Supporting Document for 1.3.2 and 1.3.3

Syllabi of courses that include experiential learning through project work/field work/internship

S. No.	Name of Program	Page no.
1.	M.Com Accountancy and Business Statistics	1-30
2.	M.Com Business Administration	31-67
3.	M.Com Economic Administration and Financial Management	68-133
4.	B. Sc. Biotechnology	134-181
5.	M.Sc Chemistry	182-240
6.	M.A/ M.Sc Geography	241-292
7.	BBA (Bachelor of Business Administration)	293-315

UNIVERSITY OF RAJASTHAN

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SYLLABUS

M.Com.

Accountancy & Business Statistics

Semester Scheme

I/II Semester Examination 2020-21
III/IV Semester Examination 2021-22

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M.COM IN ABST (SEMESTER SCHEME)

Semester-1

Compulsory Courses

ABS 101: Business Mathematics and Statistics

ABS 102: Direct Tax

ABS 103: Advanced Cost Accounting

Optional Courses (Select any three)

ABS-A 01: Management & Operational Audit

ABS-A02: Financial Reporting

ABS- A 03: Tax and Audit & Practical

ABS-A04 : Information System & Accounting

Semester-I1

Compulsory Courses

ABS 201: Advanced Business Statistics

ABS 202: Tax Planning & Management

ABS 203: Advanced Corporate Accounting

Optional Courses (Select any three)

ABS-B01: Security Analysis

ABS-B 02: Financial Services

ABS-B 03: Operations Research Optimisation Techniques

ABS-B 04: Computerised Accounting

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Semester-1II

Compulsory Courses

ABS 301: Advanced Management Accounting

ABS 302: Goods and Service Tax (GST)

ABS 303: Research Methodology

Optional Courses (Select any three)

ABS-C01: Operation Research for Decision Making

ABS-C02: Financial & Commodity Derivatives

ABS- C 03: Cost Audit

ABS-C04: Portfolio Management

Semester-IV

Compulsory Courses

ABS 401: Advanced Auditing

ABS 402: Accounting for Service and Government Sector

ABS 403: Cost Management for Decision Making

Optional Courses (Select any three)

ABS-D01: Strategic Financial Management

ABS-D 02: Project Planning & Management

ABS-D 03: Accounting Standards

ABS-D 04: Dissertation

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ABST

M.Com Semester-I

ABS 101: Business Mathematics and Statistics

Duration: 3 Hours **Max. Marks: 100**

Note:- There will be five questions in all. The candidate will require to attempt all the questions selecting one question from each unit with an internal choice (either/or).

Unit –I

Arithmetic, Geometric and Harmonic Progressions, Set Theory

Unit –II

Permutation and Combination and Theory of probability

Unit –III

Interpolation and Extrapolation, Moments and Kurtosis, Significance of Statistics in different fields

Unit –IV

Theoretical Frequency Distribution- Binomial, Poisson and Normal Distribution

Unit –V

Statistical Decision Theory & Statistical Quality Control

Note: The candidate shall be permitted to use battery operated pocket calculator that should not have more 12 digits, 6 functions and 2 memories and should be noiseless and cordless.

Books Recommended:

1. Sanchheti & Kapoor : Statistical Methods
2. Sanchheti & Kapoor : Business Mathematics
3. Mathur, Khandelwal, Gupta, Gupta : Business Statistics, (Hindi and English)
4. Sharma, Jain & Pareek : (Quantitative Methods and Their Applications (Hindi)
5. : Statistical Analysis (Hindi)
6. Sharma, Jain & Pareek : Business Mathematics & Statistics (Hindi)

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ABST

M.Com Semester-I

ABS 102:-Direct Tax

Duration: 3 Hours **Max. Marks: 100**

Note:- There will be five questions in all. The candidate will require to attempt all the questions selecting one question from each unit with an internal choice (either/or).

Unit –I

Advance Payment of Tax, TDS, Interest on Taxes and Tax Refund Procedure or E filing or return

Unit –II

Assessment of Trust, Assessment of Local Authorities

Unit –III

Assessment of Non- residents and Representative Assessee.

Advance Ruling, Double Taxation Relief and Foreign Collaboration

Unit –IV

Assessment of Co-operative Societies

Penalties and Prosecutions, Appeal, Revision and Tax Authorities

Unit –V

Assessment of Companies

Note: The candidate shall be permitted to use battery operated pocket calculator that should not have more 12 digits, 6 functions and 2 memories and should be noiseless and cordless.

Books Recommended:

1. Singhania V.K : Direct Taxes
2. Girish Ahuja : Direct Taxes
3. Lal B.B. : Income Tax Law and Practice
4. Lakhotia R.N : Assessment of Companies and their officers
5. Patel & Choudhary : Corporate Tax

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M.Com Semester-I

ABS 103: Advance Cost Accounting

Duration: 3 Hours **Max. Marks: 100**

Note:- There will be five questions in all. The candidate will require to attempt all the questions selecting one question from each unit with an internal choice (either/or).

Unit –I

Accounting Treatment and Control of Waste, Scrap, Spoilage, Defective and Obsolescence, Accounting Treatment and Control of Administrative, selling and Distribution Overhead, Research and Development Costs. Learning Curve Theory.

Unit –II

Integrated and non-integrated cost accounts (Cost Ledger or Cost Control Accounts), Reconciliation of cost and financial accounting.

Unit –III

Process Costing: Accounting treatment of losses during processing, inter-process profit. By Product and Joint-Product. Equivalent Production, Uniform Costing and Inter-firm Comparison. Ratios useful for inter-firm Comparison.

Unit –IV

Meaning of concept of Marginal Costing: Break-even Analysis and Differential costing. Valuation of stock under marginal and absorption costing. Production decisions based on Marginal Costing (Make or Buy. Manual or Machine, Key Factor based product mix only)

Unit –V

Marketing decisions and other decision based on Marginal Costing (Own or lease, replace, now or later, shut down or continue only)

Note: The candidate shall be permitted to use battery operated pocket calculator that should not have more 12 digits, 6 functions and 2 memories and should be noiseless and cordless.

Books Recommended:

1. Maheswari and Mittal : Cost Accounting, Mahaveer Book Depot, Delhi
2. Prasad N.K : Principal and Practice of Cost Accounting
3. Saxena and Vashistha : Advanced Cost Accounts, (Sultan Chand & Sons)
4. Ratanam P.V : Costing Adviser (Kitab Mahal)
5. Ravi M Kishor : Cost Accounting Taxman Publication, New Delhi
6. Oswal, Mangal, Bidawat : Advanced Cost Accounting

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ABST

M.Com Semester-I

ABS A- 01-Management & Operational Audit

Duration: 3 Hours **Max. Marks: 100**

Note:- There will be five questions in all. The candidate will require to attempt all the questions selecting one question from each unit with an internal choice (either/or).

Unit –I

Management Audit: Meaning, Need, Difference between Statutory Audit and Management Audit, Purpose/ Objects, Scope, Aspects, Techniques and Procedures of Management Audit. Management Audit Programme.

Unit –II

Review of Management Functions: Production, Distribution, Development, Personal and Industrial Relations, Review of Research and Development and General Management Functions.

Unit –III

Audit of Public Sector undertakings, Bank Audit, Audit of General Insurance Companies.

Unit –IV

Review of Personnel Audit, Appraisal and Review of Management Information System and Audit of Cooperative societies.

Unit –V

Review of Purchasing operations, Review of Manufacturing Operations, Appraisal of Management Decisions, Corporate Social Audit.

Note: The candidate shall be permitted to use battery operated pocket calculator that should not have more 12 digits, 6 functions and 2 memories and should be noiseless and cordless.

Books Recommended:

1. Choudhary D : Management Audit and Cost Audit
2. Ramanathan : Cost and Management Audit
3. Rose T. G : Management Audit
4. Kamal Gupta : Contemporary Audit
5. Agrawal N P & Govind Pareek : Cost and Management Audit
6. Saxena & Vasisth : Cost and Management Audit

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ABST

M.Com Semester-I

ABS A- 02-Financial Reporting

Duration: 3 Hours **Max. Marks: 100**

Note:- There will be five questions in all. The candidate will require to attempt all the questions selecting one question from each unit with an internal choice (either/or).

Unit –I

Corporate Financial Reporting: Meaning, Need, Developments, Issues and Problems in corporate financial Reporting with Special Reference to Published Statement.

Unit –II

Developments in Financial Reporting: value Added Statement, Economic Value Added, Market Value Added and Shareholders Value Added.

Unit –III

Environmental Accounting, Corporate Social Reporting.

Unit –IV

Human Resource Accounting, Inflation Accounting.

Unit –V

Recent Developments in financial Reporting system: Web Enabled Reporting. Value Reporting, Segment Reporting (AS-17).

Note: The candidate shall be permitted to use battery operated pocket calculator that should not have more 12 digits, 6 functions and 2 memories and should be noiseless and cordless.

Books Recommended:

1. Jain, Khandelwal Pareek : Higher Accounting (Hindi and English)
2. Agarwal B D : Advanced Financial Accounting
3. Porwal, L. S : Accounting Theory
4. Agarwal, Agarwal Jain, Bansal : Financial Reporting, RBD, Jaipur (Hindi)

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ABST

M.Com Semester-I

ABS A- 03-Tax and Audit Practical

Max. Marks: 100

1. Audit Procedure: Statutory and Internal Audit, Audit Programme, Internal Control and Internal check, Vouching, Verification, Case Studies, Preparation of Audit Report.
2. Obtaining PAN/TAN, filing I.T. Return, Filing GST Return, Filing other Taxes Return, Depositing Tax, Assessment Procedure, use of Different Tax Forms

Note: The candidate is required to appear in practical examination to be conducted by Internal & External Examiners and Head of the Department/ Principal of the College will appoint Internal Examiner.

Books Recommended:

1. Jain, Khandelwal Pareek : Auditing(Hindi & English)
2. C.P. Jain & H.S. Khandelwal : Auditing (Hindi &English)
3. T.R. Sharma : Auditing
4. Singhania V K : Direct Taxes
5. Girish Ahuja : Direct Taxes
6. Lal B.B. : Income Tax Law and Practice
7. Lokhotia R.N. : Assessment of Companies and their officers
8. Patel & Choudhary : Wealth Tax, Corporate Tax

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M.Com(ABST) Semester-II

ABS201Advanced Business Statistics

Duration: 3 Hours **Max. Marks: 100**

Note:- There will be five questions in all. The candidate will require to attempt all the questions selecting one question from each unit with an internal choice (either/or).

Unit –I

Advanced Concepts in Probability – Joint and Marginal Probability, Posterior Probability and Expected Value.

Unit –II

Multiple Correlation and Multiple Regression.

