies.
- Role of Teachers

UNIT-IV Under-graduate preparation of professional preparation.

- Areas of Health education, Physical education and Recreation.
- Curriculum design-Experience of Education, Field and Laboratory.
- Teaching practice.
- Professional Competencies to be developed-Facilities and special resources for library, laboratory and other facilities.

Reference:

Barrow, H. M. (1983). *Man and movement: principles of physical education*. Philadelphia: Lea and Febiger.

Bucher, C. A. (1986). Foundation of physical education: St. Louis: The C. V. Mosby & Company.

Cassidy, R. (1986). *Curriculum development in physical education*. New York: Harper & Company.

Cowell, C.C. & Hazelton, H.W. (1965). *Curriculum designs in physical education.* Englewood Cliffs: N.J. prentice Hall Inc.

Larson, L.A. (n.d.). *Curriculum foundation in physical education.* Englewood Cliffs: N.J. Prentice Hall Inc.

Underwood, G. L. (1983). *The physical education curriculum in secondary school: planning and implementation.*England: Taylor and Francis Ltd.

Willgoose, C.E. (1979). *Curriculum in physical education*. 3rd Ed. Englewood Cliffs.: N.J. Prentice Hall, Inc.

Semester – IV

Theory Courses

CC-401 MEASUREMENT AND EVALUATION IN PHYSICAL EDUCATION

STUDENT LEARNING OUTCOMES :

1. The students will be familiar with the need and importance of measurement and evaluation in physical education.
2. The students will understand the criteria for a good test.
3. The students will be able to understand the various types of tests and it classification.
4. They will have understanding about some important physical fitness tests.
5. The students will grasp the knowledge about some selective sports skill tests.

Unit- IIntroduction to Test & Measurement & Evaluation

- Meaning of Test & Measurement & Evaluation in Physical Education
- Need & Importance of Test & Measurement & Evaluation in Physical Education
- Principles of Evaluation

Unit- IICriteria; ClassificationandAdministration of test

- Criteria of good Test
- Criteria of tests, scientific authenticity (reliability, objectivity, validity and availabilityof norms)
- Type and classification of Test
- Administration of test, advance preparation – Duties during testing – Duties after testing.

Unit- III Physical Fitness Tests

- AAHPER youth fitness test
- National physical Fitness Test
- Indiana Motor Fitness Test
- JCR test
- U.S Army Physical Fitness Test

Unit- IV Sports Skill Tests

- Lockhart and McPherson badminton test
- Johnson basketball test
- McDonald soccer test
- S.A.I volleyball test
- S.A.I Hockey test

References:

Bangsbo, J. (1994). *Fitness training in football: A scientific approach*. Bagsvaerd, Denmark:

Ho+Storm.

Barron, H. M., &Mchee, R. (1997). *A practical approach to measurement in physical education*. Philadelphia: Lea and Febiger.

Barron, H.M. &Mchee, R. (1997). A Practical approach to measurement in physical education. Philadelphia: Lea and Febiger.

Kansal, D.K. (1996). *Test and measurement in sports and physical education*. New Delhi: D.V.S. Publications.

Mathews, D.K., (1973). *Measurement in physical education*, Philadelphia: W.B.SoundersCompnay.

Pheasant, S. (1996). *Body space: anthropometry, ergonomics and design of work*. Taylor & Francis, New York.

Phillips, D. A., &Hornak, J. E. (1979). *Measurement and evaluation in physical education*. New York: John Willey and Sons.

Sodhi, H.S., & Sidhu, L.S. (1984). *Physique and selection of sports- a kinanthropometric study*. Patiala: Punjab Publishing House.

Semester – IV
Theory Courses

CC-402 KINESIOLOGY AND BIOMECHANICS

STUDENT LEARNING OUTCOMES :

1. The students will get knowledge regarding basics of kinensiology and biomechanics.
2. The students will learn about some fundamental concepts namely centre of gravity, equilibrium and axes etc.
3. The fundamental concept of anatomy and physiology will be added to students knowledge base.
4. The students will learn about various mechanical concepts namely force, lever etc. of biomechanics.
5. The theory of linear and angular kinematics will be learned by the students.

Unit – I Introduction to Kinesiology and Sports Biomechanics

- Meaning and Definition of Kinesiology and Sports Biomechanics
- Importance of Kinesiology and Sports Biomechanics to Physical Education Teacher, Athletes and Sports Coaches.
- Terminology of Fundamental Movements
- Fundamental concepts of following terms – Axes and Planes, Centre of Gravity, Equilibrium, Line of Gravity

Unit – II Fundamental Concept of Anatomy and Physiology

- Classification of Joints and Muscles
- Types of Muscle Contractions
- Posture – Meaning, Types and Importance of good posture.
- Fundamental concepts of following terms- Angle of Pull, All or None Law, Reciprocal Innovation

Unit – III Mechanical Concepts

- Force - Meaning, definition, types and its application to sports activities
- Lever - Meaning, definition, types and its application to human body.
- Newton's Laws of Motion – Meaning, definition and its application to sports activities.
- Projectile – Factors influencing projectile trajectory.

Unit – IV Kinematics and Kinetics of Human Movement

- Linear Kinematics – Distance and Displacement, speed and velocity, Acceleration
- Angular kinematics – Angular Distance and Displacement, Angular Speed and velocity, Angular Acceleration.
- Linear Kinetics – Inertia, Mass, Momentum, Friction.

- Angular Kinetics – Moment of inertia ,Couple, Stability.

Reference:

Bunn, J. W. (1972).*Scientific principles of coaching.* Englewood Cliffs, N.J.: Prentice Hall Inc.

Hay, J. G. & Reid, J. G.(1982).*The anatomical and mechanical basis of human motion.* Englewood Cliffs, N.J.: prentice Hall Inc.

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Hay, J. G. (1970).*The biomechanics of sports techniques*. Englewood Cliffs, N.J.: Prentice Hall, Inc.

Simonian, C.(1911).*Fundamentalsof sport biomechanics.* Englewood Cliffs, N.J.: Prentice Hall Inc.

Semester – IV
Theory Courses
CC-403 RESEARCH AND STATISTICS IN PHYSICAL EDUCATION

1. To develop understand of the basic framework of research process.
2. To identify appropriate research topics.
3. To identify various sources of information for literature review and data collection.
4. To understand and apply basic research methods including research design, data analysis, and interpretation.
5. To develop testable hypotheses, differentiate research design, evaluate aptness of research conclusions, and generalize them appropriately.
6. To know how to apply the basic aspects of the research process in order to plan and execute a research proposal and research report.

Unit-I Introduction to Research

- Definition of Research
- Need and importance of Research in Physical Education and Sports.
- Scope of Research in Physical Education & Sports.
- Classification of Research
- Research Problem, Meaning of the term, Location and criteria of Selection of Problem, Formulation of a Research Problem, Limitations and Delimitations.

Unit-II Survey of Related Literature

- Need for surveying related literature.
- Literature Sources, Library Reading
- Research Proposal, Meaning and Significance of Research Proposal.
- Preparation of Research proposal / project.
- Research Report: A group project is to be undertaken by a small batch of students under the supervision of a teacher, wherein it is expected to survey school facilities of physical education, health assessment programme evaluation, fitness status of the students, staff and other stakeholders etc. and submit the report to the institution.

Unit-III Basics of Statistical Analysis

- Statistics: Meaning, Definition, Nature and Importance
- Class Intervals: Raw Score, Continuous and Discrete Series, Class Distribution, Construction of Tables
- Graphical Presentation of Class Distribution: Histogram, Frequency Polygon, Frequency Curve. Cumulative Frequency Polygon, Ogive, Pie Diagram

Unit- IVStatistical Models in Physical Education and Sports

- Measures of Central Tendency: Mean, Median and Mode-Meaning, Definition, Importance, Advantages, Disadvantages and Calculation from Group and Ungrouped data
- Measures of Variability: Meaning, importance, computing from group and ungroup data
- Percentiles and Quartiles: Meaning, importance, computing from group and ungroup data

References:

Best, J.W. (1963). *Research in education*. U.S.A.: Prentice Hall.

Bompa, T. O. &Haff, G. G. (2009). *Periodization: theory and methodology of training, 5th ed.* Champaign, IL: Human Kinetics.

Brown, L. E., &Ferrigno, V. A. (2005). Training for speed, agility and quickness, 2nd ed. Champaign, IL: Human Kinetics.

Brown, L.E. & Miller, J., (2005). *How the training work.* In: Training Speed, Agility, and Quickness. Brown, L.E. &Ferrigno, V.A &Ferrigno, V.A., eds. Champaign, IL: Human Kinetics.

Carl, E. K., & Daniel, D. A. (1969). Modern principles of athletes training. St. Louis: St. Louis's Mosby Company.

Clark, H. H., & Clark, D. H. (1975). *Research process in physical education*. Englewood cliffs, New Jersey: Prentice Hall, Inc.

Garrett, H.E. (1981). *Statistics in psychology and education*. New York: VakilsFeffer and Simon Ltd.

Oyster, C. K., Hanten, W. P., & Llorens, L. A. (1987). *Introduction to research: A guide for the health science professional.* Landon: J.B. Lippincott Company.

Thomas, J.R., & Nelson J.K. (2005). *Research method in physical activity*. U.S.A: Champaign, IL: Human Kinetics Books.

Thomas, J.R., Nelson, J.K. & Silverman, S.J. (2011). Research method in physical activity. U.S.A: Champaign, IL: Human Kinetics Books.

Uppal, A. K. (1990). *Physical fitness: how to develop.* New Delhi: Friends Publication.

Verma, J. P. (2000). *A text book on sports statistics*. Gwalior: Venus Publications.

Semester – IV
Theory Courses

EC-401 THEORY OF SPORTS AND GAMES (ELECTIVE)

UNIT-IINTRODUCTION

General Introduction of speciliazed games and sports–

- Athletics,
- Badminton,
- Basketball,
- Cricket,
- Football,
- Gymnastic,
- Hockey,
- Handball,
- Kabaddi,
- Kho-Kho,
- Tennis,
- Volleyball and
- Yoga.

Each game or sports to be dealt under the following heads

- History and development of the Game and Sports
- Ground preparation, dimensions and marking
- Standard equipment and their specifications
- Ethics of sports and sportsmanship

UNIT-II Scientific Principles of coaching: **(particular sports and game specific)**

- Motion – Types of motion and Displacement, Speed, Velocity, Acceleration, Distance and Newton's Law of motions.
- Force – Friction, Centripetal and Centrifugal force, Principles of force.
- Equilibrium and its types
- Lever and its types
- Sports Training – Aims, Principles and characteristics.
- Training load – Components, Principles of load, Over Load (causes and symptoms).

UNIT-III Physical fitness components: (particular sports and game specific)

- Speed and its types
- Strength and its types
- Endurance and its types
- Flexibility and its types
- Coordinative ability and its types

- Training methods: - Development of components of physical fitness and motor fitness through following training methods (continuous method, interval method, circuit method, fartlek /speed play and weight training)

UNIT-IV Conditioning exercises and warming up.

- Concept of Conditioning and warming up.
- Role of weight training in games and sports.
- Teaching of fundamental skill & their mastery (technique, tactic and different phases of skill acquisition).
- Recreational and Lead up games
- Strategy – Offence and defense, Principles of offence and defense.

References:

Bunn, J. W. (1968). *The art of officiating sports*. Englewood cliffs N.J. Prentice Hall.

Bunn, J. W. (1972). *Scientific principles of coaching.* Englewood cliffs N. J. Prentice Hall.

Dyson, G. H. (1963). *The mechanics of athletics*. London: University of London Press Ltd.

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Singer, R. N. (1972). *Coaching, athletic & psychology*.New York: M.C. Graw Hill.

Semester – IV

Theory Courses

EC-402 SPORTS MANAGEMENT

Unit-I

- Nature and Concept of Sports Management.
- Progressive concept of Sports management.
- The purpose and scope of Sports Management.
- Essential skills of Sports Management.
- Qualities and competencies required for the Sports Manager.
- Event Management in physical education and sports.

Unit-II

- Meaning and Definition of leadership
- Leadership style and method.
- Elements of leadership.
- Forms of Leadership.
    - Autocratic
    - Laissez-faire
    - Democratic
    - Benevolent Dictator
- Qualities of administrative leader.
- Preparation of administrative leader.
- Leadership and Organizational performance.

Unit-III

- Sports Management in Schools, colleges and Universities.
- Factors affecting planning
- Planning a school or college sports programme.
- Directing of school or college sports programme.
- Controlling a school, college and university sports programme.
    - Developing performance standard
    - Establishing a reporting system
    - Evaluation
    - The reward/punishment system

Unit-IV

- Financial management in Physical Education & sports in schools, Colleges and Universities.
- Budget – Importance, Criteria of good budget,
- Steps of Budget making
- Principles of budgeting

REFERENCES:

Ashton, D. (1968).*Administration of physical education for women*.New York: The Ronal Press Cl.

Bucher, C.A. *Administration of physical education and athletic programme.* 7th Edition, St. Louis: The C.V. Mosby Co.

Daughtrey, G. & Woods, J.B. (1976). *Physical education and intramural programmes, organisation and administration.* Philadelphia U.S.A. : W.B. Sounders Cp.

Earl, F. Z,& Gary, W. B. (1963).*Management competency development in sports and physical education*. Philadelphia: W. Lea and Febiger.

Part – B
Practical Courses

PC - 101
Track and Field:

Semester – I

Running Event

- Starting techniques: Standing start, Crouch start and its variations, Proper use of blocks.
- Finishing Techniques: Run, Through, Forward lunging, Shoulder Shrug
- Ground Marking, Rules and Officiating
- Hurdles:
    - Fundamental Skills- Starting, Clearance and Landing Techniques.
    - Types of Hurdles
    - Ground Marking and Officiating.

Relays: Fundamental Skills

- Various patterns of Baton Exchange
- Understanding of Relay Zones
- Ground Marking
- Interpretation of Rules and Officiating.

PC 102

Gymnastics: Floor Exercise

- Forward Roll, Backward Roll, Sideward Roll, different kinds of scales, Leg Split, Bridge, Dancing steps, Head stand, Jumps-leap, scissors leap.
- Vaulting Horse
- Approach Run, Take off from the beat board, Cat Vault, Squat Vault.

PC – 102

Swimming: Fundamental Skills

- Entry into the pool.
- Developing water balance and confidence
- Water fear removing drills.
- Floating-Mushroom and Jelly fish etc.
- Gliding with and without kickboard.
- Introduction of various strokes
- Body Position, Leg, Kick, Arm pull, Breathing and Co ordination.
- Start and turns of the concerned strokes.
- Introduction of Various Strokes.
- Water Treading and Simple Jumping.

- Starts and turns of concerned strokes.
- Rules of Competitive swimming-officials and their duties, pool specifications, seeding heats and finals, Rules of the races.

PC – 102

Shooting Fundamental Skills

- Basic stance, grip, Holding rifle/ Pistol, aiming target
- Safety issues related to rifle shooting
- Rules and their interpretations and duties of officials

(Any one out of three)

PC – 103 Indigenous sports:

Kabaddi: Fundamental Skills

- Skills in Raiding-Touching with hand, various kicks, crossing of baulk line, Crossing of Bonus line, luring the opponent to catch, Pursuing.
- Skills of Holding the Raider-Various formations, Catching from particular position, Different catches, Luring the raider to take particular position so as to facilitate catching, catching formations and techniques.
- Additional skills in raiding-Bringing the antis in to particular position, Escaping from various holds, Techniques of escaping from chain formation, Combined formations in offence and defense.
- Ground Marking, Rules and Officiating

PC – 103

Malkhambh and Light Apparatus:

- Lathi-Two counts exercises, Four Count exercises, eight count exercises, sixteen count exercises.
- GhatiLezuim-AathAawaaz, Bethakawaaz, AagePaon, Aagekadam, Do pherawaaz, Chau pherawaaz, Kadamtaal, Pavitra, Uchhakpavitra, Kadampavitra.
- Mass P.T. Exercises-Two count, four count and eight count exercises.
- Hindustani Lezuim-Char Awaaz, EkJagah, AantiLagaav, Pavitra, Do Rukh, Chau Rukh, Chau rukhbethak, Momiya.
- Drill and Marching
- Malkhamb-Salaami, Hold, Saadiudi, Bagaludi, Dashrangudi, Bagliudi, Veludi, Soydoro, Phirki, Padmasana, T.Balance, Pataka, Landing.
- Rope Malkhamb-Salaami, PadmasanaChadh, Katibandh1-2, Sadiadhi, Rikebpakkad, Rikebpagniadhi, Kamaradhi, Nakkikasadhi, Kamaradhi, Nakkikasadhi, Urubandhtedhi, Sadibagli, Do hatibagli, Kamarbandhbagli, nakkikasbagli, Dashrang, Hanuman pakad, Gurupakkad, various padmasana, Landing.

PC - 104

Kho Kho:

- General skills of the game-Running, chasing, Dodging, Faking etc.
- Skills in chasing-Correct Kho, Moving on the lanes, Pursuing the runner, Tapping the inactive runner, Tapping the runner on heels, Tapping on the pole, Diving, Judgement in giving Kho, Rectification of Foul.
- Skills in Running-Zig zag running, Single and double chain, Ring play, Rolling in the sides, Dodging while facing and on the back, fakes on the pole, fake legs, body arm etc, Combination of different skills.
- Ground Marking
- Rules and their interpretations and duties of officials.

PC – 104

Dumbells/ Wands/ Hoop/ Umbrella/ Tipri: Fundamentals skills

- Apparatus/ Light apparatus Grip
- Attention with apparatus/ Light apparatus
- Stand – at – ease with apparatus/ ligfht apparatus
- Exrcise with verbal command,drum, whistle and music – Two count, Four count, Eight count and Sixteen count.
- Standing Exercise
- Jumping Exercise
- Moving Exercise
- Combination of above all

STUDENT LEARNING OUTCOMES:

1. Learn skills, technique of the Game/Sport.
2. Learn the layout and marking and rules of the Game/Sport.
3. Be able to develop drills & lead up activities of Game/Sport.
4. Learn officiating of Game/Sport.
5. Develop teaching ability of Game/Sport

Semester – II

PC – 201

Track and Field

Athletics: Jumping Events

- High Jump (Straddle Roll)

- Approach Run,
- Take off
- Clearance over the bar.
- Landing

PC – 202

Gymnastics:

- Parallel Bar:
- Mount from one bar
- Straddle walking on parallel bars.
- Single and double step walk
- Perfect swing
- Shoulder stand on one bar and roll forward.
- Roll side
- Shoulder stand
- Front on back vault to the side(dismount)
- Horizontal /Single Bar:
- Grip
- Swings
- Fundamental Elements
- Dismount
- Uneven Parallal Bar:
- Grip
- Swings
- Fundamental Elements
- Dismount

PC – 202

Yoga:

- Surya Namaskara,
- Pranayams
- Corrective Asanas
- Kriyas
- Asanas
  - Sitting
  - Standing
  - Laying Prone Position,
  - Laying Spine Position

PC – 202

Swimming:

Introduction of water polo game

- Fundamental skills
- Swimm with the ball
- Passing
- Catching
- Shooting
- Goal keeping
- Rules of the games and responsibility of officials

Introduction of Diving sports.

- Basic Diving Skills from spring boards
- Basic Diving Skills from platform

PC – 202

Aerobics: Introduction of Aerobics

- Rhythmic Aerobics - dance
- Low impact aerobics
- High impact aerobics
- Aerobics kick boxing
- Postures – Warm up and cool down
- THR Zone – Being successful in exercise and adaptation to aerobic workout.

PC - 203

Badminton: Fundamental Skills

- Racket parts, Racket grips, Shuttle Grips.
- The basic stances.
- The basic strokes-Serves, Forehand-overhead and underarm, Backhand-overhead and underarm
- Drills and lead up games
- Types of games-Singles, doubles, including mixed doubles.
- Rules and their interpretations and duties of officials.

PC - 203

Table Tennis: Fundamental Skills

- The Grip-The Tennis Grip, Pen Holder Grip.
- Service-Forehand, Backhand, Side Spin, High Toss.
- Strokes-Push, Chop, Drive, Half Volley, Smash, Drop-shot, Balloon, Flick Shit, Loop Drive.
- Stance and Ready position and foot work.
- Rules and their interpretations and duties of officials.

PC – 203

Squash Fundamental Skills

- Service- Under hand and Over hand
- Service Reception
- Shot- Down the line, Cross Court
- Drop
- Half Volley
- Tactics – Defensive, attacking in game
- Rules and their interpretations and duties of officials.

PC – 203

Tennis: Fundamental Skills**.**

- Grips- Eastern Forehand grip and Backhand grip, Western grip, Continental grip, Chopper grip.
- Stance and Footwork.
- Basic Ground strokes-Forehand drive, Backhand drive.
- Basic service.
- Basic Volley.
- Over-head Volley.
- Chop
- Tactics – Defensive, attacking in game
- Rules and their interpretations and duties of officials.

STUDENT LEARNING OUTCOMES :

1. Learn and master fundamental skills,technique of the Game/Sport.
2. Learn the layout and marking, rules of the Game/Sport.
3. Be able to develop drills & lead up activities of Game/Sport.
4. To learn officiating of Game/Sport.
5. Develop teaching ability of Game/Sport

Semester – III

PC – 301

Track and fields (Throwing Events)

- Discus Throw, Javelin, Hemmer throw, shot-put
- Basic Skills and techniques of the Throwing events
- Ground Marking / Sector Marking
- Interpretation of Rules and Officiating.
- Grip
- Stance
- Release
- Reserve/ (Follow through action)
- Rules and their interpretations and duties of officials

PC – 302

Boxing: Fundamental Skills

- Player stance
- Stance - Right hand stance, left hand stance.
- Footwork – Attack, defense.
- Punches – Jab, cross, hook, upper cut, combinations.
- Defense slip – bob and weave, parry/block, cover up, clinch, counter attack
- Tactics – Toe to toe, counter attack, fighting in close, feinting
- Rules and their interpretations and duties of officials.

PC – 302

Martial Arts/Karate: Fundamental Skills

- Player Stances – walking, hand positions, front-leaning, side-fighting.
- Hand Techniques - Punches (form of a punch, straight punch, and reverse punch), Blocks (eight basic).
- Leg Techniques - Snap kicks, stretching straight leg, thrust kicks, sidekicks, round house.
- Forms - The first cause Katas.
- Self Defense - against punches, grabs and strikes, against basic weapons (knife, club sticks).
- Sparring - One step for middle punch, high punch and groin punch. (Defended by appropriate block from eight basic blocks).
- Rules and their interpretations and duties of officials.

PC – 302

Taekwondo Fundamental Skills

- Player Stances – walking, extending walking, L stance, cat stance.
- Fundamental Skills – Sitting stance punch, single punch, double punch, triple punch.
- Punching Skill from sparring position – front-fist punch, rear fist punch, double punch, and four combination punch.
- Foot Tenchniques (Balgisul) – standing kick (soseochagi), Front kick (AP chagi), Arc kick (BandalChagi), Side kick, (YeopChagi), Turning kick (DollyoChagi), Back kick (Twit Chagi), Reverse turning kick (BandaeDollyoChagi), Jump kick (TwimyoChagi),
- Poomsae (Forms) – Jang, Yi Jang, Sam Jang, Sa Jang, O Jang, Yook Jang, Chil Jang, Pal Jang (Fundamental Movement – eye control, concentration of spirit, speed control, strength control, flexibility, balance, variety in techniques)
- Sparring (Kyorugi) – One Step Sparring (hand techniques, foot techniques, self defense techniques, combination kicks), Free Sparring.
- Board Breaking (Kyokpa) – eye control, balance, power control, speed, point of attack.
- Rules and their interpretations and duties of officials.

PC – 302

Judo: Fundamental skills

- Rei (Salutation)-Ritsurei(Salutation in standing position), Zarai (Salutation in the sitting position)
- Kumi kata (Methods of holding judo costume)
- Shisei (Posture in Judo)
- Kuzushi (Act of disturbing the opponent posture)
- Tsukuri and kake (Preparatory action for attack)
- Ukemi (Break Fall)-UrhiroUkemi (Rear break Fall), Yoko Ukemi (Side Break Fall), Mae Ukemi (Front Break Fall), Mae mawariUkemi (Front Rolling break fall)
- Shin Tai (Advance or retreat foot movement)-Suri-ashi (Gliding foot), Twugi-ashi (Following footsteps), Ayumi-ashi (Waling steps.
- Tai Sabaki (Management of the body)
- NageWaze (Throwing techniques)-HizaGuruma (Knee wheel), SesaeTwurikomi-ashi (Drawing ankle throw), De ashihari (Advance foot sweep), O Goshi (Major loinm), SeoiNage (Shoulder throw).
- Katamawaze(Grappling techniques)-Kesagatame (Scaff hold), Kata gatame (Shoulder hold), Kami shihogatama (Locking of upper four quarters), Method of escaping from each hold.

PC – 302

Wrestling: Fundamental Skills

- Take downs, Leg tackles, Arm drag.
- Counters for take downs, Cross face, Whizzer series.
- Escapes from under-sit-out turn in tripped.
- Counters for escapes from under-Basic control back drop, Counters for stand up.
- Pinning combination-Nelson series(Half Nelson, Half Nelson and Bar arm), Leg lift series, Leg cradle series, Reverse double bar arm, chicken wing and half Nelson.
- Escapes from pining: Wing lock series, Dopuble arm lock roll, Cridge.
- Standing Wrestling-Head under arm series, whizzer series
- Referees positions.

PC – 302

Fencing: Fundamental Skill

- Basic Stance - on-guard position (feet and legs)
- Footwork – advance, retire, lunge, Step-lunge
- Grip – hold a foil correctly, Etiquette – salute and handshake to coaches and partners
- Hit a target (glove, mask, person) at riposte distance
- Lunge from an on-guard position.
- Attack - simple attacks from sixte – direct, disengage, doublé attack, compound attacks high line – one-two and cut-over disengage, Cut-over attack, Low line attacks
- Semi circular parries – octave and septime
- Understand the layout of a piste.
- Compound or successive parries.
- Lateral parry and direct riposte
- Fence a bout – judges etc. salutes and handshakes
- Rules and their interpretations and duties of officials.

PC 303 Team Games

PC 303

Base Ball Fundamental Skills

- Player Stances – walking, extending walking, L stance, cat stance.
- Grip – standard grip, choke grip,
- Batting – swing and bunt.
- Pitching –

- Baseball : slider, fast pitch, curve ball, drop ball, rise ball, change up, knuckle ball, screw ball,
- Softball: windmill, sling shot,
- starting position: wind up, set.
- Fielding –
    - Catching: basics to catch fly hits, rolling hits,
    - Throwing: over arm, side arm.

- Base running –
    - Base running: single, double, triple, home run,
    - Sliding: bent leg slide, hook slide, head first slide.

- Rules and their interpretations and duties of officials.

PC 303

Netball: Fundamental Skills

- Catching: one handed, two handed, with feet grounded, in flight.
- Throwing (different passes and their uses): one handed passes (shoulder, high shoulder, underarm, bounce, lob); two handed passes (push, overhead, bounce).
- Footwork: landing on one foot; landing on two feet; pivot; running pass.
- Shooting: one hand; two hands; forward step shot; backward step shot.
- Techniques of getting free: dodge and sprint; sudden sprint; sprint and stop; sprinting with change of speed.
- Defending: marking the player; marking the ball; blocking; inside the circle; outside the circle (that is, defending the circle edge against the pass in).
- Intercepting: pass; shot.
- The toss-up.
- Role of individual players
- Rules and their interpretations and duties of officials.

PC – 303

Cricket: Fundamental Skills

- Batting-Forward and backward defensive stroke
- Bowling-Simple bowling techniques
- Fielding-Defensive and offensive fielding
- Catching-High catching and Slip catching
- Stopping and throwing techniques
- Wicket keeping techniques

PC 303

Football: Fundamental Skills

- Kicks-Inside kick, Instep kick, Outer instep kick, lofted kick
- Trapping-trapping rolling the ball, trapping bouncing ball with sole
- Dribbling-With instep, inside and outer instep of the foot.
- Heading-From standing, running and jumping.
- Throw in
- Feinting-With the lower limb and upper part of the body.
- Tackling-Simple tackling, Slide tackling.
- Goal Keeping-Collection of balls, Ball clearance-kicking, throwing and deflecting.

PC 303

Hockey: Fundamental Skills

- Player stance & Grip
- Rolling the ball
- Dribbling
- Push
- Stopping
- Hit
- Flick
- Scoop
- Passing – Forward pass, square pass, triangular pass, diagonal pass, return pass,
- Reverse hit
- Dodging
- Goal keeping – Hand defence, foot defence
- Positional play in attack and defense.
- Rules and their interpretations and duties of officials.
- Rules and their interpretations and duties of officials.
- Ground Marking.

PC – 303

Softball Fundamental Skills

- Catching: one handed, two handed, with feet grounded, in flight.
- Throwing (different passes and their uses): one handed passes (shoulder, high shoulder, underarm, bounce, lob); two handed passes (push, overhead, bounce).
- Footwork: landing on one foot; landing on two feet; pivot; running pass.
- Shooting: one hand; two hands; forward step shot; backward step shot.

- Techniques of getting free: dodge and sprint; sudden sprint; sprint and stop; sprinting with change of speed.
- Defending: marking the player; marking the ball; blocking; inside the circle; outside the circle (that is, defending the circle edge against the pass in).
- Intercepting: pass; shot.
- The toss-up.
- Role of individual players
- Rules and their interpretations and duties of officials.

PC 303

Volleyball: Fundamental Skills

- Players Stance-Receiving the ball and passing to the team mates,
- The Volley (Over head pass),
- The Dig(Under hand pass).
- Service-Under Arm Service, Side Arm Service, Tennis Service, Round Arm Service.
- Rules and their interpretations and duties of officials.

PC - 303

Hand Ball:

- Fundamental Skills-Catching, Throwing, Ball Control, Goal Throws-Jump Shot, Centre Shot, Dive Shot, Reverse Shot, Dribbling-High and Low, Attack and Counter Attack, Simple Counter Attack, Counter Attack from two wings and centre, Blocking, Goal keeping, Defense.
- Rules and their interpretations and duties of officials.

PC – 303

Basket ball: Fundamental Skills

- Player stance and ball handling
- Passing-Two Hand chest pass, Two hand Bounce Pass, One Hand Base ball pass, Side Arm Pass, Over Head pass, Hook Pass.
- Receiving-Two Hand receiving, One hand receiving, Receiving in stationary position, Receiving while jumping, Receiving while running.
- Dribbling-How to start dribble, How to drop dribble, High dribble, Low dribble, Reverse dribble, Rolling dribble.
- Shooting-Layup shot and its variations, one hand set shot, One hand jump shot, Hook shot, Free throw.
- Rebounding-Defensive rebound, Offensive rebound, Knock out, Rebound Organization.
- Individual Defensive-Guarding the man with the ball and without the ball.
- Pivoting.
- Rules and their interpretations and duties of the officials.

STUDENT LEARNING OUTCOMES :

6. Learn and master fundamental skills,technique of the Game/SportTeaching
7. Learn the layout and marking, rules of the Game/Sport
8. Be able to develop drills & lead up activities of Game/Sport.
9. To learn officiating of Game/Sport
10. Develop teaching ability of Game/Sport

TP – 201 Teaching practices:

10 teaching practice lessons out of which 5 lessons in class-room situation and 5 lessons for out-door activities within premises on the students of B.P.Ed course.

TP – 301 Teaching practices:

10 teaching lesson plans for Racket Sport/ Team Games/ Indigeneous Sports out of which 5 lessons internal and 5 lessons external at school.

TP – 401 **Sports Specialization: Track and field / Gymnastics / Swimming**

(4 internal lesson at prcticing school and 1 final external lesson on the students of practicing school as a sports specialization of any discipline mentioned above.)

TP- 402 **Games Specialization: Kabaddi, Kho-kho, Base ball, cricket, Football, Hockey, Softball Volleyball, Handball, Basketball, Netball, Badminton, Table Tennis, Squash, Tennis**

STUDENT LEARNING OUTCOMES :

1. To develop teaching ability master Advance skills, technique of the Game/Sport Teaching
2. Learn the layout and marking, rules of the Game/Sport
3. Be able to develop drills & lead up activities of Game/Sport
4. To learn officiating of Game/Sport.
5. Develop teaching ability of Game/Sport

(4 internal lesson at prcticing school and 1 final external lesson on the students of practicing school as a games specialization of any discipline mentioned above.)

Note: Where ever details of any activities are not mentioned, it is expected to elaborate skills by the competent bodies of local Universities.

Table – 1: Semester wise distribution of hours per week

Semester	***Theory***	***Practicum***	***Teaching practice***	***Total***
I	*16*	*24*	*00*	*40*
II	*16*	*18*	*6*	*40*
III	*16*	*18*	*6*	*40*
IV	*16*	*12*	*12*	*40*
Total	*64*	*72*	*24*	*160*
Minimum of 36 teaching hours per week is required in five or six days in a week				

Table – 2: Number of credits per semester

Semester	***Theory***	***Practicum***	***Teaching practice***	***Total***
I	*16*	*16*	*00*	*32*
II	*16*	*12*	*04*	*32*
III	*16*	*12*	*04*	*32*
IV	*16*	*08*	*08*	*32*
Total	*64*	*48*	*16*	*128*
Minimum of 36 teaching hours per week is required in five or six days in a week				

Master of Physical Education Course
Semester I: Paper I
Professional Preparation and Curriculum designs

UNIT-I

Foundation of professional preparation

1. **Ideals of Indian Democracy: Contribution of Physical Education.**

2. **Forces and factor effecting Education Policies and programmes – social, religious, economic and political. Education and professional preparation in physical education in India with those in USA, USSR and UK.**

UNIT-II

1. **Under graduate preparation of professional areas of health education, physical education and recreation. Purpose of under graduate preparation. Administration, curriculum, laboratory experiences, field experiences, Laboratory Experiences, Field Experiences, Teaching Practice and Professional competences to be developed. Facilities and special resources for Library.**

2. **Post Graduate preparation of professional personnel: Purposes of post graduate studies, admission requirements, sports, curriculum, area of specialization and concentration on core areas, Research requirement, Methods of instruction.**

3. **In service education of professional personnel: Nature and scope of in service education; Responsibility for in service training, Role of administration, Physical Education Training Institute, Supervisors, the professional, and in – service training programmes. In service through individual efforts, apprenticeship on the job projects. Survey and reports, critical appraisal of existing types of post graduate programs.**

UNIT-III

1. **Importance of Curriculum Development Factors affecting curriculum, changing needs of student, national and professional policies**

2. **The Role of the teacher in curriculum development.**

3. **Principles of Planning: Understanding the capacity characteristics and needs of the learner. Evaluation and follow up.**

4. **selecting material for instruction – classification of activities for different age group and sexes. Progress in cariculam. Cultural influences in the choice of activities flexibility of programme material.**

UNIT-IV

Selecting methods of teaching

1. **Grouping of students for instruction, lecture, projects, activities, demonstration,**
2. **Block of period, total time allotment do a given activity, teaching aids, conditioning**
3. **Special gadgets to concentrate on development of particular skills or activity, provision for individual differences.**

Development program for different levels of education: Kindergarden, elementary school, Middle School, High School and Higher Secondary School, College and University, Special institution (Technical School & orphan hostel) special days, national days etc.

UNIT V

1. **Co-education in physical education – Interrelating the Programs for boys and girls. Activities suitable for co-education, levels at which co-education is desirable, spcial provision for development of girls programme.**
2. **Evaluation and follow up process in physical education – nature, importance and procedure for evaluation in physical education, follow- up: curriculum followed in colleges of physical education – BPE, MPEd, BPEd. In physical Education, M. Phil. Etc. committees recommendation: NCE – CBSE, UGC recommendation on curriculum for schools and colleges.**

Semester I: Paper II

Test Measurement and Evaluation in Physical Education

UNIT-I

1. **Meaning of evaluation.**
2. **Nature and scope of evaluation program.**
3. **Need and importance of evaluation in the field of physical education.**
4. **Principles of Evaluation.**

UNIT-II

1. **Criteria of test selection (reliability, validity, objectivity and norms), Administrative feasibility and educational application,**
2. **Classification of test, standardized tests (objective and subjective test).**
3. **Construction of test, Knowledge tests (written and skill tests).**
4. **Suggestions for administering test - Medical Examination, Testing Personnel, Time of testing, Economy of testing, Test record, Preparation of reports, Construction of tables & graphs and Purpose of reporting.**

UNIT-III

Measurements of Organic Function, Motor Fitness and General Motor Ability.