Unit –III

Analysis of Time Series: Meaning, Component of Time Series, Calculation of Different Components.

Unit –IV

Association of Attributes and Chi-Square Test.

Unit –V

Vital Statistics: Death Rates, Birth Rates, Fertility Rates and Reproduction Rates.

Note: The candidate shall be permitted to use battery operated pocket calculator that should not have more 12 digits, 6 functions and 2 memories and should be noiseless and cordless.

Books Recommended:

1. Sanchheti & Kapoor : Statistical Methods
2. Sanchheti & Kapoor : Business Mathematics
3. Mathur, Khandelwal, Gupta, Gupta : Advanced Business Statistics, (Hindi and English)
4. Sharma, Jain & Pareek : Statistical Analysis (Hindi)
5. Sharma, Jain &Pareek Advanced Business Statistics (Hindi)
6. Agarwal N P : Advanced Business Statistics

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ABS 202Tax Planning and Management

Duration: 3 Hours **Max. Marks: 100**

Note:- There will be five questions in all. The candidate will require to attempt all the questions selecting one question from each unit with an internal choice (either/or).

Unit –I

Tax Planning and Tax Management, Concept of Income and Problems of Tax Planning, Tax Planning & Residential Status and Tax Planning for Employees Remuneration.

Unit –II

Capital Gain & Tax Planning, Set off and carry Forward of Losses and Tax Planning with Investments.

Unit –III

Tax Planning and Form of Organizations, Diversion of Income and Tax Planning.

Unit –IV

Tax Planning for Industrial Development and Financial Management

Unit –V

Tax Planning for Specific Managerial Decisions and Investment Decisions

Note: The candidate shall be permitted to use battery operated pocket calculator that should not have more 12 digits, 6 functions and 2 memories and should be noiseless and cordless.

Books Recommended:

1. N.K. Sharma : Tax Planning, RBD, Jaipur (Hindi)
2. Singhania V..K. : Direct Taxes Law and Practice
3. R.N. Lakhotiya : Tax Management
4. H.P. Raina : Corporate Taxation – A Handbook
5. Shah C.K.: Tax Planning, RBD, Jaipur
6. Patel and Choudhary : Tax Planning (Hindi & English)

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M.Com(ABST) Semester-II

ABS 203: Advanced Corporate Accounting

Duration: 3 Hours **Max. Marks: 100**

Note:- There will be five questions in all. The candidate will require to attempt all the questions selecting one question from each unit with an internal choice (either/or).

Unit –I

Accounting of Corporate Restructuring, Internal Reconstruction, and Buy Back of Shares.

Unit –II

Consolidated Financial Statements- Income Statement and Balance Sheet Including Inter-company holdings.

Unit –III

Accounting for Mergers and Acquisitions, Application of Accounting of Standard 14.

Unit –IV

Liquidation of Accounts – Statement of Affairs and Liquidator's Final Statement of Account, Valuation of Brand, Objectives of Corporate Branding and Accounting of Brand.

Unit –V

Analysis and Interpretation of Corporate Financial Statements.

Books Recommended:

1. Ravi M Kishore : Advanced Accounting
2. Sehgal & Sehgal : Corporate Accounting
3. Gupta S.P. : Company Accounts Volume II

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ABS –B 01: Security Analysis

Duration: 3 Hours **Max. Marks: 100**

Note:- There will be five questions in all. The candidate will require to attempt all the questions selecting one question from each unit with an internal choice (either/or).

Unit –I

Introduction: Meaning and Significance of security Analysis. Type of Securities, Investment : Nature and Scope of Investment Analysis, Elements of Investment Avenues of Investment, Approaches To Investment Analysis, Concepts of Return and Risk, Security Return and Risk Analysis, Measurement of Risk and Return.

Unit –II

Financial Assets: Types and their Characteristics, Source of Financial Information

Unit –III

Public Issue: SEBI Guidelines on Public Issue, Size of Issue, Pricing of Issue, Promoters Contribution Appointment of Merchant Rankers, Underwriter, Brokers, Registrars, Managers, Bankers & Allotment of Shares.

Unit –IV

Secondary Market: Role, Importance, Types of Brokers, Trading Mechanism, Listing of Security, Depository- Role and Need. Depository Act- 1996.

Unit –V

Fundamental Analysis: Economics Analysis, Industry Analysis and Company Analysis. Technical Analysis: Trends, Indicator, Indices and Moving Averages Applied in Technical Analysis

Books Recommended:

1. Security Analysis and Portfolio Management : P. Pandian
2. Investment Analysis and Portfolio Management : Madhumati Rangrajan

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ABS-B 02: Financial Services

Duration: 3 Hours **Max. Marks: 100**

Note:- There will be five questions in all. The candidate will require to attempt all the questions selecting one question from each unit with an internal choice (either/or).

Unit –I

Introduction, role of financial system, scope, importance, types and innovative financial services.

Unit –II

Mutual Funds: concept, evolution of Mutual funds, types, organisation of Mutual Funds and valuation method of individual scheme i.e. Net Present Value.

Unit –III

Factoring: concept, meaning, procedure of workings, types and future prospects, Forfeiting: concept, meaning, salient features, difference between factoring and forfeiting and operating procedure.

Unit –IV

Securitization of Debts: Introduction, meaning, objective, importance, advantages and structure of Securitization, Credit Rating: Concept, Meaning types, advantages, credit rating v/s Financial Analysis and procedure of credit rating

Unit –V

Treasury and Wealth Management Services, Custodian Services, Pension Fund- Role of PFRDA

Books Recommended:

1. Avdhani A.V. : Financial Services in India, Himalaya Publications
2. Khan M.Y. : Financial Services, Tata McGraw Hills.
3. Bhole L.M.. : Financial Markets and Institutions.
4. Agashe Anil: Financial Service Markets and Regulations

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ABS- B 03: Operations Research Optimisation Techniques

Duration: 3 Hours **Max. Marks: 100**

Note:- There will be five questions in all. The candidate will require to attempt all the questions selecting one question from each unit with an internal choice (either/or).

Unit –I

Introduction to Operations Research, Characteristics, Types of Models, Techniques, Scope, O R and Decision Making Limitations.

Unit –II

Linear Programming- Meaning, Properties and Assumptions, Formulation of LPP, Graphical Method of LP, Infeasible Solution, Multiple Solutions, Unbounded Solutions, Limitations of Graphic Method

Unit –III

Linear Programming- Simplex Method- Maximisation and Minimisation Problems, Two Phase Method, Non- Existance of Feasible Solution, Unrestricted Variable, Degeneracy, Concept of Dual, Application Areas, Limitations of LP .

Unit –IV

Transportation Model- Introduction, Assumptions, Solution of Transportation- North-West Corner Rule, Vogel's Method, Least Cost Method, Unbalanced Problems, Maximising problems, Degeneracy, Special Transportation Problems

Assignment Models- Introduction, Assumptions, Maximising Problems, Special Problems

Unit –V

Inventory, Models, Replacement Theory and Sequencing.

Books Recommended:

1. Khandelwal and Gupta : Operations Research, Ajmera Book Company, Jaipur
2. Vohra,N.D. : Quantitative Techniques in Management, Tata Mc Graw Hill
3. Tulsian and Pandey. : Quantitative Techniques , Pearson Eduction
4. Sharma J.K.: Operations Research

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ABS- B 04: Computerised Accounting

Duration: 3 Hours **Max. Marks: 100**

Note:- There will be five questions in all. The candidate will require to attempt all the questions selecting one question from each unit with an internal choice (either/or).

Unit –I

Computerised Accounting System: Concept, Features, Transaction Processing system, Manual v/s computerised Accounting, Advantages and limitation of computerised Accounting system, Different types of Accounting software, Essential features of Accounting packages, Generic considerations.

Unit –II

Computerized Accounting by using Excel in Business Application: Introduction of Excel, Payroll accounting, Assets accounting, Schedule forming part of the Balance Sheet, Application of Statistical & Accounting & Finance Functions, Graphs, Charts.

Unit –III

Structuring databases for Accounting: Concept, Objectives of Database, Data Processing Cycle, Designing database for Accounting, Creating database tables for Accounting, Designing structure query, Designing tables query, forms and reports of accounting data using MS Access.

Unit –IV

Accounting in Tally: Introduction, Company Creation & Configurations, Setup accounting Masters, Creations, display & alteration of groups & ledgers, Accounting vouchers, creating Inventory masters, Stock groups & stock categories.

Unit –V

Analysis of Financial Statements and Report Generation: Generation of different types of financial statements, Fund flow, Cash flow, Ratio Analysis, Budget, Stock Summary, Generation of report Accounting Books and Registers (ledgers, cash books, bank books, purchase register, sales register, Journal register, purchase and sales)

Books Recommended:

1. Tally Education Private Limited: Computerised Accounting Using Tally.
2. Michael Fardon. : Computer Accounting (Accounting & Finance)
3. William Murray. : Computerised Accounting: the Complete Tutorial
4. S Sudalaimuthu, S Anthony Raj: Computer Application in Business
5. Rajesh Narang Database Management System

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M.Com(ABST) Semester-III

ABS 301Advanced Management Accounting

Duration: 3 Hours **Max. Marks: 100**

Note:- There will be five questions in all. The candidate will require to attempt all the questions selecting one question from each unit with an internal choice (either/or).

Unit –I

Standard Costing: Analysis of Variances- Cost and Sales Variances. Reporting and Accounting Procedure of Standard cost.

Unit –II

Budgetary control – Flexible/Fixed Budgets, Functional Budgets, Zero Based Budgeting, Performance Budgeting, Budget Ratios and Budget Variances.

Unit –III

Costing for Service Sector- Costing Method, Collection of Data for Service Sector, Pricing of Service Sector.

Unit –IV

Pricing Decisions- Pricing Strategies, Pareto Analysis Pricing Policies

Unit –V

Cost Reduction and Cost Control- Cost Reduction Techniques, Productivity Accounting.

Books Recommended:

1. Oswal, Mangal & Bidawat : Cost Analysis & Control
2. Ravi M Kishore : Advanced Management Accounting
3. Saxena & Vashist : Advanced Management Accounting

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M.Com(ABST) Semester-III

Optional Paper – ABS- 302

GOODS AND SERVICES TAX

Unit –I

Introduction of GST, IGST Act, 2017. Definition, Benefits, Constitutional Aspects and Legal Framework of GST Including CGST, IGST, SGST and UTGST.

Unit –II

Identification of Nature of Supply- Inter State and Intra State Supply, Composite and Mixed Supply, Continuous Supply and Zero Rated Supply, Taxable and Non- taxable Supply, Exemptions, Composite Scheme of GST, Applicable Rates of GST.

Unit –III

Concept Relating to Input Tax Credit and Computation of Input Tax Credit.

Unit –IV

Procedure of Registration Under GST, Maintenance of Books and Records, Filling of Returns, Computation of GST, Payment of Tax, Reverse Charge, Refund of Tax.

Unit –V

Administration of GST Regime, Assessment, Demand and Recovery, Inspection, Search, Seizure, Provisions with Respect to offences and Penalties.

Books Recommended:

1. Nitya tax associates : Basics of GST, Taxman, Delhi.
2. Dr. Harsh Vardhan : Goods & Service Tax, Bharat Publication, Delhi
3. Shah and Mangal : Goods and Service Tax, RBD, Jaipur
4. Goods and Service Tax : P.C. Publications, Jaipur.
5. Bangar and Bangar : Beginor's guide to GST, Aadhya Publication, Allahabad.

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Semester-III

ABS303Research Methodology

Duration: 3 Hours **Max. Marks: 100**

Note:- There will be five questions in all. The candidate will require to attempt all the questions selecting one question from each unit with an internal choice (either/or).

Unit –I

Research Meaning Objectives, Importance and Types of Research.

Unit –II

Meaning and concept of Research Methodology, Research Process, Data Collection and Data Analysis.

Unit –III

Sampling Theory – Methods of Sampling, Sampling Distribution, Sampling and Non-Sampling Errors, Concept of Standard Error and its Utility, Hypothesis Testing Parametric Test in Large Samples- Z Test.

Unit –IV

Hypothesis Testing in Small Samples- 't' Test, 'F' Test & Analysis of Variance.

Unit –V

Non- Parametric Tests, Mann Whiteny, Krushal Wallis Test etc

Note: The candidate shall be permitted to use battery operated pocket calculator that should not have more 12 digits, 6 functions and 2 memories and should be noiseless and cordless.

Books Recommended:

1. Croxton &Cowden : Applied Statistics
2. Karnnel, P.H. : Applied Statistics for Economics
3. Gupta B.N. : Statistics
4. Sanchheti & Kapoor : Statistical Methods
5. K.N. Nagar : Elements of Statistics (Hindi) Research methodology and Statistics
6. Mathur, Khandelwal, Gupta : ------ Me
7. Mehta, Gupta: Research Methods in Management, RBD, Jaipur
8. Himanshu Saxsena: Research Methods in Management, RBD, Jaipur

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Semester-III

ABS–C-01:Operation Research for Decision Making Techniques

Duration: 3 Hours **Max. Marks: 100**

Note:- There will be five questions in all. The candidate will require to attempt all the questions selecting one question from each unit with an internal choice (either/or).

Unit –I

Decision Theory, Decision Making Under Uncertainty, Decision Making Under Risk, Bayesian Approach, Decision Tree- Applications .

Unit –II

Decision making in a competitive Situation- Game Theory, Types of Games, Two Person Zero Sum Games, Mixed Strategy and Method of Solution Using Linear Programming.

Unit –III

Waiting line, Characteristics, Arrival Process, Structure and Service Process, Single Channel Models, Cost analysis and Business Application of Waiting Lines.

Unit –IV

PERT & CPM, Network construction and analysis, Critical Path, Time cost trade off, Crash Activity analysis Planning and Scheduling, Project Costs, Controlling Project Costs.

Unit –V

Simulation for Business Monte Carlo Method, Application of Simulation in Business Situations

Books Recommended:

1. Khandelwal and Gupta : Operations Research, Ajmera Book Company, Jaipur
2. Vohra,N.D. : Quantitative Techniques in Management, Tata Mc Graw Hill
3. Tulsian and Pandey. : Quantitative Techniques , Pearson Eduction
4. Sharma J.K.: Operations Research

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ABS –C-02FINANCIAL AND COMMODITY DERIVATIVES

Duration: 3 Hours **Max. Marks: 100**

Note:- There will be five questions in all. The candidate will require to attempt all the questions selecting one question from each unit with an internal choice (either/or).

Unit –I

Derivatives Definition- Types- Forward Contracts- Futures Contracts Options Differences between Cash and Future Markets- Types of Traders Exchange Traded Securities- Types of Settlement- Uses and Advantages of Derivatives- Risks in Derivatives. .

Unit –II

Specifications of Futures Contract- Margin Requirements- Marking to Market- Hedging using Futures- Types of Future contracts- securities. Stock Index Futures, - Relationship between future prices, Forward Prices and Spot Prices.

Unit –III

Call and Put Options- American and European Options- Intrinsic Value and Time Value of Options-Option Payoff, options on Securities, Stock Indices, Currencies and Futures-Options pricing models Black Schales and Black 76 models- Differences between future and Option contracts

Unit –IV

Advance derivative strategies, Hedging, Spread and arbitrage strategies

Unit –V

Currencies and Commodities Derivatives, Commodity derivative strategies.

Books Recommended:

1. John C. Hull, Options, Futures and other Derivative Securities,PHI Learning, 7th Edition, 2008
2. Keith Redhead, 'Financial Derivatives- An Introduction to Futures Forwards, Options and SWAPs'- PHI Learning, 2008
3. Stulz, Risk Management and Derivaties, Cengage Learning 1st Edition,2008
4. Verma Derivaties and Risk Management, 1st Edition 2008
5. David Dubofsky-'Option and Financial Futures Valuation and Uses, McGraw Hill International Edition.
6. S.L.Gupta, Financial Derivaties- Theory, Concepts and Practice, Prentice Hall of India, 2008

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ABS–C03

Cost Audit

Unit –I

Cost Accounting Standards (CAS) Introduction, Concept, Need and Significance

CAS-1 to CAS 12. .

Unit –II

CAS-13 to CAS 24

Unit –III

Cost Audit Meaning and origin of Cost Audit, Relevance and objectives of cost-audit nature, advantages and disadvantage of cost audit difference between financial audit and cost audit aspects of cost audit.

Unit –IV

Cost Auditor- Qualification, Disqualifications, Appointment Rights and duties Professional Ethics, Cost Audit Programme.

Unit –V

Cost Accounting Records &Rules, verification of Cost Records and Reports, Cost audit of Productivity, energy & Pollution Control, Companies (Cost Records and Audit) Rules, 2014, CARO-2016 under Indian Companies Act 2013

Books Recommended:

1. Jain, Khandelwal, Pareek Cost & Management Audit Ramesh Book Depot- Jaipur
2. Khandelwal:Management Audit Ramesh Book Depot Jaipur
3. Choudhary D: Management Audit & Cost audit New Central Book Agency Kolkata.
4. Ramanathan: Cost and Management Audit Tata, McGraw Hill, New Delhi, Kolkata.
5. Rose T.G. Management Audit (Gel & Co, Landon).
6. Cona W.L. Management Audit (Prentice Hall)

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ABS–C 04Portfolio Management

Duration: 3 Hours **Max. Marks: 100**

Note:- There will be five questions in all. The candidate will require to attempt all the questions selecting one question from each unit with an internal choice (either/or).

Unit –I

Portfolio Analysis: Estimated Rate of Return and Standards Deviation of Portfolio, Marketwise Risk and Return Optimization,

Unit –II

Single Index, Portfolio Total Risk, Portfolio Market Risk and Unique Risk, Sharpe Optimization Solution..

Unit –III

Capital Market Theories: Capital Market Line and Security Market Line, Risk Free Lending and Borrowings, Facto Model, Arbitrages Price Theory, Two Factors and Multifactor Model, Principal Arbitrage portfolios.

Unit –IV

Efficient Market Hypothesis: Portfolio Performance Evaluation Measurement of Return, Risk Adjusted Measure of Return, Market Timing

Unit –V

Portfolio Evaluation- Sharpe Treynor and Jensen Model, Portfolio Revision

RecommendedBooks:

1. Security Analysis and Portfolio Management P. Pandian
2. Investment Analysis and Portfolio Management Madhumati Rangrajan

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Semester-IV

ABS401Advanced Auditing

Duration: 3 Hours **Max. Marks: 100**

Note:- There will be five questions in all. The candidate will require to attempt all the questions selecting one question from each unit with an internal choice (either/or).

Unit –I

Audit Standards- Meaning, Need and Objectives, Introduction to Different Audit Standards.

Unit –II

Investigation and Due- Diligence- Meaning, Difference between Audit and Investigation, Investigation of Frauds, Financial Due- diligence and Reporting, Concept of Environmental Audit, Energy Audit and Public Expenditure Audit.

Unit –III

Tax Audit Concept, Significance, Objectives and Scope, Need of Tax Audit, Legal Provisions, Maintenance of Books..

Unit –IV

Appointment of Tax Auditor, Process of Tax Audit, AS-22 and Guidance Notes Issued by ICAI and Tax Audit Reports.

Unit –V

Audit of Life Insurance Companies and NBFCs, Excise Audit GST Audit, Corporate Governance and clause 49

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ABS – 402

Accounting for Service and Government Sector

Unit –I

Final Accounts of Banking Companies.

Unit –II

Financial Statement of life and Non-Life Insurance Companies.

Unit –III

Final Accounts of Electricity Companies and Double Accounts System.

Unit –IV

Government Accounting –Accounting Books: Daily Income Register, Case Book, Stock Register, Source of Capital and Revenue Receipt, Contingency Fund.

Unit –V

Internal Audit, Departmental Audit and CAG audit in Government sector.

RecommendedBooks:

1. Ravi M Kishore, Advance Accounting
2. PC Tulsiyan

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ABS – 403 Cost Management for Decision Making

Note:- There will be five questions in all. The candidate will require to attempt all the questions selecting one question from each unit with an internal choice (either/or).

Unit –I

Cost Co Decision Making –Relevant Cost Opportunity Cost and Differential their application, Research and Development Cost.

Unit –II

Activity Based Costing, Target Costing, Life Cycle Costing and JIT

Unit –III

Cost Sheet- Profitability Analysis and Reporting, Value Chain Analysis, Manufacturing Resource Planning and Throughput Accounting.

Unit –IV

Balanced Score Card, Benchmarking, Kaizen Costing.

Unit –V

Transfer pricing and Divisions Performance Analysis, Total Quality Management.

RecommendedBooks:

1. Ravi M Kishore : Advance Management
2. Khan & Jain : Management Accounting, Text and Cases
3. Pandey I. M.: Management Accounting
4. Mehta B.K. : Management Accounting

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ABS – D01

Strategic Financial Management

Unit –I

Indian Financial System, Information to Financial Market, Role of Financial Market in Economic Development, Financial Policy and Corporate Strategy, Strategic Decision making framework, corporate Valuation, Conceptual Framework of Valuation, Methods of Corporate Valuation

Unit –II

Risk Management, Identification of types of Risk Faced by an organisation, Evaluation of Financial Risks, Evaluation of appropriate method for the identification and management of financial risk.