1. **Organic function: Cardiovascular respiratory function.**
    a. **Coopr's 12 minute continuous run / walk test.**
    b. **Tuttles pulse ration test.**
    c. **Harward step test and its modification.**
2. **Motor Fitness –**
    a. **Oregon motor fitness test**
    b. **JCR test**
    c. **Canada fitness test**
    d. **AAHPER youth fitness test.**
3. **General motor ability:**
    a. **Mcloy's general motor ability test**
    b. **Methany Johnson motor educability test.**

UNIT-IV

1. **Test for strength:**
    a. **Strength, Roger's physical fitness index and suggested changes**
    b. **Kraus-weber test**

2. Test for skills:

a. **Tests Volleyball-Brady test, Russel and Lange test**

b. **Basket ball-Johnson test, Knox test**

c. **Soccer-Mc Donald test, Johnson test**

d. **Field Hockey-Harbans Singh field hockey test**

e. **Badminton-Miller test,**

f. **Dyer tennis test.**

UNIT-V

1. **Measures of posture-IOWA posture test**
2. **Mc cloys behaviour rating scale**
3. **Co-well social behaviour trend index**
4. **Sociometric Questionaire**
5. **Mental health analysis**
6. **Washburn social adjustment inventory**
7. **Personality inventory.**

Semester I: Paper III

Exercise physiology

UNIT-I

1. **Skeletal Muscle, Structure, function and Characteristics**
2. **Chemical composition of skeletal muscle**
3. **Gross structure of Skeletal Muscle**
4. **Microscopic structure, structure of the myofibril and contractile mechanism, Molecular basis of the contraction of skeletal muscle**

UNIT-II

Bio-energetics

1. **Fuel for muscular work**
2. **Energy for muscular contraction and biochemical changes during muscular contraction,**
3. **Heat production and thermo-dynamics of muscle contraction**

UNIT-III

Neuro-muscular concepts

1. **Neuron and motor unit transmission of nerve impulses, bio-electrical potentials**
2. **Nerve to nerve synapse, Neuro muscular junction and transmission of nerve impulse across it.**
3. **Propioception and kinesthesis. Tone, posture and Equilibrium.**

UNIT-IV

Physiological changes due to exercise. Effect of exercise and training on:

1. **Heart and circulatory systems.**
    a. **Blood supply to skeletal muscle and**
    b. **Regulation of blood flow during exercise.**

2. **Respiratory system [a brief discussion on other systems]**

    a. **Oxygen debt & recovery rate**

    b. **Aerobic and Anaerobic muscular activity**

    c. **Second wind.**

UNIT-V

1. **Other physiological aspects of exercise and sports**
2. **Concept of physical fitness and physical training, warming up conditioning and fatigue**
3. **Physiological aspects of development of strength, endurance, skill, speed, agility and coordination.**
4. **Work capacity under different environmental conditions hot, humid, cold, high attitude.**
5. **Energy cost of various sports activity.**

Semester I: Paper IV

Management of physical education

UNIT-I

1. **Review of principle and philosophy in of Education, Physical Education, Recreation and Health education.**
2. **Progressive concept of administration/ management. General administration theories.**
3. **Personal and material management programming for instruction and activities.**
4. **Hierarchy of education administration in Central, State local authorities and Individual Institution in India.**

UNIT-II

1. **Responsibilities of General Administration, technical Experts & Professionals.**
2. **Selected problems in Management / Administration**
3. **Professional preparation, professional ethics class discipline, student teaching.**

UNIT-III

1. **Budget and Finance: Budget heads principles of accounting financial power of different authorities, Sources of income auditing, terms of sanctions and purpose.**
2. **Staff job analysis, qualifications, requirement, supervision, training, leave, retirement deputation fringe benefits and staff meetings.**
3. **Office management's gathering data, programming and scheduling (Calendar, Timetable, thing that requires periodical attention) storing data (Filling), General office procedure like correspondence interview.**

UNIT-IV

1. **Management of sports in school, college & universities, Inter-University, District State & National level.**
2. **Indian and International Olympic association, SAI.**
3. **Public relation and promotional activities including-press relations, publications, Public speeches, assemblies, exhibitions demonstration, special events, staff, student welfare.**

UNIT-V

SUPERVISION

1. **Definition of Supervision**

2. **Scope of Supervision**
3. **Guiding Principles of supervision**
4. **Method of Supervision:**
    a. **Visitation**
    b. **Conference**
    c. **Bulleting**
    d. **Demonstration**

Functions of Supervisions

1. **Administrative duties**
2. **Duties pertaining to facility & Equipment**
3. **Duties pertaining to instruction**
5. **Duties pertaining to supervision**
6. **Duties pertaining to professional Growth**

Semester II: Paper I

Paper I -Training methods-

UNIT-I

1. **Brief historical sketch of development of Competitive sports in India.**
2. **Introduction to motor development.**
3. **Sports training.**
4. **Its aims, Tasks and characteristics.**
5. **Principles of sports training.**

UNIT-II

1. **Training Load: Important features of training load [Intensity, Density, Duration and Frequency].**
2. **Principles of Training load, Relationship between load and adaptation, conditions of adaptation, principles of over load. Causes and symptoms of over load, tackling of over load.**
3. **Training plans long term and short term plans,**
4. **Periodisation (Single double and triple). Cyclic process of training. Training session.**

UNIT-III

Training for Important Motor Components

1. **Strength – Forms of strength, characteristics of strength,, principle of strength, strength training, means and methods, strength training for children and women.**
2. **Endurance – Forms of endurance, characteristics of endurance, endurance training, means and methods.**

UNIT-IV

1. **Flexibility – Form of Flexibility, Methods of development of flexibility.**
2. **Coordinative abilities – Characteristics of coordination abilities, importance of coordinative abilities. Classification of coordinative abilities, Training means and methods.**
3. **speed – form of speed, characteristics of speed, basis of speed, training means and method.**

UNIT-V

1. **Planning and organization of training, Importance of Planning, Principles of planning, Contents for various periods of training.**
2. **Evaluation of training, Items to be included in evaluation programme, Forms of diagram and graphical presentation for evaluation and checking progress.**

Semester II: Paper II

Biomechanics

UNIT-I

Introduction

1. **Meaning of Bio-mechanics, Bio-mechanics in Physical Education, Sports and Research**
2. **Fundamental Skills - Basic and Specific**
3. **Movement Analysis - Kinensiological Analysis, Mechanical Analysis and Bio-mechanical Analysis.**

UNIT-II

1. **Linear, angular and general motion**
2. **Distance and Displacement (Linear and Angular)**
3. **Space and Velocity (Linear and Angular) Acceleration (Linear and Angular Uniform Motion)**
4. **Units of Relationship of Linear and Angular motion, Centrifugal and Centripetal Forces**
5. **Newton's Laws of motion as applicable to Linear and Angular Motion.**
6. **Lever and its application.**

UNIT-III

1. **Force – Meaning, Units of Force, Effects of Force, Sources of Force, Components and Resultant, Friction Pressure.**
2. **Work, Power and Energy**
3. **Movement of Force, Movement of Inertia**

UNIT-IV

1. **Freely falling bodies, Projectiles, Momentum and Impact**
2. **Stability (Static and Dynamic), Initiating Rotation in the Air.**
3. **Spin, Impact and Elasticity.**
4. **Fluid Mechanics, Air Resistance and Water resistance.**

UNIT-V

1. **Analysis of fundamental skills – Walking Running, Throwing, Lifting, Pulling, Catching and Climbing**
2. **Analysis of Sports Skills of games & sports: Athletics, Basket ball, Volley ball, Badminton, Foot ball, Cricket etc.**

Semester II: Paper IV

Research Process

UNIT-I

Meaning of research, Need and importance and its scope in physical education. Type of research, survey of related literature, need for library search, library sources, Preparation of Bibliography and abstract.

UNIT II

Formulation and development of research problem: location of research problem. Criteria in selecting the research problem. Formulation of hypothesis.

UNIT III

a) **Historical research: scope of historical research in Physical Education. Historical evidence, validity of historical data.**

b) **Philosophical Research: Brief Introduction.**

UNIT IV

Survey studies: Place of survey Research in Physical Education. Tools of survey research, questionnaire and interviews, case studies. Definition of case studies, Importance of case studies. Characteristics of case studies, data collection in case studies.

UNIT V

Experimental Research

a) **Meaning, scope, and nature. Control of experimental factors. Experimental designs.**

b) **Research Proposal and preparation of research report.**

Semester II: Paper III

Statistics and computer

UNIT I

Statistics

Introduction

- **Defintion,Nature and needs of statistics.**
- **Type of statical process – descriptive, comparative, relationship, inferential and predictive.**

The frequency distribution

- **Meaning of raw data, single score and grouped data.**
- **Definition of frequency table; advantages and disadvantages.**
- **Construction of frequency table – Range of score, Number of intervals, intervals size, tabulation of frequency table.**

Measure of central tendency

- **Mean, median, mode – definition and meaning.**
- **Computing mean from ungrouped and grouped data.**
- **Computing median from ungrouped and grouped data.**
- **Mode, Crude mode and computed mode, specific characteristics and uses of measure of central tendency.**

UNIT II

Measure of Variability

- **Range – Quartile deviation : Mean deviation, Standard devaiation, Probable error –-Definition and meaning and Definition.**
- **Computation of Quartile deviation, mean deviations and standard deviation from ungrouped and grouped scores.**
- **Specific characteristics and uses of measure of variability.**
- **Coefficient of variability, meaning and uses of absolute and relative variability.**

Correlation

- **Meaning of correlation**
- **Direction and degree of correlation**
- **Computing correlation using following Methods:**

  Karl Pearson Coefficient Correlation [(Product Moment method) (Ungrouped and Grouped data)]

  Rank Difference Method (Spearman Ranks Method)

- **Level of significance for correlation coefficients.**
- **Probable error and standard error.**

UNIT III

The normal curve.

- **Definition of normal curve.**
- **Principal of normal curve, Properties of normal curve**
- **Binomial Theorem relationship to normal curve**
- **Properties of normal curve**
- **Divergence from normality – skewness and kurtosis.**
- **Scoring scale – Sigma scale, S scale, T scale.**

Hypothesis: Meaning and characteristics

- **Type of Hypothesis : Null and Alternative**
- **Type I and Type II error**
- **Test of significance: Meaning parameter and statistics,Process of testing hypothesis**
- **Test of significance – Large sample (Variables), Fisher's 'Z' distribution.**
- **Test of significance in small sample**

a. **Student 't' distribution**

b. a. **Fisher's Z distribution**

c. b. **F distribution, ANOVA, Post hoc test.**

d. c. **Chi-square Test**

UNIT IV

Basic concepts:

- **Introduction to computer.**
- **History of computers. Input – output Devices, Processors, Memory, storage Devices.**
- **Type of computers, Operating system – Features, Prominent features of Windows, OS.**
- **Working with Internet – its basic concepts, creating mail account sending and receiving mail and attachment.**

UNIT V

- **Working with Microsoft Word (Creating File, Edit, View, Insert, Format, Tools, Table)**
- **Working with Microsoft Excel (Creating File, Edit, View, Insert, Format, Tools, Table)**
- **Working with Microsoft Powerpoints (Creating File, Edit, View, Insert, Format, Tools, Table)**

Practical:

Part A

Assessment of:

1. **Cardiovascular fitness**
2. **Motor fitness**
3. **Motor educability**
4. **Health related fitness**
5. **Strength**
6. **Somatotype**
7. **Body composition**
8. **Body proportion**

PART B

Field Work: a candidate has to conduct one test on at least 10 subject and prepare a report.

Seminar:

2 Seminar to be presented On field work

Semester III: Paper I

Scientific Coaching Methods

UNIT-I

1. **Historical development of coaching schemes in India.**
2. **Philosophy of coaching and qualities of coach.**
3. **Introduction to motor development, stages of motor development.**

UNIT II

1. **Technical preparation – Fundamental methods for the development of technique in sports. Stages of technical development, grounding, causes and correction of faults.**
2. **Tactical preparation – Tactical concepts, methods of tactical training.**

UNIT III

Psychological preparation

1. **Psychology of a coach and his trainees**
2. **Individual differences, psychological potentiality**
3. **Development of will power, stress, anxiety, frustration control**
4. **Planning for competitions. Main and build up competition. Frequency, preparation for competition.**

UNIT IV

1. **Preparation for competition. Competition system. Competition frequency.**
2. **Preparation for competition – Long term and Short term plans.**
3. **Arrangement of training session. Post competition plan.**

UNIT V

1. **Diet for sportsmen during training and pre-post competition, time for diet.**
2. **Use of drugs and their ill effects. Ergogenic aids – its use in competitive sports.**
3. **Talent identification, steps for talent identification.**

Semester III: Paper II

Sports Psychology

UNIT-I

1. **The meaning, nature and scope of sports psychology.**
2. **Development of sports psychology.**
3. **Relationship of sports psychology with other sports sciences.**
4. **Importance of sports psychology for physical education.**

UNIT II

1. **Methods of investigation in sports psychology, its importance.**
2. **Various methods used in sports psychology.**
3. **Different test to be used in sports psychology.**

UNIT III

1. **Growth and development, factor affecting growth and development.**
2. **Individual differences and their influence on physical activity.**
3. **Psychological aspects of action regulation.**
4. **Importance of action regulation in physical activities, psychological characteristics of physical activities.**

UNIT IV

1. **Psychological aspects of competition, psychology of sports competition.**
2. **Psychological characteristics of pre-competition, competition and post competition.**
3. **Motivation, meaning of motive, role of motive, attitudes, interest for physical activity, importance of motivation in peak performance.**

UNIT V

1. **Cognitive process in physical activities, characteristics of cognitive process in sports.**
2. **The importance of perception in physical activities.**
3. **The function of thinking and imagination in physical activity.**
4. **The role of memory in physical activities.**
5. **The importance of attention in sports and its relationship with cognitive process.**

Semester III: Paper III

Sports Medicine

UNIT-I

1. **Definition of sports medicine, it's aims and objectives**
2. **Brief History nature and effect of sports medicine, Physiological, pathological and psychological problems of sportsmen.**
3. **Care and problems of sportsmen; before competition and after competition.**

UNIT II

1. **Nutrition: Athletic nutrition malnutrition, low cost High calorie diet role of vitamins, minerals, salts. Carbohydrate loading.**
2. **Doping: Agents, effect, dope test and sanctions.**

UNIT III

1. **Work capacity under different environmental conditions. Thermoregulation and sports.**
2. **Physique and performance. Somatotypes.**

UNIT IV

1. **Prophylactic health-care. Health related fitness.**
2. **Aging & sports.**
3. **Women in sports. Pregnancy and exercises.**

UNIT V

1. **Common old age problems namely – arthritis, heart diseases and diabetes. Role of exercise in rehabilitation.**
2. **Obesity and weight control.**
3. **Adapted physical Education – Physically & Mentally challenged persons.**

Semester III: Paper IV

Specialization

UNIT-I

Skills, Techniques and strategies:

1. **Advance skills of games / sports.**
2. **Techniques, Tactics and strategies of game / sports.**

UNIT II

Officiating of games / sports.

1. **Rules and their interpretation.**
2. **Mechanics of officiating.**

UNIT III

Play field, Sports bodies and Organization.

1. **Construction, layout and maintenance of play field and equipment.**
2. **Structure and function of Federation and Associations.**
3. **National and International competition.**
4. **Organization of competitions and coaching camps.**

UNIT IV

1. **Skill test, Mechanics of games / sports.**
2. **Analysis of scientific principles applied to different skills / techniques.**

UNIT V

1. **Training Method: for improving the performance in games / sports.**
2. **Training Schedule.**

Semester IV: Paper I

Health education

UNIT-I

1. **Health**
    a. **Concept of health**
    b. **History of health in India**
    c. **Various level of health care in India**
    d. **Role of heredity and genetics in achieving positive health**
2. **Health education**
    a. **Meaning of health education**
    b. **Aim and content of health education**
    c. **Approaches of health education**
    d. **Latest trend in health education**

UNIT-II

1. **School health services**
    a. **Meaning and objectives of school health services and school health programs aspect of school health services**
        i. **Health appraisal**
        ii. **Medical examination**
        iii. **Common childhood diseases and their control**
        iv. **First aid and accident preventions**
        v. **Nutritional services**
        vi. **Mental health, dental health and eye health**
        vii. **School health records**
2. **Healthful school environment**
    a. **Meaning of healthful school environment**
    b. **Point to be kept in mind for healthful school environment**
    c. **Role of physical education teacher**

3. **Role of Physical education teacher in relation to school health services and healthful school environment.**

UNIT-III

1. **Community and environmental sanitation**
    a. **Housing**
    b. **Pollution, light, noise and temperature**
        i. **Population policy, population dynamic and population explosion**
        ii. **National family welfare program**
        iii. **Sex education**

UNIT-IV

1. **Communicable diseases**
    a. **Meaning of epidemiological approach of communicable diseases brief description of following communicable diseases and their prevention**
        i. **Tuberculoses**
        ii. **Chicken pox, measles, mumps**
        iii. **Malaria and filarial**
        iv. **Rabies**
        v. **STD and AIDS**
        vi. **Hepatitis (Jaundice)**

UNIT-V

1. **Non-communicable diseases**
    a. **Meaning of non communicable diseases**
    b. **Brief description of following non communicable diseases and their prevention: Heart diseases, Cancer, diabetes**

Semester IV: Paper II

Psychology of coaching and counseling

UNIT-I

Psychological assessment of the players, capacity of the player psychological preparation for pre, during and post competition. Pep talk, Self confidence. Emotional maturity. Emotional intelligence.

UNIT-II

Counseling process introduction. Preparation for counseling.

a. **Readiness**
b. **Pre counseling interview**
c. **Case history**
d. **Process of counseling**
e. **The first interview**
f. **Reassurance**
g. **Winning confidence**
h. **Advising**

Counseling relationship – content and process. Physical setting. Privacy value orientation. Acceptance. Understanding. Report. Communication and empathy. Attentiveness. Counseling relationship. Counseling process.

UNIT-III

Psychological testing and diagnosis – introduction. Limitation of the use of psychological tests. Type of psychological tests. Test used in counseling situations. Test interpretation in counseling. Not – test client appraisal techniques. Autobiography. Anecdotal records. Rating Scale. Cumulative records. Pupil data questionnaires. Case studies. Psychodiagnostics, limitation of diagnosis. Common diagnostic classification systems in counseling.

UNIT-IV

Counseling interview – introduction, interviewing its essential aspects association of ideas contained within interview. Shifts in conversation, Opening and closing remark, recurrent reference, Inconsistencies and gaps. Review, Non verbal communication in interview. Counselee. Counsellof relationship. Interviewing techniques in counseling. Structuring the counseling relationship degree of lead, silence. Relationship techniques. Sharing of experience.

UNIT-V

Group counseling – Introduction. Case for group counseling, emerging field of group counseling. Structuring groups, limitation and assumptions of group counseling. Mechanisms of group counseling. Types of groups. Group counseling – its value. The

process of group counseling. Individual and group counseling similarities. Differences between individual and group counseling.

Special areas in counseling – Introduction, family group consultation

Counseling families. Counseling with parents, counseling the delinquent, counseling reluctant clients, structuring. Counseling women.

Semester IV: Paper III

Sports physiotherapy

UNIT-I

Introduction

1. **Review of anatomy and physiology of various muscles, joints and their function and action, physiological changes due to exercise – cardio-respiratory muscles, nervous systems.**
2. **Causes of injuries – intrinsic, excentric factors**
3. **Types of sports injury**
4. **Load deformation curve, response to stress, inflammation healing.**

UNIT-II

Common regional injuries

1. **Mechanism of injury clinical feature of injuries**
2. **Injuries of head, neck and face**
3. **Injury involving upper limbs**
4. **injuries involving thorax, abdomen and back**
5. **injuries involving lower limbs**

UNIT-III

Common sports injuries

1. **Common injuries found in various sports**
2. **Mechanism of injuries in various sports activity**
3. **Basic on field assessment and management, RICE, first aid, moving the injured athlete**
4. **Bandaging, crape.**

UNIT IV

1. **Injury management & rehabilitation**

    (a) Cryotheraopy

(b) Electrical modulating SWD, TENS, IFT,US,LASER

(c) Exercise therapy- flexibility, strengthening endurance, neuromuscular co-ordination, CVR-Stages of rehabilitation, criteria to returr to sports.

(d) Various factors to be considered during injury-psychological nutrition, time, ecomomice.

UNIT-V

1. **Sports massage**
2. **Core stability**
3. **Protective equipment**
4. **Injury in children, women and elderly**

Practical demonstration

1. **Uses of crape bandage, banding technical**
2. **Electrical modulation**
3. **Use of thera band, exercise ball, Medicine ball**
4. **Visit to health club / fitness camps**
5. **Visit to sauna bath / steam bath**

Semester IV: Paper IV

Foundation of physical education and current trends

UNIT-I

Philosophical foundation of physical education

1. **Idealism**
2. **Pragmatism**
3. **Naturalism**
4. **Existentialism and other philosophies**

UNIT-II

1. **Journalism & Sports journalism**
    a. **Meaning, concept, scope**
    b. **Basic principles of sports reporting, source of sports news**
    c. **News gathering process**
2. **Reporting for print media and electronic media**
3. **Editing, writing for various media**
4. **Layout and design for print media**

UNIT-III

Adapted physical education

1. **Introduction to adapted physical education – meaning, definition, aims and objectives.**
2. **Classification of disabilities**
3. **Development of adapted physical education program**
    a. **Guiding principles**
    b. **Special adapted physical education program for different categories**

UNIT-IV

Communication skills. Types of communication. Methods of communication. Official communication. Reports, minutes and agenda. Circular, notice, office orders, note sheet and memo etc.

Press release, media conferencing and invitation

Verbal and non verbal communication

UNIT-V

Yoga and fitness

Yoga and fitness,

Introduction to Yog, concept, meaning and definition. Importance of Yog, benefits of yog asanas and Pranayam

Meaning , Definition and Types of fitness, Components of fitness and assessment of fitness

Practical: Physiological and Psychological assessment

Part A

Physiological assessment of:

1. **Heart Rate**
2. **Respiratory Rate**
3. **Peak flow Rate**
4. **Hemoglobin**
5. **Blood Pressure**
6. **Nutritional Assessment**
7. **Somatotype**

PART B

Psychological assessment:

1. **Paper pencil test**
2. **Psychomotor test**

Field Work: a candidate has to conduct one test on at least 10 subject and prepare a report.

Seminar: 2 Seminar to be presented on field work

Ph.D Course work Syllabus for Physical Education, Research Process & Statistics

Unit I

1. Meaning, Nature, Need and Scope of Research in Physical Education.
2. Types of Research. Research Method vs. Research methodology,
3. Planning of statistical enquiry.
4. Collection of data – Primary and Secondary

Unit II

1. Population and Sampling, Types of sampling. Different methods of Sampling.
2. Research Design.
3. Control of Experimental Variables/Groups, Control Groups and Factors

   Affecting Experimental Outcome – Subjects, Age, Sex, Physiological,

   Psychological Variables etc.

Unit III

1. Dispersion and Skewness- Mean deviation, Standard deviation, Coefficient of variation and coefficient of variation.
2. Coefficient of correlation- Carl- Pearson method, Spearman's ranking method.
3. Regression- Simple and Multiple regressions up to three variables.
4. Standard error of estimate.

Unit IV

1. Hypothesis- Meaning of hypothesis, formulation of hypothesis, Characteristics of a good hypothesis, Type I and Type II error
2. Testing of hypothesis
3. Test of significance- Parametric't' test, 'F' ratio, ANOVA, Post-hoc test, nonparametric Chi square test,.
3. Theoretical frequency Distribution- Normal distribution

Unit V

1. Introduction of computer Organization and architecture Types of Computers, Different parts of computers Input Output Devices. Processors. Memory, Storage Devices.
2. Use of computers in research- Statistical packages and Co state.
3. Working with Microsoft Word [Creating File, Edit, View, Insert, Format, Tools, Table]
4. Working with Microsoft Excel [Creating File, Edit, View, Insert, Format, Tools, Table]
5. Working with Microsoft Power Point Presentation [Creating File, Edit, view, Insert, Tools Slide Show]
6. Working With Internet – its basic concept, creating mail account sending & receiving mail and attachment.
7. Knowledge of SPSS.

SCHEME OF EXAMINATION
&
SYLLABUS
of
M.Sc. (PHYSICS)
UNDER

FACULTY OF SCIENCE

Approved by Board of Studies in Physics

EFFECTIVE FROM JULY 2019

School of Studies in Physics & Astrophysics
Pt. Ravishankar Shukla University
Raipur (C.G.) 492010
PH: - 0771-2262864
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Approved by Board of Studies in Physics on 18, January 2019
PT. RAVISHANKAR SHUKLA UNIVERSITY, RAIPUR

M. Sc. - PHYSICS

M.Sc. in Physics is a full time 2-year (4-semesters course). There will be four theory papers, and two laboratory courses/project in each semester. In each semester, there will be two internal examinations/assessments. Semester-wise course structure along with distribution of marks is given below:

Semester I

Name of the Paper	Marks				Total	Credits
	Theory		Internal			
	Max	Min	Max	Min		
1. Mathematical Physics	80	16	20	04	100	4
2. Classical Mechanics	80	16	20	04	100	4
3. Electrodynamics & Plasma Physics	80	16	20	04	100	4
4. Electronics	80	16	20	04	100	4
A : General & Optics	-		-		100	2
Laboratory Course I-B : Electronics	-		-		100	2
Total Marks					600	20

Total Marks for Semester I = 600 & Credit = 20

Semester II

Name of the Paper	Marks					Credits
	Theory		Internal		Total	
	Max	Min	Max	Min		
1. Quantum Mechanics-I	80	16	20	04	100	4
2. Statistical Mechanics	80	16	20	04	100	4
3. Electronic & Photonic Devices and Optical Modulators	80	16	20	04	100	4
4. Computational Physics & Computer Programming	80	16	20	04	100	4
Laboratory Course II-A : Numerical Analysis & Computer Programming	-		-		100	2
Laboratory Course II-B : Digital Electronics & Microprocessor	-		-		100	2
Total Marks					600	20

Total Marks for Semester II = 600 & Credit = 20

Semester III

Name of the Paper	Marks					Credits
	Theory		Internal		Total	
	Max	Min	Max	Min		
1. Quantum Mechanics-II	80	16	20	04	100	4
2. Atomic & Molecular Physics	80	16	20	04	100	4
3. Solid State Physics-I	80	16	20	04	100	4
4. (A) Astronomy & Astrophysics-I (B) Electronics (Communication)-I (C) Physics of Nano-material-I (D) Space Physics-I	80	16	20	04	100	4
Laboratory Course III-A Materials Science & General	-		-		100	2
Laboratory Course III-B : Astronomy & Astrophysics **OR** : Electronics (Communication) **OR** : Physics of Nano-material **OR** : Space Physics	-		-		100	2
Total Marks					600	20

Total Marks for Semester III = 600 & Credit = 20

Semester IV

Name of the Paper	Marks					Credits
	Theory		Internal		Total	
	Max	Min	Max	Min		
1. Nuclear & Particle Physics	80	16	20	04	100	4
2. Laser Physics and Applications	80	16	20	04	100	4
3. Solid State Physics -II	80	16	20	04	100	4
4. (A) Astronomy & Astrophysics-II (B) Electronics (Communication)-II (C) Physics of Nano-material-II (D) Space Physics-II	80	16	20	04	100	4
Project Work	-		-		200	4
Total Marks					600	20

Total Marks for Semester IV = 600 & Credit = 20

In Each Semester

MAXIMUM MARKS TOTAL	PASS PER TH.	PR.
600	36	36

In semester IV, Project work in Solid State Physics/ Astronomy & Astrophysics/ Electronics/ Physics of Nano-materials/ Space Physics will lead to specialization in the respective area. It will be primarily based on research oriented topics. On completion of the project, student will submit project report in the form of dissertation which will be examined by an external examiner. The examination of project work shall consist of (a) Presentation and (b) comprehensive viva-voce.

Marks-distribution for Laboratory Courses and Project Work:

(a) Laboratory courses (Semesters I-III):

Sessional	: 20 Marks
Viva	: 20 Marks
Experiment	: 60 Marks

(b) Project Work (Semester IV) :

Report – Dissertation	: 60 Marks
Presentation	: 100 Marks
Comprehensive viva-voce	: 20 Marks
Internal assessment	: 20 Marks

Note: Paper IV of both Semesters III and IV is a major elective course. Student has to opt for any one of the courses: (A) or (B) or (C) or (D). The commencement of any one of the major elective paper is subjected to the availability of basic infrastructural facilities viz. expert faculty, laboratory etc.

Detailed Course Content

Semester - I

PAPER-I: MATHEMATICAL PHYSICS

Unit-I: Vector space and Matrices, Linear independence, Bases, dimensionality, Inner product, Linear transformation, matrices, Inverse, Orthogonal and Unitary matrices, Independent element of a matrix, Eigen values and eigen Vectors, Diagonalization, Complete orthonormal sets of functions.

Unit-II: Complex Variables: Cauchy- Riemann condition, analytic functions,Cauchy's theorem, Cauchy integral formula, Laurent series, singularities, residue theorem, contour integration, evaluation of definite integrals, problems.

Unit-III: Differential equations, first order differential equation, second order differential equation with constant coefficients, second order linear ODEs with variable coefficients, Solution by series expansion, nonhomogenous differential equations and solution by the method of Green's functions.

Unit-IV: Special functions, Legendre, Bessel, Hermite and Laguerre functions with their physical applications, generating functions, orthogonality conditions, recursion relations,

Unit-V: Integral transforms, Fourier integral and transforms, inversion theorem, Fourier transform of derivatives, convolution theorem, Laplace Transform(LT), LT of Derivatives, Inverse LT, Fourier series; properties and applications, discrete Fourier transform.

TEXT AND REFERENCE BOOKS

1. Mathematical Methods for Physics, by G. Arfken.
2. Matrices and Tensors for Physicist, by A. W. Joshi.
3. Advanced Engineering Mathematics, by E. Kroyazig.
4. Special Functions, by E. B. Rainville.
5. Special Functions, by W.W. Bell.
6. Mathematical Method for Physicist and Engineers, by K. F. Relly, M. P. Hobson and S. J. Bence
7. Mathematics for Physicists, By Marry L. Boas.

Paper - II: CLASSICAL MECHANICS

Unit-I Preliminaries, Newtonian mechanics of one and many particle systems, Conservation laws,Constraints & their classification, Principle of virtual work, Generalized coordinates, D'Alembert's principle and Lagrange's equations, Velocity-dependent potentials and dissipation function, Simple applications of the Lagrangian formulation, Hamilton's principle, Lagrange's equations from Hamilton's principle, Conservation theorems and Symmetry properties, Energy function and the conservation of energy.

Unit-II The Hamiltonian formulation of mechanics, Legendre transformations and the Hamilton's equations of motion, Cyclic coordinates and Conservation Theorems, Hamilton's equations from Hamilton's principle, The principle of least action, Simple applications of the Hamiltonian formulation.

Unit-III Canonical transformations with examples, The harmonic oscillator, Poisson's brackets, Equations of motion and conservation theorems in the Poisson Bracket formulation. Hamilton-Jacobi (HJ) theory: The HJ equation for Hamilton's principal function, Harmonic oscillator as an example of the HJ method, The HJ equation for Hamilton's characteristic function, The action-angle variables

Unit –IV The Central force: Two-body central force problem and its reduction to the equivalent one-body problem, The equations of motion and first integrals, The equivalent one-dimensional problem and classification of orbits, The differential equation of the orbit, Closure and stability of orbits, The Kepler problem, Scattering in a central force field: Rutherford scattering.

Unit – V Rigid body dynamics, The Euler angles, Euler's theorem on the motion of a rigid body, Rate of change of a vector, The Coriolis force, Angular momentum and Kinetic energy of motion about a point, The Euler equations of motion of rigid bodies. Formulation of the problem of small oscillations, The eigen-value equation and the principal axis transformation, Frequencies of free vibration and normal coordinates, Free vibration of linear triatomic molecule.

TEXT AND REFERENCE BOOKS

1. Classical Mechanics, By N.C. Rana and P.S. Joag (Tata McGraw-Hill, 1991)
2. Classical Mechanics, by H.Goldstein (Addison Wesley, 1980)
3. Classical Mechanics, by H.Goldstein, C Poole & J Fafko (Pearson Education, Inc, 2002)
4. Mechanics, by A.Sommerfeld, (Academic press, 1952)
5. Introduction to Dynamics by Perceival and D.Richaeds(Cambridge University, press, 1982).

Paper-III: ELECTRODYNAMICS & PLASMA PHYSICS

Unit-I Maxwell's equations, vector and scalar potentials and the wave equation, Gauge transformations, Lorenz gauge, Coulomb gauge, Green function for the wave equation, four-vectors, mathematical properties of the space-time in special relativity, matrix representation of Lorentz transformation, covariance of electrodynamics, transformation of electromagnetic fields.

Unit-II Radiation by moving charges, Lienard-Wiechert potential and fields for a point charge, total power radiated by an accelerated charge- Larmor's formula and its relativistic generalization, angular distribution of radiation emitted by an accelerated charge, radiation emitted by a charge in arbitrary extremely relativistic motion, distribution in frequency and angle of energy radiated by accelerated charge.

Unit -III Bremsstralung: emission from single-speed electrons, thermal Bremsstralung emission and absorption, Synchrotron radiation: spectrum of synchrotron radiation, spectral index for power law electron distribution, transition from Cyclotron to Synchrotron emission, Cherenkov radiation

Unit-IV Plasma: definition, Debye shielding phenomenon and criteria for plasma, motion of charged particles in electromagnetic field; Uniform E & B fields, Electric field drift, Non-uniform magnetostatic field, Gradient B drift, Parallel acceleration and magnetic mirror effect, Curvature drift, adiabatic invariants.

Unit-V Elementary concepts of plasma kinetic theory, the Boltzmann equation, the basic plasma phenomena, plasma oscillations. Fundamental equations of magneto-hydrodynamics (MHD), Hydrodynamics Waves; Magneto sonic and Alfven waves, Magnetic viscosity and magnetic pressure, plasma confinement schemes.

REFERENCE BOOK:

1. Jackson, classical electrodynamics.
2 Rybicki & Lightman: Radiative Processess in Astrophysics
2 Panofsky and Phillips: Classical electricity and magnetism.
3 Bittencourt, Plasma physics.
4 Chen: Plasma physics.

Paper - IV: ELECTRONICS

Unit-I Operational Amplifier- Basic Op.Amp. Differential amplifier, the emitter coupled Difference Ampl, Transfer characteristics of a Diff. Ampl., an example of an IC Op.-Amp., off set error voltage and currents, measurement of Op.-Amp. Parameters, frequency response of Op-amp.Linear analog systems: Basic Op.-Amp. Applications, Analog integration and differentiation, Electronic analog computation, Non-linear analog systems: Comparators, Waveform generators.

Unit-II Combinational Logic –Basic logic gates: OR, AND and NOT gates, NOR and NAND gates, Boolean algebra, DeMorgan's theorems, exclusive OR gate, characteristics of logic families, saturated logic families: RTL, DCTL, non-saturated logic families: TTL and ECL, Unipolar logic families.

Unit -III Sequential Logic, Flip-flops: RS Flip-flop, level clocking, Edge triggered Flip Flops, D Flip flops. JK Flip-flops, J.K.master slave Flip-flops, Registers: buffer, shift and control shift registers, counters: ripple synchronous & ring counters, tri-state registers, Buffer: controlled buffer Register, Bus organized structure, Latch, multiplexer, Demultiplexer, decoder, ALU Memories: RAM, ROM, PROM, EPROM, A/D and D/A converters.

Unit-IV Microprocessors – Building concept of microprocessors, developing inside of microprocessor , Instruction codes ,Instruction Register ,Introducing RESET Pin, Introducing on chip oscillator, Interfacing I/O devices, Introducing Interrupt lines :Stack,Push,Pop operation ,delay in servicing interrupts, multiply interrupts, location for interrupts .Introducing slow and fast data transfer, Status of microprocessor, interrupt pins, General purpose Register, flag Register, Increment/decrement register. Features of 8085 microprossor. Pin diagram of 8085, block diagram of 8085. CPU of a microprocessor, timing and control, system timings and interrupt timings of 8085, registers in 8085, interfacing memory and I/O devices- a preliminary ideas.Number system, Floating Point notation.

Unit – V Instructions set of 8085, types of instructions- Data transfer group, Arithmetic logic, branch group, stack I/O machine control group, addressing mode of Intel 8085, examples of Assembly language programs of 8085, summing of two 8-bit numbers to result a 16-bit number, summing two 16-bit number, multiplying two 8-bit number to result a 16-bit product, block transfer of data from one memory block to other, BCD to hexadecimal data, finding the largest number in a series.

Text and reference books

1. Integrated Electronics: J.Millman R.C.C.Halkias.
2. Electronics devices and circuit theory, by Robert Boylested and Louis Nashdaky PHI, New Delhi-110001, 1991.
3. Operational amplifier linear integrated circuits, by Romakanth A. Gayakwad PHI, second edition 1991.
4. Digital computer electronics- An introduction to microcomputers-A.P.Malvino.
5. Digital finances and applications, by A.P. Malvino and Donald P.Leach, Tata

McGraw Hill company, New Delhi 1993.
6. Microprocessor architecture, programming applications with 8085/8086 by Ramesh S.Gaonkar, Willey-Eastern limited 1987.
7. Introduction to microprocessors – A.P.Mathur (Tata McGraw).
8. Microprocessors-Theory and applications- M.Hafiquizzaman (Prentice hall).
9. Microprocessors fundamentals- Schanmi Outling Service Author Pocer L.Tokheim.
10. Integrated circuits : K KBotkar(Khanna publications)
11. Digital Electronics : R P Jain (Tata McGraw Hill)
12. Microprocesss : B Ram
13. 8-bit microprocessor : V.J.Vibhute & P.B. Borole(Tecn-Max Publication, Pune)

Laboratory Course

Lab I-A: General & Optics (Any ten)

1. Determination of band gap of semiconductor by four prob method.
2. Measurement of Hall Coefficient of given semiconductor: identification of type of semiconductor and estimation of charge carrier concentration.
3. Determination of wavelength of mercury light by constant deviation spectrometer using Hartmann formula.
4. Ultrasonic velocity in a liquid as a function of temperature using ultrasonic interferometer.
5. Experiment on transmission line (A) Determination of characteristics impedance, (B) Study of voltage distribution.
6. Determination of the Curie temperature of ferromagnetic material.
7. Determination of forbidden gap of a diode by plotting reverse saturation current as a function of temperature.
8. Determination of operating voltage and study the characteristics of a GM tube.
9. Determination of operating voltage of a GM tube and determine the linear absorption coefficient.
10. Determination of operating voltage of a GM tube and verify inverse-square law.
11. Determination of short half life of a given source which can be obtained from a mini generator or produced with a neutron source by activation.
12. X-ray diffraction by Telexometer.
13. Determination of ionization potential of Lithium/Mercury.
14. Determination of e/m of electron by Normal Zeeman Effect using Febry -Perot Etalon.
15. Determination of Dissociation energy of iodine (I_2) Molecule by photography, the absorption bands of I_2 in the visible region.
16. Measurement of wavelength of He-Ne Laser light using a ruler and thickness of thin wire by the laser.
17. To study Faraday Effect using He-Ne Laser.

Lab I-B: Electronics (Any ten)

1. Design & Study of Regulated Power supply.
2. Study of Transistor Amplifiers in CE, CB, and CC modes.
3. Study of Transistor Bias Stability.
4. Study of Astable, Monostable and Bistable Multivibrator.
5. Study of Silicon Controlled Rectifier.
6. Experiment of Uni – Junction Transistor and its application.
7. Experiment of FET and MOSFET characterization and application as an amplifier.
8. Study of Differential. Amplifier.
9. Basic Logic gates and verification of their Truth- Tables.
10. Combinational logic gates and verification of De-Morgan's Theorem.
11. Study of Basic Operational Amplifier (741).
12. Study of Opto- Electronics Devices.

Semester – II

PAPER - I : QUANTUM MECHANICS-I

Unit - I Inadequacy of classical mechanics, Plank quantum hypothesis and radiation law, Photoelectric effect, de-broglie's theory. Schrödinger equation, continuity equation, Ehrenfest theorem, admissible wave functions, general formalism of wave mechanics, representation of states and dynamical variables, stationary states, one-dimensional problems; walls and barriers, Schrödinger equation for harmonic oscillator and its solution.

Unit –II Superposition principle, uncertainty relations, states with minimum uncertainty product, commutation relationship, completeness and normalization of eigen functions, Dirac-delta function, Bra & Ket notation, matrix representation of an operator, harmonic oscillator and its solution by matrix method, Heisenberg equation of motion.

Unit -III Angular momentum in quantum mechanics, commutation relationships, eigen values, Spin angular momentum, Pauli's matrices, addition of angular momentum, Clebsch-Gordon coefficients.

Unit – IV Central force problem, spherically symmetric potentials in three dimensions, separation of wave equation, parity, three-dimensional square-well potential and energy levels, the hydrogen atom; solution of the radial equation, energy levels and stationery state wave functions, discussion of bound states, degeneracy.

Unit –V Time- independent perturbation theory, non-degenerate case, first order and second perturbations with the example of an oscillator, degenerate cases, removal of degeneracy in second order, Zeeman effect without electron spin, first-order Stark effect in hydrogen, perturbed energy levels, correct eigen function, occurrence of permanent electric dipole moments.

TEXT AND REFERENCE BOOKS:

1. L.I. Schiff: quantum mechanics (McGraw-Hill).
2. S.Gasiorowicz, Quantum Physics (Wiley).
3. Landau and Lifshitz : Non-relativistic quantum mechanics.
4. B.Craseman and Z.D.Powell: quantum mechanics (Addison Wesley)
5. A.P. Messiah: Quantum Mechanics.
6. J.J. Sakurai : Modern Quantum Mechanics.
7. Mathews and Venkatesan : Quantum Mechanics.

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PAPER – II: STATISTICAL MECHANICS

Unit-I Foundation of statistical mechanics : macroscopic and microscopic states, contact between statistics and thermodynamics, physical significance of $\Omega(N, V, E)$, the classical gas, entropy of mixing and Gibb's paradox, phase space of classical system, Liouville's theorem and its consequences, quantum states and phase space.