Unit –III

Foreign Exchange Exposure and Risk Management, Exchange rate determination, Foreign currency market, Management of transaction, translation and economic exposures, Hedging currency risk, Foreign exchange derivatives- forward, futures, options and swaps..

Unit –IV

Mergers, Acquisitions and corporate Restructuring, Conceptual Framework, Different Forms of Mergers and Acquisitions, Reverse Merger, Demerger, Ownership Restructuring Management /Leveraged Buyouts, Cross Border Mergers.

Unit –V

Startup Finance, Introduction including Sources of Funding, Start up India Initiative, Small & Medium Enterprises Market Size, Employment Generation and Contribution to GDP

Books Recommended:

1. Prasnna Chandra : Financial Management
2. Khan & Jain : Financial Management
3. Pandey I. M.: Financial Management
4. Ravi M Kishore. : Financial Management
5. Agarwal M.R. : Financial Management

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ABSD 02 Project Planning &Management

Duration: 3 Hours **Max. Marks: 100**

Note:- There will be five questions in all. The candidate will require to attempt all the questions selecting one question from each unit with an internal choice (either/or).

Unit –I

Project Management, Project Management System and System Development Cycle, Project Feasibility Study.

Unit –II

Project Planning, Project Evaluation, Managing Risk in Projects

Unit –III

Project Organization Structure, Risk and Sensitivity Analysis, Social Cost Benefit Analysis

Unit –IV

Cost Estimation and Budgeting, Network Analysis (PERT & CPM).

Unit –V

Project Control, Project Management Information System, Project Management Performance.

Note: The candidate shall be permitted to use battery operated pocket calculator that should not have more 12 digits, 6 functions and 2 memories and should be noiseless and cordless.

Books Recommended:

1. Prasanna Chandra : Project Preparation Appraisal Budgeting and Implementation
2. Dean J : Capital Budgeting (Columbia University Press. New York.1973)
3. Agarwal N.P. and Mishra B.K. : Project Planning, Ramesh Book Depot. Jaipur
4. Himanshu Saxsena: Project Management, RBD, Jaipur

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ABS D 03 Accounting Standards

Duration: 3 Hours **Max. Marks: 100**

Note:- There will be five questions in all. The candidate will require to attempt all the questions selecting one question from each unit with an internal choice (either/or).

Important Note : Business Problems based on Accounting Standards will also be asked in the examination.

Unit –I

Introduction to AS, IndAS, Guidance Notes and Schedule III of Companies Act, 2013 Introduction to IPRS,

AS 1 Disclosure of Accounting Policies, AS3Cash Flow Statements (Revised).

AS 4 Contingencies and Events Occurring after the Balance Sheet Date,

AS 5 Net Profit or Loss for the period, Prior Period Items and Changes in Accounting Policies (Revised), AS 9 Revenue Recognition 01/04/1993

Unit –II

AS 2 Valuation of Inventories (Revised), AS 6 Depreciation Accounting (Revised)

AS 10 Accounting for Fixed Assets, AS 16 Borrowing Costs

AS 26 Intangible Assets, AS28 Impairment of Assets

Unit –III

AS 7 Construction Contracts (Revised), AS 11The Effects of Changes in Foreign Exchange Rates (Revised)

AS 12 Accounting for Government Grants, AS 13 Accounting for Investments

AS 14 Accounting for Amalgamations, AS 20 Earnings Per Share

Unit –IV

AS 17 Segment Reporting, AS 18 Related Party Disclosures

AS 21 Consolidated Financial Statements, AS 23 Accounting for Investment in Associates in Consolidated Financial Statements

AS 25 Interim Financial Reporting, AS 27 Financial Reporting of Interests in Joint Ventures

Unit –V

AS 15 Employee Benefits, AS 19 Leases

AS 22 Accounting for Taxes on Income, AS 24 Discontinuing Operations

AS 29 Provisions, Contingent Liabilities and Contingent Assets.

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ABS D 04 Dissertations

Max. Marks: 100

Important Note:

1. Dissertation will be completed in the guidance of supervisor on particular topic of research.
2. Supervisor will be allotted to the student by the Head of the Department. Topic of Research will be allotted by the Supervisor.
3. Five copies of Dissertation should be prepared in hard bound and cover should be lemon yellow cover in standard format as explained by the supervisor.
4. Three copies of Dissertation should be submitted in the Department. One copy should be provided to the supervisor at the time supervisor is approving dissertation by his/her signature. One copy should be kept by the student for his/her record.
5. Dissertation should be submitted in the Department before commencement of Examination.

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UNIVERSITY OF RAJASTHAN

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SYLLABUS

M.Com. in Business Administration

Semester Scheme

I/II Semester Examination 2020-21
III/IV Semester Examination 2021-22

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BUSINESS ADMINISTRATION

(SEMESTER SCHEME)

(FIRST SEMESTER 2019-20)

1. **Eligibility:** Bachelor of Commerce (B.Com.) with at least 50% in the aggregate or 55% marks in the subject of postgraduation or Bachelor or its equivalent degree recognized by this University with at least 55% marks in the aggregate.
2. **Scheme of Examination:** There will be five questions in all. The candidate will be required to attempt all the questions selecting one question from each unit with an internal choice (either/ or).
3. **Semester Structure:** The details of the courses with code, title and the credits assigned are given below.

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First Semester

S. No.	Subject Code	Course Title	Credit	Contact Hours per week	
Compulsory Papers				L	T
1	BUA 101	THEORY AND PRACTICE OF MANAGEMENT	6	4	2
2	BUA 102	MARKETING MANAGEMENT	6	4	2
3	BUA 103	HUMAN RESOURCE MANAGEMENT	6	4	2
Elective Papers (Any Three)				L	T
1	BUA 104	MANAGEMENT ACCOUNTANCY	6	4	2
2	BUA 105	INDUSTRIAL RELATIONS AND SOCIAL SECURITY	6	4	2
3	BUA 106	MODERN BUSINESS COMMUNICATION	6	4	2
4	BUA 107	ENTREPRENEURSHIP DEVELOPMENT	6	4	2

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BUA 101: THEORY AND PRACTICE OF MANAGEMENT

Unit- I

Nature and Importance of Management, Process of Management, Managerial Roles, Functions of Management, Skills of an Effective Manager, Schools of Management Thought.

Unit-II

Planning, Managerial Decision Making, MBO, Departmentalization, Management of Change.

Unit-III

Leadership Styles, Power, Group Behavior and Team Building, Effective Communication System, MIS.

Unit-IV

Motivation Concepts, Contemporary Views of Motivation, Conflict Management, Management of Stress, Time Management, Total Quality Management.

Unit-V

Global Environment of Management, Ethics in Management, Corporate Social Responsibility, Corporate Culture.

Books Recommended

1. Prasad, L.M. : Principles and Practice of Management, Sultan Chand & Sons.
2. Vashisth, Neeru : Principles of Management, Taxman Publications Pvt. Ltd.
3. Tripathi and Reddy : Principles of Management, Tata- McGraw Hill.
4. Sudha, G.S. : Principles of Management, Ramesh Book Depot.

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BUA 102: MARKETING MANAGEMENT

Unit- I

Marketing Management- Concept, Importance, Scope, Approaches to Marketing, Marketing process, Marketing Environment, Social, Legal and Ethical Issues in Marketing.

Unit- II

Product Planning: Product Policy Decision, Brands and Trade Marks, Packaging, Product Planning in India, Brand Equity.

Unit- III

Pricing-Factors to be considered in Pricing, Pricing Objectives and Strategy, Breakeven Analysis, Price Maintenance, Discount Policy, Special Selling Terms, Credit Terms.

Unit- IV

Channels of Distribution, Types of Channels, Evaluating the Major Channel Alternatives, Channels of Distribution in India.

Unit- V

Advertising and Sales Promotion, Advertising Programmes, Sales Promotion-Tools and Techniques, Sales Forecasting, Direct Marketing. Event Management, Integrated Marketing Communication, Customer Relationship Management.

Books Recommended

1. Kotler and Keller : Marketing Management, Pearson Publication.
2. Stanton, Etuland : Fundamentals of Marketing, Tata McGraw Hill.
3. Saxena, Rajan : Marketing Management, Tata McGraw Hill.
4. Ramaswami and Namakumari : Marketing Management in India, McMilan.

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BUA 103: HUMAN RESOURCE MANAGEMENT

Unit- I

Introduction: Concept, Objectives, Scope and Importance of Human Resource Management, Human Resource Environment in India, Changing Role of HRM, Organisation of Human Resource Department.

Unit- II

Job Analysis and Job Design: Human Resource Planning, Job Analysis, Job Description and Specifications, Job Design Approaches.

Unit- III

Recruitment and Selection: Factors affecting Recruitment, Sources of Recruitment (Internal and External), Selection Process, Psychological tests for selection, Requirement of a good test for selection. Interviewing, Placement and Induction.

Unit- IV

Performance Appraisal: Concept and Objectives, Traditional and Modern Methods, Limitations.

Unit- V

Compensation Management, Job Evaluation, Base Compensation and Supplementary Compensation, Innovations in Compensation Management.

Books Recommended

1. Dessler, Garry: Human Resource Management, Prentice Hall of India.
2. Gupta, C.B. : Human Resource Management, Sultan and Sons
3. Chhabra, T.N. : Human Resource Management, Dhanpat Rai and Co. Pvt. Ltd.
4. Filppo, Edwin B. : Principles of Personnel Management, Tata McGraw Hill.
5. Dwivedi, R.S. : Managing Human Resources: Personnel Management in Indian Enterprises, Galgotia Publishing Co.
6. Subba Rao, P. : Personnel & Human Resource Management, Himalaya Publishing House.
7. Aswathappa, K. : Human Resource and Personnel Management, Tata McGraw Hill.

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BUA 104: MANAGEMENT ACCOUNTANCY

Unit- I

Nature and Scope of Management Accounting, Financial Statement: Analysis and Interpretation, Comparative Statements and Common Size Statement.

Unit- II

Ratio Analysis, Fund Flow and Cash Flow Analysis.

Unit- III

Capital Budgeting, Operating and Financial Leverages.

Unit- IV

Variance Analysis, Cost of Capital, Responsibility Accounting.

Unit- V

Breakeven Analysis, Trend Analysis, Business Forecasting.

Books Recommended

1. Pandey, I.M. : Management Accounting, Vikas Publishing House Pvt. Ltd.
2. Shah, Paresh : Management Accounting,Oxford University Press.
3. Agarwal, M. R. : Management Accounting, RBSA Publishers.
4. Jain and Singh, Management Accounting, Shivam Book House.

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BUA 105: INDUSTRIAL RELATIONS AND SOCIAL SECURITY

Unit- I

Industrial Relation: Concept, nature, importance, changing pattern of industrial relations in India.

Unit- II

Industrial Dispute: Meaning, causes, forms, effects, prevention and settlement machinery, Industrial peace, suggestions.

Unit- III

Association of Employer and Employee Associations: Features, role, functioning, problems, suggestions. Study of INTUC, AITUC, Chamber of Commerce, ASSOCHAM.

Unit- IV

Collective Bargaining: Meaning, nature, scope, process, pre-requisites for success, Collective Bargaining in India, Workers Participation in Management.

Unit- V

Social Security: Need and importance, scope, Social Assistance and Social Insurance Related Laws: Workmen Compensation Act, 1923, Employee State Insurance Act. 1948, Provident Fund and Misc. Act, 1952, (Main Provisions).

Books Recommended

1. Kumar, Bipin : Industrial Relations: Legal Theory and Practice, PHI Publications.
2. Venkataratnam, C.S. : Industrial Relations, Oxford University Press.
3. Sen, Ratna, Industrial Relations: Text and Cases, Mcmillan India Pvt. Ltd.
4. George, Pylee : Industrial Relations and Personnel Management, Vikas Publishing House.
5. Mamoria, C. B. andMamoria, Satish : Labour Welfare, Social Security, and Industrial Peace in India, Kitab Mahal.
6. Chatterjee,N. N. : Industrial Relations in India's Developing Economy, Allied Book Agency.
7. Sinha, P. R. N. : Industrial Relations, Trade Unions, and Labour Legislation, Pearson Education.
8. Bhagoliwal,T. N. : Industrial Relations, Sahitya Bhawan.

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BUA 106: MODERN BUSINESS COMMUNICATION

Unit I

Business Communication: Definition, Types, Principles of Effective Communication, Barriers and Remedies to Communication.

Unit II

Business Letter: Layout, Kinds of Business letters- Interview,Communicationand Technology, video Conferencing, Fax, E-mail, Multi-media presentations, Web2. 0 and Communication, Skype, Linked in, Facebook and Whatsapp.

Unit III

Public Speaking, Seminar Presentation, Interview, Group Discussion, Effective Listening.

Unit IV

Report Writing, Agenda, Minutes of Meeting, Memorandum, Office Order, Circular, Notes.

Unit V

Business Etiquettes and Manners: Shake hand, Dress sense, Dining Etiquettes, Introducing a guest, E-mail Etiquettes, Work place Etiquettes, Telephone Etiquettes.

Books Recommended

1. Rai , Urmila and Rai ,S.M.: Business Communication, Himalaya Publishing House.
2. Thomas, Jane, Murphy, Herta and Hilderbrandt, Herbert: Effective Business Communication, Tata McGraw-Hill.
3. Madhukar , R.K.: Business Communication, Vikas Publishing.
4. Kaul , Asha: Effective Business Communication, PHI Learning Pvt. Ltd.
5. Chatterjee , Abha, Bovee , Courtland L. and Thill , John V.: Business Communication Today, Pearson Education.
6. Rao , Nageshwar and Das , Rajendra P.: Communication Skills, Himalaya Publishing House.
7. Bhatia,R.C. Business Communication, Anita Books Pvt. Ltd.

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BUA 107: ENTREPRENEURSHIP DEVELOPMENT

Unit I

Concept of Entrepreneurship and Small Business Management, Characteristices, Role of Entrepreneurship in Economic Development, Competencies and Qualities of Entrepreneurs.

Unit II

Concept of SME$_s$, Forms of ownership for Small Business, Preprations of Project Reports, Setting up of a SSI- Steps involved, Policies and Programmes for SMEs, Concept of Start ups- Facilities and Incentives.

Unit III

Project Formulation, Project Appraisal, Financial Analysis, Social Cost-Benefit Analysis, Budgetary Control.

Unit IV

Institutional Assistance to SME$_s$- Central, State and District Level Entrepreneurship in Rajasthan, Role of NABARD, SIDBI, NSIC and RIICO In Entrepreneurship Development.

Unit V

Management of Small Business- Production Management, Marketing Management, Human Resource Management and Financial Management.

Books Recommended

1. Desai, Vasant: Entrepreneurship Development.
2. Khanka, S.S.: Entrepreneur Development, S.Chand &Company, New Delhi.
3. Sharma, R.A.: Entreprenurial Change in Indian Industry, Sterling Publishers (P) Ltd.
4. Mathur, B.L.: Entrepreneurship Development, Himalaya Publishing House.
5. Chabra, T.N.: Entrepreneurship Development, S.Chand & Company, New Delhi.
6. Pareek, H.S.: Financing of Small Scale Industries in Developing Economy, National Publishing House, New Delhi.

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UNIVERSITY OF RAJASTHAN JAIPUR

SYLLABUS OF

M.Com. (BUSINESS ADMINISTRATION)

(SEMESTER SCHEME)

(SECOND SEMESTER 2019-20)

1. Eligibility: It is given in the Prospectus of the University of Rajasthan.
2. Scheme of Examination: There will be five questions in all. The candidate will be required to attempt all the questions selecting one question from each unit with an internal choice (either/ or).
3. Semester Structure: The details of the courses with code, title and the credits assigned are given below.

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Syllabus of M.Com. (Business Administration)

Second Semester

S. No.	Subject Code	Course Title	Credit	Contact Hours Per Week	
		COMPULSORY PAPERS		L	T
1	BUA 201	MANAGEMENT THINKERS	6	4	2
2	BUA 202	BUSINESS RESERCH METHODS	6	4	2
3	BUA 203	PRESENTATION IN SEMINAR AND VIVA VOCE	6	4	2
		ELECTIVE PAPERS (Any Three)			
4	BUA 204	STRATEGIC MANAGEMENT	6	4	2
5	BUA 205	BUSINESS ENVIRONMENT	6	4	2
6	BUA 206	MARKETING RESEARCH	6	4	2
7	BUA 207	MANAGERIAL ECONOMICS	6	4	2

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BUA 201: MANAGEMENT THINKERS

Unit- I

Spirituality and Management- Concept of Spirituality, Indian Ethos and Values, Role of Values in Management, Western Values vis a vis Indian Values, Applications of Yoga in Management- Personality Development, Meditation and Management of stress.

Unit- II

Indian Epics and Management- Dimensions of Vedic Management, Bhagwad Gita, Ramayan, Kautilaya's Arthshastra.

Unit- III

Indian Thinkers- Swami Vivekanand, Mahatama Gandhi, S.K. Chakraborty, C.K. Prahlad.

Unit- IV

Western Thinkers I- F.W. Taylor, Henri Fayol, Elton Mayo, Herbert Simon.

Unit- V

Western Thinkers II- Peter F. Drucker, William G. Ouchi, Tom Peters, Gary Hamel.

Books Recommended

1. Chakraborty, S.K. and Bhattacharya, Pradip: Human Values, New Age International (P) Limited Publishers.
2. Saneev, Rinku and Khanna, Parul: Ethics and Values in Business Management, Ane Books Pvt. Ltd.
3. Khanna, S. : Vedic Management, Taxman Publications (P) Ltd.
4. Bhawad Gita as Viewed by Swami Vivekananda: Vedanta Press & Bookshop.
5. Rajgopalachari, C. : Ramayan, Bhartiya Vidya Bhawan.

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BUA 202 Business Research Methods

Unit I

Meaning and Objectives of Research,Need and Importance of Research in Business, Types of Research, Problems in Social Science Research, Identification of Research Problem.

Unit II

Framing of Hypothesis. Research Design - Important Concepts. Sampling Design-Steps. Collection of Data: Primary and Secondary Sources.

Unit III

Questionnaire and Schedule, Interviews, Observation. Scaling: Importance and Techniques, Editing, Coding, Classification and Tabulation.

Unit IV

Hypothesis Testing : Parametric and Non-parametric Methods. Interpretation and Report Writing.

Unit V

Probability and Probability Distribution, Business Forecasting, Time Series, Decision Theory.

Books Recommended:

1. Donald R. Cooper, Pamela S. Schindler: Business Research Methods, 8/e, Tata McGraw-Hill.
2. Timothy J.Ross: Fuzzy Logic with Engineering Applications, Wiley Publications.
3. Simulated anealing: Theory and applications, Timothy J. Ross,Wiley Publications.
4. P.J. Van Laarhoven and E.H. Aarts:Simulated Annealing: Theory and Applications(Mathematics and its Applications.
5. C.R. Kothari: Research Methodology, Wiley Eastern Ltd.
6. Richard Levia: Statistics of Management, Prentice Hall of India Pvt. Ltd.
7. Goode & Hatt: Methods in Social Research, McGraw-Hill.

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BUA 203 – Presentation in Seminar and Viva Voce

1. Presentation in Seminar: 50 Marks
2. Viva-Voce based on presentation: 50 Marks

The Department/College shall organise Seminar in Second Semester and announce topics (at least ten). Students can make presentations on topic of his/her choice. The presentation shall be evaluated by internal examiner appointed by Head of the Deptt. and external examiner appointed by the university.

The Viva-voce examination will be based on the presentation made by the student.The Department shall maintain record of the presentation made with a photograph pasted on the copy of the presentation made with signature, date of presentation etc.

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BUA 204- Strategic Management

UNIT I

Introduction : Meaning of Strategic Management, Role of Strategic Management, Process of SM, Limitations of SM, Organizational Mission, Vision and Objectives , Strategy & Structure, 7s Framework.

UNIT II

Environmental Scanning: Appraisal of External Environment, Dynamics of Internal Environment, Organizational Capabilities and Appraisal, Core competence.

UNIT III

Strategy Formulation: Corporate Level Strategy, Business Level Strategy, Functional Level Strategy.

UNIT IV

Strategy Implementation: Aspects of Strategy Implementation, Procedural Implementation, Resource Allocation, Organizational Design and Change, Corporate Culture.

UNIT V

Strategic Evaluation and Control: Meaning of Strategic Evaluation and Control, Criteria and Techniques of Strategic Evaluation and Control.

Books Recommended:

1. Azhar Kazmi : Strategic Management
2. P. Rao : Strategic Management
3. L.M. Prasad : Strategic Management
4. Ravi Kumar : Strategic Management

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BUA 205: BUSINESS ENVIRONMENT

UNIT- I

Introduction of Business Environment, Concept Significance and Nature of Business Environment, Changing Dimensions of Business Environment.

UNIT -II

Implications of Globalization, Competition Act, 2002.

UNIT - III

Legal Environment of Business, Changing dimensions of Legal Environment, Intellectual Property Rights.

UNIT -IV

Environment Protection, Government Policy on Environment, Water Pollution Act, Air Pollution Act, Environment Pollution Act.

UNIT -V

Coroporate Ethics and Government, Contemporary issues in CSR and Governance, Work Ethics, Sustainable Development.