Unit- II Elements of ensemble theory – A system in microcanonical, canonical, and grand canonical ensembles, partition functions, physical significance of statistical quantities, example of classical system, energy and energy-density fluctuations and mutual correspondence of various ensembles.

Unit -III Formulation of quantum statistics – Quantum mechanical ensemble theory, density matrix, statistics of various quantum mechanical ensembles, system composed of indistinguishable particles.
Theory of simple gases –Ideal gas in various quantum mechanical ensemble, Maxwell-Boltzmann, Bose-Einstein, Fermi-Dirac distributions, statistics of occupation number.

Unit - IV Ideal Bose and Fermi gases -Thermodynamic behavior of an ideal Bose gas, Bose-Einstein condensation and, elementary excitations in liquid helium II, Thermodynamic behavior of an ideal Fermi gas, the electron gas, nonrelativistic and relativistic degenerate electron gas, theory of white dwarf stars.

Unit -V Statistical Mechanics of interacting systems – the method of cluster expansion for a classical gas, Virial expansion of the equation of state. Theory of phase transition – general remark on the problem of condensation, Fluctuations: thermodynamic fluctuations, Spatial correlation in a fluid Brownian motion: Einstein Smoluchowski theory of Brownian motion.

TEXT & REFERENCE BOOKS –

1. R. K. Pathria, Statistical Mechanics (Pergamon Press).
2. L. D. Landau & E. M. Lifshitz (Butter worth and Heinemann Press).
3. Federick Reif, Fundamental of statistical and thermal physics (McGraw-Hill publishers).
4. Kerson Huang, Statistical Mechanics (Wiley Eastern).

PAPER –III: ELECTRONIC & PHOTONIC DEVICES AND OPTICAL MODULATORS

Unit – I: Special Bipolar devices: Thyristors- the four-layer diodes and their basic characteristics, Shockley diode, three terminal thyristor, Diac & Triac, SCR, UJT, Field controlled Thyristors.

Unit- II: Unipotar Devices : JFET, MESFET and MOSFET, basic structure, working and device I-V characteristics, small signal equivalent circuit for Microwave performance Introduction to MIS and MOS diodes, charge coupled devices (CCDs), basic structure and working principle , MOSFET-basic device characteristics, types of MOSFET.

Unit-III: Special Microwave Devices: Tunnel diode and backward diode- basic device characteristics, IMPATT diodes and their static and dynamic characteristics, Transfer electron devices- transferred electron effect, Gunn diodes.

Unit-IV : Photonic Devices : Radiative transitions, LEDs, Visible and infrared SC lasers; Photo detectors; Photo conductor, & Photodiode, Solar cells, Solar radiation and ideal conversion efficiency, p-n junction solar cells, Hetero junction. Interface thin film solar cells.

Unit -V: Optical Modulators and Display Devices :Modulation of light- Birefringence, Optical activity, Electro-optic, Magneto-optic and Acoustic- optic effects, Materials exhibiting these properties, Non-linear optics.Display devices: Luminescence, Photo-luminescence, Electro-luminescence, Liquid crystal displays, Numeric displays.

TEXT & REFERENCE BOOKS-

1. Semiconductor Devices – Physics and Technology, by S M Sze ,Wiley (1985)
2. Introduction to semiconductor device, M.S. Tyasi, John Wiley and sons
3. Measurement, Instrumentation and experimental design in physics and engineering by M.Sayer and A.Mansingh, Prentice Hall India 2000
4. Optical electronics by Ajay Ghatak and K.Thyagarajah, Cam.Univ. Press.
5. Opto electronics – An introduction: J.Wilson and JFB Hawkes (Eastern Economy Edition).
6. Optical Communications: J.H. Franz and V.K. Jain (Narosa).

PHYSICS COMPUTER

PAPER – IV: COMPUTATIONAL ~~METHODS~~ AND PROGRAMMING

Unit –I Methods for determination of zeroes of linear and nonlinear algebraic equations and transcendental equations, convergence of solutions. Solution of simultaneous linear equations, Gaussian elimination, pivoting, iterative method, matrix inversion.

Unit –II Finite differences, interpolation with equally spaced and unevenly spaced points, curve fitting, polynomial least squares and cubic spline fitting. Numerical differentiation and integration, Newton-Cotes formulae, error estimates, Gauss method.

Unit –III Numerical solution of ordinary differential equations, Euler and Runga-Kutta methods, predictor-corrector method, elementary ideas of solutions of partial differential equations.

Unit- IV Elementary information about digital computer principles, compilers, interpreters and operating systems(Windows/Linux) Fortran programming, flow charts, integers and floating point arithmetic, expressions, built in functions.

Unit-V Executable and non-executable statements, assignments, control and input-output statements, subroutines and functions; The statement functions, main features of functions and subroutines ,subprogram, function subprogram, overall structure of FORTRAN programe, external statement, subroutine subprogram ,common statement, equivalence statement, operations with files-open and close statement, Format statements, field specifications.

TEXT AND REFERENCE BOOKS

1. Sastry: Introductory Methods of Numerical Analysis.
2. Rajaraman: Numerical Analysis.
3. Antia: Numerical methods.
4. Raja Raman: FORTRAN programming.

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Laboratory Course

LabII-A: Numerical Analysis & Computer Programming (Any ten)

1. To solve simultaneous Linear equation by Gauss Elimination method.
2. To calculate the root of a transcendental equation by Newton – Raphsons method.
3. Solving the system of linear simultaneous equation by Gauss Serdel method.
4. Numerical Integration by Simpson's 1/3 Rule.
5. Solving simultaneous Linear equation by Gauss-Jordon method.
6. Solution of Differential equation by Euler's Method.
7. To invert a given matrix by Gauss-Jordon Method.
8. Solution of Differential equation by Runga Kutte Method.
9. To fit the given data in a straight line by linear regression Method.
   a) WAP to find the Largest of n number of series.
   b) To calculate the standard deviation of a given set of data.
10. To write a program to compute the complex roots of a given polynomial of N^{th} degree by Grafffe's Method.
11. To write a program to compute the Eigen values of a given matrix.
12. To integrate a given function by: (a) Trapezoidal method or by (b) Gauss Quadrature.
13. To find solutions of Ist order, ordinary differential equation by Taylor method

Lab II-B: Digital Electronics & Microprocessor (Any ten)

1. Study of R-S, D/T, J-K Flip-Flops.
2. Study of counters: Ripple, Mode 3, Mode 5 counters.
3. Study of Shift Register.
4. Study of R-2R D/A Converter.
5. Study of Random Access Memory (RAM) Read Only Memory. (ROM)
6. Study of A/D Converter.
7. Experiment with Microprocessor:- I
   (a) Convert BCD in to HEXADECIMPL
   (b) To transfer group of date blocks from one location to another location.
8. Experiment with microprocessor: - II
   (a) To write programs for addition of two 1 byte data giving results of 2 bytes.
   (b) To write programs for multiplication of two 1 byte data giving results of 2 bytes.
9. (a) To add 2 16-BIT numbers stored in locations from x x x x to x x x x + 3 and add them store the results from x x x x + 4 to x x x x+6 memory location
   (b) To find the largest of n numbers of a series.
10. To arrange N numbers in an ascending orders.
11. Experiments with Microprocessor.
    (a) Convert BCD in to binary and vice-versa.
    (b) To transfer group of data blocks from one location to another location.
    (c) To write programs for addition of two 1byte data giving result of 2byte data
    (d) To write programs for multiplication of two 1 byte data giving result of 2byte data.
12. Logic gate study DTL and RTL.
13. Study of adder/Subractor.

Semester – III

PAPER –I: QUANTUM MECHANICS -II

Unit-I Variational method, expectation value of energy, application to excited states, ground state of He-atom, Zero point energy of one dimensional harmonic oscillator, Vander-waals interaction, the W.K.B. approximation, approximate solutions, asymptotic nature of the solution, solution near turning point, connection formulae, energy levels of a potential well and quantization rule.

Unit -II Theory of scattering: differential and total scattering cross section, wave mechanical picture of scattering & the scattering amplitude, Green's functions and formal expression for scattering amplitude, The Born approximation and its validity, Partial wave analysis, asymptomatic behavior of partial waves and phase shifts, optical theorem, scattering by a square well potential, scattering by a hard sphere, scattering by a Coulomb potential..

Unit – III Time-dependent perturbation theory, first order perturbation, Harmonic perturbation, Fermi's Golden rule, Ionization of a H-atom, absorption and induced emission, Selection rules. Identical particles, symmetric and anti symmetric wave functions

Unit –IV Relativistic quantum mechanics, formulation of relativistic quantum theory, the Klein-Gordon equation; plane wave solutions, charge and current densities, The Dirac equation for a free particle, matrices alpha and beta, Lorentz covariance of the Dirac equation, free particle solutions and the energy spectrum, charge and current densities.

Unit-V The spin of the Dirac particle, Dirac particle in electromagnetic fields and the significance of the negative energy state, Dirac equation for a central field : Spin angular momentum, approximate reduction, spin –orbit energy, separation of equation, the hydrogen atom, classification of energy levels and negative energy states.

TEXT AND REFERENCE BOOKS –

1. L.I. Schiff: Quantum Mechanics (McGraw-Hill).
2. S.Gasiorowicz: Quantum Physics (Wiley).
3. Landau and Lifshitz : Quantum Mechanics.
4. B.Craseman and Z.D.Powell : Quantum Mechanics (Addison Wesley)
5. A.P. Messiah: Quantum Mechanics.
6. J.J. Sakurai: Modern Quantum Mechanics.
7. Mathews and Venkatesan: Quantum Mechanics.
8. Bjorken and Drell : Relativstic Quantum Mechanics.

PAPER –II: ATOMIC AND MOLECULAR PHYSICS

Unit-I: Quantum states of one electron atoms-atomic orbitals, Hydrogen spectrum, spin-orbit(l-s) interaction energy, fine structure of hydrogen spectrum including l-s interaction and relativistic correction, spectra of alkali elements, fine structure in alkali spectra, penetrating and non-penetrating orbits, intensity rules.

Unit-II: Pauli's principle, equivalent and non-equivalent electrons, ground state(basic level of different elements), two electron systems, interaction energy in L-S. and J-J. Coupling, Hyperfine structure, line broadening mechanisms (general ideas).

Unit–III: Normal and anomalous Zeeman effect, early discoveries and developments, vector models of one electron system in a weak magnetic field, magnetic moment of a bound electron, magnetic interaction energy, selection rules, intensity rules, Paschen-Back (PB) effect – principal series effect, Zeeman and PB effects in hydrogen, Stark effect- discovery, Stark effect in Hydrogen, orbital model, weak and strong effect in Hydrogen.

Unit-IV: Types of molecules: linear diatomic molecules, symmetric top, asymmetric top and spherical top molecules. Rotational spectra of diatomic molecules: rigid rotator model, energy levels, selection rule, spectrum, comparison with observed spectrum and non-rigid rotator model, Intensities of spectral lines, microwave spectrometer, Raman spectrum; classical and quantum theory of Raman Effect, pure rotational Raman spectrum.

Unit-V: Vibrational spectra of diatomic molecules: simple harmonic model, energy levels and spectrum, comparison with observed spectrum and anhormonic model, Vibrating rotators, Interaction of rotations and vibrations, fine structures and P-Q-R branches, IR spectrometer, Vibrational Raman spectrum, Vibrational rotational Raman spectrum.

TEXT AND REFERENCE BOOKS:

1. Introduction to atomic spectra - H.E. White (T).
2. Fundamentals of molecular spectroscopy – C.N. Banwell and E.M McCash (T).
3. Spectroscopy vol. I, II and III – Walker and straughner.
4. Introduction to Molecular spectroscopy – G.M. Barrow.
5. Spectra of diatomic molecules – Herzberg.
6. Molecular spectroscopy – Jeanne L.Mc-Hale.
7. Molecular spectroscopy – J.M. Brown.
8. Spectra of atoms and molecules –P.F.Bemath.
9. Modern spectroscopy, J.M. Hollas.

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PAPER – III: SOLID STATE PHYSICS-I

Unit- I: Electrons in Solids and Electronic Properties

Energy bands: nearly free electron model, origin of energy gap and its magnitude, Bloch function, Kronig-Penny model, Wave equation of electron in periodic potential, restatement of Bloch theorem, crystal moment of an electron, solution of Central equation, Kronig-Penny model in reciprocal space, empty lattice Approximation, approximate solution near zone boundary, Number of orbitals in a band, metals and insulators.

Unit -II: Fermi surfaces and metals

Effect of temperature on F-D distribution, free electron gas in three dimension. Different zone schemes, reduced and periodic zones, construction of Fermi surfaces, nearly free electrons, electron, hole, open orbits, Calculation of energy bands, Tight binding, Wigner-Seitz, cohesive energy, pseudo potential methods. Experimental methods in Fermi surface studies, quantization of orbits in a magnetic field, de Haas van Alphen Effect, External orbits, Fermi surface of copper.

Unit- III: Crystal vibration and thermal properties

Lattice dynamics in monoatomic and diatomic lattice: two atoms per primitive basis, optical and acoustic modes, quantization of elastic waves, phonon momentum, inelastic neutron scattering by phonons, Anharmonic crystal interactions-thermal expansion, thermal conductivity, thermal resistivity of phonon gas, umklapp processes, imperfections.

Unit –IV: Electron-Phonon interaction- superconductivity

Experimental survey: occurrence of superconductivity, Destruction of superconductivity by magnetic field, Meissner effect, heat capacity, energy gap, MW, and IR properties, isotope effect. Theoretical survey : thermodynamics of superconducting transition, London equation, Coherence length, Cooper pairing due to phonons, BCS theory of superconductivity, BCS ground state, flux quantization of superconducting ring, duration of persistent currents, Type II superconductors, Vortex states, estimation of Hc1 and Hc2, single particle and Josephson superconductor tunneling, DC/AC Josephson effect, Macroscopic quantum interference. High temperature superconductors, critical fields and currents, Hall number, fullerenes ring.

Unit – V: Semiconductor crystals

Band gap, equation of motion, physical derivation of equation of motion, holes, effective mass, physical interpretation of effective mass, effective masses of semiconductors Si and Ge, intrinsic carrier concentration, intrinsic mobility, impurity conductivity, donor and acceptor states, thermal ionization of donors and acceptors, thermo-electric effects.

TEXT AND REFERENCE BOOKS

1. C. Kittel: Introduction to Solid State Physics (Wiley and Sons).
2. J.M.Ziman: Principles of theory of solids (Cambridge Univ.Press).
3. Azaroff: X-ray crystallography.
4. Weertman and weertman : Elementary Dislocation Theory.
5. Verma and Srivastava: Crystallography for Solid State Physics.
6. Azeroff and Buerger: The Power Method.
7. Buerger: Crystal Structure Analysis.

8. Thomas: Transmission Electron Microscopy.
9. Omar: Elementary solid state physics.
10. Ashcroft and Mermin: Solid State Physics.
11. Chalking and Lubensky: Principles of Condensed Matter Physics.
12. Madelung: Introduction to solid state theory.
13. Callaway: Quantum theory of solid state physics.
14. Huang: Theoretical Solid State Physics.
15. Kittel: Quantum theory of solids.

PAPER –IV (A): ASTRONOMY AND ASTROPHYSICS-I

Unit – I Stars-apparent magnitudes, Colour index, Spectral classification, Stellar distances, Absolute magnitude, The H-R diagram of stars.
Stellar interiors: The basic equations of stellar structure, Hydrostatic equilibrium, Thermal equilibrium, Virial Theorem, Energy sources, Energy transport by radiation and convection, Equation of state

Unit – II Formation and evolution of stars: Inter stellar dust and gas, Formation of protostars, Pre-main sequence evolution, Post main sequence evolution and Evolution on the main sequence for low and high mass stars, Late stages of evolution, Fate of massive stars, Supernovae and its characteristics.

Unit – III End states of stars, Electron degeneracy pressure, White dwarfs, and Chandrasekhar limit, Neutron stars and Pulsars, Black holes.
Binary stars and their classification, close binaries, Roche Lobes, Evolution of semidetached systems: Algols, Cataclysmic variables and X-ray binaries.

Unit– IV Solar Physics: Physical Characteristics of sun, Photosphere: Limb darkening, Granulation, Faculae, Solar Chromosphere and Corona, Prominences, Solar Cycle and Sunspots, Solar Magnetic Fields, Theory of Sunspots, Solar flares, solar wind, Helioseismology.

Unit – V Kepler's law and its implication to Binary Stars, Doppler Effect and its use in velocity measurement e.g. rotation of Saturn and its Ring, determination of velocity of galaxies, Hubble's law and Age of the Universe, Star clusters, HR diagram of star clusters, distance and age determination through HR diagram. Variable stars, Cepheid Variables, Period Luminosity relation and Distance measurement. Period, dispersion and distance of the Pulsars. Photometer and photoelectric photometry.

TEXT AND REFERENCE BOOKS:

1. Astrophysics for Physicists, Arnab Rai Choudhuri, Camb. University Press, 2010.
2. Astrophysics : Stars and Galaxies, K.D. Abhayankar, Universities Press (India) Ltd, 2001.
3. An Introduction to Astrophysics, Baidyanath Basu, PHI, 2010.
4. Modern Astrophysics, B.W. Carroll and D.A. Ostlie, Addison-Wealey, 2007.
5. Introductory Astronomy and Astrophysics, M.Zeilik and S.A. Gregory, 4th ed., Saunders College Publishing, 1998.

6. The Physical Universe: An introduction to astronomy, F.Shu, University Science Books 1982.
7. Textbook of astronomy and astrophysics with elements of cosmology, V.B. Bhatia, Narosa Publishing House, 2000.
8. The new cosmos, A.Unsold and B. Baschek, Newyork, Springer 2002.
9. Theoretical Astrophysics, vol. I: Astrophysical Processes T. Padmanabhan, Cambridge University Press, 2000.
10. Theoretical Astrophysics, vol. – II: Stars and stellar systems, T. Padmanabhan, Cambridge University Press 2001.
11. A Workbook for Astronomy, Jerry Waxman, Cambridge University Press, 1984.

Paper – IV (B) ELECTRONICS (Communication)-I

Unit I **Microwave devices**

Klystron ,magnetron & traveling wave tubes ,velocity modulation ,basic principal of two cavity klystrons & relex klystrons ,principle of operation of magnetrons ,helix traveling wave tubes .

Unit II **Microwave wave guides & components**

(Wave modes) rectangular wave guides: solution of wave equation in rectangular coordinates, TE modes in rectangular wave guides ,TM modes in rectangular wave guides ,excitations of modes in rectangular wave guides .

Circular wave guides :solutions of wave equation in Cylindrical coordinates, TE modes in Circular wave guides ,TM modes in Circular wave guides , TEM modes in Circular wave guides, excitations of modes in Circular wave guides .

Unit-III **Microwave cavites**: rectangular cavity resonator, circular –cavity resonator &semi –circular –cavity resonators Q- factor of a cavity resonator.

Transferred Electrons devices (TEDs)

Gunn effect diodes, principle of operation, modes of operations, read diodes, IMPATT diodes, TRAPATT diodes.

Microwave communications: advantages of microwave transmission, loss in free space, propagation of microwave, components of antennas used in MW communication system.

Unit-IV **Radar system**:

Radar block diagram & operation ,radar frequencies ,pulse consideration, radar range equation ,derivation of radar range equation ,minimum detectable single receiver noise ,signal to noise ratio ,integration of radar pulses ,radar cross sections ,pulse reflections frequency ,antenna ,parameters ,systems losses & propagation losses ,radars transmitters receivers ,antennas displays

Unit V **Satellite communication**

Orbital Satellite, geostationary satellite ,orbital patterns ,look angles ,orbital spacing , satellite system ,link modules

REFERENCE BOOKS

1) "Microwaves" by K.L. Gupta Wiley Estern Ltd. Delhi.
2) Advanced Electronic communication system by Wayne Tomsi Physics education.
3) Principle of communication of system-by Toub & Schilling: 2nd ed. TMH 1994
4) Communication system: by Siman Haykin, 3rd ed. John wiley & sons inc.1994.
5) Microwave devices & circuits by : Samuel, Y. Liau.
6) Electronic communication: George kennedy.

Paper IV (C) PHYSICS OF NANO MATERIALS - I

Unit I: Nano Materials

Properties of Nano-Particles: Metal nano-clusters, theoretical modeling of nanoparticles, geometric and electronic structure, magnetic clusters, Semiconductor nanoparticles, optical properties, rare gas and molecular clusters, Bulk nano-structured materials: Solid disordered nanostructures, methods of synthesis, properties,nano-cluster composite glasses, porous silicon, nano structured crystals.

UNIT II: Carbon Nano Tubes (CNTs)

Nature of carbon bonds, different allotropies of carbon, structure and properties of C_{60}, graphene, carbon nanotubes and its types, laser vaporization techniques, arc discharge method and chemical deposition technique, purification techniques, Properties of Carbon Nanotubes and Graphene: Optical, electrical, electronic, mechanical, thermal, optical, and vibrational properties.

UNIT III: Synthesis of Nano- Materials

Top-down & Bottom-up approaches: Formation of nanostructures by mechanical milling (ball milling) and mechanical attrition, Chemical Vapor Deposition (CVD), Physical Vapour Deposition (PVD), thermal and e beam evaporation, Pulsed Laser Ablation (PLD).

Chemical Routes for synthesis of Nanomaterials:Chemical precipitation and co-precipitation, chemical bath deposition (CBD), Sol-gel synthesis, Microemulsions or reverse micelles, Solvothermal synthesis, Thermolysis routes and spray pyrolysis.

UNIT IV: Characterization of Nano-materials (a)

X-ray Diffraction (XRD), powder and single crystal Diffraction, X-ray fluorescence (XRF), X ray photoelectron spectroscopy (XPS), Energy Dispersive X-ray analysis (EDAX), Extended X ray absorption and fluorescence spectroscopy (EXAFS), Dispersive high pressure XRD and Diamond anvil cells (DAC).

Nuclear Magnetic Resonance (NMR) and Raman spectroscopy: description and analysis. Surface analysis methods: Secondary ion mass spectroscopy (SIMS), Auger Electron Spectroscopy, ESCA, Deep Level Transient Spectroscopy (DL TS), Thermo Gravimetric Analysis (TGA), Differential Scanning Calorimetry (DSC), Differential Thermal Analysis.

UNIT V: Characterization of Nano-materials (b)

Scanning Tunneling Microscopy (STM), Contact and non contact Atomic Force Microscopy (AFM), Magnetic Force Microscopy (MFM), Nano indentation. Scanning Electron Microscopy (SEM), Transmission electron microscopy (TEM), High resolution TEM Field emission SEM, Electron Energy Loss Spectroscopy (EELS).

Spectrophotometry: UV-Vis spectrophotometers, IR spectrophotometers, Fourier Transform Infrared Radiation (FTIR), Photoluminescence (PL), electroluminesce and thermoluminescence spectroscopy, Near-field Scanning Optical Microscopy (NSOM).

References: Books/ Research Monographs

1. Nano materials: Synthesis properties ,characterization and application: A.S Edelstein and R.C Cammaratra
2. Introduction to Nanotechnology: Charles P. Poole Jr and Franks J. Qwens
3. Nanotechnology, Kohlr, Michael.
4. Nanoelectronics and Nanosystems , Karl Goser, Peter Glosekotter, Jan Dienstuhl., Springer, 2004
5. Handbook of Analytical instruments, R.S. Khandpur
6. X-ray diffraction procedures, H. P. Klung and L.E.Alexander
7. The Powder Method IV. Azaroff and M. J. Buerger
8. Elements of X-ray diffraction, B. D.Cullity
9. Differential Thermal Analysis, R.C.Mackenzie
10. Thermal Methods of Analysis, W.W.Wendlandt
11. Synthesis, Functionalization and Surface treatment of Nanoparticles :Maric Isbella and Buraton
12. Encyclopedia of Nanotechnology, H.S. Nalwa
13. Nanomaterial Systems Properties and Application, A.S.Eldestein and R.C.Cammarata.
14. Handbook of Nanotechnology: Bhushan (Ed), Springer Verlag, New York (2004).
15. Nanostructures and Nanomaterials- Synthesis properties and Applications by Guozhong Cao (Empirical College Press World Scientific Pub., 2004).
16. Nanocomposite Science and Technology, Ajayan, Schadler and Braun
17. Fullerene & Carbon nanotubes, Dressel Shaus
18. Carbon Nanotubes, Elizer
19. Physical properties of CNT, Saito
20. Carbon nanotechnology, Liming Dai
21. Nanotubes and nanowires, CNR Rao and Govindaraj RCS Publishing.
22. Piezoelectric Sensors: Force, Strain, Pressure, Acceleration and Acoustic Emission Sensors, Materials and Amplifiers, G. Gautschi.
23. Block Copolymers in Nanoscience Massimo Lazzari
24. Supramolecular Chemistry, Jonathan W. Steed, Jerry L. Atwood
25. Nanotechnology: Importance and Application by M.H. Fulekar, IK International, 2010.
26. Nanotechnology in Biology and Medicine: Methods, Devices and Application by Tuan Vo-Dinh, CRC press, 2007.
27. Nanosystem characterization tools in the life sciences by Challa Kumar. Wiley-VCH, 2006.
28. Nanolithography M.Gentili et al.(edits),Springer.
29. Environanotechnology by Mao Hong fan, Chin-pao Huang, Alan E Bland, Z Honglin Wang, Rachid Sliman, Ian Wright. Elsevier, 2010.
30. Nanotechnologies, Hazards and Resource efficiency by M. Steinfeldt, Avon Gleich, U. Petschow, R. Haum. Springer, 2007.
31. Nanotechnlogy: Health and Environmental risk by Jo Anne Shatkin. CRC press, 2008.
32. An Introduction to Quantum Computing Phillip Kaye, Raymond Laflamme, Michele Mosca
33. The Physics of Quantum Information: Quantum Cryptography, Quantum Teleportation, Quantum Computation by Dirk Bouwmeester, Artur K. Ekert, Anton Zeilinger
34. Problems And Solutions in Quantum Computing And Quantum Information Yorick Hardy Willi-Hans Steeb

PAPER –IV (D): SPACE PHYSICS - I

Unit I: Solar Physics

Physical Characteristics of sun, Source of solar energy, thermonuclear reaction and building up of higher elements, Description of solar internal and external layers, Photosphere: Limb darkening, Granulation, Faculae, Solar Chromosphere and Corona, Heating of the solar chromosphere and corona, Prominences, Solar Cycle and Sunspots, Solar Magnetic Fields, Theory of Sunspots, Solar flares, Solar wind, Coronal mass ejections, Helioseismology.

Unit II: Planetary System

Solar planetary system, Major characteristics of the Planets, Atmospheric Composition, Planetary magnetism, Magnetic fields, Magnetic dipole, Asteroids, Comets, Extra Solar Planets, Magnetic fields of Extra Solar Planets

Unit III: Celestial Mechanics

Time and Coordinate system: Celestial Sphere, Solar Time, Sidereal Time, Julian Date, Right Ascension and Declination, Azimuth and Elevation, galactic coordinates, WGS 84 coordinate system. GPS – operation, accuracy, time and position information.

Unit IV: Space and Observational tools

Electromagnetic bands of observation: radio, infrared, optical, UV, X-ray and Gamma-ray windows. Ground-based, balloon-borne and satellite-borne telescopes, Resolution of Instruments and Limitations, Optical telescopes, Photometers, Spectrographs, CCDs, Polarimeters. Radio telescopes - interferometry, X-ray and Gamma-ray detectors, Neutrino and Cosmic Ray astronomy, Radar.

Unit V: Space Missions

Planetary Exploration, Early spacecraft visits to the moon, Unmanned Lunar landers; The Apollo program - man on the moon – instruments and experiments, Lunar structures; Exploration of Mercury, Venus, Mars - the Red Planet – Structure of Mars, Martian atmosphere; ice at the poles, Martian landscapes: linear features, volcanoes, and impact craters; exotic terrains; Study of Planetary moons with space missions, The Cassini-Huygens Mission, The Deep Impact Mission. Search for extra terrestrial life – SETI experiments.

Text and Reference Books

1. Solar System Astrophysics, J. C. Brandt and P. W. Hodge
2. Introduction to Experimental Physics, W. B. Fretter.
3. The Magnetic Field of the Earth, Roland T. Merrill, Michael W. McElhinny, Phillip L. Mcfadden,Academic Press
4. Physics of Geomagnetic Phenomena, Vol. I and II, S. Matsushita. and W. H. Campbell, Academic Press
5. Earth's Magnetospheric Process, Ed. B. M. McCormac, D. Reidel Publishers
6. Physics of the Magnetosphere, Eds. R. L. Corovillano, J. T. McCaulley and H. Radosky, D. Reidel Publishers
7. Solar System Plasma Physics, Vol. I, II and III, Eds. C. F. Kennel, L. J. Lanzenrutti and E. N. Parker
8. Dynamics of the Geomagnetically Trapped Radiation (Physics and Chemistry in Space, Vol II)

9. Solar Terrestrial Physics, Ed. E. R. Dyer, D. Reidel Publishers
10. Solar Magneto–Hydrodynamics, E.R. Priest; D Reidel, 1982
11. R.C. Smith, Observational Astrophysics; CUP, 1995.
12. C.R. Kitchin, Astrophysical Techniques; Adam Hilger, 1984.
13. Digital Image Processing, R. C. Gonzales and R. E. Woods, 2nd Ed, Pearson India, 2002
14. Satellite Meteorology, S. Q. Kidder and T. H. Von der Haar, Academic Press, 1995
15. Lecture Notes on Satellite Meteorology, Vol 1 and 2, SAC, Ahmedabad
16. Remote Sensing and Image Interpretation, T. M. Lillesand and R. W. Kieffer, John Wiley, 2002
17. Fundamentals of Space Systems, V. L. Pisacane and R. C. Moore, Oxford University Press, 1994
18. Fundamentals of Remote Sensing, George Joseph, 2003
19. Processing Remote Sensing Data, M. C. Girgard and C. Girgard, Oxford-IBH, 1999
20. Quantitative Remote Sensing of Land Surfaces, Shunlin Liang, Wiley Interscience, 2004
21. Scale in Remote Sensing and GIS, D. A. Quattrachi and M. F. Goodchild
22. Theory of Satellite Orbits in an Atmosphere, King-Hele Desmond, Butterworths, 1964
23. Uncertainty in Remote Sensing and GIS, Ed: G. M. Foddy and P. M. Atkinson
24. Remote Sensing by George Joseph
25. Concepts in Space Sciences Edited by R.R. Daniel
26. Mathematical Principles of Remote Sensing by A.. Milman
27. An Introduction to Ionosphere and Magnetosphere, J. A. Raticliffe
28. Solar System Astrophysics, J. C. Brandft and P. W. Hodge
29. Plasma Diagnostic Techniques, R. H. Huddlestone and S. L. Leonard
30. Introduction to Experimental Physics, W. B. Fretter
30. High Vacuum Techniques, J. Yarwood
31. Plasma Diagnostics, Vol. I, O. Anciello and D. L. Flamn
32. The Earth's Ionosphere: Plasma Physics and Electrodynamics, Michael C. Kelley, AcademicPress
33. Ionospheric Techniques and Phenomena, A. Giraud and M. Petit, D. Reidel Publish.
34. Physics of Geomagnetic Phenomena, Vol. I and II, S. Matsushita and W. H. Campbell, Academic Press
35. Introduction to Ionospheric Physics, H. Risbeth and H. Garriot, Academic Press
36. Space Weather, Physics and Effects by Volker Bothmer and Loannis.A.Depli Springer
37. Aerospace Environment by T Beer
38. Free flight of a rocket By Gantmaker
39. Orbital Mechanics, Ed. Vladimir A, Chobotov, AIAA Edn Series
39. Introduction to Celestial Mechanics, S. W. McCusky, Addison-Wesley
40. Fundamentals of Astrodynamics, R. R. Bates et al, Dover
41. Orbital Motion, A. E. Roy, Adam Hinglar Ltd
42. Orbital Methods in Astrodynamics, P. R. Escobal, John Wiley
43. Fundmentals of Astrodynamics, R. R. Bates et al, Dover
44. Orbital Motion, A. E. Roy, Adam Hinglar Ltd
45. Design of Orbital Flights, J. Johnson et al., McGraw Hill
46. Modern Astrophyiscs, B. W. Carroll and D. A. Ostlie, Addison -Wesley
47. The Physical Universe, F. Shu, University Science Books
48. The Physics of Astrophysics, Vol. I and II, F. Shu, University Science Books

49. Theoretical Astrophysics, Vol. I, II and III, T. Padmanabhan, Cambridge Uni.Press
50. The Physics of Fluids and Plasmas, Arnab Rai Choudhuri, Cambridge Uni.Press
51. Astrophysical Concepts, M. Harwitt, Springer-Verlag
52. Galactic Astronomy, J. Binney and M. Merrifeld, Princeton University Press
53. Galactic Dynamics, J. Binney and S. Tremaine, Princeton University Press
54. Quasars and Active Galactic Nuclei, A. K. Kembhavi and J. V. Narlikar, Cambridge University Press
55. An Introduction to Active Galactic Nucleii, B. M. Peterson

Lab III-A: Materials Science & General

At least ten experiments should be performed from the following list of experiments or parallel level experiment depending upon the facilities available.

1. To determine activation energy of ionic/superionic solid by Temperature depended conductivity measurement.
2. To study Electron Spin(ESR) Resonance in DPPH (Diphenyl Pricyl Hydrazy) sample.
3. To study I-V characteristics of photovoltaic solar cell and find the efficiency.
4. To study the decay of photoconductivity of given sample and find out trap depth.
5. Study of decay of photoluminescence of a given sample.
6. Measurement of electrical conductivity using Impedance Spectroscopy technique.
7. To determine drift velocities of Ag+ ion in AgI from temperature dependence of ionic transference number study.
8. Electrical conductivity of Ball milled/Mechano-chemical synthesized materials.
9. Determination of strength of a given radioactive source.
10. Study of complete spectra of radioactive sources, and study of photo peak efficiency of NaI(Tl) crystal for different energy gamma rays.
11. Structural analysis of powder sample by XRD and particle size determination using Scherrer's formula.
12. FTIR studies of solid samples.
13. Mechanoluminescence of sucrose crystals.
14. Thermoluminescence of irradiated samples.
15. Study of Op-Amp.-IC-741 is inverting/ Non inverting amplifier and draw frequency response curve.
16. Construction of Schmitt triggers using IC-741 and study of its characteristics.
17. Study of Astable and monostable Multi Vibrator using IC 555.
18. Digital electronics experiments on bread board using IC-7400.

Lab III-B: Astronomy & Astrophysics

1. Study of Quasar.
2. Study of the orbit of a visual binary Star.
3. Determine the mass of Saturn & it's rotational velocity.
4. Verification of Hubble's law and determination of Hubble's constant.
5. Identification of element from Fraunhoffer spectrum of the sun.
6. Study of sun spots.
7. Study of light curves of Cepheid variable stars.
8. Study of Proper motion of stars.

9. Determination of Pulsar period and distance.
10. Photo-electric photometry of Pleiades star cluster.
11. Study of expansion of the universe and calculate the age of the Universe.

OR III -B: Electronics

(1) Experiments with microprocessor.
   (a)Convert BCD in to binary & vice versa.
   (b) To transfer group of data blocks from one location to another location.
   (c) To write programme for addition & subtraction.
   (d) To write programme for multiplication & division.
(2) Logic gate study DTL & RTL.
(3) To study& verify the Demorgon's Theorem.
(4) Study of Adder/ Subtractor.
(5) Study of Encoder & Decoder.
(6) Study of Multiplexer & Demultiplexer
(7) Study of digital to analog converter.
(8) Study of analog to digital converter.
(9) Study of 4-bit Counter/ ripple Counter.
(10) Study of left/right shift register.
(11) Study of read only memory.
(12) Study of Random Access Memory.
(13) Study of Phase locked loop.
(14) Study of BCD to seven segment Decoder.
(15) Study of modulation & demodulation.
(16) Optical fiber based experiment.
(17) Microwave characterization and measurements.

OR III -B: Physics of Nano-material

1. Synthesis of II-IV semiconductor nanoparticles by wet chemical method.
2. Synthesis of nanoparticles (ZrO_2) by Combustion method.
3. Synthesis of nanoparticles by Sol-gel method.
4. Synthesis of nanoparticles by Ball milling method.
5. Synthesis of Quantum cells structures using vacuum coating unit.
6. Synthesis of nanoparticles using Solid state reaction method.
7. Measurement of band gap energy and size of the nano particle of II-IV semiconductor using absorption spectrophotometer.
8. To make the peak analysis of IR transmission spectra of nanoparticle using FTIR spectrometer.
9. Study of effect of capping agent on the size of the nanoparticle during synthesis.
10. To determine the average particle size of nano materials by XRD using Sherer's formula.
11. To determine the Hall coefficient and carrier type for a semiconducting nanoparticles.
12. To determine the Band gap of a given semiconductor using Four probe method from room temperature to 100°C.
13. To determine the average size of naonparticles using Zetasizer.

14. To measure the change of dielectric constant and dielectric loss of nanoparticle with the change of signal frequency by impedance analyzer.
15. To characterize the mechanical properties by tensile testing.
16. To estimate the particle size by SEM.
17. To perform electron diffraction analysis from TEM image.
18. To do roughness analysis of nanostructured sample using AFM.

OR III -B: Space Physics

1. The flow of energy out of the Sun.
2. Study of Sun-spot.
3. Astrometry of asteroids.
4. Study of expansion of the universe and calculate the age of the Universe.
5. Identification of element from Fraunhoffer spectrum of the sun.
7. The transit of Venus and Murcury.
8. Jupiter's Moon and speed of light.
9. Determination of Pulsar period and distance.
10. Photo-electric photometry of Pleiades star cluster.
11. The large scale structure of the Universe.

Semester – IV

PAPER – I: NUCLEAR AND PARTICLE PHYSICS

Unit-I **Nuclear Interactions :** Nucleon-nucleon interaction, Two-nucleon system, The ground state of the deuteron, Tensor forces, Nucleon-nucleon scattering at low energy, Scattering length, Effective range theory, Spin dependence of nuclear forces, Charge independence and charge symmetry of nuclear forces, Iso-spin formalism, Exchange forces, Meson theory of nuclear forces and the Yukawa interaction.

Unit-II **Nuclear Reactions :** Reaction energetics: Q-equation and threshold energies, Reactions cross sections, Resonance: Breit-Wigner single-level formula, Direct and compound nuclear reactions, Formal reaction theory: Partial wave approach and phase shifts, Scattering matrix, Reciprocity theorem,

Unit-III **Nuclear Decay :** Beta decay, Shape of the beta spectrum and problems in conservation laws, Pauli's neutrino hypothesis, Femi's theory of beta decay, Total decay rate, Angular momentum and parity selection rules, Comparative half-lives, Allowed and forbidden transitions, Parity violation, Detection and properties of neutrino.

Gamma decay, Multiple transitions in nuclei, Angular momentum and Parity selection rules, Internal conversion.

Unit –IV Nuclear models : Liquid drop model, Bohr-Wheeler theory of fission, Shell Model, Experimental evidence for shell effects, Single particle shell model, Spin-orbit interaction and magic numbers, Analysis of shell model predictions, Magnetic moments and Schmidt lines, Collective model of Bohr and Mottelson.

Unit –V Elementary particle Physics: The fundamental interactions, Classification of elementary particles, Leptons and Hadrons, Symmetries, groups and conservation laws, SU(2) and SU(3) multiplets and their properties, Quark model, Properties of Quarks, the standard model.

TEXT AND REFERENCE BOOKS:

1. A. Bohr and B.R.Mottelson, Nuclear structure, vol. 1 (1969) and vol.2, Benjamin, Reading, A, 1975.
2. Kenneth S. Krane, Introductory Nuclear Physics, Wiley, New York, 1988.
3. Ghoshal, Atomic and Nuclear Physics vol.2.
4. P.H.Perking, Introduction to high energy physics, Addison-Wesley, London, 1982.
5. Shriokov Yudin, Nuclear Physics vol.1 & 2, Mir Publishers, Moscow, 1982.
6. D.Griffiths, introduction to elementary particles, harper and row, New York, 1987.
7. H.A.Enov, introduction to Nuclear Physics, Addison-Wesley, 1973.
8. G,E.Brown and A.D.Jackson, Nucleon-Nucleon interaction North-halland Amsterdam, 1976.
9. S.D.Benedetti, Nuclear interaction, John Willey and sons, NewYork, 1964.
10. M.K.Pal, theory of Nuclear structure, affiliated East West, Madras, 1982.
11. Y.R.Waghmare,introductory nuclear physics, Oxford, IBH, Bombay, 1981.
12. J.M.Longo, elementary particles, McGraw Hill, New York, 1971.
13. R.R.Roy and B.P.Nigam, Nuclear Physics, Wiley-Easterm Ltd. 1983.

PAPER – II LASER PHYSICS AND APPLICATIONS

Unit- I Laser Characteristics –

Spontaneous and stimulated emission, Einstein's quantum theory of radiation, theory of some optical processes, coherence and monochromacity, kinetics of optical absorption, line broadening mechanism, Basic principle of lasers, population inversion, laser pumping, two & three level laser systems, resonator, Q-factor, losses in cavity, threshold condition, quantum yield.

Unit – II Laser Systems

Solid state lasers- the ruby laser, Nd:YAG laser, ND: Glass laser, semiconductor lasers – features of semiconductor lasers, intrinsic semiconductor lasers, Gas laser - neutral atom gas laser, He-Ne laser, molecular gas lasers, CO2 laser, Liquid lasers, dye lasers and chemical laser.

Unit-III Advances in laser Physics

Production of giant pulse -Q-switching, giant pulse dynamics, laser amplifiers, mode locking and pulling, Non-linear optics, Harmonic generation, second harmonic generation, Phase matching, third harmonic generation, optical mixing, parametric generation and self-focusing of light.

Unit – IV Multi-photon processes; multi-quantum photoelectric effect, Theory of two-photon process, three- photon process, second harmonic generation, parametric generation of light, Laser spectroscopy : Rayleigh and Raman scattering, Stimulated Raman effect, Hyper-Raman effect, Coherent anti-stokes Raman Scattering, Photo-acoustic Raman spectroscopy.

Unit – V Laser Applications – ether drift and absolute rotation of the Earth, isotope separation, plasma, thermonuclear fusion, laser applications in chemistry, biology, astronomy, engineering and medicine.

Communication by lasers: ranging, fiber Optics Communication, Optical fiber, numerical aperture, propagation of light in a medium with variable index, pulse dispersion.

TEXT AND REFERENCE BOOKS:

1. Laud, B.B.: Lasers and nonlinear optics, (New Age Int.Pub.1996).
2. Thyagarajan, K and Ghatak, A.K.: Lasers theory and applications (Plenum press, 1981).
3. Ghatak, A.K.and Thyagarajan, K : Optical electronics (Cambridge Univ. Press 1999).
4. Seigman, A.E.: Lasers (Oxford Univ. Press 1986)
5. Maitland, A. and Dunn, M.H. : Laser Physics (N.H.Amsterdam, 1969).
6. Hecht, J.The laser Guide book (McGraw Hill, NY, 1986).
7. Demtroder, W. : Laser Spectroscopy (Springe series in chemical physics vol.5,Springe verlag, Berlin, 1981).
8. Harper, P.G.and Wherrett B.S. (Ed.): Non-linear-optics (Acad.press, 1977).

PAPER – III: SOLID STATE PHYSICS- II

Unit- I: Plasmons, Polaritons

Dielectric function of the electron gas, Plasma optics, Dispersion relation for EM wave, Transverse optical modes in Plasma, Transparency of Alkali metals in the ultraviolet, Longitudinal Plasma oscillations, Plasmon, electrostatic screening and screened Coulomb potential, Mott metal-insulator transition, screening and phonons in metals, Polaritons, LST relation .

Unit –II: Dielectric and ferroelectrics

Maxwell's equations, polarization, macroscopic electric field, depolarization filed, E1;local electric field at an atom, Lorentz filed E2, fields of dipoles inside cavity E3; dielectric constant and polarizability, electronic polarizability; structural phase transition; ferro-electric crystals, classification; displacive transition, soft optical phonons, Landau theory of phase transitions, first and second order transition, antiferro-electricity, ferro-electric domain, piezoelectricity, ferro-elasticity, optical ceramics.

Unit –III: Magnetism

General ideas of dia- and para- magnetisms, quantum theory of paramagnetism, rare earth ions, Hund rule, iron group ions, crystal field splitting, quenching of orbital angular momentum, spectroscopic splitting factor, van vleck temperature dependent paramagnetism, Cooling by isentropic demagnetization, nuclear demagnetization, paramagnetic Susceptibility of conduction electrons.

Unit –IV: Ferromagnetism and anti ferromagnetism

Ferromagnetic order, Curie point and exchange integral, temp dependence of saturation magnetization, saturation magnetization at absolute zero; magnons, quantization of spin waves, thermal excitation of magnons; neutron magnetic scattering, Ferrimagnetic order, Curie temp and susceptibility of ferrimagnets, iron garnets. Antiferromagnetic order, susceptibity below neel temp, antiferromagnetic magnons, ferromagnetic domains.

Unit – V: Optical Processes & Excitons and defects

Optical reflectance, excitons, Frenkel and Mott-Wannier excitons, Alkali Halides and Molecular crystals Defects: lattice vacancies, Schottkey and Frenkel point effects, colour centers, F and other centres, Line defect. Shear strength of single crystals, dislocations-edge and screw dislocations, Burger vectors, Stress fields of dislocations, low angle grain boundaries, dislocation densities, dislocation multiplication and slip, strength of alloys, dislocations and crystal growth, hardness of materials.

TEXT AND REFERENCE BOOKS

1. C. Kittel: Introduction to Solid State Physics (Wiley and Sons).
2. J.M.Ziman: Principles of theory of solids (Cambridge univ.press).
3. Azaroff : X-ray crystallography.
4. Weertman and weertman : Elementary Dislocation Theory.
5. Verma and Srivastava: Crystallography for Solid State Physics.
6. Azeroff and Buerger: The Power Method.
7. Buerger: Crystal Structure Analysis.
8. Thomas: Transmission Electron Microscopy.
9. Omar: Elementary solid state physics.

10. Aschroft and Mermin : Solid State Physics.
11. Chalking and Lubensky: Principles of Condensed Matter Physics.
12. Madelung : Introduction to solid state theory.
13. Callaway: Quantum theory of solid state physics.
14. Huang: Theoretical Solid State Physics.
15. Kittel: Quantum theory of solids.

PAPER –IV (A): ASTRONOMY AND ASTROPHYSICS - II

Unit– I: The Milkyway Galaxy: Structure of the Milkyway, Oort's theory of galactic rotation, Dynamics of the spiral arms, Distribution of Interstellar matter. Normal Galaxies: Classification of galaxies, Hubble sequence: Elliptical, Lenticulars and Spiral galaxies, and their properties, Brightness profiles, Distribution of gas and dust in galaxies, Rotation curve and dark matter.

Unit- II: Active galaxies: Active Galactic Nuclei (AGNs), Seyfert galaxies, BL Lac Objects, Radio galaxies: General properties, Superluminal motion, Quasars: Properties and Energy requirements, Nature of quasar redshifts, Supermassive black hole model and Unified model of AGNs.

Unit-III: Failure of Newtonian gravity and need of General Relativity. Principle of Equivalence. Concept of curved space, Predictions of General Relativity: precession of perihelion of Mercury, bending of light, gravitational lensing, Gravitational wave and its detection through Laser interferometer. Weyl's Postulate, Cosmological Principle, Friedmann Model, Einstein's model with cosmological constant, Steady State Model.

Unit- IV: Relics of the big bang, The early universe, Thermodynamics of the early universe, Thermal History, Primordial neutrinos, Helium synthesis and other nuclei, Microwave background, The very early universe, The formation of structures in the Universe, Jeans Mass, Growth Rate, Recombination era, Onset of matter dominated era.

Unit- V: Observations of the cosmological significance, Measurement of Hubble`s constant, Anisotropy of local large - scale velocity fields, Age of the universe, Abundance of light nuclei, Dark matter, The redshift-magnitude relation, Number counts of extragalactic objects, The variation of angular sizes with distance.

TEXT AND REFERENCE BOOKS:

1. Astrophysics for Physicists, Arnab Rai Choudhuri, Camb. University Press, 2010.
2. Astrophysics : Stars and Galaxies, K.D. Abhayankar, Universities Press (India) Ltd, 2001.
3. An Introduction to Astrophysics, Baidyanath Basu, PHI, 2010.
4. Modern Astrophysics, B.W. Carroll and D.A. Ostlie, Addison-Wealey, 2007.
5. Introductory Astronomy and Astrophysics, M.Zeilik and S.A. Gregory, 4th ed., Saunders College Publishing, 1998.
6. Quasars and active galactic neuclei, A.K. Kembhavi and J.V. Narlikar, Cambridge University Press, 1999.
7. Elements of Cosmology, J.V. Narlikar, Universities Press, 1996.
8. Introduction to cosmology, J.V. Narlikar, 3rd edition, Cambridge Uni. Press, 2002.

9. The Physical Universe: An introduction to astronomy, F.Shu, University Science Books 1982.
10. Textbook of astronomy and astrophysics with elements of cosmology, V.B. Bhatia, Narosa Publishing House, 2000.
11. The new cosmos, A.Unsold and B. Baschek, Newyork, Springer 2002.
12. Theoretical Astrophysics, vol. I, II, III, T. Padmanabhan, Cambridge University Press.
13. A Workbook for Astronomy, Jerry Waxman, Cambridge University Press, 1984.
14. Structure formation in the universe, T.Padmanbhan, Cambridge University, press 1993.
15. Galactic Astronomy: Binney and Merrifield, Princeton University Press,1981.
16. General relativity and Cosmology, J.V. Narlikar, Macmillan Company of India Ltd, New Delhi 1978.
17. General relativity, I.R. Kenyon, Oxford University Press 1990.
18. Classical theory of fields, vol. 2, L.D. Landau and E.M. Lifshitz, Oxford: Pergamon press 1971.
19. First course general relativity, B.P. Schutz – Cambridge Univ. Press 2009.

Paper – IV (B) Electronics II (Communication)

Unit-I Digital communications

Pulse modulation systems, Sampling Theorem, Low pass &Band pass signal, PAM- Channel BE for PAM signal, Natural Sampling, Plat-top sampling, Signal through holding, Quantization of signals, quantization error.

Unit-II Digital modulation techniques

PCM, Differential PCM, Delta modulation, Adaptive, delta modulation (CVSD). BPSK, DPSK, QPSK, PSK,QASK, BFSK, FSK,MSK

Unit-III Mathematical representation of noise

Sources of noise, Frequency domain representation of noise , Effect of filtering on the probability density of Gaussian noise, Spectral component of noise, Effect of a filter on the power spectral density of noise, Superposition of noise, Mixing involving noise, binear filtering, Noise bandwidth, Quadrature component of noise, Power spectral density of $n_c(t)$ $n_s(t)$ & their time derivatives.

Unit-IV Data Transmission I

Base band signal receiver, Probability of error optimum filter, White noise: Matched filter & probability of error, Coherent reception correlation, PSK, FSK, Non-Coherence detection on FSK, Differential PSK, QASK, Calculation of error probability for BPSK,BSFK,QPSK.

Unit-V Data Transmission II

Noise in pulse code & delta modulation system, PCM transmission, Calculation of quantization noise output signal power, Effect of thermal noise, output signal to noise ratio in PCM, DM, Quantization noise in DM, output signal power, DM output signal to quantization noise ratio, effect of thermal noise in delta modulation, output signal to niose ratio in DM

Text and Reference Books:

1) "Microwaves" by K.L. Gupta Wiley Estern Ltd. Delhi.
2) Advanced Electronic communication system by Wayne Tomsi Physics education.

3) Principle of communication of system-by Toub & Schilling: second edition TMH 1994
4) Communication system: by siman Haykin, third edition John wiley & sons inc.1994.
5) Microwave devices & ckts by: Samuel, Y. Liau.
6) Electronic communication: George kennedy.

Paper – IV (C) PHYSICS OF NANO MATERIALS- II

UNIT I: Electrical transport in nano-stucture

Crystal bonding, structure, growth and symmetries; Band structure and density of states at nano-sclale; Electrical transport in nano-structure- Electical conduction in metals, classical and quantum theory, Conduction in Insulator and Ionic crystal, electron transport in semiconductors, various conduction mechanism in 3D (bulk) and 2D (thin film) and low dimensional systems, thermoionic emission , Field –enhanced thermoionic emission, Arrhenius type thermally activated conduction, variable range hopping and Polaron conduction.

UNIT II: Application of CNT

Applications of Carbon NanoTubes (CNTs) in field emission, fuel cells, CNT FETs, Light Emitting Displays (LEDs) and Flat Panel Displays (FPD), hydrogen storage, solar panels. Application of functional nanomaterials: clean energy (Hydrogen Production from Biomass, Catalytic coal hydrogasification), environmental technologies (clean water and air), health care (tissue and bone repairs, bio medical sensors)

Unit III: Next Generation Applications for Polymeric Nanofibres

Background, Biomedical Applications, Medical Prostheses, Tissue Engineering Scaffolds, Drug Delivery, Wound Dressing, Cosmetics. Filtration applications, Filter media, Protective Clothing, Material Reinforcement, Electrical Conductors, Optical applications, Sensor devices, Conclusion.

Reference: Nanotechnology: Global Strategies, Industry Trends and Applications (Editor: Jurgen Schulte)

UNIT IV: Nano-Lithography

Photolithography Principles; Phase Shifting Optical Lithography; Electron Beam Lithography (EBL); Neutral Atomic Beam Lithography; Ion-Beam Lithography (IBL); X-ray Lithography (XRL); Proximal Probe Lithography, Proximal Probes, STM based Electron-Beam Lithography, Soft Lithography. Nano lithographic applications and current research.

UNIT V: Sustainable Nanotechnology and Human Health

Application of industrial ecology to nanotechnology, Fate of nanomaterials in environment, environmental life cycle of nano materials, environmental and health impacts of nano materials, toxicological threats, eco-toxicology, exposure to nano particles – biological damage, threat posed by nano materials to humans, environmental reconnaissance and surveillance. Corporate social responsibility for nanotechnology, Nano materials in future - implications.

References: Books/ Research Monographs

1. Nanostructures & Nanomaterials: Synthesis, Properties & Applications: Guozhang Cao.
2. Introduction to Nanotechnology: Charles P. Poole Jr and Franks J. Qwens.
3. Handbook of Analytical instruments, R.S. Khandpur
4. Nano materials: Synthesis properties ,characterization and application: A.S Edelstein and R.C Cammaratra
5. Nanoelectronics and Nanosystems , Karl Goser, Peter Glosekotter, Jan Dienstuhl.,
6. Springer, 2004
7. Nanomaterial Systems Properties and Application, A.S.Eldestein and R.C.Cammarata.
8. Handbook of Nanotechnology: Bhushan (Ed), Springer Verlag, New York (2004).
9. Nanocomposite Science and Technology, Ajayan, Schadler and Braun
10. Piezoelectric Sensors: Force, Strain, Pressure, Acceleration and Acoustic Emission Sensors, Materials and Amplifiers, G. Gautschi.
11. Block Copolymers in Nanoscience Massimo Lazzari Supramolecular Chemistry, Jonathan W. Steed, Jerry L. Atwood
12. Nanotechnology: Importance and Application by M.H. Fulekar, IK International, 2010.
13. Nanotechnology in Biology and Medicine: Methods, Devices and Application by Tuan Vo-Dinh, CRC press, 2007.
14. Nanosystem characterization tools in the life sciences by Challa Kumar. Wiley-VCH, 2006.
15. Nanolithography M.Gentili et al.(edits),Springer. Environanotechnology by Mao Hong fan, Chin-pao Huang, Alan E Bland, Z Honglin
16. Wang, Rachid Sliman, Ian Wright. Elsevier, 2010.
17. Nanotechnologies, Hazards and Resource efficiency by M. Steinfeldt, Avon Gleich, U. Petschow, R. Haum. Springer, 2007.
18. Nanotechnlogy: Health and Environmental risk by Jo Anne Shatkin. CRC press, 2008.
19. An Introduction to Quantum Computing Phillip Kaye, Raymond Laflamme, Michele Mosca
20. The Physics of Quantum Information: Quantum Cryptography, Quantum Teleportation, Quantum Computation by Dirk Bouwmeester, Artur K. Ekert, Anton Zeilinger
21. Problems And Solutions in Quantum Computing And Quantum Information Yorick Hardy Willi-Hans Steeb
22. Introduction to Nano Science and Nano Technology- K.K. Chatopadhyay and A. N. Banerjee

PAPER –IV (D): SPACE PHYSICS - II

Unit I: Glimpse of Universe

Universe - description, origin, its evolution, age and size; Stars–birth, life, death, spectral analysis, stellar composition - element synthesis in stars, Exotic stars- novae, supernovae, pulsars, black holes and gamma ray bursts; Galaxies; Starbursts and Active Galactic Nucleus; Evidence for the Big Bang; Cosmic Background Radiation; Expansion Models; Dark Matter and Energy Recent innovations about the concept of Universe: Dark Energy and an accelerating universe

Unit II: Spacecrafts & Satellites

Satellite orbits and attitude: principles of satellite motion, Kepler's laws, orbital elements, satellite attitude and its control, types of orbits, polar and geostationary, earth and sunsynchronous, orbit optimization, viewing geometry, launch vehicles and spacecrafts, rocket propulsion concepts such as solid, hybrid, liquid, nuclear and antimatter. Rocket motors and their design, flight stability and recovery systems, stability and control system.

Unit III: Remote Sensing

Sensors and systems: visible, infrared, water vapour and microwave sensors, sensor characteristics, sensor materials, passive and active sensors, scanning radiometers, spectral signatures.

Satellite data processing: satellite data acquisition, satellite communications, data collection platforms, earth station, image processing, geometric and radiometric corrections, image navigation, registration, image enhancement techniques, noise removal methods, histogram methods, density slicing, image classification.

Applications of remote sensing in earth resources management, agriculture, forestry, water resources and disaster mitigation

Unit IV: Solar Wind and Interuactions

The ionospheric layers D, E, F and their formation, effect of radiation on earth's atmosphere, photochemical processes,

Geomagnetic and magnetic coordinates, poles, measurement of geomagnetic field components, micropulsation indices, variations of geomagnetic field, quiet and disturbed variations, geomagnetic storms, equatorial and auroral phenomena.

Solar wind, model of solar winds, interaction in the interplanetary medium and with the planets. Magnetosphere: interaction of solar wind with the geomagnetic field and formation of the magnetospheric tail, storm and sub-storm phenomena, Van Allen radiation belts

Unit V: Space Weather

Space Weather Effects on Communication, Space Weather Effects on Power Grids, Space Radiation Protection, Effects on Spacecrafts hardware and Operations, Effects on Satellite Navigation, Forecast of Space Weather.

Text and Reference Books

Same as mentioned in Semester III, Paper IV (D)

16/01/2019 A Singh Nishad Dhar 35 18/01/19 18.1.19

SCHEME OF EXAMINATION
&
SYLLABUS
of

CHOICE BASED CREDIT SYSTEM (CBCS)
UNDER
FACULTY OF SCIENCE

Approved by Board of Studies in Physics
EFFECTIVE FROM SESSION 2019-2020

School of Studies in Physics & Astrophysics
Pt. Ravishankar Shukla University
Raipur (C.G.) 492010
PH: - 0771-2262864
WEBSITE: -www.prsu.ac.in

Approved by Board of Studies in Physics on 18, January 2019
PT. RAVISHANKAR SHUKLA UNIVERSITY, RAIPUR

Choice Based Credit System (CBCS)

Under the CBCS scheme all the courses offered at P.G. level are under semester system. Semester system is applicable to regular students of affiliated colleges and Autonomous colleges of this University and different SoS of Pt. Ravishankar Shukla University, Raipur. Course structure along with distribution of marks is given below:

Name of the Paper	Marks					Credits
	Theory		Internal		Total	
	Max	Min	Max	Min		
Semester-I Paper-I: Basic Concepts of Physics and Astrophysics	80	16	20	04	100	03
Semester-II Paper-II: Basic Concepts of Optics	80	16	20	04	100	03

Note: Any one of the paper chosen by the students for CBCS will have 03 credits.

अध्ययनशाला का नाम – भौतिकी एवं खगोल भौतिकी अध्ययनशाला

पाठय्क्रम – च्वायस बेस्ड पाठ्यक्रम द्वितीय सेमेस्टर

प्रश्नपत्र का नाम – **Paper-I: Basic Concepts of Physics and Astrophysics**

कुल केडिटः 03 कुल अंकः 100

Choice Based Credit Course
Semester –I
Paper I- Basic Concepts of Physics and Astrophysics
Total Credit- 03, Total Marks: 100 [80+20]

Mechanical Properties of Matter: Newton laws of motion; Kepler's laws of planetary motion; Friction; Conservative & non-conservative forces; Work and Energy: kinetic and potential energy; Law of conservation of Energy, power; Elasticity; Surface tension, Viscosity, Equation of continuity, Bernoulli's theorem and its application.

Thermal Properties of Matter: Heat and temperature; Thermal expansion; Specific heat capacity; Latent heat; Calorimetry; Transfer of heat; Thermal conductivity; Thermal radiation; Black body radiation; Kirchhoff's law; Stefan's law; Newton's law of cooling; Perfect gas; Boyle's law, Charles's law, Kinetic theory of gases.

Electricity and Magnetism: Coulomb's law; Electrostatic force; Electric field; Electric Potential; Work done on a charge in an electrostatic field; Lines of force & Electric Flux; Gauss law; Dielectrics; Electric Susceptibility; Permittivity and Dielectric constant; Biot-Savart Law; Lorentz force; Ampere law; Time varying fields; Magnetization; Electromagnetic induction; Faraday law; Maxwell Equations.

Digital Electronics: Number systems; decimal, binary, octal, hexadecimal and their conversion; Logic gates: AND, OR, NOT, NAND, NOR, EX-OR gates and their logic symbols/ equivalent simplified switching circuits/ truth tables; Boolean algebra; De- Morgan theorems; Half and Full Adder circuits.

Astronomy & Astrophysics: Time and Coordinate system; Celestial Sphere; Solar Time; Sidereal Time; Julian Date; Right Ascension and Declination; Azimuth and Elevation; Optical telescopes; Apparent Magnitude; Absolute magnitude; Colour Index; UBVRI photometric systems; Luminosity; Stellar Distances; Spectral classification; The H-R diagram of stars; Physical Characteristics of Sun; Morphological classification of galaxies; Milky way galaxy.

REFERENCE BOOKS:

1. Fundamental of Physics, Halliday, Resnick & Walker, Wiley publication.
2. University Physics, Shears & Zimanski.
3. Basic electronics, V.K.Mehta.
4. Classical Electrodynamics, J. D. Jackson, J. Wiley & Sons.
5. Astrophysics for Physicists, Arnab Rai Choudhuri, Cambridge University Press.
6. Modern Astrophysics, B.W. Carroll and D.A. Ostlie, Addison-Wiley Publishing Co.
7. Introductory Astronomy and Astrophysics, M. Zeilik and S.A. Gregory, Saunders College Publishing.
8. The Physical Universe: An introduction to astronomy, F. Shu, Mill Valley University Sciences books.

अध्ययनशाला का नाम – भौतिकी एवं खगोल भौतिकी अध्ययनशाला

पाठय्क्रम – च्वायस बेस्ड पाठ्यक्रम तृतीय सेमेस्टर

प्रश्नपत्र का नाम – **Paper-II: Basic Concepts of Optics**

कुल केडिटः 03 कुल अंकः 100

Choice Based Credit Course
Semester –II
Paper II- Basic Concepts of Optics
Total Credit- 03, Total Marks: 100 [80+20]

Light and Optics: Nature of light; Optical Path; Reflection, Refraction, Refractive index, Dispersion and dispersive power; Achromatic prisms: Deviation without dispersion; Dispersion with no deviation in prismatic combination; Introduction to Optical instrument; Eyepieces: Ramsden and Huygens eyepiece; Huygens principle of wave front propagation; Reflection and Refraction of light from wave theory.

Interference: Interference of light; Young's experiment; Analytical treatment of Interference (wave theory); Condition for interference; Interference and conservation of energy; Fringe-width and shape of fringes in double slit; White light fringes: Colour effect; Newton's rings: Applications of Newton's rings, Michelson's interferometer, Applications of Michelson's interferometer.

Diffraction: Diffraction, Distinction between Interference and diffraction; Classes of diffraction; Fresnel's half-period zones: Plane wave-front; Diffraction at a straight edge; Diffraction at a single slit; Diffraction at a double slit; Resolving power of grating; Resolving power of a prism(spectrograph); Resolving power of telescope; Resolving power of microscope.

Polarisation: Polarisation of light; Experiment to show transverse nature of light waves; Polarisation by reflection: Brewster's law; Double refraction; Ordinary and extra-ordinary rays; Uniaxial and Biaxial Crystal and their refractive indices.

Luminescence: Source of light; Incandescence, Luminescence, Fluorescence, Phosphorescence; Broad classification of luminescence.

Laser & Fibre Optics: Ordinary and Laser light; Einstein theory: Interaction of radiation with matter; Einstein's coefficients; Conditions for Laser Production: Population inversion, Pumping, Resonance Cavity; Laser system: Solid, Liquid, Gas; Applications of Laser; Introduction to Fibre Optics: Basic principle, Structure, Classification and Applications in modern communication systems.

REFERENCE BOOKS:

1. Physics part-I by R. Resnick and D. Halliday, Wiley Eastern Ltd, New Delhi.
2. Physics part-II by R. Resnick and D. Halliday, Wiley Eastern Ltd, New Delhi.
3. Laser Physics and Applications by L Tarasov, NIR Publisher Moscow.
4. Principle of Optics Eigth Edition by B. K. Mathur and T.P. Pandya, Gopal Printing Press Kanpur.
5. Optical Electronics by Ajoy Ghatak and K. Thyagarajan, Cambridge University Press.
6. A Text Book of Optics Eigth Edition N. Subramanyam and Brij Lal, S Chand Company Pvt. Ltd New Delhi.
7. Laser Systems and Applications by N. Choudhary and R. Verma, PHI Learning Pvt. Ltd New Delhi.
8. Fundamentals of Optics by Devraj Singh, PHI Learning Pvt. Ltd New Delhi.
9. Fiber Optic Communication Second Edition by D. C. Agrawal, Wheeler Publishing.

SCHEME OF EXAMINATION

&

SYLLABUS OF

Course Work for Ph.D. (PHYSICS)

UNDER

FACULTY OF SCIENCE

Approved by Board of Studies in Physics

EFFECTIVE FROM JULY 2017

School of Studies in Physics & Astrophysics
Pt. Ravishankar Shukla University
Raipur (C.G.) 492010
PH: - 0771-2262864
WEBSITE: -www.prsu.ac.in

Approved by Board of Studies in Physics on 10, February 2017
PT. RAVISHANKAR SHUKLA UNIVERSITY, RAIPUR

SCHEME OF EXAMINATION & SYLLABUS PRESCRIBED FOR THE EXAMINATION OF Ph.D. Course Work (Physics)

EFFECTIVE FROM JULY 2017

Scheme of Examination

The Course Work for Ph.D degree in Physics is a six month course after completion of P.G. degree in the subject. There shall be two compulsory papers based on the research areas of Physics. The structure of the course is given below:

S.No.	Theory Paper	Marks
1.	Research Methodology, Quantitative Methods & Computer Applications	100
2.	Review of Literature in Concerned Subject, Seminar/ Project Report	100
Total		**200**

Paper – I

Research Methodology& Quantitative Methods and Computer Applications

UNIT- I

Techniques for Structural, Microscopic, and Spectroscopic Characterization

X-ray diffraction: coherent scattering of X-rays, reflected intensities, experimental methods of crystallography, particle size determination.

Microscopy: Scanning Electron Microscopy (SEM), Transmission Electron Microscopy (TEM), Scanning Transmission Electron Microscopy (STEM), Scanning Tunneling Microscopy (STM), Atomic Force Microscopy (AFM).

Spectroscopy: Fourier Transform Infrared (FTIR) and Raman spectroscopy, Nuclear Magnetic Resonance (NMR), Electron Spin Resonance (ESR).

UNIT – II

Techniques for Characterization of Solid State Ionic and Luminescent Materials

Solid State Ionic Materials: Characterization of ion transport properties; AC Impedance Spectroscopy (IS) for conductivity of (σ) measurements; DC polarization methods viz, Tubandt's method, Wagher's method, Transient Ionic Current (TIC) method for ionic mobility (μ), ionic transference number (t_{ion}),mobile ion concentration (n) and ionic drift velocity (v_d) measurements. Temperature dependent studies on σ, μ, n, v_d etc. and computation of respective energies.

Techniques for ML measurement and TL measurements. Measurement techniques to study Photoluminescence response, UV-visible spectrometry.

Thermal analysis: Differential Thermal Analysis (DTA), Differential Scanning Calorimetry (DSC), Thermal Gravimetric Analysis (TGA).

UNIT – III

Astrophysical Techniques for Astronomical Observations

Photometry: Instrumental magnitudes and colors, seeing and atmospheric effects, extinction correction. Standard photometric systems: UBV and other systems. Transformation to a standard photometric systems. Absolute and differential photometry.

Spectroscopy: Basics of prism and grating spectroscopes.

Basics of CCD data reduction: Plate scale, readout noise and gain, signal-to-noise ratio. correction for bias, dark and flat fielding, fringing and cosmetic effects.

UNIT – IV

(I) Programming in C

Getting Started: Elementary idea about C Language, Getting Started with C,the First C Program, Compilation and Execution, Receiving Input; C Instructions: Type Declaration Instruction, Assignment Instruction, Integer and Float Conversions, Type Conversion in Assignments, Hierarchy of Operations, Associativity of Operators. Control Instructions in C.

Control Structures: The Decision Control Structures, If Statement, If-else Statement, Use of Logical Operators, The Conditional Operators. **The Loop Control Structure:** Loops, the while Loop, the for Loop, the Odd Loop, the break Statement, the Continue Statement, the do-while Loop.**The Case Control Structure:** Decisions Using switch, switch Versus if-else Ladder The goto Keyword.

UNIT – V

(II) Programming in C

Functions & Pointers : What is a Function, Passing Values between Functions, Scope Rule of Functions calling Convention, Advanced Features of Functions; Function Declaration and Prototypes Call by Value and Call by Reference , An Introduction to pointers, Pointer Notation, Back to Function Calls, Conclusions.

Storage Classes in C: Automatic Storage Class, Register Storage Classes, Static Storage Classes, External Storage Classes, Which to Use When.

The C Preprocessor: Features of C Preprocesor, Macro Expansion, File Inclusion, Conditional Compilation, #if and #elif Directives, Miscellaneous Directives.

Arrays: What are Arrays; A Simple Program using Array. More on Arrays; Array Initialization, Bounds Checking, Passing Array Elements to a Function. Pointers and Arrays; Passing an Entire Array to a Function.

Recommended Text and Reference books:

1. Characterization of Materials: Wachtman J B (Butterworth-Heinemann)
2. Introduction to Nanotechnology by Charles P. Poole Jr. and Frank J. Owens (Willey Inter. Science Pub. 2003)
3. Condensed Matter Physics by Michal P. Marder (Willy Inter. Science Pub., 2000)
4. Superionic Solids- Principle and applications by S. Chandra (NH Pub., 1980)
5. Luminescence of Solids : R Vij (Plenum Press)
6. Digital Image processing: Gonzalez R. C. and Woods R. E. (Addision-Wesley)
7. Astronomical Photometry: Henden A. A. and Kaitchuck R H (Willmann-Bell)
8. Astrophysical techniques: Kitchin C R , third edition (IOP publishing)
9. Optical Astronomical Spectroscopy: Kitchin C R (IOP Publishing).
10. Let us C by Yaswant Kanitkar
11. C Programming by Dennis Riche and Brian Karnighan
12. C Programming by Schauam Series

Paper – II
Review of Literature in Concerned Subject, Seminar/ Project Report

Approved by Board of Studies in Physics on 20th September 2013

M.A. PSYCHOLOGY

[SEMESTER EXAM]

SYLLABUS

2018-19

2018–19

School of Studies in Psychology
Pt. Ravishankar Shukla University, Raipur
M. A. Psychology Syllabus
w.e.f. July, 2018

VISION

To prepare competent psychologists who would excel in knowledge, orientation and practice of psychology, with high ethical standards and social relevance.

OBJECTIVES

1. To create a strong research oriented theoretical foundation in consonance with recent advances in the discipline of psychology.
2. To enable students to take a creative, empirical and ethical approach to the program that combines conceptual repertoire and research practices in both quantitative and qualitative traditions.
3. To provide an opportunity to extend the knowledge base to the world of practice with a view to promote healthy interface between academia and society.

Programme Structure

The M. A. Psychology Programme divided into two Semesters to be known as Semester -1 and Semester- 2.

		Semester – 1	Semester – 2
Part I	First Year	Semester – I – 1	Semester – 1- 2
Part II	Second Year	Semester – II – 1	Semester – II – 2

The schedule of papers prescribed for all semesters shall be as follows:

30.6.18

SEMESTER –I & SEMESTER - II

NOTE:

1. Each paper will carry 100 marks (80 marks for theory and 20 marks for internal assessment).
2. Each practicum course shall consist of 100 marks, which would include written record 25 marks, conduction of lab practical in exam 50 marks and viva-voce 25 marks.

SCHEME OF EXAMINATION

1. English and Hindi shall be the medium of instruction and examination.
2. Examinations shall be conducted at the end of each Semester as per the Academic Calendar notified by the University.
3. The System of evaluation shall be as follows:

- Each paper will carry 80 marks, and 20 marks for the Internal Assessment based on classroom participation, seminar, **class tests**, viva-voce, field and laboratory work, practical and attendance. The weightage given to each of these components shall be decided and announced at the beginning of the semester by the individual teacher responsible for the course.

- Any student who fails to participate in classes, seminars, tests, viva-voce, practical, field and laboratory work will be debarred from appearing in the end semester examination in the specific course and no Internal Assessment marks will be awarded.

- His/her Internal Assessment marks will be awarded as and when he/she attends regular classes and unit tests in the course in the next applicable semester.
- No special classes will be conducted for him/her during other semesters.
- The duration of written examination for each paper shall be of three hours.
- The duration of Practicum examination shall be of four hours.

30.6.18

PASS PERCENTAGE

However, a candidate who has secured the minimum marks to pass in each paper but has not secured the minimum marks to pass in aggregate may reappear in any of the paper/s of his choice in the concerned semester in order to be able to secure the minimum marks prescribed to pass the semester in aggregate. No student would be allowed to avail of more than 3 chances to pass any paper inclusive of the first attempt.

DIVISION CRITERIA

Successful candidates will be classified on the basis of the combined results of Part-I and Part-II examinations as follows:

Candidates securing 60% and above: Ist Division

Candidates securing between 50% to 59.99 %: IInd Division

Candidates securing 40 to 49.99%: IIIrd Division

39.99% and less: Failed

ATTENDANCE REQUIREMENT

No student shall be considered to have pursued a regular course of study unless he/she is certified by the Head, School of Studies in Psychology, Ravishankar Shukla University, to have attended 75% of the total number of lectures, tutorials and seminars conducted in each semester, during his/her course of study.

Note: ***M. A. Psychology students will opt for 1 Choice-Based Course (CBC) of 100 marks each, in Semester II, & III with at least one from the other Department of the University.***

30.6.18

M. A. PSYCHOLOGY

FIRST SEMESTER

(w.e.f. JULY 2018)

Paper No.	Title of the Paper	Theory	Internal
PSM 101 (I)	Basic Psychological Processes	80	20
PSM 102 (II)	Social Psychology	80	20
PSM 103 (III)	Basic Research Methodology	80	20
PSM 104 (IV)	Psychopathology	80	20
PSM 105 (V)	Practicum: (Experiment)	100	
		420	80

Note: All are compulsory papers

PAPER – I

BASIC PSYCHOLOGICAL PROCESSES – I

M. M. - 80

Note: This paper consists of five units. From each unit minimum two questions will be set and candidates will have to answer one question from each unit.

Unit – I. Psychophysics

Psychophysics: Nature, problems and Methods. Signal Detection Theory, Subliminal Perception and related factors.

Unit 2. Perceptual Processes

Approaches to study Perception: Gestalt, Physiological, Information Processing and Ecological Approaches. Perceptual Organization: Gestalt, Figure and Ground. Laws of Organization. Perceptual Constancy: Size, Shape and Brightness. Depth Perception: Monocular and Binocular cues Movement Perception: Nature, Types and Theories.

30.6.18

Unit 3. **Attention**

Nature, concept and Mechanism of Attention. Selective Attention. Types, Theories and Applications.

Unit 4. **Motivation**

Nature and properties; origin, development and present status.

Basic Motivational Concepts: Instincts, Needs, Drives, Incentives, Motivational Cycle. Theoretical framework: Murray and Maslow, Intrinsic and Extrinsic Framework. Biogenic Motive, Sociogenic Motive: Achievement, Affiliation and Approval.

Unit 5 **Emotion**

Emotion: Nature and concept. Physiological correlates of Emotions. Theories of Emotions: James-Lange, Canon-Bard, Schachter-Singer. Emotional Intelligence Conflict: Sources and Types.

BOOKS RECOMMENDED

1. Averill, J. R., Chon, K. K., & Hahn, D. W. (2001). Emotions and Creativity, East and West. *Asian Journal of Social Psychology*, *4*(3), 165-183.
2. Barrett, L. F., Niedenthal, P. M. & Winkielman, P. (2007). Emotion and Consciousness. Guilford Press.
3. Best, J. B. (1989). Cognitive Psychology. II Edition. West Publishing Company, New York.
4. Carr, A. (2011). Positive Psychology: The Science of Happiness and Human Strengths. Routledge; 2 edition.
5. Ciccarelli, S. K. & Meyer, G. E. (2008). Psychology: South Asian Edition 1st Edition. Pearson.
5. Snyder (2011). Positive Psychology: The Scientific and Practical Explorations of Human Strengths Edition-Second. Sage South Asia.