Books Recommended

1. N. Gopal : Business Environment, Tata McGraw Hill
2. Saleem Shaikh : Environment, Pearson Education of India
3. David : The Environment of Business, SAGE Publication
4. Aswathappa : Essentials of Business Environment, Himalaya Publishing House

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BUA 206: MARKETING RESEARCH

Unit- I

Marketing Research: An Introduction, research design, marketing information system and marketing research, problems in conducting marketing research.

Unit- II

Marketing research process, Problem identification, Developing research proposal, Primary Data collection, Secondary Data sources.

Unit- III

Preparation of questionnaire, Sample design-Sampling methods and Sample size determination, field work and data collection.

Unit- IV

Data analysis and report preparation: Data editing, tabulation, editing, report preparation and presentation.

Unit- V

Marketing research applications: Consumer research, Product research, Advertising research, ethical issues in marketing research.

Books Recommended

1. Cooper, Donald, R. and Pamela, S. ScHindler : Marketing Research, Tata McGraw Hill.
2. Malhotara, Naresh K. : Marketing Research, Prentice Hall of India.
3. Harper W., Boyd, Ralph Westfall and Stanley F. : Marketing Research: Text and Cases.
4. Green, Paul E., et.al : Research for Marketing Decisions, Prentice Hall of India Pvt. Ltd.
5. Donald, S., Tull and Del, I., Hawkins ; Marketing Research: Measurement and Methods, Prentice Hall of India Pvt. Ltd.

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BUA 207: MANAGERIAL ECONOMICS

Unit- I

Nature and scope of Managerial Economics, Role of Managerial Economist, Demand Elasticity, Demand Forecasting.

Unit- II

Cost: Concepts, Classification of Cost, Cost and Output Relationship.

Unit- III

Price Decision under Perfect Competition, Pure Competition and Monopolistic Competition.

Unit- IV

Theories of Income, Profit, Wages and Rent.

Unit- V

National Income: Concept, Measurement, Distribution, National Income and Welfare.

Books Recommended

1. Dean, Joel : Managerial Economics
2. Gopalkrishan : A Study of Managerial Economics, Himalaya Publication.
3. Dwivedi, D. N. : Managerial Economics, Vikas Publishing House.
4. Agarwal, M.D. and Somdev : Managerial Economics
5. Seth, M.L. : Principles of Economics (Hindi & English).
6. Jhingam, M.L. : Principles of Economics (Hindi & English), Vikas Publishing House.

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M.Com. IIIrd Semester Session : [illegible]

S. No.	Subject Code	Course Title	Credit	Contact Hours per week	
Compulsory Papers				L	T
1	BUA 301	Organisational Behaviour	6	4	2
2	BUA 302	Financial Management	6	4	2
3	BUA 303	Advertising Management	6	4	2
Elective Papers (Any Three)				L	T
1	BUA 304	International Marketing	6	4	2
2	BUA 305	Human Resource Development	6	4	2
3	BUA 306	E-Commerce	6	4	2
4	BUA 307	Labour Laws	6	4	2

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M.COM. IIIrd Semester

BUA 301 - Organizational Behaviour

Unit I

Organizational Behaviour - Definition, Scope, Importance, Concepts of Organizational Behaviour, Models of O.B.

Unit II

Motivation-Definition, Importance, Theories of motivation, Motives: Characteristics, Types-primary and secondary,

Unit III

Group Dynamics and Team Building-Theories of group formation, formal and informal groups, Importance of team building, Conflict-Definition, Traditional Vs Modern view of conflict, Types of conflict - intra personal, interpersonal, organizational, constructive and destructive conflict, conflict management.

Unit IV

Stress Management - Definition, causes, types, Management of stress, Interpersonal Relations, Organizational Culture & Climate.

Unit V

Personality - Development of personality, Attributes of personality, Egostate, transactional analysis, Johari window.

Books Recommended:

2. Principles and Practices of Management: Shejwalkar
3. Essentials of Management: Koontz H. and Weitrich
4. Principles and Practices of Management: T.N. Chabra
5. Management :Stomen and Jane
6. Organisational Behaviour: Stephen Robbins
7. Organisational Behaviour: Keith & Davis
8. Organisational Behaviour: Fred Luthans
9. Organisational Behaviour: K.A. Ashwathappa
10. Management and Organisational Behaviour: P. Subba Rao.
11. Understanding Organisational Behaviour: Udai Pareek

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BUA 302 - Financial Management

Unit I

Perspective of Finance: Finance Function; Meaning, Objectives, and Scope of Financial Management; Role of Finance Manager.

Unit II

Working Capital Management, Determinants of Working Capital, Forecasting of Working Capital, Management of Inventories, Receivables and Cash, Financing of Working Capital.

Unit III

Capital Structure, Capital Structure Theories, EBIT/EPS Analysis, Operating and Financial Leverage.

Unit IV

Indian Capital Market: Role of Primary and Secondary Market, Capital Market, Instruments of Financial Derivatives-Stock Futures, Stock Options, Index Futures, Index Options.

Unit V

Security Analysis - Fundamental Analysis; Economic, Industry and Company Analysis, Technical Analysis, Mutual Funds: Regulatory Framework, Evaluation of Various Schemes of Mutual Funds.

Books Recommended:

1. Khan & Jain : Financial Management
2. Pandey, I.M. : Financial Management
3. Agrawal, M.D. and Agrawal, N.P. : Financial Management (RBD, Jaipur)
4. Agrawal, N.P. & Mishra, B.K. : Business Finance (RBD, Jaipur)

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BUA 303 – Advertising Management

Unit I

Introduction to advertising, socio-economic effect of advertising. Advertising and Marketing Process, Types of Advertising, Advertising Decisions, Role of Advertising in Adoption of New Products, Advertising Department.

Unit II

Advertising Planning , Framework, Objectives, Advertising Media Decisions, Advertising Budget, Message Tactics, Advertising Copy Elements, Advertising Campaign.

Unit III

Measuring Advertising Effectiveness, Need and Scope of Advertising Research, Advertising Research Process, Media Research, Copy Research.

Unit IV

Advertising and Society, Ethics in Advertising, Laws Affecting Advertising in India, Television Advertising, Globalisation and Advertising, Advertising Agencies-Role and Functions.

Unit V

Advertising Standards Council of India- Functions and Working, Advertising Agencies Association of India, Other Institutions Facilitating Advertising in India, Social Advertising in India.

Books Recommended:

1. Das, Gupta: Sales Management in Indian Perspective, Prentice Hall of India, New Delhi.
2. S.A. Chunawalla& K.C. Sethia: Foundation of Advertising, Himalaya Publishing House, New Delhi.
3. G.S. Sudha: Advertising and Sales Management, Ramesh Book Depot, Jaipur

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BUA 304 – INTERNATIONAL MARKETING

UNIT I

Introduction: Meaning, Nature, Importance, Scope and Limitations of International Marketing, Domestic and International Marketing, International Marketing Environment.

UNIT II

Initial Selection of International Market, Marketing Research-Scope, Importance and Process of Marketing Research.

UNIT III

Product Planning and Development, Process of Developing Products for Overseas Markets, Product Life Cycle, Pricing: Factors Affecting Pricing Decisions, Pricing Methods. Brand Strategies.

UNIT IV

Channels of Physical Distribution: Factors Affecting the Choice of Channels, Logistic Decisions, Promotional Measures and Strategies.

UNIT V

Export Finance, WTO, IMF, World Bank, Impact of Globalization, Emerging Issues in International Marketing.

Books Recommended:

1. Kothari, Jain and Jain:International Marketing (RBD, Jaipur).
2. R.K. Kothari and Mukesh Jain: International Marketing(RBD, Jaipur)(MBA Edition).
3. Fair Weather John:International Marketing (Prentice Hall of India Pvt. Ltd., New Delhi).
4. Varshney and Bhattacharya-International Marketing Management, Sultan Chand & Sons, New Delhi.
5. Joshi,R.M.:International Marketing,Oxford University Press.
6. Vasudeva, P.K.: International Marketing, Excel Books.
7. Cherunilam,Francis: International Marketing, Himalaya Publishing House.
8. कोठारी, राठौड़ एवं जैन : अन्तर्राष्ट्रीय विपणन, रंगोश बुक डिपो, जयपुर ।

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BUA 305 –

HUMAN RESOURCE DEVELOPMENT

UNIT I

Conceptual Framework of HRD. Meaning, Characteristics, Objectives, Scope, Need and Importance of HRD. Distinction between HRD and HRM, Nature of HRD, HRD Framework, Assumptions of HRD, HRD Culture.

UNIT II

Sub-systems and Mechanisms of HRD, HRD Matrix, Principles of Designing HRD Systems, Functions of HRD Department, Qualities required for HRD manager.

UNIT III

Training & Development: Objectives and Importance of Training, Training Need Assessment, Types and Methods of Training, Evaluation of training programme.

UNIT IV

Organization Development (OD):Objectives, Various OD Interventions, Transactional Analysis, Sensitivity Training, Team Building.

UNIT V

Career Planning: Succession Planning, Employee Counselling Feedback, HRD in India.

Books Recommended:

1. Dayal, Ishwar: Successful Applications of HRD, New Delhi, New Concepts.
2. Dayal, Ishwar:Designing HRD Systems, New Delhi,New Concepts.
3. Kohli,Uddesh& Sinha, Dhami P.: HRD- Global Challenges & Strategies in 2000 A.D. New Delhi,ISTD.
4. Maheshwari, B.L. & Sinha, Dhami P.: Management of Changethrough HRD, New Delhi, Tata McGraw-Hill.
5. Pareek, Udai etc.:Managing Transitions: The HRD Response,New Delhi, TataMcGraw-Hill.
7. Rao,T.V. etc.: Alternative Approaches & Strategies of Human Resource Development, Jaipur, Rawai.
8. Silvera, D.N.: HRD -The Indian Experience, New Delhi

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BUA 306 -

E-Commerce

Unit I :

Meaning, Characteristics, Origin, Process, Key Drivers of E-Commerce, Elements, Traditional Commerce Vs E-Commerce, Benefits, Standards, Technologies, E-Commerce Models, Mobile Commerce, Barriers to E-Commerce.

Unit II :

Internet and E-Commerce, Networking-LAN, WAN, Business Uses of Internet, www, Protocols, Intranet and Internet, Multimedia Application, Hardware and Software.

Unit III :

Electronic Payment Systems- Methods, Security Issues, Electronic Banking, Electronic Stock Trading.

Unit IV :

Data Warehousing, Client-Server Computing, Data Mining, Website Management - Steps.

Unit V :

ERP - Meaning, Functions, SAP Applications, Business Intelligences, Ethics, Security and E-Governance.