7. Feldman, R. (2009). Essentials of Understanding Psychology. Tata McGraw-Hill Education Pvt. Ltd.
8. Galotti, K. M. (1999). Cognitive Psychology in and Outside Laboratory. Mumbai: Thompson, Asia.
9. Iyer, S. (2006). Introduction to Psychology. Premier Publishing Company, India.
10. Menon, S., Nagaraj, N. & Binoy, V. V. (Editors) (2017). Self, Culture and Consciousness: Interdisciplinary Convergences on Knowing and Being. Springer.
11. Menon, S., Sinha, A. & Sreekantan, B. V. (2014).Interdisciplinary Perspectives on Consciousness and the Self. Springer.
12. Misra, G. & Baron, R. A. (2014). Psychology: Indian Subcontinent Edition 5th Edition, Pearson.
13. Rao, R. K. (2005). Perception, Cognition, and Consciousness in Classical Hindu Psychology. *Journal of Consciousness Studies,12, 3-30.*
14. Rao, R. K. (2011). Cognitive Anomalies, Consciousness and Yoga. New Delhi, Matrix Publishers.
15. Sen, Anima: Attention and Distraction, New Delhi.
16. Snodgrass, J. G., Berger, G. L. & Haydon, M. (1985). Human Experimental Psychology. New York: Oxford University Press.
17. Solso, R. L. (2004). Cognitive Psychology. Sixth Edition. Pearson Education Pvt. Ltd., New Delhi
18. Stevens, S. (1959). Handbook of Experimental Psychology. A Wiley Publication in Psychology.
19. Wessells, M. G. (1982). Cognitive Psychology. Harper and Row Publishers, New York.
20. Wood, G. (1983). Cognitive Psychology - A Skills Approach. Cole Publishing Company, California.

30.6.18

PAPER – II

SOCIAL PSYCHOLOGY

M. M. - 80

NOTE: This paper consists of five units. From each unit minimum two questions will be set and candidates will have to answer one question from each unit.

UNIT – I Introduction and Social Psychological Perspectives

Nature and Scope of Social Psychology. Historical Background. Methods of Social Psychology. Theoretical Perspective: Cognitive Dissonance, Attribution, Field, Psychodynamic, Symbolic Interactions, Socio-Biology.

UNIT – II Social Cognition and Person Perception

Sources of Errors in Social Cognition. Social Perception, Person Perception. Determinants of Person Perception. Impression Formation and Management. Role of Stereotypes in Person Perception.

UNIT – III Social Influence Process

Meaning and nature of Social Influence. Social Facilitation, Conformity, Compliance and Obedience, Social Power, Reactance.

UNIT – IV Attitude

Nature and Characteristics. Development, Functions and Formation of Attitudes. Influence of Attitude on Behaviour. Theories of Attitude Change. Barriers in Changing Attitudes.

UNIT – V Social Psychology and Social Situation

Prosocial Behaviour, Aggression: Nature, Characteristics Determinants and Theories. Controlling and Management of Aggression. Violence, Categories of Violence, Self-directed (Suicide), Domestic Violence.

30.6.18

BOOKS RECOMMENDED

1. Baron, R. A. & Byrne, D. (2000) Social Psychology 12th edition. Pearson, New Delhi.
2. Billing, M. (1976). Social Psychology and Intergroup Relations. New York, Academic Press.
3. Crisp, R. J. & Turner, R. N. (2014). Essential Social Psychology: 3rd Edition. SAGE Publications Ltd.
4. Dalal, A. K. (1989). Attribution: Theory and Research. New Delhi, Wiley Limited.
5. Dalal, A. K. & Misra, G. (Ed.) (2001). New Directions in Indian Psychology, Vol. 1 Social Psychology.
6. Eiser, J. R. (1986). Social Psychology. London: Cambridge University Press.
7. Feldman, R. S. (1985). Social Psychology. New York, Mc Graw Hill.
8. Lindsey, G. & Aronson, E. (Eds) (1985). The Handbook of Social Psychology. New York. Random House.
9. Mathur, S. S. (2004). Social Psychology. Vinod Pustak Mandir, Agra.
10. Mishra, G. (1990). Applied Social Psychology in India. New Delhi, Sage.
11. Mishra, G. (Ed.) (2009). Psychology in India, Vol. 2. Social and Organizational Processes. New Delhi, Pearson.
12. McGarty, C. & Haslam, S. A. (Eds.) (1997). The Message of Social Psychology. Oxford, U K, Blackwell.
13. Pandey, J. (1988). Psychology in India; the State – 7 the Art Vol – 2 ND. Sage.
14. Tajfel, H. (1981). Human Groups and Social Categories. London: Cambridge University Press.
15. Taylor, M. & Moghaddam, F. M. (1987). Theories of Intergroup Relations. New York: Praeger

समाज मनोविज्ञान (2004): अरूण कुमार सिंह, मोतीलाल बनारसी दास।

समाज मनोविज्ञानः गिरीश्वर मिश्रा

समाज मनोविज्ञानः लालबचन त्रिपाठी

30.6.18

PAPER – III

BASIC RESEARCH METHODOLOGY

M. M. - 80

NOTE: This paper consists of five units. From each unit minimum two questions will be set, and candidates will have to answer one question from each unit.

UNIT – I Introduction to Psychological Research

Meaning, Purpose and Dimensions of Research. Types of Psychological Research: Qualitative and Quantitative. Parametric and Non-Parametric Statistics. Methods of Psychological Research: Experimental, Quasi-Experimental, Case Studies, Field Studies. Variables: Nature and Types. Techniques of experimental manipulation, control in experiment.

UNIT – II Research Process

Research Process: Consideration of Research Problem and Hypothesis, Operationalization. Sampling: Probability and Nonprobability Sampling. Sources of Bias. Ethical Issues in Psychological Research.

UNIT – III Research Designs

Cross Sectional and Longitudinal, Experimental, Correlational. Single Factor, Quasi – Experimental.

UNIT – IV Central Tendencies

Measures of Dispersion, Normal Probability Curve, its properties and utility. Null Hypothesis, Type-I and Type-II Errors, Level of Significance. Inferential Statistics: t -Test.

UNIT – V Method of Data Collection

Survey and Observation Method: Questionnaire, Interview. Tests and Scales.

30.6.18

BOOKS RECOMMENDED

1. Black, T. R. (1988). Quantitative Research Designs for Social Sciences. Thousand Oaks: Sage.
2. Broota, K. D. (1992). Experimental Design in Behavioural Research. Wiley Eastern Ltd. New Delhi.
3. Edwards, A. K. (1976). Experimental Designs in Psychological Research. New York Holt Rinehart.
4. Kerlinger, F. N. (1999). Foundation of Behavioural Research. S. Chand (G/L) & Company Ltd; 4th edition.
5. Kothari C. R. (1986). Research Methodology: Methods and Techniques. Wiley Eastern Ltd. New Delhi.
6. Mangal, S. K. (2012). Statistics in Psychology and Education (2nd Ed.). New Delhi: PHI Learning Pvt. Ltd.
7. Mason, J. (1997). Qualitative Researching. Thousand Oaks: Sage.
8. Miles, J. & Banyard, P. (2007). Understanding and Using Statistics in Psychology A Practical Introduction. Sage Publications.
9. Siegal, S. (2002). Non-Parametric Statistics for Behavioural Sciences. New Delhi: Tata McGraw Hill.
10. Winer, B. J. (1971). Statistical Principles in Experimental Design. New York, McGraw Hill.

30.6.18

PAPER – IV
PSYCHOPATHOLOGY

M. M. - 80

NOTE: This paper consists of five units. From each unit minimum two questions will be set and candidates will have to answer one question from each unit.

UNIT – I **Concept of Psychopathology and Classification System**

Diagnosis: Purpose, Diagnostic System: Mental Status Examination (MSE). Clinical Interview and Diagnostic Tools. Classification Systems: ICD and DSM. Evaluation of Classification System.

UNIT – II **Theoretical Models of Psychopathology**

Psychodynamic, Behavioural, Cognitive, Humanistic, Biological and Socio-Cultural.

UNIT – III **Disorders of Anxiety, Somatoform, and Behavioural Syndromes**

Panic, Phobic, OCD, Post-Traumatic, GAD, Somatoform Disorders, Impulse Control Disorder, Eating Disorder, Sleep Disorder. Dissociative Disorder: Types, Characteristics, Etiology and Management.

UNIT – IV **Psychotic Spectrum Disorders**

Schizophrenia, Mood Disorder. Personality Disorders: Clinical Characteristics, Etiology and Management.

UNIT – V **Substance Related Disorders and Developmental Disorders of Childhood**

Mental Retardation. Developmental Disorders of Childhood: Autism Spectrum Disorder (ASD), Attention Deficit Disorder (ADD), Attention Deficit and Hyperactive Disorder (ADHD). Learning Disabilities.

30.6.18

BOOKS RECOMMENDED

1. Adams, H. E. & Sutker, P. B. (2004). Comprehensive Handbook of Psychopathology. New York, Plenum Press.
2. Aboud, T. D. (1988). Health Psychology in Global Perspective. Thousand Oaks, C.A: Sage.
3. Carson, C.R. & Butcher, J. N. (1992). Abnormal Psychology and Modern Life (9th Ed), Harper Collins Publisher.
4. Davison, G. C. & Neal, J. N. (2000). Abnormal Psychology – 8th Ed. Wiley, Publishers.
5. Page, J. D. (1975). Psychopathology: The Science of Understanding Deviance. (2nd Ed.). Chicago, IL, Aldine
6. Prokap, C. R. & Bradly, L.A. (1991). Medical Psychology: Contribution to Behavioural Medicine. Academic Press.

असामान्य मनोविज्ञान (2004): अरूण कुमार सिंह, मोतीलाल बनारसी दास।

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PAPER – V

PRACTICUM

M. M. - 100

This paper consists of the laboratory (Experimental) and Field -Work done throughout the semester and will be evaluated at the time of examination along with the other papers. Distribution of marks would be as under:

	Marks
A. Record of Lab Practical and Field Work	25
B. Evaluation of one Lab. Experiment of be conducted in the examination	50
C. Viva-Voce on Practicum	25

Note: No candidate would be allowed to appear in the practical examination unless his/ her day-to-day practical work and report are found satisfactory.

List of Practicum: **(Any five Experiments and One Field Study)**

1. Constancy- Size/Shape/Brightness
2. Biofeedback
5. Mental Fatigue
6. Learning
7. Verbal Learning
8. Selective Attention
9. Knowledge of Results
10. Problem Solving
11. RI / PI

Field Work

1. Motivation
2. D.A.T./ Personality
3. Mental Health
4. Frustration Tolerance
5. Stress / Anxiety
6. Depression

Note: Field Studies topics would be allotted by the Departmental Committee.

COURSE STRUCTURE

M. A. PSYCHOLOGY

SECOND SEMESTER

(w.e.f. JULY 2018)

Paper No.	Title of the Paper	Theory	Internal
PSM 201 (VI)	Basic Psychological Processes – II	80	20
PSM 202 (VII)	Group Processes and Cultural Psychology	80	20
PSM 203 (VIII)	Advanced Research Methodology	80	20
PSM 204 (IX)	Physiological Psychology and Health Behaviour	80	20
PSM 205 (X)	Practicum	100	---
		420	80

PAPER – VI

BASIC PSYCHOLOGICAL PROCESSES – II

M. M. - 80

NOTE: This paper consists of five units. From each unit minimum two questions will be set and candidates will have to answer one question from each unit.

Unit I Learning Process

Classical Conditioning: Procedure, Phenomena and related Issues.

Instrumental Learning: Phenomena, Paradigms and Theoretical Issues. Process, Escape Conditioning, Avoidance Conditioning, Generalization. Reinforcement: Basic Variables and Schedules.

30.6.18

UNIT II **Experimental Analysis of Behaviour**

Behaviour Modification, Shaping. Discrimination Learning. Neurophysiology of Learning.

Unit III **Verbal Learning**

Verbal Learning: Methods and Materials, Organizational Processes

UNIT IV **Learning Theories**

Learning Theories: Hull, Tolman, Skinner.

Cognitive approaches in Learning: Latent Learning, Observational Learning.

Unit V. **Memory and Forgetting**

Memory Processes: Encoding, Storage, Retrieval. Stages of Memory: Sensory Memory, Short-term Memory (STM) and Long-term Memory (LTM).

Episodic and Semantic Memory Forgetting: Nature and causes of Forgetting.

Theories of Forgetting: Interference, Decay, Retrieval. Improving Memory.

BOOKS RECOMMENDED

1. Baddley, A. (1997). *Human Memory: Theory and Practice*. New York: Psychology Press.
2. Baron, R. & Misra, G. (2013). Psychology. New Delhi: Pearson.
3. Chadha, N. K. & Seth, S. (2014). The Psychological Realm: An Introduction. New Delhi: Pinnacle Learning.
4. Ciccarelli, S. K., & Meyer, G. E. (2010). Psychology. South Asian Edition. New Delhi: Pearson Education.
5. Coon, D., & Mitterer, J. O. (2007). Introduction to Psychology: Gateway to Mind and Behaviour. New Delhi: Cengage.
6. DAmato, M. R. (1970). Experimental Psychology, New York, Mc. Graw Hill.
7. Feldman, R. (2009). Essentials of Understanding Psychology. New Delhi: Tata McGraw Hill.

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8. Galotti, K. M. (1999). Cognitive Psychology in and outside Laboratory. Mumbai: Thompson, Asia.
9. Gerrig, R. J., & Zimbardo, P. G. (2006). Psychology and Life (17th Ed.). New Delhi: Pearson Education.
10. Passer, M. W. & Smith, R. E. (2010). Psychology: The Science of Mind and Behaviour. New Delhi: Tata McGraw-Hill.
11. Sen Anima: Attention & Distraction. New Delhi.
12. Smith, E.E. & Kosslyn, S. M. (2007). *Cognitive Psychology: Mind and Brain.* Prentice Hall.
13. Snodgrass, J. G., Berger, G. L. & Haydon, M. (1985). Human Experimental Psychology, New York, Oxford University Press.
14. Tripathi, A. N. & Babu, N. (2008). Cognitive Processes. In Misra, G. (Ed.). *Psychology in India: Advances in Research*, Vol. 1. New Delhi: Pearson Education.

30.6.18

PAPER – VII

GROUP PROCESSES AND CULTURAL PSYCHOLOGY

M. M. – 80

NOTE: This paper consists of five units. From each unit minimum two questions will be set and candidates will have to answer one question from each unit.

UNIT – I **Inter Group Relations**

Group Dynamics and Group Behaviour, Group Effectiveness, and Group Cohesiveness: meaning, formation, Decision Making, Problem Solving and Group Level Behaviours.

UNIT – II **Leadership**

Meaning nature and Function of Leadership. Styles and Effectiveness of Leadership. Psychology of Followers.

UNIT – III **Social Issues**

Poverty, Caste, Gender, Population Issues in India. Unemployment. Communal Tension and Harmony.

UNIT – IV **Culture and Behaviour- I**

Culture and Cognition and Emotion. Culture and Organisation.

UNIT – V **Culture and Behaviour- II**

Culture and Health. Culture and Personality. Health, Environment and Law.

30.6.18

BOOKS RECOMMENDED

1. Ahuja, R. (2012). Social Problems in India. Rawat Publication.
2. Alcock, P. (1997). Understanding Poverty (2nd Ed). Great Britain: Palgrave.
3. Aronson, E (Eds). (1985). The Handbook of Social Psychology. N Y: Random House.
4. Baron, A.B. & Byrne, D. (1991). Social Psychology, - Boston Allyn & Bacon.
5. Billing, M. (1976). Social Psychology and Inter Group Relations, NY: Academic Press.
6. Dalal, A. K. (1989). Attribution Theory and Research. New Delhi, Wiley Limited.
7. Dalal, A. K. & Misra, G. (2001) New Directions in Indian Psychology. New Delhi: Sage Publications.
8. Eiser, J. R. (1986). Social Psychology. London: Cambridge University Press.
9. Feldman R.S. (1985) Social Psychology. New York, McGraw Hill.
10. Jai Prakash, I. & Bhogle, S. (1998). (Eds.) Psychology and Changing World. Bangalore, Prasaranga, Bangalore University.
11. Kakkar, S. (1996). Indian Psyche. New Delhi: Penguin.
12. Mishra, G. (1990). Applied Social Psychology in India. New Delhi, Sage.
13. Misra, G. & Nagpal, A. (1999). (Eds.). Psychology of Poverty and Disadvantages. New Delhi. Concept Publishing Company.
14. Pandey, J. (1988). Psychology in India; the State – 7 the Art Vol – 2. New Delhi: Sage.

समाज मनोविज्ञान (2004): अरूण कुमार सिंह, मोतीलाल बनारसी दास।

समाज मनोविज्ञानः गिरीश्वर मिश्रा।

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PAPER – VIII

ADVANCED RESEARCH METHODOLOGY

M. M. – 80

NOTE: This paper consists of five units. From each unit minimum two questions will be set and candidates will have to answer one question from each unit.

UNIT – I **Experimental Design**

Randomized groups, Matched Groups, Factorial Designs: Between and Within Groups, Repeated Measures (One Factor).

UNIT – II **Analysis of Variance**

ANOVA: One -Way and Two - Way, ANCOVA, a-priory and Post-Hoc Comparisons.

UNIT – III **Measures of Relationships**

Bi-serial, Point Bi-serial, Tetrachoric and Phi.

Multiple and Partial Correlations.

UNIT – IV **Regression and Factor Analysis**

Simple and Multiple, Factor Analysis: Assumptions, Methods Rotation and Interpretation.

UNIT – V **Report Writing**

Use of Computer in Psychological Researches, Research Report Writing (APA Style)

30.6.18

BOOKS RECOMMENDED

1. Black T. R. (1988). Quantitative Research Designs for Social Sciences. Thousand Oaks: Sage.
2. Breakwell, G. M., Smith, J. A., & Wright, D. B. (2012). *Research Methods in Psychology* (4th ed.). Sage.
3. Bridget, S. & Cathy, L. (Eds.) (2008). Research Methods in the Social Sciences. Vistaar Publication New Delhi.
4. Broota, K. D. (1992). Experimental Design in Behavioural Research. New Delhi, Wiley Eastern Ltd.
5. Edwards, A. L. (1984). Experimental Design in Psychological Research. Harpercollins College Div; Subsequent edition.
6. Elmes, D., Kantowitz, B., & Roediger, H. (2011). Research Methods in Psychology (9f ed). Cengage Learning.
7. Kerlinger, F. N. (1983). Foundation of Behavioural Research (2nd ed) Surjeet Publication, Kamla Nagar, New Delhi, 1983.
8. Kothari, C. R. (1986). Research Methodology: Methods and Techniques. Wiley Eastern Ltd. New Delhi.
9. Mason, J. (1997). Qualitative Researching, Thousand Oaks: Sage.
10. Nestor, P.G. & Schutt, R. K. (2011). Research Methods in Psychology: Investigating Human Behaviour. Sage.
11. Winer, B. J., Brown, D. R. & Michels, K. M. (1991). Statistical Principles in Experimental Design. New York: McGraw Hill.

30.6.18

PAPER – IX

PHYSIOLOGICAL PSYCHOLOGY AND HEALTH BEHAVIOUR

M. M. – 80

NOTE: This paper consists of five units. From each unit minimum two questions will be set and candidates will have to answer one question from each unit.

UNIT – I **Methods and Basic Concepts**

Methods of Physiological Psychology: Lesion and Brain Stimulation. Receptors, Effectors and Adjuster Mechanisms. Neural Impulse: Origin. Conduction and Measurement.

UNIT – II **Sensory System**

Vision and Audition. Human Nervous System: Structure and Functions. Structure of Neuron; The different parts of a Neuron; Types of Neurons Functions of Neuron; generation of IPSP and EPSP, Conduction and generation of Action Potential, Ionic Exchanges and Refractory Periods

UNIT – III **Sleep, Waking and Endocrine System**

Sleep and Waking: Stages of Sleep, Disorders of Sleep and Physiological Mechanisms of Sleep and Waking. Drinking and its Neural Mechanism; Hunger and its Neural Mechanism. Endocrine System: Structure and Function. Abnormalities of major Glands: Thyroid, Adrenal, Gonads, Pituitary, Pancreas and Pineal

UNIT - IV **Approaches to Therapy**

Psychoanalytic, Biological, Behavioural, Behavioural Medicine and Spiritual Therapy.

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UNIT – V Health Assessments and Promotion

Quality of Life Scales, Health Indices Checklist, Lifestyle Evaluation and Coping Scales, Health Promotion Strategies, Psychological Intervention, Lifestyle Modification Techniques, Utility of Relaxation and Bio-Feedback Methods. Mental Health Promotion and Maintenance. Current Issues and Trends in Health Psychology.

BOOKS RECOMMENDED

1. Aboud, T. D. (1998). Health Psychology in Global Perspective. Thousand Oaks, C.A: Sage.
2. Adams, H. E. & Sutker, P. B. (2001). Comprehensive Handbook of Psychopathology. Kluwer Academic / Plenum Publishers, New York.
3. Brannon, L. & Feist, J. (2010). Health Psychology: An Introduction to Behaviour and Health. Belmont, CA: Thomson/Wadsworth.
4. Carson, C. R., Butcher J. N. (1992). Abnormal Psychology and Modern Life (9th ed) Harper Collins Publisher.
5. Davison, G. C. & Neal, J. N. (2000). Abnormal Psychology – 8th Ed. Wiley Publishers.
6. Deb, S. (2009). Reproductive Health Management, New Delhi, Akansha Publications.
7. Dimmates, M. R. & Martin, L. R. (2007). Health Psychology. Pearson.
8. Friedman, H. S. (1998). Encyclopaedia of Mental Health. Academic Press.
9. Kleinman, A. (1988). Rethinking Psychiatry from Cultural Category to Personal Experience. Free Press. New York.
10. Marks, D. F. (2002). The Health Psychology Reader. Sage.
11. Ogden, J. (1996). Health Psychology. A Textbook. Open University Press.
12. Page, J. D. (1975). Psychopathology: The Science of Understanding Deviance.
13. Prokop, C. K. & Bradly, L. A. (1981). Medical Psychology: Contribution to Behavioural Medicine. Academic Press.
14. Rice, P. L. (1998). Health Psychology. Pacific Grove Books. Cole Pub.
15. Taylor, S. E. (1999). Health Psychology. McGraw Hill.

30.6.18

PAPER – X

PRACTICUM

M. M. 100

This paper consists of the laboratory (Testing) and Field-Work done throughout the semester and will be evaluated at the time of examination along with the other papers.

Distribution of marks would be as under:

	Marks
C. Record of Lab Practical and Field Work	25
D. Evaluation of One Lab Testing of be conducted in Examination	50
E. Viva-Voce on Practicum	25

Note: No candidate would be allowed to appear in the practical examination unless his/ her day-to-day practical work and reports are found satisfactory.

List of Practicum: **(Any Five Tests and One Field Study)**

1. Aggression
2. Aptitude
3. Emotional Intelligence
4. Digit Memory Scope/Span
5. Intelligence (Individual / Group)
6. Locus of Control
7. Personality
8. Mental Health
9. Projective Test
10. Problem Solving Ability
11. Stress / Depression
12. Motivation

Field Work

1. Achievement Motivation
2. Adjustment
3. Anxiety
4. Happiness
5. Intelligence
6. Leadership
7. Parent Child Relationship
8. Personality
9. Social Support

Note: Field Studies topics would be allotted by the Departmental Committee.

30.6.18

M. A. – III SEMESTER (PSYCHOLOGY)

The curriculum frame – work is as under.

COMPULSORY PAPERS (Two)

S.No.	Paper No	Title of Paper	Marks	
			Theory	Internal Assessment
1.	XI	Personality and Indigenous Psychology	80	20
2.	XII	Psychological Assessment - I	80	20
Optional Papers: Two Papers from any One of the Three Groups				
	Group A: Psychology of Management			
3.	XIII	Organizational Behaviour – I	80	20
4.	XIV	Human Resource Development and Management – I	80	20
	Group B: Psychology of Education			
3.	XIII	Educational and Instructional Psychology – I	80	20
4.	XIV	Basics of Psychological Guidance and Counselling – I	80	20
	Group C: Clinical Psychology			
3.	XIII	Clinical Diagnosis – I	80	20
4.	XIV	Psychotherapeutic Counselling - I	80	20
5.	XV	Practicum	100	

NOTE: Internal Assessment will be done on the basis of Class Tests / Seminar / Tutorials

30.6.18

M. A. – III SEMESTER (PSYCHOLOGY)
PAPER – XI (COMPULSORY)
PERSONALITY AND INDIGENOUS PSYCHOLOGY – I

M. M. - 80

NOTE: This paper consists of five units. From each unit minimum two questions will be set and candidates will have to answer one question from each unit.

UNIT – I Introduction

Personality Meaning, Perspectives and Measurement of Personality.
Concept of Mature Personality, Personality Theory- Problems and Procedures.

UNIT – II Approaches to Personality- I

Psychodynamic Perspectives of Personality: Theories of Personality: Freud, Erikson, Adler. Structure, Dynamics and Development of Personality.
Methods to study Personality.

UNIT – III Approaches to Personality –II

Theories of Personality: Cattell and Eysenck- Structure, Dynamics and Development of Personality. Research Methods.

UNIT – IV Approaches to Personality-III

Cognitive, Behavioural and Humanistic. Kelly, Bandura and Roger's.
Structure, Dynamics and Development of Personality. Research Methods.

UNIT – V Approaches to Personality-IV

Indigenous Concept and Models of Personality – Yogic, Samkhya.
Current Researches in the Field of Personality.

30.6.18

BOOKS RECOMMENDED

1. Barbara, E. (2008). Personality Theories (8th Edition). California. Wadsworth Publishing Company.
2. Bischof, L. J. (1970). Interpreting Personality Theories. Harper & Row, New York.
3. Feldman, R. (2009). Essentials of Understanding Psychology, 7Th Edition. Tata McGraw-Hill Education, Pvt. Ltd.
4. Friedman, H. S. & Schustack, M. W. (2016). Personality: Classic Theories and Modern Research. (6th Edition), Pearson.
5. Hasurkar, S. S. (1958). *Vācaspati Miśra on Advaita Vedanta*. Darbhanga: Mithila Institute of Post-Graduate Studies.
6. Hall, C. S., Lindzey, G. & Campbell, J. B. (2007). Theories of Personality (4th Ed.). John Wiley, New York.
7. Hjelle, L. A. & Ziegler, D. J. (1992). Personality Theories: Basic Assumptions, Research and Applications (2nd Ed.). International Student Edition. McGraw Hill, International Book Co.
8. John, O. P., Robins, R. W. & Pervin, L. A. (2010). Handbook of Personality: Theory and Research. Guilford Press.
9. Loehlin, J. C., Willerman, L., & Horn, J. M. (1988). Human Behaviour Genetics. *Annual Review of Psychology*, 39(1), 101-133.
10. Magnusson, D., & Endler, N. S. (1977). Personality at Crossroads. New Jersey, Hillsdale: Lawrence Erlbaum Associates.
11. Misra, G., & Mohanty, A. K. (2002). Perspectives on Indigenous Psychology. New Delhi: Concept Company.
12. Mohanty, J. N. (2000). Classical Indian Philosophy. Oxford: Rowman & Littlefield.
13. Mukhopadhaya, K. L. & Swami Niranjana Saraswati. Yoga Darshan Munger: Bihar School of Yoga.
14. Murphy, G., & Murphy, L. B. (1968). Asian Psychology. New York: Basic Books.
15. Naidu, R. K. & Pandey, N. (1999). Anāsakti: The Indian vision of Potential Human Transcendence beyond Mechanistic Motivations. In G. Misra (Ed.), Psychological Perspectives on Stress and Health (pp. 85–99). New Delhi: Concept Publishing Company.

30.6.18

16. Paranjpe, A. C. (2011). Indian Psychology and the International Context, Psychology and Developing Societies, 23 (1), 1-26.
17. Paranjpe, A. C. (1988). A Personality Theory according to Vedanta. In A.C. Paranjpe, D.Y.F. Ho, & R. W. Rieber (Eds), Asian contributions to Psychology. New York: Praeger.
18. Paranjpe, A. C., Ho, D. Y. F., & Rieber, R. W. (Eds.). (1988). Asian Contributions to Psychology. New York, NY, England: Praeger Publishers.
19. Patanjali Yog Sutra.
20. Pervin, L. A. (1975). Personality: Theory, Assessment and Research. 2nd Ed. Wiley International ed. New York.
21. Pervin, L. A. (1993). Personality: Theory and Research. John Wiley & Sons.
22. Rao, Sheshagiri, V. N. (1984). *Vācaspati's Contribution to Advaita*. Mysore: Samvit Publishers.
23. Sahakian, W. S. (1975). Psychology of Personality: Readings in Theory. Rand McNally, Chicago, Illinois, United States.
24. Sinha, J. (1958). Indian Psychology (2nd ed., 2 vol). Calcutta: Sinha Publishing House.

उच्चतर सामान्य मनोविज्ञान (2004): अरूण कुमार सिंह, मोतीलाल बनारसी दास।
व्यक्तित्व मनोविज्ञान (2004): अरूण कुमार सिंह, मोतीलाल बनारसी दास।
व्यक्तित्व मनोविज्ञान (2002): मधु अस्थाना, किरण बाला, मोतीलाल बनारसी दास।
व्यक्तित्व मनोविज्ञान (2004): डी. एन. श्रीवास्तव, भार्गव पब्लिकेशन हाउस, आगरा।

30.6.18

M. A. – III SEMESTER

(COMPULSORY)

PAPER – XI

PSYCHOLOGICAL ASSESSMENT – I

M. M. – 80

NOTE: This paper consists of five units. From each unit minimum two questions will be set and candidates will have to answer one question from each unit.

UNIT – I Nature of Psychological Assessment

Nature of Psychological Assessment, Difference between Physical and Psychological Assessment. Problems in Psychological Assessment. Levels of Assessment.

UNIT – II Scaling

Scaling: Unidimensional and Multidimensional. Scale Construction Techniques. Difference among Tests, Scales, Questionnaire and Schedule. Characteristics of a good Psychometric Test. Difference between Psychometric and Projective Tests.

UNIT – III Construction of Psychometric Tools

Construction of Psychometric Tools: Steps in Test Construction, Item-writing, Pre-try out, Item difficulty, Discrimination Power. Types of Psychological test.

UNIT – IV Standardization Process of Psychometric Test

Standardization Process of Psychometric Test. Reliability: Concept and Type. Methods of determining Reliability. Validity: Concept and Type. Methods of determining Validity. Factors affecting Reliability and Validity. Norms: Types, Uses and Method.

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UNIT – V Adaptation of Tests

Adaptation of Tests. Test taking Response Styles: Social Desirability, Acquiescence and Faking. Use of Psychological Tests in applied field of Life: Diagnosis, Psychotherapy, Education, Occupations and Organizations.

BOOKS RECOMMENDED

1. Anastasi, A. (1988). Psychological Testing. Macmillan.
2. Cronbach, L. (1951). Essentials of Psychological Testing New York: Harper & Brothers.
3. Freeman, F. S. (2008). Theory and Practice of Psychological Testing. Publisher: Oxford and IBH Publishing.
4. Friedenberg, L. (1995). Psychological Testing: Design, Analysis, and Use. Allyn & Bacon.
5. Ghiselli, E. E. (1964). Theory of Psychological Measurement. New Delhi, Tata McGraw- Hill.
6. Gregory, R. J. (2004). Psychological Testing: History, Principles, and Applications. Needham Heights, M A, US: Allyn & Bacon.
7. Guilford, J. P. (1954). Psychometric Methods. New Delhi Tata Mc Graw Hill
8. Nunnally, J. C. (1970). Introduction to Psychological Measurement. New York: McGraw-Hill.
9. Price, L. R. (2016). Psychometric Methods: Theory into Practice. Guilford Press, Routledge.

30.6.18

M. A. – III SEMESTER (PSYCHOLOGY)

GROUP - A

PAPER – XIII (OPTIONAL)

ORGANIZATIONAL BEHAVIOUR – I

M. M. – 80

NOTE: This paper consists of five units. From each unit minimum two questions will be set and candidates will have to answer one question from each unit.

UNIT – I **Introduction**

Emergence of OB as a Discipline and Contributing Disciplines to OB. Contributions of Hawthorne Studies to OB; OB trends – Globalization; Outsourcing; Call Centres; Knowledge Process Outsourcing. The FIVE Anchors of OB and Knowledge Management.

UNIT – II **Motivational Process**

Motivational Process: Meaning of Motivation; Primary Motives; General Motives, Secondary Motives and Motivational Process. Content Theories of Work Motivation – Maslow's Hierarchy of Needs; Herzberg's Factor Theory; ERG Theory. Theory X and Theory Y.

UNIT – III **Leadership**

Leadership: Difference between Leader and Manager. Important studies on Leadership. Factors influencing Leadership Role. Essentials of Leadership, Leadership Styles. Supervision and Patterns of Supervision. Modern Theoretical Process of Leadership: Charismatic Leadership Theories; Transformational Leadership Theory; A Socio-Cognitive Approach; Leadership across Cultures; Corporate Leaders.

UNIT – IV **Conflict and Power at Work Place**

Conflict: The Conflict Process; Sources of Conflict in Organizations. Organizational Conflict, Conflict Management. Interpersonal Conflict Management Styles; Resolving Conflicts.

Power: Meaning of Power; Sources of Power; Contingencies of Power; Influencing Others; Influencing Tactics and Organizational Politics. Organizational Power and Politics. Union Management Interface.

30.6.18

UNIT – V **Decision Making**

Nature and Concepts. Decision Making Process, Types of Decisions. Factors influencing Decision Making. Management Decision Techniques.

BOOKS RECOMMENDED

1. Bristal, V. (1997). Rethinking the Future: Rethinking Business, Principles, Competition, Control & Complexity, Leadership, Markets and the World. *The Journal of Business Strategy, 18(4), 62.*
2. Gibson, R., & Handy, C. (1998). Rethinking the Future: Rethinking Business Principles, Competition, Control and Complexity, Leadership, Markets and the World.
3. Greenberg, J. & Baron, R. A. (2003). Behaviour in Organizations: Understanding and Managing the Human Side of Work. Upper Saddle River, N J: Prentice Hall.
4. Griffin, W. H. & Pareek, U. (2005). Management of Change in Education.
5. Luthans, F. (1995). Organizational Behaviour. Mc Graw Hill, International Student Edition.
6. Lynton, R. P. & Pareek, U. (1978). Training for Development.
7. Pareek, U. (1996). Organizational Behaviour Processes.
8. Pareek, U. (2007). Understanding Organizational Behaviour.
9. Pareek, U. (2011). Udai Pareek's Understanding Organizational Behaviour.
10. Pareek, U. (2016). Understanding Organizational Behaviour 4E.
11. Pareek, U. (2017). Designing and Managing Human Resource Systems.
12. Pareek, U. & Rao, V. (2005). First Handbook of Psychological and Social Instruments.
13. Pareek, U. & Khanna, S. (2007). Understanding Organizational Behaviour. Oxford University Press.
14. Rao, T. V. (2015). Performance Management: Toward Organizational Excellence.
15. Robbins, S. P. (2000). Organizational Behaviour. (9th edition). Prentice Hall India, New Delhi.

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16. Schein, E. M. (1990). Organizational Psychology 3rd edition. Prentice Hall of India Pvt. Ltd. New Delhi.
17. Toffler, A., Toffler, H., & Gibson, R. (2011). Rethinking the Future: Rethinking Business Principles, Competition, Control and Complexity, Leadership, Markets and the World. Hachette UK.
18. Ulrich, D., Allen, J., Brockbank, W., Younger, J., & Nyman, M. (2009). HR Transformation: Building Human Resources from the Outside In. New York: McGraw-Hill.
19. Wolfe, B. (2015). The Little Black Book of Human Resources Management. The Expressive Press.

M. A. – III SEMESTER (PSYCHOLOGY)

GROUP - A

PAPER – XIV (OPTIONAL)

HUMAN RESOURCE DEVELOPMENT AND MANAGEMENT – I

M. M. 80

NOTE: This paper consists of five units. From each unit minimum two questions will be set and candidates will have to answer one question from each unit.

UNIT – I Human Resource Management

Nature, Function, Personnel Management vs. HRM, HRD vs. HRM. Assumptions about HRM, Structure and Role of HRM. The Indian context of HRM. Models of HRM. Current and Future Challenges to HRM. Strategic Role, International Human Resource Management.

UNIT – II Human Resource Planning

Human Resource Planning: Importance, process, Forecasting Demand, Estimating Supply, Effective HRP, Human Resource Accounting. Steps, Stages and Structure in Manpower Planning. HRD in India.

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UNIT – III **Job Analysis and Job Design**

Job Analysis: Uses, Process, Methods, Job Description and Job Specifications. Job Analysis and Job Design. Recruitment and Selection.

UNIT – IV **Training and Development**

Training: Nature and Importance. How to make Training Effective. Importance of Training in Organizational Set Up-Training as a Profession-Training Needs Analysis- Types of Training-Training Design-Steps Involved. Organizational Development: Nature and Objectives of OD. Phases of an OD Programme; OD Interventions; OD in Indian Industry; Criticism of OD.

UNIT – V **Performance Appraisal**

Performance Appraisal, Factors Distorting Appraisal and how to improve Appraisals. Types of Appraisal. Comparing with Performance Management, Methods, Challenges, Legal Implications.

BOOKS RECOMMENDED

1. Aswathappa, K. (1999). Human Resource and Personnel Management-Text and Cases, New Delhi: Tata McGraw Hill, pp.208.
2. Beardwell, I. & Holden, L. (997). Human Resource Management. A Contemporary Perspective.
3. DeCenzo, D. A., Robbins, S. P. & Verhulst, S. L. (2012). Fundamentals of Human Resource Management, Wiley.
4. Fisher, C. D., Shaw, J. B. & Schoenfeldt, L. F. (1993). Human Resource Management. Houghton Mifflin Company.
5. Pareek, U. (2017). Designing and Managing Human Resource Systems. Oxford and IBH Publishing.
6. Pareek, U. & Rao, T. V. (1981). Designing and Managing Human Resource Systems. New Delhi: Oxford and IBH.
7. Robbins, S. P. & Judge, T. A, (2013). Essentials of Organizational Behaviour. Pearson.
8. Sinha, J. B. (2009). Culture and Organizational Behaviour. SAGE Publications India.

30.6.18

M. A. – III SEMESTER (PSYCHOLOGY)

GROUP - B

PAPER – XIII (OPTIONAL)

EDUCATIONAL AND INSTRUCTIONAL PSYCHOLOGY – I

M. M. - 80

NOTE: This paper consists of five units. From each unit minimum two questions will be set and candidates will have to answer one question from each unit.

UNIT – I Conceptual and Theoretical Perspectives

Conceptual and Theoretical Perspectives in Educational Psychology. Theories: Behaviouristic, Social Learning and Cognitive Applications in Teaching.

UNIT – II Information Processing Models

Instructional Models, Programmed Learning, Concept, Characteristics and Models.

UNIT – III Human Diversity and Education

Learning Styles: Nature, Approaches to Learning Style, Measurement of Learning Styles. Attempt to Modify Learning Styles.

UNIT – IV Individual and Group Differences

Individual and Group Differences in Intelligence. Theories of Intelligence, Gender Differences issues in the Classroom.

UNIT – V Learning and Motivation

Learning and Motivation, Study Habit, importance, Levels of Learning.

30.6.18

BOOKS RECOMMENDED

1. Bruce, R. J., Weil, M., & Calhoun, E. (2014). Models of Teaching (9th Edition) Pearson.
2. De Secco, J. P. & Crawford, W. R. (1974). The Psychology of Learning and Instruction. Englewood Cliffs, NJ: Prentice Hall.
3. Ellis, R. S. (1965). Educational Psychology, A Problem Approaches Affiliated. New Delhi, East West Press.
4. Gage, N. L., & Berliner, D. C. (1998). Educational Psychology (6th ed.). Boston, MA: Houghton Mifflin.
5. Ghaoui, C. (2004). Human Factors and Innovative Approaches. Idea Group Inc (IGI).
6. Santrock, J. W. (2011). Educational Psychology. Tata McGraw Hill.
7. Schunk, D. H. (2012). Learning Theories an Educational Perspective, Sixth Edition. Pearson.
8. Travers, J. F. (1979). Educational Psychology (2nd Ed.). New York & Row.
9. Woolfolk, A. E. (1995). Educational Psychology (6th Ed.) Allyn & Bacon, London/ Boston.
10. Woolfolk, A. (2005). Educational Psychology, 9/E, Active Learning Edition. Allyn & Bacon, Boston.
11. Woolfolk, A. (2006). Educational Psychology. International Edition with Pearson Education.
12. Woolfolk, A., Misra, G. & Jha, A. (2012). Fundamentals of Educational Psychology. Pearson.
13. Woolfolk, A. & Perry, N. E. (2014). Child and Adolescent Development. Pearson.
14. Woolfolk, A., & Vij Shivani (2017). Educational Psychology. Pearson.

30.6.18

M. A. – III SEMESTER (PSYCHOLOGY)

GROUP - B

PAPER – XIV (OPTIONAL)

BASICS OF PSYCHOLOGICAL GUIDANCE AND COUNSELLING – I

M. M. – 80

NOTE: This paper consists of five units. From each unit minimum two questions will be set and candidates will have to answer one question from each unit.

UNIT – I Introduction

Nature, Need and Functions of Guidance. Principles of Guidance. Individual and Group Approaches.

UNIT – II Techniques of Appraising the Client – I

Non-Standardized Methods: Anecdotal Record, Auto Biography, Case Study, Sociometric, Observation, Rating Scale, Questionnaire.

UNIT – III Techniques of Appraising the Client -II

Standardized Methods: Intelligence, Personality Aptitude, Interest, Achievement.

UNIT – IV Organization of a Guidance Programme

Duties and Responsibilities of the Guidance Personnel, School, Duties and Responsibilities of Family and Community. Individual and Group Guidance

UNIT – V Special Areas of Guidance

Vocational Guidance, Educational Guidance, Personal Guidance. Problems of Guidance in India.

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BOOKS RECOMMENDED

1. Anastasi, Z. (1992). Psychological Testing (Seventh Ed.). New York, McMillan.
2. Anastasi, Z., 1 Lewis, E.C. (1970). Counselling Psychology. New York, Holt Rinehart and Winster, Inc.
3. Gibson, R. L. & Mitchell, M. (2008). Introduction to Counselling and Guidance. New Delhi: Prentice Hall of India.
4. Harson, J. C. (1978). Counselling Processes and Procedures. New York, McMillan Publishing Co. Inc.
5. Kemp. C. G. (1970). Foundations of Group Counselling. New York, McGraw Hill.
6. Nystul, M. S. (2006). Introduction to Counselling: As an Art and Science Perspective. Allyn & Bacon.
7. Rappaport, D., Gill, M. M. & Schafer, R. (1968). Diagnostic Psychological Testing. (Revised edition, edited by Holt, R. R.) New York, International Universities Press.
8. Rao. S. N. (1981). Counselling Psychology. New Delhi, Tata McGraw Hill.
9. Siddiqui, M. H. (2008). Guidance and Counselling. APH Publishing.
10. Shrivastava, K. K. (2003). Principles of Guidance and Counselling. Kanishka Publishers, Distributors, New Delhi.
11. Steffler, B. (Ed.) (1965). Theories of Counselling. New York, McGraw Hill Book Co.
12. Warters, J. (1964). Techniques of Counselling. New York, McGraw Hill Book Co.

30.6.18

M. A. – III SEMESTER (PSYCHOLOGY)
GROUP - C
PAPER – XIII (OPTIONAL)
CLINICAL DIAGNOSIS – I

M. M. - 80

NOTE: This paper consists of five units. From each unit minimum two questions will be set and candidates will have to answer one question from each unit.

UNIT – I Introduction

History and Current trends. Nature, Problems and Methods of Clinical Psychology. Professionals. Growth of the Branch. Growth in India.

UNIT – II Approaches

Psychodynamic, Behaviouristic, Humanistic, Cognitive and Socio-Cultural.

UNIT – III Diagnosis -I

Meaning of Psycho-Diagnosis. Types and Importance. Concept of Prognosis. Symptomatic vs. Dynamic. Symptomatic Diagnosis: ICD-10, DSM-IV (R).

UNIT – IV Diagnosis -II

Dynamic Diagnosis: Observation, Case History, and Interview.

UNIT – V Impressionistic Approach

Impressionistic Approach of Diagnosis: Informal Assessment, Sources of Errors in Impression Formation. Importance of Psychometric Approach.

BOOKS RECOMMENDED

1. Bhola, P. & Raghuram, A. (2016). Ethical Issues in Counselling and Psychotherapy Practice. Springer.
2. Carr, A. (2012). Clinical Psychology: An Introduction. Routledge.
3. Dalton, J. H., Elias, M. J., Wandersman, A. & Dalton, J. H. (2007). Community Psychology: Linking Individuals and Communities. Wadsworth, Thomson Learning US.
4. Davey, G. (2008). Clinical Psychology. Taylor & Francis, India Pvt Ltd, New Delhi.

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5. DeRubeis R. J., Donald, K. and Routh, D. K. (1998). The Science of Clinical Psychology: Accomplishments and Future Directions. Google Books.
6. Gladding, S. T. (2017). Counselling: A Comprehensive Profession. Seventh Edition. Pearson.
7. Hecker, J. E. & Thorpe, G. L. (2007). Introduction to Clinical Psychology. Pearson Education.
8. Heiden, L. A. & Hersen, M. (1995). Introduction to Clinical Psychology 1st Edition. Springer.
9. Iscope, I., Block, B. L. & Spielberger, C. D. (1977). Community Psychology: Perspectives in Training and Research. NY: Appleton.
10. Kellerman, H. & Burry, A. (2009). Handbook of Psycho-Diagnostic Testing: Analysis of Personality in the Psychological Report. Springer.
11. Korchin, S. J. (1978). Modern Clinical Psychology: Principles of Intervention in the Clinic and Community. International Edition.
12. Korchin, S. J. (2004). Modern Clinical Psychology: Principles of Intervention in the Clinical and Community. 1st Edition. CBS Publisher.
13. Kumar, V. (2011). Clinical Psychology. Aadi Publications.
14. Mann, P.A. (1978). Community Psychology: Concepts and Applications. The Free Press.
15. Perkins, D. (2011). An Introduction to Community Psychology. Vanderbilt University.
16. Plante, T. G. (2010). Contemporary Clinical Psychology. John Wiley & Sons.
17. Pomerantz, A. M. (2017). Clinical Psychology: Science, Practice, and Culture 4th Edition. Sage Publications.
18. Rapaport, J. (1977). Community Psychology: Values, Research and Action. NY: Holt Rinehart.
19. Rappaport, J. & Seidman, E. (2000). Handbook of Community Psychology. Springer Science + Business Media, LLC.
20. Reich, S. M., Riemer, M, Prilleltensky, I. & Montero, M. (2007). International Community Psychology: History and Theories. Springer.
21. Walker, E. C. (1991). Clinical Psychology: Historical and Research Foundations. Springer Science + Business Media, LLC.
22. Wolman, B. B. (ed). (1965). Handbook of Clinical Psychology. Mc Graw Hills.

30.6.18

M. A. – III SEMESTER (PSYCHOLOGY)

GROUP - C

PAPER – XIV (OPTIONAL)

PSYCHOTHERAPEUTIC COUNSELLING – I

M. M. – 80

NOTE: This paper consists of five units. From each unit minimum two questions will be set and candidates will have to answer one question from each unit.

UNIT – I Psychotherapeutic Counselling Techniques

Techniques of Psychotherapeutic Counselling: Psychoanalytic, Behavioural. Client Centred. Community Interventions and Group Therapeutic Techniques.

UNIT – II Methods for Altering Maladaptive Behavioural - Deficits

Shyness, Delinquency, Depression, Speech and Sexual Dysfunctions.

UNIT – III Methods for Altering Maladaptive Behavioural - Excesses

Excessive Smoking, Alcoholism, Drug Addiction and Temper-Outburst, Physical Aggression.

UNIT – IV Methods of Altering Inappropriate Behaviour

Marital Maladjustment, Child Misbehaviour, Homosexuality, Exhibitionism. Stress and Coping.

UNIT – V Methods for Altering Fears and Anxiety

Methods for altering Fears and Anxiety. Treating Psychophysiological Disorders: Test-Anxiety, Generalized Anxiety, Stress, School Phobia, Snake Phobia, Combination of Fears, CHD, Asthmas and Peptic Ulcer.

30.6.18

BOOKS RECOMMENDED

1. Abate, L. & Milan, M. A. (ed.) (1985). Handbook of Social Skill Training and Research. New York: John Wiley & Sons.
2. Adelson, D. & Kalis, B. L. (1970). Community Psychology and Mental Health Perspectives. Seaton.
3. Carson, R. C., Butcher, J. N. & Mineka, S. M. (1999). Abnormal Psychology and Modern Life. Pearson.
4. Corey, G. (1986). Theory and Practice of Counselling and Psychotherapy. Monterey, C A.
5. Gelso, C J. Williams, E. N. & Fretz, B. R. (1995). Counselling Psychology. APA Books.
6. Ghosh, M. (2015). Health Psychology: Concepts in Health and Well-being. Pearson.
7. Iscoe, I., & Spielberger, C. D. (Eds.). (1970). Community Psychology: Perspectives in Training and Research. New York, Appleton-Century-Crofts.
8. Iscoe, I. Bloom, B. L. & Spielberger, C. D. (1977). Community Psychology in Transition. USA: Hemisphere Publishing Corporation.
9. Levine, M., Perkins, D. D. & Perkins, D. V. (2005). Principles of Community Psychology: Perspectives and Applications. Third Edition, New York, Oxford University Press.
10. Mann. A. P. (1978). Community Psychology: Concepts and Applications. Free Press.
11. Rennie, D. L. (1998). Person-Centred Counselling: An Experiential Approach. London, UK: Sage.
12. Tayler S. E. (2006). Health Psychology. Tata McGraw Hill, New Delhi
13. Toukmanian, S. G. & Rennie, D. L. (1992). Psychotherapy Process Research: Paradigmatic and Narrative Approaches. Thousand Oaks, CA: Sage.
14. Wolberg, L. R. (2013).The Technique of Psychotherapy. Fourth Edition, International Psychotherapy Institute E-Books.
15. Woolfe, R. & Dryden, W. (eds) (1996). Handbook of Counselling Psychology. Sage, London.

30.6.18

M. A. – III SEMESTER (PSYCHOLOGY)

PAPER – XV (OPTIONAL)

PRACTICUM

M. M. – 100

NOTE: Any five of the following to be completed in the Laboratory training.

1. Knowledge of Results.
2. Effect of Social Support on Conformity.
3. Attribution of Achievement Outcomes.
4. Zeigarnik Effect.
5. Level of Aspiration as a function of Success or Failure.
6. Reminiscence in Motor Learning.
7. Short Term Memory (STM)
8. Effect of Group on Individual Judgement.
9. Mental Health

One Field Study

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M. A. – IV SEMESTER (PSYCHOLOGY)

S. No.	Paper No	Title of Paper	Marks		Time
			Theory	Internal Assessment	
16.	XVI	Life Span Development	80	20	Three Hours
17.	XVII	Psychological Assessment – II	80	20	Three Hours
Optional Papers: Two Papers from any One of the Three Groups					
Group A: Psychology of Management					
18.	XVIII	Organizational Behaviour - II	80	20	Three Hours
19.	IX	Human Resource Development and Management – II	80	20	Three Hours
Group B: Psychology of Education					
18.	XVIII	Educational and Instructional Psychology – II	80	20	Three Hours
19.	IX	Basics of Psychological Guidance and Counselling – II	80	20	Three Hours
Group C: Clinical Psychology					
18.	XVIII	Clinical Diagnosis and Community Mental Health – II	80	20	Three Hours
19.	IX	Psychotherapeutic Counselling – II	80	20	Three Hours
20.	XX	**Practicum (Field Work)**	100		Four Hours

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M. A. – IV SEMESTER (PSYCHOLOGY)

PAPER – XVI (COMPULSORY)

LIFE SPAN DEVELOPMENT

M. M. – 80

NOTE: This paper consists of five units. From each unit minimum two questions will be set and candidates will have to answer one question from each unit.

Unit – I Introduction to Development

Introduction: Nature, Stages and Principles of Developmental Psychology, Maturation vs Experience; Nature- Nurture debate

Unit – II Theories of Development

Theories of Human Development: Psychodynamic, Psychosocial, Behaviourism, Social Learning, Cognitive, Socio-Cultural Theory of Development.

Unit–III Research Methods and Ethical Issues

Research Methodology in Development Psychology and Measurement Techniques, Research Design, Ethical Issues in Research on Child Development.

Unit – IV Foundations of Development

Biological foundation of Development, Development of Language and Communication. Emotional, Social, Personality and Moral Development.

Unit – V Development in Later Age

Adulthood, Middle and Old Age: Characteristics, Psychological Changes and Adjustment.

Books Recommended

1. Baltes, P. B. & Brim O. G. Jr. (1978). Life Span Development and Behaviour. New York Academic Press.
2. Baltes, P.B. & Brim O.G. Jr. (1979). Life Span Development and Behaviour (Vol. 2). New York Academic Press.
3. Baltes, P. B. & Brim O. G. Jr. (1980). Life Span Development and Behaviour (Vol. 3). New York Academic Press.
4. Baltes, P. B., Reese, H. W., & Lipsitt, L. P. (1980). Life-Span Developmental Psychology. *Annual Review of Psychology*, *31*(1), 65-110.

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5. Baltes, P. B. & Brim O. G. Jr. (1981). Life Span Development and Behaviour (Vol. 4). New York Academic Press.
6. Baltes, P. B. & Brim O. G. Jr. (1983). Life Span Development and Behaviour (Vol. 5). New York Academic Press.
7. Baltes, P. B. & Brim O. G. Jr. (1984). Life Span Development and Behaviour (Vol. 6). New York Academic Press.
8. Baltes, P. B. (1987). Theoretical propositions of Life-Span Developmental Psychology: On the Dynamics between Growth and Decline. *Developmental Psychology*, *23*(5), 611.
9. Brophy, J. E., & Willis, S.L. (1981). Human Development and Behaviour. New York: St. Martin's Press.
10. Hurlock, E. (2017). Developmental Psychology: A Life-Span Approach. Tata McGraw Hill Education (5th Ed.).
11. Keenan, T. & Evans, S. (2009). An Introduction to Child Development. London: Sage Publications.
12. Papalia, D., Olds, S. & Feldman, R. (2017). Human Development. McGraw Hill Education, (9 Edition).
13. Thomas, M. R. (2000). Recent Theories of Human Development. Thousand Oaks: Sage Publication Hill.

30.6.18

PAPER – XVII (COMPULSORY)

PSYCHOLOGICAL ASSESSMENT - II

M. M.- 80

NOTE: This paper consists of five units. From each unit minimum two questions will be set and candidates will have to be answer one question from each unit.

UNIT – 1 Measurement of Intelligence

Concept and Measurement of Intelligence, Major Tests of Intelligence developed under Western and Indian Cultural set up.

UNIT – II Measurement of Aptitude Test

Concept and Measurement of Aptitude Test. Major Test of Aptitude Developed under Western and Indian Cultural set up. Achievement Test: Concept and Measurement.

UNIT – III Test of Personality

Test of Personality: Projective and Psychometric Approaches, Major Test of Personality: Developed under Western and Indian Cultural set up.

UNIT – IV Test of Adjustment, Values, Interest, Stress and Anxiety development under Indian condition.

UNIT – V Psychological Testing in Applied Field

Psychological Testing in Applied Field: Neuro-Psychological Testing: Objectives and Major Neuropsychological Test. Emotional Intelligence Test: Concept and Major Test of Emotional Intelligence developed under Western and Indian Cultural set-up.

30.6.18

BOOKS RECOMMENDED

1. Anastasi, A. (1988). Psychological Testing. London: Mc Millan Publishing Company.
2. Cronbach, L. J. (1997). Essentials of Psychological Testing. Pearson.
3. Freemen, S. (2018). Theory and Practice of Psychological Testing, 3/E. Oxford & IBH-Pubs Company-New Delhi.
4. Ghiselli, E. E. (1964). Theory of Psychological Measurement. Tata McGraw-Hill.
5. Goleman, D. (1996). Emotional Intelligence. Bantam Doubleday Dell Publishing Group.
6. Guilford, J. P. (1954). Psychometric Methods. New Delhi,Tata Mc Graw Hill.
7. Guilford, J. P. (1982). Psychometric Methods. New Delhi, Tata McGraw Hill.
8. Nunnally, J. C. (1970). Introduction to Psychological Measurement. Mc Graw Hill.
9. Nunnally, J. C. (1997). Psychometric Theory. Pearson, 5 Edition.
10. Nunnally, J. & Bernstein, I. (2017). Psychometric Theory. McGraw Hill Education.
11. Psychological Studies – 2004, Vol.-49.
12. Urbina, S. (2014). Essentials of Psychological Testing. John Wiley & Sons Inc.

GROUP - A

PAPER – XVIII (OPTIONAL)

ORGANIZATIONAL BEHAVIOUR – II

M. M. – 80

NOTE: This paper consists of five units. From each unit minimum two questions will be set and candidates will have to answer one question from each unit.

UNIT – I Groups

Types of Groups, Processes, Group Culture and Social Influence, Team Building. Techniques of Building Group Consensus. Understanding and Managing Team Dynamics.

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UNIT – II Communication

Nature, Types, Application of different types of Communication, Role of T A in Communication.

UNIT – III Organizational Change

Types of Change, Sources of Change Process, Human Element in Change.

UNIT – IV Organizational Development

Concepts, objectives and Goals, Process Behavioural Science approach to Organizational Development.

UNIT – V Marketing

Marketing Research, Nature and Functions, Consumer Behaviour. Sales Promotion Strategies.

BOOKS RECOMMENDED

Drummond, H. (2000). Introduction to Organizational Behaviour. OUP Catalogue.

Greenberg, J. & Baron, R. A. (2008). Behaviour in Organizations. Upper Saddle River, N.J.: Prentice Hall.

Johns, G., & Saks, A. M. (2001). Organizational Behaviour: Understanding and Managing Life at Work.

Luthans, F. (1995). Organizational Behaviour. Mc Graw Hill International Edition.

Luthans, F. (2011). Organizational Behaviour. The McGraw-Hill Companies, Inc.

Robbins, S. P. (2000). Organizational Behaviour (9th edition). Prentice Hall India, New Delhi.

Robbins, S.P. Organizational Behaviour: Concepts and Self-Assessment. Pearson College Division.

Robbins, S. P., Judge, T., & Breward, K. (2003). Essentials of Organizational Behaviour (Vol. 7). Upper Saddle River, NJ: Prentice Hall.

Wilson, F. M. (2018). Organizational Behaviour and Work: A Critical Introduction. Oxford University Press.

30.6.18

GROUP - A

PAPER – XIX (OPTIONAL)

HUMAN RESOURCE DEVELOPMENT AND MANAGEMENT – II

M. M. – 80

NOTE: This paper consists of five units. From each unit minimum two questions will be set and candidates will have to answer one question from each unit.

UNIT – I **Job Evaluation**

Job Evaluation, Wage and Salary Administration. Employment Incentives.

UNIT – II **Human Resource Policies and Practices**

Human Resource Policies and Practices, changing trends in Work Environment, Developing the Human Resource.

UNIT – III **Maintaining Human Resource**

Maintaining Human Resource Safety and Health Stress Management, Labour Relations.

UNIT – IV Collective Bargaining, Employee Involvement, Employee Communication.

UNIT – V Employee Counselling. Challenges of Human Resource Management.

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BOOKS RECOMMENDED

Aswathappo. (2002). Human Research and Personnel Management. Tata McGraw Hill.

Bhattacharyya, D. K. (2011). Performance Management Systems and Strategies. Pearson Education India.

Cascio, W. F. (1998). Managing Human Resource. Delhi: Tata McGraw Hill.

Cascio, W. F. & Aguinis, H. (2010). Applied Psychology in Human Resource Management. Prentice Hall India Learning Private Limited; 6 Edition.

Cascio, W. & Nambudiri, R. (2010). Managing Human Resources: Productivity, Quality of Work Life, Profits. McGraw Hill Education; 8 Edition.

John O. Okpara, J. O. & Wynn, P. (2007). Human Resource Management Practices in a Transition Economy: Challenges and Prospects. Emerald Group Publishing Limited.

Johnson, G. & Scholes, K. (1996). Exploring Corporate Strategy. Prentice- Hall, New Delhi.

Miner, J. B. (1992). Industrial / Organizational Psychology. New York, McGraw Hill.

Pareek, U. & Rao, T. V. (2015). Designing and Managing Human Resources Systems. Oxford & IBH.
Pareek, U. (2017). Designing and Managing Human Resource Systems. Oxford & IBH Publishing Co Pvt. Ltd; 3rd edition.

Pareek, U. & Rao, T. V. (2005). First Handbook of Psychological and Social Instruments. Concept Publishing Company.

Rao, T. V. (2015). Performance Management: Toward Organizational Excellence. SAGE Response; Second edition.

Pareek, U. & Khanna, S. (2016). Understanding Organizational Behaviour. Oxford University Press.

Robbins, S. P., Judge, T. & Vohra, N. (2016). Organizational Behaviour. Pearson.

Snell, S. & Bohlander, G. (2012). Human Resource and Management. Cengage Learning.

30.6.18

GROUP - B

PAPER – XVIII (OPTIONAL)

EDUCATIONAL INSTRUCTIONAL PSYCHOLOGY – II

M. M. - 80

NOTE: This paper consists of five units. From each unit minimum two questions will be set and candidates will have to answer one question from each unit.

UNIT – I Teaching and Classroom Management

Effective Teaching and Classroom Management. Planning and Setting Objectives for Teaching. Characteristics of Effective Teachers.

UNIT – II Teaching Methods and Instruction

Teaching Methods, Instruction Lecturing and Explaining, Questioning, Student Centred Teaching Class Room Management and Teaching in Small Groups. Discussion Method and Cooperative Learning, Computer-Assisted Instruction.

UNIT – III Exceptionality and Social Education

Exceptionality and Social Education: Categories of Exceptionality, Labelling and Educational Relevance. Physically Disabled Students. Students with Cognitive Disabilities. Brain Dysfunction and Communication Disorders.

UNIT – IV Emotional and Behaviour Disorder

Students with Emotional and Behaviour Disorder. Attention Deficit Disorder (ADD), Attentional Deficit Hyperactive Disorder (ADHD), Gifted and Talented Students. Intervention and Special Education for Various Forms of Exceptionality, Mainstreaming.

UNIT – V Measurement and Evaluation

Measurement and Evaluation: Educational Assessment, Measurement and Evaluation (Norm Referenced and Criterion Referenced Tests). Test Scores- Meaning and Types, Standardized Test: Meaning Types and Interpretation. Classroom Assessment and Grading. Techniques of Class Room Evaluation. Observation, Questionnaire.

30.6.18

BOOKS RECOMMENDED

1. Aruna, M. G. (2003). Educational Psychology. New Delhi: Neel Kamal Publications.
2. Best, J. W. (1992). Research in Education. New Delhi: Prentice Hall of India, Private Limited.
3. Borg, W. R., Gall, M. D. & Gall, M.D. (1997) Educational Research and Introduction. New York: Longman Inc.
4. Cecco, John P.De (1968). The Psychology of Learning and Instruction: Educational Psychology. Englewood Cliffs, N. J.: Prentice-Hall.
5. Cohen, L & Manion, L. (1989) Research Methods in Education. London: Routledge.
6. Crow, L. & Crow A (1991.) Educational Psychology. New Delhi: Eurasia Publishing Home.
7. Ellis, R. S. (1965). Educational Psychology: A Problem Approach Affiliated, New Delhi, East West Press.
8. Gage, N. L., & Berliner, D. C. (1998) Educational Psychology (6th ed.). Boston, MA: Houghton Mifflin.
9. Goswami, M. (2015). Essentials of Educational Psychology. Mahaveer Publications.
10. Meece, J. L., Anderman, E. M. & Anderman, L. H. (2006). Classroom Goal Structure, Student Motivation and Academic Achievement. Annual Review of Psychology, Vol. 57 (1), 487-503.
11. Sharma, R. A. (2010). Essentials of Educational Technology and Management. International Publishing House – Meerut.
12. Travers, J. F. (1979). Educational Psychology (2nd Ed.). Harper & Row, New York.
13. Travers, R. M. W. (1986). An Introduction to Educational Research. New York: The McMillan Publishing Company.
14. Woolfolk, A. H. (1993). Educational Psychology (6th Ed.) Allyn & Bacon, London/Boston.
15. Woolfolk, A. H. (2018). Educational Psychology. Pearson.

30.6.18

GROUP - B

PAPER – XIX (OPTIONAL)

BASICS OF PSYCHOLOGICAL GUIDANCE AND COUNSELLING – II

M. M. – 80

NOTE: This paper consists of five units. From each unit minimum two questions will be set and candidates will have to answer one question from each unit.

UNIT – I Introduction

Nature, Need and Functions of Counselling. Counselling and Psychotherapy. Intervention, Goal and Objectives of Counselling. Characteristics of a Good Counsellor. Counsellor's Training.

UNIT – II Counselling Process and Counselling Skills

Stages in Counselling. Critical Issues in Counselling Process. Basic and Advanced Counselling Skills: Active Listening, Empathy, Probing, Working through thought Cognition, Affect and Emotion.

UNIT – III Approaches

Approaches of Counselling: Directive, Non-Directive, Eclectic. Individual and Group Counselling. Group Counselling Skills. Evaluation of Counselling. Follow-Up and Placement.

UNIT – IV Counselling in Special Settings -I

Educational Settings: Elementary, School, Secondary School, Institutions of Higher Education. Vocational Schools, Career Counselling, Employment Counselling

UNIT – V Counselling in Special Settings -II

Community and Mental Health. Pre-Marital and Marital Counselling. Family Counselling. Gerontology Counselling. Special Populations: Suicide, HIV-AIDS, Sexual Abuse.

30.6.18

BOOKS RECOMMENDED

1. American Psychiatric Association (2013). Diagnostic and Statistical Manual of Mental Disorders (DSM-5 (R)). American Psychiatric Association Publishing; 5th Revised edition.
2. Anastasi, Z., & Lewis, E. C. (1970). Counselling Psychology. New York, Holt Rinehart and Winster, Inc.
3. Berms, C. (1999). Dealing with Challenges in Psychotherapy and Counselling (Skills, Techniques, & Process). Brooks Cole.
4. Bhatnagar, A. & Gupta, N. (1199). Guidance and Counselling, Vol. 1: A Theoretical Perspective. Vikas Publishing House Pvt. Ltd., New Delhi.
5. Bhatnagar, A. & Gupta, N. (1999). Guidance and Counselling, Vol. II: A Practical Approach. Vikas Publishing House Pvt. Ltd., New Delhi.
6. Corey, G. (2013). Theory and Practice of Counselling and Psychotherapy Perfect. Wadsworth; 9 Edition.
7. Corey, G., Haynes, R. H., Moulton, P. & Muratori, M. (2014). Clinical Supervision in the Helping Professions: A Practical Guide. American Counselling Association; 2 Edition.
8. Feltham, C., Feltham, C. & Hortan, I. (2006). The SAGE Handbook of Counselling and Psychotherapy. Sage Publications Ltd; Second Edition.
9. Gibson, R. L. & Mitchell, M. H. (2009). Introduction to Counselling & Guidance Learning: New Delhi: PHI, Pvt. Ltd.
10. Harson, J. C. (1978). Counselling Processes and Procedures. New York, McMillan Publishing Co. Inc.
11. Jones, R. N. (2012). Basic Counselling Skills: A Helper's Manual. Sage South Asia; Third Edition.
12. Jones R. N. (2012). Theory and Practice of Counselling and Therapy. SAGE South Asia; Fifth edition.
13. Jones R. N. (2012). Introduction to Counselling Skills: Text and Activities. SAGE Publications Ltd; Fourth edition.
14. Jones, R. N. (2014). Nelson-Jones' Theory and Practice of Counselling and Psychotherapy. SAGE Publications Ltd; Sixth edition.
15. Kapur, M. (1995). Mental Health of Indian Children. New Delhi: Sage Publications.
16. Kapur, M. (1997). Mental Health in Indian Schools. New Delhi. Sage Publications.

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17. Kapur, M. (2011). Counselling Children with Psychological Problems. Pearson Education India.
18. Kemp. C.G. (1970). Foundations of Group Counselling. New York, McGraw Hill.
19. Lewis, E. C. (1970). The Psychology of Counselling. New York: Holt, Rinehart and Winston, Inc.

GROUP - C

PAPER – XVIII (OPTIONAL)

CLINICAL DIAGNOSIS AND COMMUNITY MENTAL HEALTH

M. M. - 80

NOTE: This paper consists of five units. From each unit minimum two questions will be set and candidates will have to answer one question from each unit.

UNIT – I **Clinical Assessment**

Clinical assessment: Basic principles, Psychometric Tests: MMPI, WAIS and WISC.

UNIT – II **Projective Tests**

Projective Tests: Characteristics and Clinical Use, Rorschach and TAT.

UNIT – III **Neuro Psychological Examination**

Neuro Psychological Examination: Approaches: Halstead Neuropsychological Test Battery, Luria Nebraska Battery, use of Bender Gestalt and Weschler Scale in Neuro Psychological Testing.

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UNIT – IV Community Psychology

Community Psychology: History and Perspectives of Community Psychology. Theoretical concepts of Community Psychology: Definition and Perspectives with Reference to Mental Health, Organizational Health and Social Action. Individual Wellness, Sense of Community, Psychological Sense of Community, Social Justice, Participatory Approach, Empowerment Citizen Participation, Collaborative Community Strength, Human Diversity and Empirical Grounding.

UNIT – V Community Psychology and Social Intervention

Community Psychology: Social Interventions: Methods and Strategies.

BOOKS RECOMMENDED

1. Carter, J. W. (1986). Research Contributions from Community Psychology in Community Health Behaviour Pub. NY.
2. Iscope, I., Block, B. L. & Spielberger, C. D. (eds) (1977). Community Psychology: Perspectives in Training and Research. NY: Appleton.
3. Korchin, S. (1978). Modern Clinical Psychology. Harper and Row.
4. Mann. A. P. (1978). Community Psychology: Concepts and Applications. Free Press.
5. Nelson, G., Kloos, B. & Ornelas, J. (2014). Community Psychology and Community Mental Health: Toward Transformative Change. Prints Publication.
6. Park, K. (2013). Park's Textbook of Preventive and Social Medicine. Banarsidas Bhanot-Jabalpur.
7. Rapaport, J. (1977). Community Psychology: Values, Research and Action. NY: Holt Rinehart.
8. Wolman, B. B. (ed). (1972). Handbook of Clinical Psychology. Mc Graw Hills.

30.6.18

GROUP - C

PAPER – XIX (OPTIONAL)

PSYCHOTHERAPEUTIC COUNSELLING – II

M. M. – 80

NOTE: This paper consists of five units. From each unit minimum two questions will be set and candidates will have to answer one question from each unit.

UNIT I **Cognitive and Behaviour Therapies**

Nature, Concept and Modes of Therapies: Individual and Group, Couple and Family. Behaviour Modification. Behavioural Therapy, Cognitive Behaviour Therapy, Rational Emotive Therapy. Integrative and Multi-Model Therapies.

UNIT II **Assertiveness Training**

Nature and Concept. Assertiveness Training. Developing Assertive Behaviour. Assertiveness through Personal Appearance, Improving Client's Grooming Modelling.

UNIT III **Career Planning and Decision Making**

Counselling for Career Planning and Decision Making. Theories of Career Development and Decision Making. Career Planning and Decision Making in Schools.

UNIT IV **Psychological Interventions**

Psychological Interventions Techniques. Rogers Client Centred Therapy. Family and Group Interventions and Wellness.

UNIT V **Ethical Issues and Legal Concerns**

Counsellors Accountability System. Ethical Issues, Legal Concerns of the Counsellors. Special Counselling Population: HIV- AIDS, Substance Abuse.

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BOOKS RECOMMENDED

1. Abate, L. & Milan, M. A. (ed.) (1985). Handbook of Social Skill Training and Research. New York: John Wiley & Sons.

2. Busch, F. N. (2018). Psychodynamic Approaches to Behavioural Change. American Psychiatric Association, Publishing.

3. Caligor, E., Kernberg, O. F., Clarkin, J. F. & Yeomans, F. E. (2018). Psychodynamic Therapy for Personality Pathology: Treating Self and Interpersonal Functioning. American Psychiatric Association, Publishing.

4. Carson. R. C., Butcher, J. N. & Mineka, S. (2000). Abnormal Psychology and Modern Life. Allyn & Bacon.

5. Corey, G. (2017). Theory and Practice of Counselling and Psychotherapy. Cengage Learning.

6. Corbett, F. C. (1977). The Community Involvement Program: Social Service as a Factor in Adolescent Moral and Psychological Development. Dissertation and Thesis. https://digitalcommons.unomaha.edu/slcedt/5, University of Nebraska at Omaha.

7. Dewan, M.J., Steenbarger, B. N. & Greenberg, R. P. (2018). The Art and Science of Brief Psychotherapies: A Practitioner's Guide, Third Edition. American Psychiatric Association Publication.

8. Gelso, C. J. & Fretz, B. R. (1995). Counselling Psychology, Bangaluru. Prism Book Ltd.

9. Iscoe. I. Block, B.L. & Spielberger, C.D. (eds.) (1977): Community Psychology: Perspectives in Training and Research. N.Y: Appleton.

10. Levine, M., Perkins, D. D. & Perkins, D. V. (2005). Principles of Community Psychology: Perspectives and Applications.

11. Mann. A. P. (1978): Community Psychology: Concepts and Applications. Free Press.

12. McBride, D. M. & Cutting, J. C. (2015). Lab Manual for Psychological Research. Revised Third Edition. SAGE Publications, Inc.

13. Simel, D. L. & Rennie, D. (2009). The Rational Clinical Examination: Evidence-Based Clinical Diagnosis. McGraw-Hill Education / Medical; 1 edition.

14. Toukmanian, S. G. & Rennie, D. L. (1992): Psychotherapy Process and Research, Sage. Psychology. (Editor) SAGE Publications.

30.6.18

15. Wolberg, L. R. (1995). The Technique of Psychotherapy. Jason Aronson, Inc.; Fourth edition.
16. Wolberg, L. R. (1977). The Technique of Psychotherapy, 3rd edition, Parts 1 and 2, Grune & Stratton, New York City.
17. Wolberg, L. R. (2013). The Technique of Psychotherapy. Fourth Edition. International Psychotherapy Institute E-Books.
18. Woolfe, R. & Dryden, W. (eds) (1996). Handbook of Counselling Psychology. Sage Publications.
19. Woolfe, R., Strawbridge, S., Douglas, B. & Dryden, W. (2009). Handbook of Counselling Psychology, Third Edition, Sage Publications.

PAPER – XX (OPTIONAL)
PRACTICALS (COMPULSORY)

M. M. - 100

FIELD STUDY

This part of the practical paper comprises of completion of two Field Studies, and two tests, one from the area of compulsory papers and another from the area of optional papers of the special groups. Administration, Scoring and Interpretation of various test results should be done. The optional group prescribed along with the areas of specialization given below:

Group 'A" Psychology of Management

Communication Network

Emotional Intelligence

Job Satisfaction / Job Analysis

Management Style

Occupational Stress

Organizational Structures

Role Conflict / Role Stress

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Group 'B" Psychology of Education

Academic Stress

Exceptional Children

Learning Style /Thinking Style

Need of Guidance: Educational/ Vocational

Test Anxiety

Youth Problem

Group 'C" Clinical Psychology

Adjustment

Intelligence (Verbal / Non- Verbal)

Mental Health

Depression

Personality

Rorschach Ink Block Test

Well-Being

Note: Besides the above, the candidate has to complete any two of the following in detail.

Case Study

Construction of a tool on a theme

Construction of Questionnaire

Steps of Clinical Interview

Designing any OD intervention

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Suggested Readings

List of Books in English and Hindi

Semester I & II

Cognitive and General Psychology

Best, J. B. (1992). Cognitive Psychology .3rd Edition. West Publishing Company.

Feldman, R. S. (2008). Essentials of Understanding Psychology. Pearson Education; Eighth edition.

Feldman, R. S. (2008). Understanding Psychology. McGraw-Hill, Higher Education; 9th edition.

Feldman, R. (2010). Development across the Lifespan. Pearson Education: Delhi.

Feldman, R. S. (2013). Understanding Psychology. McGraw-Hill, Higher Education; eleventh edition.

Galotti, K. M. (2001). Cognitive Psychology in and outside of the Laboratory. 2nd Edition, Wadsworth.

Goldstein, B. E. (2007). Sensation and Perception (7th Edition). Wadsworth.

Harley, T. A. (2002). The Psychology of Language: From Data to Theory. Taylor Francis

Hoeksema, S. N., Fredrickson, B. L. Loftus, G. R. & Lutz, C. (2015). Atkinson & Hilgard's Introduction to Psychology. Cengage India.

Kellog, R. T. (2012). Fundamentals of Cognitive Psychology. SAGE South Asia; Second edition.

Kosslyn, S. M. & Smith, E. E. (2015). Cognitive Psychology: Mind and Brain. Pearson Education India; 1 edition.

Mangal, S. K. (2009). General Psychology. Sterling Publishers, Pvt. Ltd.

Mangal, S. K. (2009). An Introduction to Psychology. Sterling Publishers.

Matlin, M. W. (2008). Cognition (7th Ed.). CA: John Wiley & Sons.

Naranjo, C. (2000). Gestalt Therapy: The Attitude and Practice of an Atheoretical Experientialism. Wales: Crown House Publishing Limited.

Passer, M. W. & Smith, R. E. (2010). Psychology: The Science of Mind and Behaviour. New Delhi: Tata McGraw-Hill.

30.6.13

Solso, R. L., MacLin, O. H. & MacLin, M. K. (2008). Cognitive Psychology. Pearson, Allyn and Bacon.

Social Psychology

Aronson, E., Wilson, T. D., & Akert, R. M. (2010). Social Psychology (7th ed.). Upper Saddle River, NJ: Prentice Hall.

Baron, R. A., Branscomb, N. R. & Byrne, D. (2009). Social Psychology (12th ed.). New York: Pearson Education.

Baron, R. A., Branscombe, N. R., Byrne, D. & Bharadwaj, G. (2009). Social Psychology. Pearson India.

Baumeister, R. F. & Bushman, B. J. (2013). Social Psychology and Human Nature. Wadsworth.

Bhardwaj, G. (2011). Fundamentals of Social Psychology. Pearson Education India.

Branscombe, N. R., Baron, R. A. & Kapur, P. (2017). Social Psychology. Pearson Education; Fourteenth edition.

Chiu, C., & Hong, Y. (2006). Social Psychology of Culture. New York: Psychology Press.

Cornelissen, R. M., Verma, S. & Misra, G. (2010). Foundations of Indian Psychology, Volume one: Concepts and Theories. Pearson, New Delhi.

Dalal, A. K. (2016). Cultural Psychology of Health in India: Well-Being, Medicine and Traditional Health Care. Sage Publications India Private Limited.

Deb, S. (2004). Child Abuse and Neglect: South Asian Scenario. Kolkata. Lunar Publications.