Books Recommended:

1. E-Commerce and E-Business : Dr. C.S. Rayudu, Himalaya Publishing House.
2. Information Technology : E-Commerce & E Business : V.D. Dudeja, Commonwealth Publisher, New Delhi
3. Electronic Consumer Framework- Technologies and Applications: B. Bhasker, Tata McGraw-Hill
4. Electronic Commerce : A Managers Guide to E-Business: Parag Diwan and Sunil Sharma, Vanity Books International, New Delhi

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Labour Laws

Unit-I

Indian Trade Union Act, 1926
Industrial Employment (Standing Order) Act, 1946

Unit-II

Payment of Wages Act, 1936

Minimum Wages Act, 1948

Unit-III

Factories Act, 1948.

Unit-IV

Industrial Dispute Act,1965

Unit-V

Maternity Benefit Act, 1961

Payment of Bonus Act, 1965

Books

N.D. Kapoor : Industrial Laws

S.N. Mishra : Industrial Laws

R.L.. Nolakha : औद्योगिक सन्नियम

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Book Recommended :-

P.K. Padhi	Labour and Industrial Laws	PHI Learning
Pvt. Ltd.		
Selvanaj,	Industrial Relations and	Tata McGraw
Nambudiri,	Labour Laws	Hill Education
Monappa		
R. Shivarethinamohan Pvt. Ltd.	Industrial Relations and Labour Welfare : Text and Cases	PHI Learning
Singh, Kaur	Introduction to Labour and Industrikal Law	Lexis Nexis
S.C. Srivastava Publishing House	Industrial Relations and Labour Laws	Vikas

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M.Com. IVth Semester Session [illegible]

S. No.	Subject Code	Course Title	Credit	Contact Hours per week	
Compulsory Papers				L	T
1	BUA 401	Business Ethics and Corporate Governance	6	4	2
2	BUA 402	Capital Market	6	4	2
3	BUA 403	Dissertation and viva-voce	6	4	2
Elective Papers (Any Three)				L	T
1	BUA 404	Management Information System	6	4	2
2	BUA 405	Retail Management	6	4	2
3	BUA 406	Security Analysis and Portfolio Management	6	4	2
4	BUA 407	Production and Operations Management	6	4	2

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BUA-401 Business Ethics and Corporate Governance

Unit I-
Meaning and Importance of Business Ethics, Ethical Dilemma, Values and Work Ethics.

Unit II-
Indian Ethos in Management- Basic principles of Indian Ethos, Geeta and Management, Sprituality and Ethics.

Unit III-
Social Responsibilities of Business, Arguments for and against Social Responsibilities of business, Consumer protection, Employee protection, Legal Provisions about CSR.

Unit IV-
Corporate Governance, Godes of Corporate Governance, Recommendations of Various Committees, Lessons from USA and other developed countries.

Unit V-
Business and Environmental Ethics, Unethical Practices in India, Quality of Work Life, Ethics in Advertising.

Books

1. Bhatia, S.K., : Business Ethics and Corporate Governance, Deep and Deep Publications.
2. Khanka, S.S., : Business Ethics and Corporate Governance, S. Chand.
3. Vasishth, Neeru and Rajput, Namita, Governance, Ethics & Social Responsibility of Business, Taxman's.
4. Ghosh, B.N., : Business Ethics and Corporate Governance.
5. Murthy, C.S.V., : Business Ethics, Himalaya Publishing House.

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BUA- 402 Capital Market

Unit-I

Introduction : Financial market- defination, role, functions, Indian Financial market, Capital Market: evolution and growth, Capital market instruments : Equity, Debentures, Prefernce Shares, Sweat Equilty, Non-Voting Shares, Share warrants.

Unit-II

Stock Exchange : History, meaning, functions Signifance and SEBI: Working and Fuctions, BSE and NSE, Stock exchange traders, SEBI Act, 1992.

Unit-III

Primary market: meaning, methods of new issue, intermediaries in new market, SEBI guidelines on primary market, Listing of securities, Consequences of non-Listing, Underwriting: definition, types, mechaniks and benefits.

Unit-IV

Book-building: Concepts, Characteristics, process. Mutual Funds: concepts, Classification, growth and importance, risk involved in mutual Funds, International Capital Market: Listing of securities issued outside India, Foreign Currency Convertible Bonds, Global Depository Receipts, American Depository Receipts.

Unit-V

Secondary Market: Meaning, need and significance. Tading Methods: Trading Ring, On-Line Trading, Carry Forward Systems, Government Securities Market: Government Debt Instrument, Short term and Long term Instruments, Tading in Debt Instrument, Indian Depository System: Need and benefits.

List of Recommended Books:

1. E. Gordon & K. Natarajan : Capital Market in India; Himalaya Publishing House, Ramdoot, Dr. Bhalerao Marg, Girgaon, Mumbai-400004.
2. M.Y. Khan: Indian Financial Systems; Tata McGraw Hill, 4/12, Asaf Ali Road, New Delhi-110002.
3. S. Suryanarayanan & V. Varadarajan: SEBI-Law Practice & Procedure; Commercial Law Publilshers (India) Pvt. Ltd., 151, Rajindra Market, Opp. Tis Hazari Court, Delhi-110054.
4. Sanjeev Aggarwal: Guide to Indian Capital Market; Bharat Law House, 22, Tarun Enclave, Pitampura, New Delhi-110034.
5. Shashi K Gupta Nishja Aggarwal Neeti Gupta: Financial Institutions and Markets; Kalyani Publishers, 4863/2B, Bharat Ram Road, 24, Daryaganj, New Delhi-110002.
6. Taxman: SEBI Manual.
7. Vishal Saraogi: Capital Markets and Securities Laws simplified, Lawmant Publication, 6C, R.N. Mukherjee Road, Kolkata-700001.

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BUA 403 - -DISSERTATION and Viva-Voce

Dissertation - 50 Marks
Viva-Voce - 50 Marks

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BUA - 404 MANAGEMENT INFORMATION SYSTEM

Unit –I

Introduction to MIS: Concept of MIS, Role of MIS, Objectives of MIS, Emergence of MIS, MIS and computers, Impact of MIS, Systems approach to MIS, Advantages and disadvantages of computer based MIS.

Unit –II

Information : Classification of information, levels of information, levels of information, Methods of data and Information collection, value of Information.

Unit –III

Information system for decision making: Decision- making and MIS, Decision making concepts, Organisational decision-making, MIS and decision making concepts. MIS as technique for programmed decisions,Decision support system.MIS and role of DSS.

Unit –IV

Data base Management systems: Data base concepts, Data base models, Data base design, MIS and RDBMS, Network topology, LAN and WAN, Data communication.

Unit –V

MIS in operations: MIS for Finance, MIS for Marketing , MIS for production, MIS for Human resource Management.

Books Recommended :

1. Javadekar, W.S.-Management Information Systems (Tata McGraw-Hill Publishing Company Ltd., New Delhi)
2. Mardic R.G., Ross J.E.& clagget J.R. - Information System for Modern Management (Prentice Hall of India)
3. James A.O. Brien Management Information Systems, (Galgota Publications)
4. Anderson, Lavid L. Post, Gerald V., Management Information System (Tata-McGraw Hill Publishing Co.)

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BUA 405- RETAIL MANAGEMENT

UNIT –I

Introduction to Retail: Role, Relevance and Trends, Benefits, Enablers and Challenges, Types of Retail outlets- organized and unorganized.

UNIT- II

Product and Merchandise Management, Merchandise procurement, Merchandise forecasting, budgeting.

UNIT- III

Store layout, location atmosphere and space Management, Retail Market segmentation, Retail store operation.

UNIT- IV

Retail Pricing, Retail promotion strategy, Retail selling, Communication and consumer handling, stock and inventory Management.

UNIT- V

Recent trend, retail strategy and FDI, impact and execution of FDI in retail, problems and prospects of retailing in India.

Recommended Books

1. Gibson G. Vedamani: Retail Management (Jaico Publishing House)
2. Chetan Bajaj, Rajnish Tuli, Nidhi V. Shrivastava: Retail Management.
3. Gourav Ghosal: Retail Management.
4. S.C. Bhatia: Retail Management.
5. S. Sudershan, S.R. Prakash and M.S. Sharma: Retail Management

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BUA- 406 SECURITY ANALYSIS AND PORTFOLIO MANAGEMENT

Unit-I

Investment- A Conceptual Framework: Investment process, risks of investment and the common mistakes made in investment management,. Investment Environment: Features and composition of money market and capital market, money market, capital market instruments and financial derivatives, Risk and Return: Concepts of risk and return, the relationship between risk and return.

Unit-II

Mutual Funds- Concept Objectives, Functions and Types Organization and management-Asset Management Company, Sponsor, Board of Trustee- Guidelines for Mutual Funds-Working of Public and Private Mutual Funds in India-Performance Evaluation of Mutual Funds-Sharpe's Performance measure-Treyner's Performance Measure-Jensen;s Model. Mutual Fund Schemes, Life Insurance Policies and other Investment Opportunities.

Unit-III

Fundamental Analysis : Economic Analysis and Economic Forecasting, Industry Analysis – Industrial Classification, Analysis of Industry Life Cycle and Industrial Indicators, Company Analysis-Analysis of Financial Statements, Estimation of Intrinsic Value of Shares-Traditional and Modern Methods.

Unit-IV

Technical Analysis : Meaning and its Components, Technical Analysis vs. Fundamental Analysis, Tools of Technical Analysis-Point and Figures, BAr and Line Charts, Moving Averages and other Modern Tools, Limitations of Technical Analysis, Meaning and Form of Efficient Market Hypothesis.

Unit-V

Portfolio Management- Risks and Returns: Concept of portfolio and portfolio management, concept of risk, types of portfolio management, Markowitz Portfolio Selection Model: Concept of portfolio analysis and diversification of risk, Also discusses Markowitz Model and Efficient Frontier, Capital Asset Pricing Model (CAPM): Deals with the assumptions of CAPM and inputs required for applying CAPM and the limitations of this Model, Sharpe- The Single Index Model: Measurement of return on an individual stock, measurement of portfolio return and measurement of individual stock risk.

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References :

1. Barua, Raghunathan and Verma : Portfolio management, Tata McGraw Hill, Delhi.
2. Clark, James Francis : Investment- Analysis and Managementk, McGraw Hill, International Edition, New York.
3. Fabozzi, Frank J : Investment Management, Prentice hall, Internatioanal Edition, New York.
4. Fischer, D.E. and Jordan R.J. : Security Analysis and Portfolio Management, Prentice hall, Delhi.
5. Sharpe, William F, Fordon J Alexander and J. V Bailly : Investments, Prentice Hall, Delhi.
6. Strong, Robert : Portfolio Theory and Capital Markets, McGraw Hill, New York.
7. Elton Edwin J, Gumber Martin J: Modern Portfolio Theory and Investment Analysis, John Wiley, New York.