Deb, S. (2004). Child Protection: Socio-Legal Measures in India. Kolkata. Lunar Publications.

Deb, S. (2006). Children in Agony. New Delhi, Concept Publications.

Deb, S. (2006). Contemporary Social Problems in India. New Delhi, Anmol Publications.

Deb, S. (2009). Child Protection: Scenario in India. *International Journal of Child Health and Human Development*, 2 (3), 339-348.

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Deb, S. & Modak, S. (2010). Prevalence of Violence against Children in Families in Tripura and its relationship with Socio-economic, Cultural and Other Factors. *Journal of Injury and Violence Research*, 2 (1), 5-18.

Deb, S. (2011). Background and Adjustment Capacity of Sexually Abused Girls and their Perceptions of Intervention. *Child Abuse Review,*20, 213-230.

Deb, S. & Mathews, B. (2012). Children's Rights in India: Parents' and Teachers' Attitudes, Knowledge and Perceptions. *International Journal of Children's Rights*, 20, 1-24.

Deb, S. & Walsh, K. (2012). Impact of Physical, Psychological, and Sexual Violence on Social Adjustment of School Children in India. *School Psychology International, 33(4),391-415.*

Elliot, A., Timothy, W. D. & Sommers, S. R. (2017). Social Psychology. Pearson Education; Ninth edition.

Feldman, R. S. (1999). Social Psychology. Pearson Education; Eighth edition.

Fiske, S. T., & Taylor, S. E. (2007). *Social Cognition, from Brains to Culture.* New York, McGraw-Hill.

Franzoi, S. L. (2009). Social Psychology (5th Ed.). New York: McGraw-Hill.

Glassman, W. & Hadad, M. (2008). Approaches to Psychology (3rd Ed.). Buckingham: Open University Press.

Jain, U. (2002). An Indian Perspective on Emotions, in G. Misra, and A. K. Mohanty (eds.), Perspectives on Indigenous Psychology, p. 281-291. New Delhi: Concept Publishing Company.

Kim, U., Shu, K., Yang, K. S. & Hwang, K. K. (2006). Indigenous and Cultural Psychology: Understanding People in Context. Springer.

Kimble, C. E. (1990). Social Psychology: Studying Human Interaction. C. Brown Publishers, New York.

Kothurkar, V. V. & Vanarase, S. D. (1985). Experimental Psychology, Wiley Eastern, New Delhi

Krech, D. & Crutchfield, R. S. (1961). Theory and Problems of Social Psychology. McGraw Hill, New York.

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Lindgren, H. C. (1973). An Introduction to Social Psychology. Second Edition. John Wiley and Sons, New York.

Lindzey, G. & Aronson, E. (1975). Handbook of Social Psychology. Amerind Publishing Company, New Delhi, Vol III and IV (Selected Chapters).

Macrae, C. N., & Quadflieg, S. (2010). Perceiving People. in S. T. Fiske, D. T. Gilbert, & G. Lindzey (Eds.), *Handbook of Social Psychology* (5th Ed., Vol. 1, Pp. 428–463). Hoboken, NJ: John Wiley & Sons.

Madan, G. R. (1995). Indian Social Problems. Vol.1, Allied Publishers.

Misra, G., Tripathi, R. C. & Sinha, D. (1995). Deprivation: Its Social Roots and Psychological Consequences. Concept Publishing Company.

Misra, G. (2006). Psychology and Societal Development. Concept Publishing Company.

Misra, G. (2009). Psychology in India. Volume I: Basic Psychological Processes and Human Development. Pearson Education India.

Misra, G. & Gergen, K. J. (2002). On the place of Culture in Psychological Science. In G. Misra, and A. K.Mohanty (eds.), Perspectives on Indigenous Psychology, p. 421- 439. New Delhi: Concept Publishing Company.

Myers, D. G., Sahajpal, P. & Behra, P. (2017). Social Psychology. McGraw Hill Education; tenth edition.

Myers, D. G. (2006). Social Psychology. New Delhi: Tata McGraw Hill.

Myers, D. G. (2017). Social Psychology. McGraw Hill Education.

Newman, W. L. (1991). Social Research Methods: Quantitative and Qualitative Methods, Boston: Allyn & Bacon.

Oskamp, S. & Schultz, P. W. (1998). Applied Social Psychology. Pearson.

Sanderson, C. A., & Safdar, S. F. (2012). Social Psychology. Ontario, Canada: John Wiley.

Singh, A. K. (2015). Social Psychology. Prentice Hall India Learning Private Limited.

Sinha, D. (2015). Psychology for India. Sage Publications India Private Limited.

Sinha, D., Tripathi, R. C., & Misra, G. (Eds.). (1982). Deprivation: Its Social Roots and Psychological Consequences. Concept Publishing Company.

30.6.18

Sinha, J. B. P. (2002). Towards indigenization of Psychology in India. In G. Misra and A. K. Mohanty (eds.), Perspectives on Indigenous Psychology, p. 440-457. New Delhi: Concept Publishing Company.

Smith, P. B., Bond, M. H., & Kagitcibasi, C. (2006). Understanding Social Psychology across Cultures: Living and Working in a Changing World. London: Sage.

Smith, P. K., Fischer, R., Vignoles, V. L. & Bond, M. H. (2013). Understanding Social Psychology across Cultures: Engaging with others in a Changing World. Sage.

Smith, R. E. & Passer, M. W. (2010). Psychology: The Science of Mind and Behaviour. McGraw-Hill Education.

Taylor, S. E., Peplau, L. A., & Sears, D. O. (2006). Social Psychology (12th ed.). New Jersey: Pearson Education.

Wells, G. L., Memon, A., & Penrod, S. D. (2006). Eyewitness Evidence: Improving its Probative Value. *Psychological Science in The Public Interest, 7*(2), 45–75.

Worcel, S., Cooper, J., Goethals, G. R. & Olson, J. M. (2000). Social Psychology. CA Wadsworth.

Research Methods and Statistics

Aron, A., Coups, E. J. & Aron, E. N. (2012). Statistics for Psychology. Pearson Education, Prentice Hall.

Chadha, N. K. (1991). Statistics for Behavioural and Social Sciences. Reliance Pub. House: New Delhi.

Coolican, H. (2006). Introduction to Research Methodology in Psychology. London: Hodder Arnold.

Field, A. (2013). Discovering Statistics using IBM SPSS Statistics. Sage Publications.

Garett, H. E. (2011). Statistics in Q2 Education, New Delhi, Paragon International Publishers.

Gravetter, F. J. & Forzana, L. A. B. (2009). Research Methods for Behavioural Sciences. United States: Wordsworth Cengage Learning.

Heman, G. W. (1995). Research Methods in Psychology. Houghton Mifflin Company, Boston, Illinois, New Jersey.

30.6.18

Howell, D. (2009). Statistical Methods for Psychology. Wadsworth Publishing.

King, B. M. & Minium, E. W. (2007). Statistical Reasoning in the Behavioural Sciences (5th Ed.). USA: John Wiley & Sons.

King, B. M., Rosopa, P. J. & Minium, E. W. (2007). Statistical Reasoning in the Behavioural Sciences USA: John Wiley & Sons Inc.

Kothari, C. R. & Garg, G. (2018). Research Methodology. New Age International Publishers; Fourth Edition.

Kumar, R. (2014). Research Methodology. Sage Publishing; 4th Edition.

McCormick, K., Abbott, D., Brown, M. S., Khabaza, T., & Mutchler, S. R. (2013). IBM SPSS Modeler Cookbook. Packt Publishing.

Neuman, W. L. (2006). Social Research Methods: Qualitative and Quantitative Approaches (6th Ed.) Boston: Pearson Education.

Tripathi, L. B. (1985). Psychological Research Methods, Har Prasad Bhargav, Agra.

Willig, C. (2001). Introducing Qualitative Research in Psychology: Adventures in Theory and Method. Philadelphia, Open University Press.

Paneerselvam, R. (2013). Research Methodology. Prentice Hall India Learning Private Limited; Second edition.

Psychopathology and Health Behaviour

Ahuja, N. (2011). A Short Textbook of Psychiatry. JPB; seventh edition.

Allen, F. (2011). Health Psychology and Behaviour. Tata McGraw Hill Edition.

American Psychological Association (2009). Publication Manual of the American Psychological Association, 6th Edition.

American Psychiatric Association (2013). Diagnostic and Statistical Manual of Mental Disorders (DSM-5 (R)). American Psychiatric Association Publishing; 5th Revised edition.

Bennett, P. (2006). Abnormal and Clinical Psychology: An Introductory Textbook. New York: Open University Press.

Butcher, N. J., Hooley, J. M., Mineka, S. & Dwivedi, C. B. (2017). Abnormal Psychology. Pearson Education; Sixteenth edition.

30.6.18

Carson, R. C., Butcher, J. N. Mineka, S. & Hooley, J. M. (2008). Abnormal Psychology. New Delhi: Pearson.

Coleman, J. C. Butcher J. N. & Carson B. C. (2000). Abnormal Psychology and Modern Life. 12th edition. Scot, Foresman and Company.

David, B. H. & Durand, V. M. 7th Edition, e-book (2013). Abnormal Psychology. Cengage Learning India Edition.

Gabbarel, G. O., Beck, J. S., & Holmes, J. (2007). Oxford Text Book of Psychotherapy. New York: Oxford University Press.

Kearney, C. A. & Trull, T. J. (2012). Abnormal Psychology and Life: A Dimensional Approach. Cengage Learning.

Mangal, S. K. (2008). Abnormal Psychology. Sterling Publishers, Pvt. Ltd; UK ed. Edition.

Misra, G. (1999). Psychological Perspectives on Stress and Health. Concept Publishing Company.

Snyder, C. R. & Lopez, S. J. (2007). Positive Psychology: The scientific and practical explorations of human strengths. Thousand Oaks, CA: Sage.

Taylor, S. E. (2014). Health Psychology. 9th Edition. New Delhi: Tata McGraw Hill.

Sarason I. G. & Sarason B. R. (2000). Abnormal Psychology. Prentice Hall of India Pvt. Ltd. New Delhi.

Taylor, S. E. (2017). Health Psychology. McGraw Hill Education.

W H O (2004). The ICD-10 Classification of Mental and Behavioural Disorders: Clinical Descriptions and Diagnostic Guidelines. AITBS Publishers and Distributors.

Whitbourne, S. K. & Halgin, R. P. (2015). Abnormal Psychology. McGraw Hill Education.

Semester III & IV

Developmental Psychology

Feldman. R. S. & Babu, N. (2018). Development Across the Life Span. Pearson Education.

Hurlock, E. (1993). Developmental Psychology. Tata McGraw Hill.

Feldman, R. (2010). Development Across the Lifespan. Pearson Education: Delhi

Hurlock, E. (1993). Developmental Psychology. Tata McGraw Hill

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Personality Psychology

Adair, J. G. (2002). How International is International Psychology? *International Journal of Psychology,*37, 160-170.

Auluck, S. (2002). Self and Identity in G. Misra, and A. K. Mohanty (eds.), Perspectives on Indigenous Psychology, p. 374-398. New Delhi: Concept Publishing Company.

Cornelissen, R. M. M. & Misra, G. & Varma, S. (2013). Foundations and Applications of Indian Psychology. Pearson Education.

Dalal, A. K. & Misra, G. (2010). The Core and Context of Indian Psychology. SAGE.

Fadiman, J. & Frager, R. (2005). Personality and Personal Growth. 6th Edition New York: Prentice Hall.

Misra, G. (2002). Perspectives on Indigenous Psychology. Concept Publishing Company.

Misra, G., Cornelissen, R. M. M. & Verma, S. (2010). Foundations of Indian Psychology Volume 1: Concepts and Theories. Pearson Education India.

Pandey, A. (2010). Psychotherapy and Indian Thought. Science and Spirituality, Next Future.

Rao, K. R. (2011). Indian Psychology: Implications and Applications. In Cornelissen, R. M. M., Misra, G., Varma, S. (Eds.), Foundations of Indian Psychology: Theories and Concepts, Vol, 1. New Delhi: Pearson.

Assessment

Anastasi, A. & Urbina, S. (2016). Psychological Testing 7/e (Adaptation). Pearson Education India; Seventh edition.

Cohen, R. J. & Swerdlik, M. E. (2009). Psychological Testing and Assessment. McGraw-Hill Higher Education.

Gregory, R. J. (2014). Psychological Testing: History, Principles, and Applications. Pearson Education Limited.

Hussain, A. (2012). Psychological Testing. New Delhi Pearson Education.

Murphy, K. R. & Davidshofer, C. O. (2004). Psychological Testing: Principles and Applications (6th Ed.) New Jersey: Prentice Hall.

Palmer, J. O. (1983). The Psychological Assessment of Children New York: John Wiley and Sons.

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Sattler, J. H. (1986). Assessment of Children. 3rd Ed. San Diego, Jerome, M. Sattler Publisher.

Singh, A. K. (2017). Tests, Measurements and Research Methods in Behavioural Sciences. Bharati Bhawan Publishers & Distributors; Fifth edition.

Educational Psychology

Aggarwal, J. C. (2014). Essentials of Educational Psychology. Pearson Education India.

Lahey, R. B. & Graham, J. E. (2000). An Introduction to Educational Psychology. 6th Ed., Tata McGraw Hill Publishers, New Delhi.

Mathur, S. S. (2016). Fundamentals of Guidance and Counselling. Vinod Pustak Mandir, Agra.

Misra, G., Jha, A. & Woolfolk, A. (2012). Fundamentals of Educational Psychology. Pearson Education India.

Rao, S. N. (2002). Educational Psychology. New Age International Pub; First edition.

Santrock, J. W. (2010). Educational Psychology. McGraw-Hill Education; 5edition.

Sharma, R. N. & Sharma, R. K. (2006). Advanced Educational Psychology. Atlantic Publishers.

Slavin, R. E. (2014). Educational Psychology: Theory and Practice. Tenth edition, New International ed. Harlow, England, Pearson.

Swanson, L. H. & Vbiafirou, B. (l982). Educational and Psychological Assessment of Exceptional Children. St. Louis: The C.V. Mosby Company.

Vatsyayan (1966). Educational Psychology. Kedarnath Ramnath Publishers, Meerut.

Woolfolk, A. & Woolfolk, H. A. (2008). Educational Psychology. Pearson, New Delhi.

Woolfolk, A. (2014). Educational Psychology. (12th Edition), Pearson India.

30.6.18

Guidance and Counselling

Gladding, S. T. (2017). Counselling. Pearson.

Gladding, S. T. & Batra, P. (2017). Counselling: A Comprehensive Profession. Pearson Education; Seventh edition.

Jones, R. N. (2012). Theory and Practice of Counselling and Therapy. SAGE South Asia.

Nayak, A. K. (1997). Guidance and Counselling. New Delhi: APH Publishing Corporation, New Delhi.

Peterson, J. V. & Nisenholz, B. (1995). Orientation to Counselling. Allyn and Bacon, Boston.

Rao, S. N. (2002). Counselling and Guidance. Tata McGraw - Hill Education.

Ranganathan, N. & Wadhwa, T. (2017). Guidance and Counselling for Children and Adolescents in Schools (India). SAGE Publications, India, Pvt Ltd.

Sharma, R. A. (2001). Fundamentals of Guidance and Counselling. Meerut: R. Lall Book Depot.

Sharma, S. R. (2016). Guidance and Counselling: An Introduction. Vinod Pustak Mandir, Agra.

Taneja, V. B. (1972). First Course in Guidance and Counselling. Chandigarh: Mohindra Capital Publishers.

Clinical Diagnosis / Psychotherapeutic Counselling

Brewer, K. (2001). Clinical Psychology. Oxford: Heinemann Educational Publishers.

Corey, G. (2009). Theory and Practice of Counselling and Psychotherapy. (8th ed). Belmont, C. A: Brooks/Cole.

Culari, S. (1998). (Ed.) Foundations of Clinical Psychology. New York: Allyn & Bacon.

Kapur, R. L. (2002). Can Indian Spiritual Practices be used in Psychotherapy? *Unpublished Manuscript*. Bangalore: National Institute of Advanced Studies.

Kakkar, S. (2003). Psychoanalysis and Eastern Spiritual Healing Traditions. *Journal of Analytical Psychology, 48*, 659-678.

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Misra, G. (2010). Psychology in India Volume 3: Clinical and Health Psychology. Pearson Education; First edition.

Neitzel, M. T., Bernstein, D. A. & Millich, R. (1998). Introduction to Clinical Psychology (5th ed). Upper Saddle River, New Jersey: Prentice Hall.

Nystul, M. S. (2015). Introduction to Counselling: An art and science perspective. SAGE Publications

Page, A. C. & Stritzke, W. G. K. (2006). Clinical Psychology for Trainees: Foundations of Science informed Practice. New York: Cambridge University Press.

Pandey, A. (InPress). Psychotherapy and Indian Thought. In Cornelissen, M., Misra, G. & Varma, S. (Eds.). Foundations of Indian Psychology: A Handbook. New Delhi: Pearson.

Pfeiffer, S. J. (Ed). (1985). Clinical Child Psychology. London: Grime and Stratton Inc.

Planate, T. J. (2005). Contemporary Clinical Psychology. New Jersey: John Wiley & Sons.

Rappaport, D., Gill, M, M. & Schafer, R. (1968). Diagnostic Psychological Testing. (Revised edition, edited by Holt, R. R.). New York, International Universities Press.

Reeves, D. & Wedding, P. (1990). The Clinical Assessment of Memory: A Practical Guide. New York: Springer Publishing Company.

Sinha, D. (1990). The concept of Psycho-Social Well-Being: Western and Indian Perspectives. *National Institute of Mental Health and Neurosciences Journal*, 8, 1-11.

Spiegler, M. D. (2015). Contemporary Behaviour Therapy. 6th Edition, Cengage Learning.

Waters, J. (1964). Techniques of Counselling. McGraw Hill Book Co., Inc., New York.

Organizational Behaviour / Human Resource Management

Aamodt, M. G. (2001). Industrial / Organizational Psychology. New Delhi: Cengage.

Bhatnagar, J. & Budhwar, J. (2009). The Changing Face of People Management in India.London: Routledge.

Briscoe, D. R., Schuler, R. S. & Claus, L. (2009). International Human Resource Management: Policies and Practices for Multinational Enterprises (3rd Ed). New York: Routledge.

Chadha, N. K. (2005). Human Resource Management-Issues, Case Studies and Experiential Exercises. (3rd ed.) New Delhi: Sai Printographers.

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DeCenzo, D. A. & Robbins, S. P. (2006). Fundamentals of Human Resource Management. (8th Ed). New York, Wiley.

Greenberg, J. & Baron, R. A. (2007). Behaviour in Organizations (9th Ed.). India: Dorling Kindersley.

Griffin, R.W. & Moorhead, G. (2013). Organizational Behaviour: Managing People and Organizations. South-Western College Pub; 11th edition.

Landy, F. J. & Conte, J. M. (2007). Work in the 21st Century: An Introduction to Industrial and Organizational Psychology. New York: Wiley Blackwell.

Luthans, F. (2005). Organizational Behaviour (12th Ed.). New York: McGraw Hill.

Luthans, F. (2017). Organizational Behaviour: An Evidence. McGraw Hill Education; Twelfth Edition.

Mc Shane. S. L., Glinow, M. A.V. & Sharma, R. R. (2006). Organizational Behaviour. Tata McGraw Hill Publishing Company Ltd. New Delhi.

Muchinsky, P. M. (2006). Psychology Applied to Work: An introduction to Industrial and Organizational Psychology. Belmont, CA Thomson/Wadsworth. 2006

Pareek, U. & Khanna, S. (2011). Udai Pareek's Understanding Organizational Behaviour. Oxford University Press; 3 Edition.

Pareek, U. (2017). Designing and Managing Human Resource Systems. Oxford & IBH Publishing Co Pvt. Ltd; 3rd edition.

Prakash, A. (2011). Organizational Behaviour in India: An Indigenous Perspective. in G. Misra (Ed.), Handbook of Psychology. New Delhi: Oxford University Press.

Riggio, R. E. (2003). Introduction to Industrial/Organizational Psychology (4thd.), New Jersey: Prentice-Hall.

Robbins, S., Judge, T. A., & Sanghi, S. (2009). Organizational Behaviour (13th Ed.). New Delhi: Pearson Education.

Robbins, S. P., Judge, T. A. & Vohra, N. (2016). Organizational Behaviour. Pearson Education; Sixteenth edition.

Sinha, J. B. P. (2008). Culture and Organizational Behaviour. New Delhi: Sage.

Singh, K. (2010). Organizational Behaviour: Texts and Cases. India: Dorling Kindersley.

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Spector, P. E. (2016). Industrial and Organizational Psychology: Research and Practice. Wiley

Tripathi, P. C. & Reddy, P. N. (2017). Principles of Management. McGraw Hill Education; Sixth Edition.

Hindi

1. Singh, A. K. (2012). Ucchatar Samanya Manovigyan: Advanced General Psychology. Motilal Banarsidass Publishers Pvt. Ltd., New Delhi, India.
2. Singh, A. K. & Singh, A. K. (2013). Vyaktitva Ka Manovigyan: The Psychology of Personality. Motilal Banarsidass Publishers Pvt. Ltd., New Delhi, India
3. Singh, A. K. (2015). The Comprehensive History of Psychology. Motilal Banarsidass Publishers Pvt. Ltd., New Delhi, India.
4. Singh, A. K. (2015). Ucchatar Samanya Manovigyan: Advanced General Psychology. Motilal Banarsidass Publishers Pvt. Ltd., New Delhi, India.
5. Singh, A. K. (2016). Uchatar Naidanik Manovigyan: Advanced Clinical Psychology. Motilal Banarsidass Publishers Pvt. Ltd., New Delhi, India.
6. Singh, A. K. (2016). Adhunik Asamanaya Manovigyan: Modern Abnormal Psychology. Motilal Banarsidass Publishers Pvt. Ltd., New Delhi, India.
7. Singh A. K. (2017). Tests, Measurements and Research Methods in Behavioural Sciences. Motilal Banarsidass Publishers Pvt. Ltd., New Delhi, India.
8. Singh A. K. (2017). Shiksha Manovigyan. Motilal Banarsidass Publishers Pvt. Ltd., New Delhi, India.
9. Singh A. K. (2017). Manovigyan, Samajshastra tatha Shiksha mein Shodh Vidhiyan: Research Methods in Psychology, Sociology and Education. Motilal Banarsidass Publishers Pvt. Ltd., New Delhi, India.
10. Singh, A. K. (2017). Sangyanatamak Manovigyan: Cognitive Psychology. Motilal Banarsidass Publishers Pvt. Ltd., New Delhi, India.
11. Singh, A. K. (2017). Samaj Manovigyan Ki Rooprekha: An Outline of Social Psychology. Motilal Banarsidass Publishers Pvt. Ltd., New Delhi, India.
12. Singh, A. K. (2017). Neuromanovigyan ke Mooltattva: Fundamentals of Neuropsychology. Motilal Banarsidass Publishers Pvt. Ltd., New Delhi, India.
13. Suleman, M. (2014). Uchatar Samaj Manovigyan: Advanced Social Psychology. Motilal Banarsidass Publishers Pvt. Ltd., New Delhi, India.
14. Suleman, M. (2014). Uchatar Shiksha Manovigyan: Advance Educational Psychology. Motilal Banarsidass Publishers Pvt. Ltd., New Delhi, India.
15. Suleman, M. (2015). Samanya Manovigyan: Mool Prakriyain evam Sangyanatamak Prakriyain: General Psychology: Fundamental Processes and Cognitive Processes. Motilal Banarsidass Publishers Pvt. Ltd., New Delhi, India.
16. Suleman, M. & Choudhary, V. K. (2014). Adhunik Audhyogik Evam Sangathanatamak Manovigyan: Modern Industrial and Organizational Psychology. Motilal Banarsidass Publishers Pvt. Ltd., New Delhi, India.

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17. Suleman, M. & Kumar, D. (2016). Sangathanatmak Vyavahar: Organizational Behaviour. Motilal Banarsidass Publishers Pvt. Ltd., New Delhi, India.
18. Suleman, M. & Kumar, D. (2017). Manorog Vigyan: Psychopathology. Motilal Banarsidass Publishers Pvt. Ltd., New Delhi, India.
19. Suleman, M. & Touwab, M. (2017). Asamanya Manovigyan: Vishay aur Vyakhya. Motilal Banarsidass Publishers Pvt. Ltd., New Delhi, India.
20. Suleman, M. (2018). Manovigyan, Shiksha evam anya Samaajik Vigyanon mein Samkhyikee: Statistics in Psychology, Education and other Social Sciences. Motilal Banarsidass Publishers Pvt. Ltd., New Delhi, India.

30.6.18

M.A. PSYCHOLOGY

[ANNUAL EXAM]

SYLLABUS

2018-19

M. A. PREVIOUS (PSYCHOLOGY)

The curriculum frame – work is as under.

COMPULSORY PAPERS

PAPER	NAME	MARKS	HOUR
I	Experimental and Cognitive Psychology	100	3 hours
II	Social and Cultural Psychology	100	3 hours
III	Research Methodology and Statistics	100	3 hours
IV	Psychopathology and Health Psychology	100	3 hours
V	Practicum	100	4 hours
	Total Marks	**500**	

PAPER – I
EXPERIMENTAL AND COGNITIVE PSYCHOLOGY

M.M. - 100

NOTE : This paper consists of five units. From each unit minimum two questions will be set and candidates will have to answer one question from each unit.

UNIT – I **Attentional and Perceptual Processes:**
Attention: selective attention and its theories, Biological basis. Motivation: Perception: Nature, Principles of perceptual organization, Picture perception, and Determinants.

UNIT – II Memory & forgetting: Memory process: Encoding, Storage, Retrieval: stages of memory: Sensory. STM, LTM Episodic, Memory improvement Meta-Cognition, Tip of the tongue Phenomenon, Meta memory.
Theories of forgetting: Interference, decay.

UNIT – III Thinking & Problem solving: Theories of thought Process, Reasoning, Problem solving: Problem solving approaches strategies, Role of Concepts in thinking.
Decision-making: Algorithms and heuristics.

UNIT – IV Learning: Nature and Types, Classical Conditioning Instrumental learning, Verbal learning, reinforcement.

UNIT – V Creativity and Reasoning
Creativity: Nature and Measurement, Factors affecting creativity.
Reasoning: Types and errors in reasoning process: deductive and inductive.

BOOK RECOMMENDED :

1. Snodgrass, J. Gray. Et. Al (1985) Human experimental psychology, New York : Oxford University Press.
2. Galott, K. M. (1999) Cognitive psychology in and outside laboratory, Mumbai : Thompson Asia.
3. D. Amato M.R. (1970) Experimental Psychology, New York, Mc. Graw Hill.
4. Sen Anima : Attention & Destraction New Delhi.

PAPER – II

SOCIAL AND CULTURAL PSYCHOLOGY

M.M. - 100

NOTE : This paper consists of five units. From each unit minimum two questions will be set and candidates will have to answer one question from each unit.

UNIT – I Historical Background & Theoretical perspective: Growth of social psychology, Methods of social psychology. Theoretical perspective: Cognitive dissonance, Social comparison, Attribution, Field Psychoanalytic, Socio-biology.

UNIT – II Social cognition and Influence Processes : Social and Person perception, impression management.
Communication.
Attitude : Nature and Characteristics, Development and change.
Leadership : Meaning and nature, function, styles of leadership, effectiveness.

UNIT – III Understanding Relationship and Group Processes: Social Motivations,
Pre-social Behaviour.
Aggression and Violence.
Group Dynamics and cohesiveness: Group Dynamics: meanings, formation, decision making, group level behaviour.

UNIT – IV Applied Social Psychology: National character.
Poverty, Grader and Population Issues.
Social tension and group conflict.
Problems of social change

UNIT – V Culture and Behaviour: Culture and Cognition.
Culture and Organisation.
Culture and Personality.
Culture and Health.
Prejudice and discrimination.
Stereotypes.

BOOK RECOMMENDED :

1. Billing, M. (1976) Social Psychology and inter group relations, NY: Academic Press Lindsey, G. & Aronson, E (Eds) (1985) The Handbook of social psychology. NY : Random House.
2. Mishra, G. (1990) Applied social psychology in India ND: Sage
3. Eiser, J.R. (1986) Social Psychology, London : Cambridge University Press.
4. Dalal, A.K. (1989) Attribution theory and research ND wiley limited .
5. Feldman R.S. (1985) Social Psychology, New York, Mc Graw hill.
6. Baran A.B. & Byre, D (1991) Social Psychology, - Boston allyn & Bacon.
7. Pandey, J. (1988) Psychology in India; the state – 7 the art Vol – 2 ND. Sage.

PAPER – III

RESEARCH METHODOLOGY AND STATISTICS

M.M. - 100

NOTE : This paper consists of five units. From each unit minimum two questions will be set and candidates will have to answer one question from each unit.

UNIT – I Nature of scientific research in behavioural sciences. Experimentation in psychology Variables: Nature and types. Techniques of experimental manipulation, control in experiment. Sources of bias. Ethical issues in psychological research, Research Process: Consideration of research problem and hypothesis.

UNIT – II Sampling: probability and nonprobability sampling. Research report writing (APA style). Normal Probability Curve, its properties and utility in inferential statistics, Null hypothesis, Type I and Type II errors, Levels of significance.

UNIT – III Method of Collecting data: Observation, Questionnaire, Interview. Case Study, Psychological tests and Content - Analysis.

UNIT – IV Experimental Design : Single Factor, Ranomized block, 2X2 factorial design, Repeated measures (on one factor) Design : Graceo Latin – Square Design, t-test, NOVA : one – way and two – way : Newman - Keul tests.

UNIT – V Cross sectional and longitudinal designs. Measures of relationships: Multiple regression, factor analysis: the centroid method, calculation of factors, content analysis.

BOOK RECOMMENDED :

1. Kerlinger D & Katz L. : Foundation of behavioural research (2^{nd} ed) Surjeet Publication, Kamlanagr, Delhi, 1983
2. Kothari C.R.: Research methodology : methods and techniques. Wiley eastern Ltd. New Delhi 1986
3. Broota, K.D. : Experimental design in behavioural research Wiley eastern Ltd. New Delhi 1992
4. Black T.R. : Quantative research designs for social sciences thousand oaks: sage 1988
5. Winer, B.J. : Stastical principles in experimental design, New York, Mc graw hill, 1971
6. Edwards, A.K.: Experimental designs in psychological research. New York Holt 1976
7. Mason, J. : Qualitative Researching, thousand oaks: sage 1997.

PAPER – IV

PSYCHOPATHOLOGY AND HEALTH PSYCHOLOGY

M.M. - 100

NOTE : This paper consists of five units. From each unit minimum two questions will be set and candidates will have to answer one question from each unit.

UNIT – I Classification systems in psychopathology: W.H.O. (ICD-10) and multiaxial systems (DSM-IV TR): Evaluation of classification system. Theoretical background, approaches to psychopathology (1) Psychodynamic; (2) Behavioural; (3) Cognitive; (4) Phenomenological; (5) Biological (6) Socio-cultural approach Diagnosis – purposes of diagnosis, Method of diagnostic assessment.

UNIT – II Intervention models and Psychotherapies Psychodynamic, Behavioural, Biological, Behavioural medicine socio-cultural, Phenomenological and spiritual approach to therapy.

UNIT – III Theories and models of Anxiety disorder: (a) Panic, Phobic, OCD Post – Traumatic. Stress disorders, Generalized Anxiety Disorders, (b) somatoform disorders, Impulse control disorder, eating disorder and Sleep disorder.

UNIT – IV Schizophrenia Mood disorder. Mental Retardation and Personality disorder (cluster categories and problems), types & symptoms substance related disorders.

UNIT – V Psychophysiological disorder, Theories of Personality-dispositions, coronary heart desease (CHD), Asthma, Allergy, Eczema Itching, Rheumatoid, Arthritis, Peptic. Ulcer, Diabetes and Menstrual disorders, sexual and gender identity disorder. Mental Health Promotion and Maintenance.

BOOK RECOMMENDED :

1. Aboud, T.D.: Health psychology in global perspective. Thousand oaks, C.A: Sage (1988).
2. Page, J.D.: PSYCHOPATHOLOGY : The Science of understanding Deviance. (2^{nd} ed.) (1975)
3. Carson, C.R., Butcher J. N. : Abnormal psychology and modern life (9^{th} ed) Harper Collins publisher. (1992).
4. Adams, H.E. & Sutkar. P.B. : comprehensive handbook of psychopathology New York, Plenum Press.
5. Prokap, C.R. & Bradly, L.A.: Medical psychology: Contribution to Behavioural medicine, Academic press, (1991)
6. Davison G.C. and Neal J.N. Abnormal Psychology – 8^{th} Ed. Wiely Publishers, 2000.

PAPER – V

PRACTICUM

M.M. 100

This paper consists of the laboratory (experimental and testing) and field – work done throughout the academic session and will be evaluated at the time of annual examination along with the other papers. Distribution of marks would be as under:

		Marks
A.	Record of lab practical and field work	25
B.	Evaluation of one lab. Experiment of be conducted in the examination	25
C.	One test to be administered in the examination	25
D.	Viva-Voce on practicum	25

Note : No candidate would be allowed to appear in the practical examination unless his/ her day-to-day practical work and report are found satisfactory.

List of Practicum : **(Any five experiments four tests and one field study)**

1) Experiments :-

1. Meaningfulness and selective attention.
2. Effect of types of information on impression formation.
3. Memory improvement.
4. Episodic memory
5. Chunking
6. Proactive inhibition
7. Problem solving
8. Retroactive inhibition
9. Meaningfulness in verbal learning
10. Feedback in verbal learing.

Tests :-

1. E.P.Q.
2. Locus of control
3. Picture frustration
4. Intelligence test (performance/non-verbal)
5. Thinking style
6. Cognitive style
7. Trait-state anxiety
8. Projective test.

Field Work :

1. Person perception
2. Impression management
3. Attitude measurement
4. Group conformity
5. Value judgement
6. Identity crisis
7. Gender discrimination
8. Communal tension
9. Interpersonal interaction
10. Pro-social behaviour
11. Social loafing.

Note : Field study Workshop on topics would be allotted by the departmental committee.

M. A. FINAL (PSYCHOLOGY)

The curriculum frame – work is as under.

COMPULSORY PAPERS (Two)

No.of Paper	Name of Paper	Marks	Hours
(vi)	Life Span Development and Personality Psychology	100	3 hours
(vii)	Psychological Assessment	100	3 hours
	Optional Papers : Two papers from any one of the three groups		
	Group A : Psychology of Management		
(viii)	Organizational Behaviour Management	100	3 hours
(ix)	Human Resource Development and Management	100	3 hours
	Group B : Psychology of Education		
(viii)	Educational and Instructional Psychology	100	3 hours
(ix)	Guidance and Counselling Psychology	100	3 hours
	Group C : Clinical Psychology		
(viii)	Clinical Diagnosis and Community Mental Health	100	3 hours
(ix)	Psychotherapeutic Counselling	100	3 hours
(x)	Practicum	100	4 hours

PAPER – VI (COMPULSORY)

LIFE SPAN DEVELOPMENT AND PERSONALITY PSYCHOLOGY

M.M. - 100

NOTE : This paper consists of five units. From each unit minimum two questions will be set and candidates will have to answer one question from each unit.

UNIT – I Scope, Nature and Principles of development, Factors influencing development: Heredity, Environment, Motivation, Learning. Methods; Cross-sectional, longitudinal approach, Research strategies: Correlation, Experimental and other sequential techniques. The Developmental tasks and theories of Development.

UNIT – II How life begins, Infancy, baby hood and childhood. Characteristics, adjustment, hazards and Physical, Emotional, Social and Personality Development.

UNIT – III Adolescence, Adulthood, Middle and Old age- Characteristics. Physical, Social, Cognitive and Spiritual development psychosocial Changes and adjustment.

UNIT – IV Personality Meaning and Concept of Mature Personality,
Theories of Personality, Psychodynamic: Approch Freud, Erikson, Adler.
Trait: Approch Allpert, Cattell and Eysenck, Cognitive: Approch Kelly, Behavioural Approch Bandura.

UNIT – V Humanistic approach: Maslow & Rogers,
Indigenous concept and Models of Personality – Yogic, Sankhya and Buddhist View. Structure, Dynamics, Development and Current Researches in the field of Personality.

BOOK RECOMMENDED :

1. Baltes, P.B. & Brim O.G. (1978): Life span development behaviour, N. Y. Academic Press.
2. Thomas, M. R. (2000): Recent theories of Human Development, thousand Oaks: sage Publication.
3. Zanden, J.W. & Vander (1997): Human Development (7^{th} Ed.) New York: Mc Graw Hill.
4. Elizabeth B. Hurlock (1977): Development Psychology. A life span approach, (5^{th} Ed.)
5. Jere E. Brothy & Sherry L. Willis (1981): Human Development and Behaviour, St. Maitins Press, NY.
6. Liebert, R.M. & Spiegler, M.P. (1993): Person aligy: Strategies & issues, P.C. California Books Cole Pub. Co.
7. Hall C.S. and Lindsey, G. (1996) theories of Personality N.Y.J. Wiley & Sons.
8. Pervin L.A. (1975): Psychology of personality readings in theory, Chigos. Rand Meznally College Lab.
9. Sinha J.N. (1969) : Indian Psychology, Calcutta.
10. Mukkopadhyay, Swami Niranjanand Saraswati Yoga Darshan Munger : Bihar School of Yoga.

PAPER – VII (COMPULSORY)

PSYCHOLOGICAL ASSESSMENT

M.M.- 100

NOTE: This paper consist of five units. From each unit minimum two questions will be set and candidates will have to be answer one question from each unit.

UNIT – 1 Nature of Psychological Assessment, Differences between Physical & psychological assessment. Problems in Psychological Assessment., Levels of Assessment.

UNIT – II **Scaling:** Unidimensional and Multidimensional. Scale construction techniques. Difference among tests, scales, questionnaire and schedule. Characteristics of a good psychometric test. Difference between psychometric and projective technique.

UNIT – III **Construction of Psychometric tools:** Step in test construction. Item writing, Pretry out, item difficulty level, discrimination power Reliability; Concept, type, method of determining reliability, Validity: Factors affecting reliability and validity. Norms: Types, uses and method to determine various types of norms.

UNIT – IV Cognitive and Non-Cognitive Tests

(a) Major Tests of Intelligence, Aptitude and Achievement developed under Western and Indian Cultural Setup.

(b) Projective and Psychometric tests of Personality, adjustment, Values Interest, Stress and Anxiety developed under Indian and Western conditions.

(c) Psycho-Physical and Neuro-Psychological test.

UNIT – V (a) Adaptation of tests.

(b) Test taking Response Styles: Social desirability, Acquiescence and Faking.

(c) Psychological testing in Applied Field of Life: Diagnosis, Psychotherapy, Education, Occupations and Organizations.

BOOK RECOMMENDED :

1. Anastasi, A. (1988) Psychological Testing London: Mc Millan Publishing Co. Crowback. L.J. Essentials of Psychological Testing.
2. Rreeman F. Theory and Practice of Psychological Testing.
3. Gheselli Theory of Psychological Measurement New Delhi Tata HeGraw Hill Publication.
4. Guilford, J.P. Psychometric Methods. New Delhi Tata Mc Graw Hill.
5. Nunally, J.C. Introduction to Psychological Measurement, Tokyo: Mc Graw Hill.
6. Nunally, J.C. Psychometuric Theory, New Delhi: Tata Mc.Graw Hill Publishing Co.

GROUP - A

PAPER – VIII (OPTIONAL)

ORGANIZATIONAL BEHAVIOUR MANAGEMENT

M.M. - 100

NOTE : This paper consists of five units. From each unit minimum two questions will be set and candidates will have to answer one question from each unit.

UNIT – I Historical overview of the field Old and Emerging forms of organizations, Psychological processes in organizations: person, learning principles perceptions and motivation.

UNIT – II Organizations Processes: Influence and power in organization leadership: Nature and theories of communication. Barriers, effectiveness, current issues, role of T.A. in communication decision making, nature of rational process of decision-making. Group decision-making, techniques of good DM.

UNIT – III Interpersonal Processes in organizations: Group dynamics and team work in organization, conflict, decision Making negotiation in organization, Union Management interface, TQM, bench marking, Re-engineering, changing organizational culture.

UNIT – IV Marketing Research: Nature and function: consumer behavior, sales promotion strategies.

UNIT – V Organizational change and development: Managing the OD process, OD approaches and techniques, theoretical development and emerging OD technique, organization change, process and models.

BOOK RECOMMENDED :

1. Udai Pareek: Organizational learning R. Gibson (1997) Rethink the future London Nicholas Brealey Publishing.

2. Luthans Fred: Organizational Behaviour (1995) Mc Graw Hill international Edition.

3. Stephens P. Robbins: Organizational behaviour (9^{th} edition) (2000) Prentie Hall India, New Delhi 110001.

4. Jerald Greenbery, Robert, A aburon: Behaviour in organization (1999) PrentieHall of India. New Delhi 110001.

GROUP - A

PAPER – IX (OPTIONAL)

HUMAN RESOURCE DEVELOPMENT AND MANAGEMENT

M.M. - 100

NOTE : This paper consists of five units. From each unit minimum two questions will be set and candidates will have to answer one question from each unit.

UNIT – I Some assumptions about HRM, Structure and Role of HRM. The Indian Contest of HRM Models of HRM. Current and future Challenges to HRM.

UNIT – II Human Resource Planning: Steps and stages in manpower planning. Structure of manpower planning HRD in India. Job analysis and job design. Recruitment and selection. Job and Careers in HRM

UNIT – III Performance appraisal, Factors distorting appraisal and how to improve appraisals. Type of appraisal system., wage and salary administration. Employment incentive.

UNIT – IV Human Resource policies and practices, changing trends in work environment, developing the human resource, the employment relationship. Professional bodies.

UNIT – V Maintaining Human Resource: Safety and Health Stress Management, Labour Relations and Collective Bargaining. Employee involvement, Employee counselling.

BOOK RECOMMENDED :

1. Human Resource Management. A contemporary perspective I. Board Well & Holden.
2. Personnel Human Resource Management. D.A. centre & S.P. Robbins.
3. Designing and Management. Human Resources Systems U. Pareek & T.V. Rao.
4. Human Resource Management. Fisher. Scheenfeldt and show.

GROUP - B
PAPER – VIII (OPTIONAL)

EDUCATIONAL INSTRUCTIONAL PSYCHOLOGY

M.M. - 100

NOTE : This paper consists of five units. From each unit minimum two questions will be set and candidates will have to answer one question from each unit.

UNIT – I Conceptual and theoretical perspectives in Educational Psychology. Theories, Behaviouristic, Social learning and Piaget and their application in teaching. Information processing Models, Instructional Medels, Programmed learning concept, Characteristics and models.

UNIT – II Human diversity and education.
Learning styles: Nature, approaches to learning style, measurement of learning styles, attempt to modify learning styles.
Individual and group differences in intelligence. Theories of intelligence, multiple intelligence, Gender differences issues in the classroom. Multilingualism and minority language issues in education, tongue education, bilingual or multilingual education.

UNIT – III Effective Teaching and Classroom Management
Planning and setting objectives for Teaching, Taxonomy of objectives. Types of objectives and their utility, characteristics of effective teachers. Teaching methods instruction lecturing and explaining, questioning, aptitude – treatment interaction, student centred teaching, individualized instruction, class room management and teaching in small groups: The discussion method and cooperative learning, computer-assisted instruction.

UNIT – IV Exceptionality and social education:
Categories of exceptionality, labeling and educational relevance Physically disabled students, students with cognitive disabilities, brain dysfunction and communication disorders.
Students with emotional and behavior disorder. Attention deficit disorder (Add), attentional deficit hyperactive disorder (ADHD), Gifted and talented students. Intervention and special education for various forms of exceptionality, mainstreaming.

UNIT – V Educational Assessment
Measurement and evaluation (Norm reference and criteria referenced tests), Test scores- meaning and types, standardized test: Meaning Types and interpretation Classroom assessment and grading: Techniques of Class room evaluation. Observation, questionnaire.

BOOK RECOMMENDED :

1. De Secco, J.P. & Croford, W.R. : The Psychology of Learning and Instruction, New Delhi. Prentice Hall.
2. Ellis, R.S.: Educational Psychology, A Problem approaches affiliated, New Delhi, ease West Press.
3. Bruce & Marshvell : Models of Teaching (2nd Ed.) 1980.
4. Travers, J.F. : Educational Psychology (2nd Ed.) 1979.

GROUP - B

PAPER – IX (OPTIONAL)

GUIDANCE AND COUNSELLING

M.M. - 100

NOTE : This paper consists of five units. From each unit minimum two questions will be set and candidates will have to answer one question from each unit.

UNIT – I Definition, Nature, Need and Functions of Guidance and Counselling. Counselling and Psychotherapy. Intervention, Goal and objectives of Counselling.

UNIT – II Techniques of Appraising the client: Standardized and Non-Standardized Techniques, Intelligence, Personality, Aptitude and Interest. Observation, Auto biography, Case study, interview, Rating scales.

UNIT – III Approaches of Counselling: Directive, Non-directive, Eclectic. Individual and group counselling. Evaluation of counselling. Follow up and placement services.

UNIT – IV Characteristics of a good Counsellor. Counsellors, Training Organization of guidance program in educational institution. Relevance of guidance under 10+2+3 educational pattern. Issues and trends in guidance and counselling. Ethical standards.

UNIT – V Special areas of Guidance and Counselling: Vocational, Marital, Educational, Family. Counselling for the pre-school and elementary school children adolescent.

BOOK RECOMMENDED :

1. Lewis, E.C. (1970): Counselling Psychology, New York, Holt Rinehart and Winster, Inc.
2. Harson, J.C. (1978): Counselling Processes and Procedures. New York, McMillan Publishing Co. Inc.
3. Narayan Rao. S. (1981): Counselling Psychology, New Delhi, Tata McGraw Hill.
4. Kemp. C.G. (1970): Foundations of group counselling., New York, McGraw Hill.
5. Steffler, B.(Ed.) 1965. Theories of counselling, New York, McGraw Hill Book Co.
6. Warters, J. (1964): Techniques of counselling, New York, McGraw Hill Book Co.
7. Rappaport, D. Gill, M.M. and Schafer, R. (1968): Diagnostic Psychological testing. (Revised edition, edited by Holt, R.R.) New York, International Universities Press.
8. Anastasi, Z. (1992): Psychological Testing (Seventh Ed.) New York, McMillan.

GROUP - C

PAPER – VIII (OPTIONAL)

CLINICAL DIAGNOSIS AND COMMUNITY MENTAL HEALTH

M.M. - 100

NOTE : This paper consists of five units. From each unit minimum two questions will be set and candidates will have to answer one question from each unit.

UNIT – I History and current trends. Approaches: Psychodynamic, Behaviouristic, Humanistic, Cognitive and Socio-cultural.

UNIT – II Clinical diagnosis: Symptomatic vs. dynamic. Symptomatic diagnosis: ICD-10, DSM-IV (R). Dynamic diagnosis: Observation, Case history and Interview.

UNIT – III Clinical Assessment : Basic principles, Psychometric tests: MMPI, WAIS & WISC. Projective tests: Rorschach & TAT.

UNIT – IV Impressionistic approach of diagnosis: Informal assessment, Psycho-Physiological Assessment: EEG, ECG, and PGR, Blood pressure, Pulse-rate; Neuro-Psychological testing. Clinical report writing.

UNIT – IV Community Psychology: Perspectives of Community Psychology, Social Interventions: Methods and Strategies.

BOOK RECOMMENDED :

1. Iscope, I.; Block B.L. and Spielberger, C.D. (eds) Community psychology: Perspectives in training and research. NY: Appleton, 1977.

2. Mann. A.P.; Community Psychology: Concepts and applications. Free Press, 1978.

3. Rapaport, J. Community Psychology: Values, Research and action. NY : Holt Rinehart. 1977.

4. Korchin, S.Modern Clinical Psychology. Harper and Row, 1978.

5. Wolman, B.B. (ed) Handbook of Clinical Psychology, Mc Graw Hills, 1972.

GROUP - C

PAPER – IX (OPTIONAL)

PSYCHOTHERAPEUTIC COUNSELLING

M.M. - 100

NOTE : This paper consists of five units. From each unit minimum two questions will be set and candidates will have to answer one question from each unit.

UNIT – I Psychotherapeutic Counselling: Psychoanalytic Technique, Behavioural. Technique, Client centered technique, Community interventions and Group therapeutic techniques.

UNIT – II Methods for Altering Maladaptive Behavioural deficits: Shyness, delinquency, depression, speech and sexual dysfunctions.

UNIT – III Methods for altering maladaptive behavioural excesses: Excessive smoking, alcoholism, drug addiction and temper-out burst, physical aggression.

UNIT – IV Methods of altering inappropriate behaviour: Marital maladjustment, child-misbehaviour, homosexuality, and exhibitionism.

UNIT – V Methods for altering fears and anxiety and treating psychophysiological disorders: test-anxiety, generalized anxiety, stress, school phobia, snake phobia, combination of fears, CHD, asthama and peptic ulcer.

BOOK RECOMMENDED :

1. Carson & Butcher : Abnormal Psychology and modern life.
2. Wolpe, R. & Dryden, W. (eds) (1996) : Handbook of counselling psychology, New Delhi
3. Woolberg, L.R. (1998) : The Techniques of Psychotherapy, Barcour Brace : Groune and stration.
4. Toukimarian, S.G. & Rennie D.C. (1992): Psychotherapy Process and Research, Sage
5. Gelso; C.J. and Fretz, B.R. (1995): Counselling Psychology, Bangalore, Prism Books Ltd.
6. Abate, L. & Milan, M.A. (ed.) (1985) : Handbook of social skill training & Research, New York: John Wiley & Sons.
7. Gorey, G (1986)Theory and Practices of Counselling and Psychotherapy, Montery California, books coley publishing.
8. Adelson, D. & Kalis, B.L. (1970) : Community Psychology and Mental Health. Perspectives Seanto.
9. Mann. A.P. (1978): Community Psychology : Concepts and applications, Free Press.
10. Iscoe. I. Block, B.L. & Spielberger, C.D. (eds.) (1977): Community Psychology : Perspectives in training and research N.Y. : Appleton.

PAPER – X (OPTIONAL)

PRAACTICALS (COMPULSORY)

M.M. - 100

Note :- This Paper Consists of two parts: Part –I and Part – II

PART – I LAB PRACTICALS :-

(Any five of the following to be completed in the Laboratory training.)

1. Knowledge of results.
2. Effect of social support on conformity.
3. Attribution of achievement outcomes.
4. Zeigarnik effect.
5. Level of aspiration as a function of success or failure.
6. Reminiscence in motor learning.
7. Short Term Memory.
8. Effect of group on individual judgement.

PART – I FIELD STUDY

This part of the practical paper comprises of completion of two field studies, one (I) from the area of compulsory papers and another (II) from the area of optional papers of the specialization group.

(I) Any one of the areas given below from the compulsory papers be selected by the candidate and its field studies be completed under supervision of the departmental supervisor.

DEVELOPMENTAL PSYCHOLOGY:

1. Childhood
2. Adolescence
3. Adulthood
4. Old age
5. Home environment

DEVELOPMENTAL PSYCHOLOGY:

1. Leadership Styles
2. Matured Personality
3. Personality type ‘A’ and ‘B’
4. Neuroticism
5. Psychopathic personality

(II) candidate is required to complete one field study from the optional group under supervision of a concern teacher. The optional group prescribed along with the areas of specialization is given below:

Optional Group 'A" Psychology of Management: Any one of the following:

1. Study of Job Analysis
2. Communication Network
3. Organizational Structures
4. Management Style
5. Role Stress

OR **Optional Group 'A" Psychology of Education: Any one of the following:**

1. Test Anxiety
2. Exceptional Children
3. Teaching Style
4. Educational Guidance
5. Vocational Guidance

OR **Optional Group 'A" Psychology of Mental Health: Any one of the following:**

1. Neuro-Psychological evaluation of a stroke patient.
2. Identification of stressors
3. Drug abuse
4. Study of faith healers
5. Study of yoga or Vipashyana

The distribution of marks of Paper X (Practical) will be as under:

1.	Conduction of Laboratory experiments.	:	30
2.	Completion of Field Study Reports		
	(a) Compulsory area	:	20
	(b) Optional area	:	20
3.	Viva – Voce on Practical	:	30

School of Studies in Psychology
Pt. Ravishankar Shukla University, Raipur (C.G.)

POST GRADUATE DIPLOMA IN PSYCHOLOGICAL GUIDANCE AND COUNSELLING (PGC)

1. SCOPE :

The P.G. Diploma in Psychological Guidance and Counselling is meant for those students. Who intend to take up position of Director of Guidance Bureau, School Counsellor, Career Master, Rehabilitation Officer, Marriage Counsellor and such other positions in private and public settings. It is also meant for those persons who intend to start their own guidance and counseling centers or consultancy services. The main purpose of this job-oriented course is to enable the student to understand the psychodynamics involved in the problems of human adjustment and their effective management.

2. Examination System

Title		Min. Marks	Max. Marks
A.	Theory Papers PAPER I – Psychological Guidance PAPER II – Counselling Theories and Techniques	 40 40	 100 100
B.	PAPER III – Field Exploration 1. Field Internship – 30 2. Case Study Report – 70	40	100
C.	PAPER IV – Laboratory Practical 1. Construction of Guidance tool – 30 2. Psychological testing – 70	40	100
	GRAND TOTAL	**160**	**400**

NOTE : Candidate securing at least 40% marks of the aggregate in (a) Theory paper in (b) Field exploration and (c) Lab practical separately shall be declared Successful at the examination. Candidates obtaining 60% marks or more in total shall be declared to have passed with merit and these obtaining 40% or more but less than 60% marks shall be declared as passed.

Course content of P.G. Diploma in P.G.C.

PAPER – I

PSYCHOLOGICAL GUIDANCE

100 Marks

This paper has five units. At least two questions are to be set from each unit candidate is required to attempt five questions in all selecting one question from each unit.

UNIT – I

The Guidance

Meaning and Functions of guidance. The bases of present guidance approach Basic Principle and assumption of guidance. Guidance services. Difference between Guidance and Counselling.

UNIT – II

Techniques of Guidance

Understanding Individual (use of interviews and questionnaires) Appraisals of Aptitude for guidance appraisal of personal qualities and interest : (Test and Inventories rating scale, behavior descriptions. Anecdotal records. Socio- metric devices evaluation of achievement, Comulative Records, Case study and follow-up.

UNIT – III

Organization of guidance programme in school. Problems of guidance in India. Types of guidance services, characteristics of a well organized guidance programme.

UNIT – IV

Guidance Services for children. Guidance of young children. Elementary School Children, Junior high school children. Adolescents.

UNIT – V

Guidance services to adults, vocational guidance. Guidance of adults. Guidance towards family life, guidance in personal adjustment, guidance to deviates, guidance in group situation appraisals of guidance programmes, Emerging Trends in guidance.

BOOK RECOMMENDED :

1. Traxler. E. Arthur and North D Robert (1996). Technique of Guidance IIIrd Edition Halper & Row, Publishers New York and London.

2. Crow, L. and Crow, A. (1962), An Introduction to Guidance IInd Ed. Eurasia Publishing House (P) Ltd.
3. Asch. M. (2000) Principals of Guidance and counselling 1st Ed. Sarun & sons New Delhi.
4. Jones, J. Arthur, eta (1952), Principal of Guidance 6th Edl Tata McGraw Hill Publishing Company.
5. Gupta S.K. (1985), Guidance and counselling in India education 1st Ed. Mittal Publishers Trinagar Delhi.

PAPER – II

COUNSELLING THEORIES AND TECHNIQUES

100 Marks

This paper has five units. At least two questions are to be set from each unit candidate is required to attempt five questions in all selecting one question from each unit.

UNIT – I

COUNSELLING : The art and Science of helping.

a. Meaning, Purpose and goats of Counselling with special reference to India.
b. Professional issues, ethics, education and training of the counsellor.
c. Counselling relationship.

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UNIT – II

COUNSELLING PROCESS : Theories and Techniques of Counselling.

a. Psychodynamic Approach, Freudian, Neo Freudian, Modern.
b. Humanistic Approach : Existential client centred.

UNIT – III

a. Cognitive Approach : rational emotive, Transaction analysis.
b. Behavioural Apporach : Operant conditionaing. Behaviour modification.
c. Indian contribution – Yoga and Meditation.

UNIT – IV

COUNSELLING APPLICATION - I

a. Counselling in schools.
b. Career Counselling.
c. Alcohal and Drug Abuse.
d. Group counselling.
e. Crises Intervention Counselling – Case Studies for each of the above types of counselling applications, counselling interview.

UNIT – V

COUNSELLING APPLICATION - II

Management of

a. Shyness.
b. Smoking.
c. Depression.
d. Stress.
e. Marital Maladjustment
f. Old age problems.
g. Eurenesis
h. Phobias
i. Fear of interview
j. Fear of stage performance.
k. Problems in decision making.

Book Recommended :-

1. Windy, D. (1988) (Ed.) Counselling in Action New York; Sage Publication.
2. Nelson, J. (1982) The theory and practice of counselling Psychology. New York. Renehart and Winston.
3. Belkin, G.S. (1988) Introduction to counselling. W.G. Brown Publishers.

PAPER – III

FIELD EXPLORATION (INTERNSHIP PROGRAMME : 100 Marks

A. INTERNSHIP PROGRAMME : 70 MARKS.

The Internship Programme consists of two phases, about 30 days each. The students would be attached to the institute organization for a period of about two months. During this period they have to explore and identify the problem for investigation, and prepare Study-report (case) under the guidance of the Supervisor (faculty member). This report would carry 70 marks and would be evaluated by both internal and external examiner, each examiner awarding marks out of 35, as per university rules.

B. INTERNSHIP EVALUATION : 30 MARKS.

i. Presentation of the report in the departmental Seminar – 20 Marks.
ii. Attendance for the programme certified by the supervisor – 30 Marks

PAPER – IV
Lab Practical

100 Marks

1. Construction of guidance tools related to the area of specialization – 30 marks
2. Psychological Testing – Candidates would be required to administer, score and interpret at least 10 Psychological tests 50 marks.
3. Practical Record book – 10 marks.
4. Viva – Voce – 10 marks.

PRE – Ph. D. COURSE

Subject :- PSYCHOLOGY

DURATION : SIX MONTHS **M.M. 200**

	COURSE	MARKS
COURSE I	Research Methods and Advanced Statistics	100
COURSE II	Project Based on Review of Research work	50
	Seminar	50
	TOTAL	**200**

PRE – Ph. D. COURSE

COURSE – I RESEARCH METHODS AND ADVANCED STATISTICS

M.M. 100

UNIT - I Psychological Research : Nature types, Complex Problems of Psychological Research : Research Designs, Types.

UNIT – II **Design :** Single subject designs, Quasi experimental design. Greco – Latin square design factorial experiments with repeated measures : One and two factors with repeated measures.

UNIT – III ANOVA up to 3 WAY.
Pre and Post ANOVA

UNIT – IV **Factor Analysis :** Theory and factor, extracting by centered method. Content analysis : Nature and applications.

UNIT – V **Basic Knowledge of Computer Application :** Internet learning, USE of SPSS

BOOK RECOMMENDED:

1. *Statistical analysis in Psychology and Education : Ferguson, George, PP316-334*
2. *Psychology Theory , Nunally, Pp151-188.*
3. *Psychology Methods. Gulford, J.P. 470-482.*
4. *Introduction to factor Analysis, Fruchter. B.*
5. *Statistical design in Experimental Research, Winer (1971) MC Graw Hill,*
6. *Foundations of Behavioural Research. Kerlinger. F.N. (1978)*
7. *An introduction to Psychological Statistics DUBOIS, Philip M.V.*
8. *Research Methodology : Methods and Techniques : Kothari, C.R.(1985)*
9. *Festinger, D. & Katz L. : Research Methods in Behaviour Science. Holt Rinchart. N.Y.(1973)*
10. *Broota, K.D. Experimental de4isgn in Behavioural research,. Milar Fastern, N. Delhi (1989)*

COURSE – II **M.M. 100**

1. **Projects Based on Reviews of Research Work** : Use of Literature, knowledge of National and International Journals, Impact factor, Citation Index, SCI Journals. (To be supervised and evaluated by guide concerned.)

2. **Seminars** : Open seminar, evaluation will be done by member of DRC.

Curriculum Framework

POSTGRADUATE DIPLOMA IN REHABILITATION PSYCHOLOGY

(P.G.D.R.P.)

Norms, Regulations & Course Content

March, 2017

Effective from Academic Session 2018-19
One Year Duration

भारतीय पुनर्वास परिषद

Rehabilitation Council of India
B-22, Qutab Institutional Area,
New Delhi - 110 016

Email: rehabstd@nde.vsnl.net.in , rehcouncil_delhi@bol.net.in

www.rehabcouncil.nic.in

Postgraduate Diploma in Rehabilitation Psychology (PGDRP)

1.0 INTRODUCTION

The aim of the course is to prepare rehabilitation counselors who promote understanding of the situations and needs of people with disabilities and perform a vital role in the personal, vocational and educational adjustment of persons with disability within self-advocacy and community development model. The program is an ideal model for entry into the field of professional rehabilitation counseling and allows for the easiest avenue to registration under CRR.

The training program prepares prospective candidates in a variety of concepts, theories, and techniques to function in numerous settings such as state or private run rehabilitation centers, public and private schools and other organizations serving persons with physical, sensory or cognitive disabilities. The coursework for the program includes: history of the rehabilitation movement and its legislation, models of disability and rehabilitation theory, psychosocial implications of disabling conditions, theoretical understanding of psychological assessment and testing methods, evaluation of the psychosocial problems and counseling, education and vocational needs of clients, case management skills utilizing community resources and multidisciplinary approach. In summary, the successful trainees have the broad base of rehabilitation knowledge to serve people with disabilities and they also have the ability to counsel, support, and deal with their clients from a humanistic and holistic approach.

1.1 Distinguishing Features

Rehabilitation counseling is first level (entry) of a two-level series within rehabilitation psychology services and is distinguished from the second higher level (M. Phil in Rehabilitation Psychology) training program. The later is an independent full-fledged professional training with higher level of competency, responsibility and authority for providing services to clients with disability. The Rehabilitation Counselor cadre shall not be used as an under fill class for existing Rehabilitation Psychologist positions for providing services to clients with disability.

1.2 Typical Tasks

The successful candidates screen and evaluate referrals to determine potential eligibility for services; may make referrals to other resources as appropriate; assess family background, prior work experience and education, disability, and functional limitations; determine needs and coordinate medical and psychological assessments with concerned specialists and/or medical/psychology consultants; advice/refer for aptitude, intelligence and personality tests and provide interpretation of results to clients and their families; determine physical restoration requirements (e.g., surgery, physical therapy, artificial limbs, hearing aids) and training necessary for employability; coordinate needed services with other agencies and organizations; provide psychological, behavioral, career and vocational counseling to clients; develop and implements rehabilitation plans with each client and track progress through successful termination of the case.

2.0 AIM

The aim of the program is to train candidates in basic knowledge and skills necessary for rehabilitation counseling practice. The program includes core counseling courses (e.g. theories of counseling) and rehabilitation-specific coursework (e.g. assessment of persons with physical/sensory/developmental/ cognitive disability). The program allows the trainees to develop expertise in any one areas of rehabilitation counseling (for eg. school counseling) during the one-month extra-institutional placement, which occurs in the third quarter of the course/training.

2.1 Objectives

On completion of the course the trainees are expected to demonstrate:

2.1.1 An understanding of basic physical, sensory, developmental and cognitive impairments and effects such impairments have on functional performance.

2.1.2 Knowledge of commonly accepted interventions for various impairments and skill in communicating verbally and in writing the decisions made and explaining and answering questions.

2.1.3 Skill in interviewing and providing support and empathy to clients with disability and their families.

2.1.4 Ability to utilize the principles and practices used in counseling and in the provision of services to rehabilitation clients and facilitate the development of problem solving skills in individuals with disability.

2.1.5 Demonstrate an understanding of caregiver and family burden, suggest and/ or undertake interventions drawing on their knowledge and problem solving skills.

2.1.6 Ability to develop plans for vocational rehabilitation clients, and counsel, motivate, and inspire clients.

2.1.7 Ability to work within specific agency programs, operations, policies, and procedures affecting assigned work, and to coordinate the provision of services to clients with other agencies and organizations.

2.1.8 Ability to read and interpret psychometric reports (intelligence, aptitude, personality assessment etc.) provided by rehabilitation/clinical psychologists and explains the implications of findings to clients and their families and carry out the suggested counseling and/or remedial training with the clients (for eg. remedial training/intervention in children with disorders of scholastic skills, and counseling of families and children with behavioral and emotional disorders occurring in the home/school context)

2.1.9 Ability to develop and maintain effective working relationships with local employers and community social service agencies, and market clients' skills and abilities to potential employers.

3.0 INSTITUTIONS ELIGIBILE TO CONDUCT THE COURSE

3.1 Centers already recognized by the RCI for conducting M. Phil. Rehabilitation Psychology program are eligible to conduct the course. However, such centers need to apply for Council's permission before starting the course.

3.2 Institute/center catering to people with following disability are eligible to conduct the program.

A) Specific developmental disability such as mental retardation, cerebral palsy, autism spectrum disorders, epilepsy or any disabling conditions found to be closely related to development processes, that limits/disrupt life activities such as learning, speech and language, mobility, self-help, and independent living begin anytime during developmental period (up to 18 years of age), and lasting throughout a person's lifetime.
B) Locomotor disability-congenital or acquired, including leprosy-cured.
C) Sensory impairments such as hearing or vision and both.
D) Multiple disabilities.
E) Traumatic/burn injuries.
F) Postgraduate Department of Psychology at universities having attachment or an MOU with any of the Rehabilitation centers (specified in A to E) to place the trainees for hands-on experience

3.3 There shall be at least two regular rehabilitation/clinical psychology faculty members on fulltime basis at the center, one of them with at least 5 years of post-qualification (RCI recognized M.Phil. Rehabilitation Psychology or Clinical Psychology degree) experience.

4.0 REGULATIONS OF THE COURSE

4.1 Number of Seats

Since the course involves hands-on training, the number of candidates registered for the course will depend on the availability of qualified clinical psychology/ rehabilitation psychology faculty working fulltime in the concerned institute and the clinical material available at the center. In order to make the training effective, therefore, the intake of the students shall not exceed the following ratio.

RCI Registered Rehabilitation/Clinical Psychologist working fulltime on regular basis - Candidate ratio shall be, 1: 5

4.2 Entry requirement

Minimum educational requirement for admission to this course will be

a. Bachelor's degree (regular mode) with general psychology courses in all the three years, or
b. Master's degree in any branch of psychology either in regular or distance mode, or
c. Master's degree in counseling psychology either in regular or distance mode

with a minimum of 55% marks in aggregate. For SC/ST/OBC category, minimum of 50% marks in aggregate is essential. Entry qualification shall be from a UGC recognized university.

4.3 Admission Procedure

A selection committee constituted by the University/ Institute shall make admission on the basis of aggregate percentage of marks, academic achievements and experience, if any, in the field of rehabilitation.

4.4 Duration

4.4.1 This is a fulltime training course with opportunities for appropriate practicum and supervised experiences for one academic year.

4.4.2 The candidates shall be posted at any other specialty center for a period of one-month duration during the third quarter of the training.

4.5 Attendance

4.5.1 Course of training must continuously be pursued and complete all the course requirements within a stipulated period from the date of enrollment.

4.5.2 A minimum attendance of 80% shall be necessary for appearing for qualifying examination.

4.5.3 Fifteen days leave shall be permitted during the entire course period.

4.6 Fee Structure

The prescribed tuition and examination fee as laid down from time to time by the concerned institution shall be paid by the candidates.

4.7 Content of the Course (See section 5.0 for subject wise syllabus.)

Group – A

Paper I : Disability and Rehabilitation

Paper II : Psychosocial Issues in Disability

Paper III : Rehabilitation Assessment and counseling

Papers IV : Community Based Rehabilitation

Practical : Rehabilitation Interventions and viva voce

Group – B

Submission :Five fully worked-out Rehabilitation Counseling Records which include case formulation, problem areas elicited, type and technique/s employed to resolve the problems, and the processes of counseling. Out of five records, two shall be related child cases including one from multiple disabilities.

4.8 Minimum prescribed clinical work during the training.

	By the end I year
1) Assessment & workup of client and/or family	25
2) Counseling of persons and/or family with disability (Out of 25 cases 5 shall be related to children)	25

4.9 Internal Assessment

In each subjects of Group – A, 30% marks shall be determined on the basis of two internal exams (theory and practical), each conducted for 50 marks. The marks so obtained are added to the marks allocated to the respective subjects in the final examinations. The results of the final examinations will be declared on the basis of the total so obtained.

4.10 Examination

a) Before appearing for the qualifying examination a candidate should have done the minimum prescribed clinical work as outlined in section 4.8. The logbook duly certified by the concerned supervisors shall be submitted at the time of examination for an evaluation of the clinical work done by the board of examiners.

b) A candidate failing in any of the Group – A subjects has to appear again in all the Group – A subjects.

c) A candidate failing in Group – B has to resubmit five fully worked-out counseling records.

d) A candidate shall appear for both Group A and B examinations when appearing for the first time.

e) All candidates have to complete the course successfully within a period of three years from the year of admission to course, and within three attempts.

f) The qualifying examination is held twice a year. The dates for supplementary examinations shall be worked out by the concerned universities depending upon the start of the academic year.

g) The medium of instruction and examination shall be in English.

h) 4.11 Scheme of Examination

Papers Title	Duration	Marks		
		Final Examination (Maximum)	Internal Assessment (Maximum)	Total
Group – A				
Paper I: Disability and Rehabilitation	3 hr.	70	30	100
Paper II: Psychosocial Issues in Disability	3 hr.	70	30	100
Paper III: Rehabilitation Assessment and Counseling	3 hr.	70	30	100
Paper IV: Community Based Rehabilitation	3 hr.	70	30	100
Practical: Rehabilitation Interventions and viva voce		70	30	100
Group – B				
Submission of five fully worked-out Counseling record – formulation, type, technique/s and processes of counseling	None		100	100

4.12 Board of Examination

The University will conduct the examinations having a board consisting of two examiners of which one shall be an external Rehabilitation/Clinical Psychology faculty appointed for this purpose, and the other shall be an internal Rehabilitation/Clinical Psychology faculty. Both internal and external examiners shall evaluate each theory paper and conduct the practical including viva-voce examination.

4.13 Minimum for Pass

No candidate shall be declared to have passed the course unless he/she obtains not less than 50% of the marks in:

i) Each of the theory paper (Group – A)
ii) Practical and viva-voce examination (Group – A)
iii) Submission (Group – B)

5.0 SUBJECT WISE SYLLABUS

The syllabus for each theory paper is as appended below. It is desired that each units of papers be covered with at least 4-hr. of input in the form of didactic lectures, seminars, tutorials/topic discussion as deemed fit depending on content nature of the units. Approximately 80-hr of theory teaching shall be required in the entire course (in all 20 units have been worked out from four theory papers), in addition to opportunities for learning through rehabilitation case management and work-ups.

6.0 CERTIFICATION AS A REGISTERED PROFESSIONAL

It is mandatory as per Section 13 of RCI Act for every teacher of special education to obtain a “Registered Professional Certificate” from the Rehabilitation Council of India to work in field of professional rehabilitation counseling in India. As continuous professional growth is necessary for the renewal of the certificate, the **Rehabilitation Counselors** should undergo in-service programme periodically to update their professional knowledge.

Amendments, if any, to the regulations of the course will be made periodically by the Rehabilitation Council of India. Any deviation from the above regulations should have the prior approval of the Rehabilitation Council of India. The successful students will be registered as **Rehabilitation Counselors** (Professional). The training institution/organization should ensure that all passed out students are registered with the Council.

Syllabus

Paper – I : Disability and Rehabilitation

Hours: 60 Hours

Unit I: Introduction – Overview of the profession, history and growth of rehabilitation field, areas of specialization, current issues and trends in different areas of rehabilitation, magnitude and incidence of disability, cost of disability, major national reports and surveys

Unit II: Concepts and theory – Impairment, disability and handicap, types and causes of impairments, realms of impairments, concept of functional capacity, coping and well-being, quality of life and its functional domains, content areas, methods of assessment, specific and global indicators of quality of life

Unit III: Disability and Rehabilitation – Models of disability and rehabilitation, enabling–disabling processes, impact of the physical, social and psychological environments on the enabling–disabling processes, effects of disability on participation, psychosocial theories of adjustment, strategies to enhance adjustment, functional limitations and strategies to reduce and accommodate limitations

Unit IV: Disability through life-cycle – Specific problems pertaining to each stage of life - childhood, adolescence, young adulthood, middle age, and older adulthood, and adapting strategies

Unit V: Ethics and policy issues – Rehabilitation ethics, rehabilitation policies and Acts(Persons with Disabilities Act, The National Trust Act, Mental Health Care Act, Rehabilitation Council of India Act, UNCRPD), assistance, concessions, social benefits and support from government, and voluntary organizations; contemporary challenges, civil rights and legislation, empowerment issues

References:

Book should be of Latest Edition

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Encyclopedia of Disability and Rehabilitation, Arthur E. Dell Orto and Robert P.Marinelli (Eds.), MacMillan Reference Books, 1995

Perspectives on Disability and Rehabilitation: Contesting Assumptions, Challenging Practice, Karen Whalley Hammell, Churchill Livingstone, 2006

Status of Disability in India – 2012, Rehabilitation Council of India, New Delhi.

Development and Disability, Lewish, Blackwell Publishers, U.K., 2003

Learning Disabilities: The interaction of students and their environments, Smith, C.R., Allyn and Bacon, Boston, 2004

The handbook of Autism: A guide for parents and professionals, Aarons, M. and Glittens, T., Routledge, New York, 1992

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The National Trust for Welfare of Persons with Autism, Cerebral Palsy, Mental Retardation and Multiple Disabilities Act, Government of India, New Delhi, 1999

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Eisenberg, M. G., Glueckauf, R. L., & Zaretsky, H. H. (Eds.) (1999). Medical aspects of disability: A handbook for the rehabilitation professional (2nd ed.). NY: Springer.

Jena, S.P.K.(2013). Learning Disabilities: Theory to Practice, New Delhi. Sage Publication

Sagar, R. (Ed.) (2014). Specific Learning Disorder: Indian Scenario. New Delhi: Department of Science and Technology, Govt. of India

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Paper II : Psychosocial Issues in Disability

Hours: 60 Hours

Unit I: Stress and Coping Style – Stress due to disability, threat to life and physical well being, body image, independency, autonomy and control, self-concept, self esteem, life goals and future plan, invisible disabilities, marginalization, Denial, regression, compensation, rationalization, emotional reaction – grief, loss, guilt and fear, coping styles and strategies, stages of adaptation and adjustment, factors impeding adjustment to disability and disabling processes, psychological control

Unit II: Mental health issues – Psychopathological reactions such as anxiety, depression, adjustment problems, other co-existing mental morbidity, emotional and behavioral disorders in children and adolescents, problems related to marital and sexual life, abuse and exploitation, substance use, interventions for mental illnesses

Unit III: Family issues – Relationship issues with family, problems of families of disabled adults and children, impact of disability on family, family burden, needs of family and models of family adaptation, intervention to strengthening family support to disabled

Unit IV: Social issues – Societal attitudes toward disabilities, measurement of attitude and strategies for attitude change, social environment, social participation, social interaction, social network and support, disabling factors, prejudice, stigma, discrimination, marginalization, gender disparity

Unit V: Vocational issues - Career competency, career development issues, work related stress, economic independence, well-being, assistive devices for activities of daily living, mobility aids, at work place, sensory devices, environment modifications and universal designs, needed support system

References:

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Dunn, D. S. (2000). Social psychological issues in disability. In R. G. Frank & T. R. Elliott (Eds.), Handbook of Rehabilitation Psychology. Washington, D.C.: American Psychological Association.

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Backman, M. (1989). The Psychology of the Physically Ill Patient: A Clinician's Guide. New York: Plenum Press.

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Paper III : Rehabilitation Assessment and Counseling

Hours: 60 Hours

Unit I: Assessment – Need for assessment in counseling, assessment-based model for decision making, planning, and implementing individualized interventions, various instruments used for assessing cognitive, learning, behavioral, and emotional functioning, social and emotional development, assessment of perception of the problems and potential to participate and benefit from interventions, and assessing intervention efficacy

Unit II: Theory and concepts – Definition and goals of rehabilitation counseling, theories and techniques, counselor role, boundaries of confidentiality, ethical guidelines in counseling activities, concept of dual relationships, professional challenges in counseling and conflict resolutions, models, spiritual, culture and gender issues in counseling

Unit III: Intervention Approaches – Individual counseling approaches viz. non-directive, existential, humanistic, person-centered, cognitive and behavioral counseling, and behavior modification, techniques of remedial training for scholastic/learning problems

Unit IV: Specific Interventions – Specific intervention for developing social skills, academic skills, assertiveness, anger management, addressing anxiety/mood disorders, assessing family functioning, its strengths and resources, family counseling, crisis intervention

Unit V: Vocational counseling – Assessment and components of vocational counseling viz. identifying interests, goals and plans, and counseling during the training and job placement processes, scheme related to skill development

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Paper IV : Community Based Rehabilitation

Hours: 60 Hours

Unit I: Goals and Objectives – Definition of CBR, Goals and objectives, key principles - equality, social justice, solidarity, integration and dignity

Unit II: Components – Creation of a positive attitude, provision of rehabilitation services, education and training opportunities, creation of micro and macro income generation opportunities, provision of long term care facilities, prevention of causes of disabilities and monitoring & evaluation

Unit III: Role of CBR professionals – As local advocates, liaison and continuity of care, continued supervision of home programs, community initiatives to remove barriers that affect exclusion, advocacy

Unit IV: Initiatives – Social counseling, training in mobility and daily living skills, community awareness raising, facilitating access to loans, vocational training, information for local self-help groups, contacts with different authorities, school enrolment

Unit V: Empowerment issues – Approaches for empowering - social mobilization, political participation, communication, self help groups and organization working for persons with disabilities

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Community Based rehabilitation for and with people with disabilities (1994), UNESCO (Special Education) , WHO

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Einar Helander, Padmani Mendis and Gunnel Nelson. Training disabled people in the Community — a manual on CBR for developing countries, WHO, Switzerland.

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Scheme of assistance to Organizations for disabled persons, Ministry of Social Welfare, Govt. of India, New Delhi.

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Mrs.Achala Pahwa (Ed.). Manual on Community Based Rehabilitation. Ministry of Social Welfare, Govt. of India.

Pilling, A. (1991). Rehabilitation and Community Care. London: Routledge

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