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BUA-407
Production and Operations Manament

Unit I
Production Management : Meaning, Objectives, Nature, Decision Making; Functions of Production Manager; Problems of Production Management; Production Systems; Product Planning and Development; Product Planning and Development; Product Design.

Unit II
Production Technology : Meaning, Role, Classification; Process Management : Planning, Selection, Procedure, Analysis; Plant Layout : Need, Significance, Criteria; Plant Planning and Design.

Unit III
Production Planning and Control : Classification, Functions, Factors, Scope, Benefits; Job Design: Decisions, Factors, Considerations; Industrial Safety: Causes of Accidents; Work Study; Inspection and Quality Control.

Unit IV
Operations Management : Meaning, Scope, Operations Strategy, Recent Trends; Break-Even Analysis: Assumptions, Mechanics; Forecasting : Steps, Methods, Facility Planning : Process Selection and Process Flow Analysis; Inventory Management : Importance, Inventory Control Systems.

Unit V
Employee Productivity : Future HR Tends; Capacity Planning : Steps, Types, Decisions; Materials Management : Functions, Scope, Importance, Modern Trends; Designing Service Delivery Systems; Re-engineering for the 21st Century.

Books Recommended :

1. Bhat, K. Shridhara and Rao, Sowmya R. (2013). Production and Materials Management. Mumbai : Himalya Publishing House.
2. Bhat, K. Shridhara (2013). Operations Management. Mumbai : Himalaya Publishing House.
3. Chunawalla, S.A. and Patel, D.R. (2010). Production and Operations Management. Mumbai : Himalaya Publishing House.
4. Buffa , Sarin (2007). Modern Production/Operations Management. New Delhi : John Wiley and Sons.
5. Broom, H.N. (1962). Production Management. Homewood : Irwin.
6. Mahadevan, B. (2010). Operations Management : Theory and Practice, New Delhi : Pearson Education India.
7. Stevenson, W.J. (2014). Operations Mangement, New York : Mc Graw-Hill.

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UNIVERSITY OF RAJASTHAN

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SYLLABUS

M.Com

Economic Administration

&

Financial Management

Semester Scheme

I/II Semester Examination 2020-21
III/IV Semester Examination 2021-22

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UNIVERSITY OF RAJASTHAN, JAIPUR

M.Com. EAFM Syllabus

Semester Scheme 2020-21
2021-22

Contents:

1. **Eligibility**
2. **Scheme of Examination**
3. **Semester Structure**
4. **Course Details**

1. **Eligibility:**

(i) 50% and above marks in B.Com. or 55% and above marks in the subject in which admission is sought, shall be eligible for admission to M.Com. (Prev.) in EAFM. (ii) B.A./B.Sc. Degree with at least 55% marks in the aggregate or M.A. Economics degree shall be eligible for admission to M.Com. (Prev.) in (a) Economic Administration group, (b) Financial Management Group, (c) Cooperation Group.

2. **Scheme of Examination:**
There will be five questions in all. The candidates are required to attempt all the question. There will be one question from each unit with an internal choice (either/or).

3. **Course Structure:**

The details of the courses with code, title and the credits assign are as given below.

Abbreviations Used

Course Category

CCC: Compulsory Core Course
ECC: Elective Core Course
OEC: Open Elective Course
SC: Supportive Course
SSC: Self Study Core Course
SEM: Seminar
DISS - Dissertation
RP: Research Publication

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Contact Hours

L: Lecture
T: Tutorial
P: Practical or Other
S: Self Study

ESE: End of Semester Examination

First Semester

S. No.	Subject Code	Course Title	Course Category	Credit	Contact Hours Per week			EoSE Duration (Hrs.)	
					L	T	P	Thy	P
1.	EFM 101	Micro Economics Analysis	CCC	6	4	2	0	3	0
2.	EFM 102	Financial Management	CCC	6	4	2	0	3	0
3.	EFM 103	Rural Economics	CCC	6	4	2	0	3	0
4.		Elective-1	ECC	6	4	2	0	3	0
5.		Elective-2	ECC	6	4	2	0	3	0
6.		Elective-3	ECC	6	4	2	0	3	0
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CCC(18), ECC(18)

Second Semester

S. No.	Subject Code	Course Title	Course Category	Credit	Contact Hours Per week			EoSE Duration (Hrs.)	
					L	T	P	Thy	P
1.	EFM 201	Macro Economic Analysis	CCC	6	4	2	0	3	0
2	EFM 202	Financial Analysis and Control	CCC	6	4	2	0	3	0
3.	EFM 203	Rural Marketing	CCC	6	4	2	0	3	0
4.		Elective-1	ECC	6	4	2	0	3	0
5		Elective-2	ECC	6	4	2	0	3	0
6		Elective-3	ECC	6	4	2	0	3	0
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Third Semester

S. No.	Subject Code	Course Title	Course Category	Credit	Contact Hours Per week			EoSE Duration (Hrs.)	
					L	T	P	Thy	P
1.	EFM 301	Economic Administration and Policy	CCC	6	4	2	0	3	0
2.	EFM 302	Public Finance	CCC	6	4	2	0	3	0
3.	EFM 303	Research Methodology	CCC	6	4	2	0	3	0
4		Elective-1	ECC	6	4	2	0	3	0
5.		Elective-2	ECC	6	4	2	0	3	0
6.		Elective-3	ECC	6	4	2	0	3	0
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CCC(18), ECC(18)

Fourth Semester

S. No.	Subject Code	Course Title	Course Category	Credit	Contact Hours Per week			EoSE Duration (Hrs.)	
					L	T	P	Thy	P
1	EFM 401	Indian Banking System	CCC	6	4	2	0	3	0
2	EFM 402	Economy of Rajasthan	CCC	6	4	2	0	3	0
3	EFM 403	Dissertation and Viva-Voce	DISS	6	4	2	-	-	-
4		Elective-1	ECC	6	4	2	0	3	0
5		Elective-2	ECC	6	4	2	0	3	0
6		Elective-3	ECC	6	4	2	0	3	0
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Course of Details

Specialization Groups

A. EA: Economic Administration Group
B. FM: Financial Management Group
C. CO: Cooperation Group

All ECC Courses shall be taken from same group.

Elective Course Code	Specialization	Paper	Semester
EFM A01	EA	Public Enterprises	First
EFM A02	EA	Indian Economic Development and Policy	First
EFM A03	EA	Industrial Economics	First
EFM A04	EA	Quantitative Techniques	First
EFM A05	EA	India's Foreign Trade	Second
EFM A06	EA	Industrial Development in Rajasthan	Second
EFM A07	EA	Agricultural Economics	Second
EFM A08	EA	Operations Research	Second
EFM A09	EA	Economic Environment in India	Third
EFM A10	EA	Development Economics	Third
EFM A11	EA	Infrastructure Management	Third
EFM A12	EA	Regional Economics	Third
EFM A13	EA	International Business Environment	Fourth
EFM A14	EA	International Finance	Fourth
EFM A15	EA	Project Management	Fourth
EFM A16	EA	Economic Growth and Development	Fourth
EFM A01	FM	Business Budgeting	First
EFM	FM	Export Finance	First

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EFM B03	FM	Security Analysis	First
EFM B04	FM	Quantitative Techniques	First
EFM B05	FM	Capital Expenditure Decisions	Second
EFM B06	FM	Portfolio Management	Second
EFM B07	FM	Financial System in India	Second
EFM B08	FM	Operations Research	Second
EFM B09	FM	International Banking	Third
EFM B10	FM	Bank Management	Third
EFM B11	FM	Investment Management	Third
EFM B12	FM	Funds Management In Banks	Third
EFM B13	FM	Merchant Banking & Financial Services	Fourth
EFM B14	FM	Treasury & Derivatives Management	Fourth
EFM B15	FM	Monetary Policy	Fourth
EFM B16	FM	Social Finance for Inclusive Growth	Fourth
EFM C01	CO	Cooperative Project Planning	First
EFM C02	CO	Co-operative Movement in Rajasthan	First
EFM C03	CO	Rural Credit and Finance	First
EFM C04	CO	Quantitative Techniques	First
EFM C05	CO	Co-operative Movement in India	Second
EFM C06	CO	Financing Co-operative Projects	Second
EFM C07	CO	Micro Finance	Second
EFM C08	CO	Operations Research	Second
EFM C09	CO	Cooperation & Agriculture Organization	Third
EFM C10	CO	Cooperative Sector Management	Third
EFM C11	CO	Cooperative Law	Third

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EFM C12	CO	Agriculture Entrepreneurship	Third
EFM C13	CO	International Cooperative Movement	Fourth
EFM C14	CO	Management of Agricultural Marketing	Fourth
EFM C15	CO	Management of Cooperative Business	Fourth
EFM C16	CO	Agricultural Finance and Project Management	Fourth

Note: The candidate shall be permitted to use battery operated pocket calculator that should not have more than 12 digits, 6 functions and 2 memories and should be noiseless and cordless.

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EFM 101 –Micro Economics Analysis

Unit-I Introduction to Micro Economics – Meaning, nature and scope of micro economics, Theories of firm-sales revenue maximisation theory, managerial theories, behavioural theories and profit theory. Theory of demand, demand analysis and determinants of demand, demand function, concept of elasticity and its significance, demand forecasting techniques.

Unit-II Theory of consumer behaviour – Cardinal and ordinal approach, income and substitution effect – Hicks and Slutsky's approaches, Band Wagon effect, Snob appeal.

Unit-III Production Function – Production functions, isoquants, laws of returns, returns to scale, estimation of production function.

Cost Function – Various concepts of costs, estimation of cost functions, economies of scale and scope. Short and long run cost curves.

Unit-IV Price and Output Relationship under different market conditions – Perfect competition, monopoly, discriminating monopoly, monopolistic competition, oligopoly, monospony, bileteral monopoly, duopoly, pricing practices and policies.

Unit-V Factor Pricing and Global Market Economy – Determination of rent, wage, interest and profit. Risk and uncertainty, technological changes and global market economy, technological change and productivity, industrial innovation and technology.

Books Recommended

1 B.P. Gupta, "Business Economics", Malik and Company, Jaipur.

2 N.D. Mathur : "Managerial Economics for MBA", Shivam Book House, Jaipur.

3 D.M. Mithani, Managerial Economics – Theory and application, Himalaya Publishing House.

4 Paul, A. Samuelson "Economics", Tata Mcgraw Hills, New Delhi.

5 Mote and Paul "Managerial Economics", Tata McGraw Hill, New Delhi

6 M.D. Agarwal and Gopal Singh, "Arthik Vishleshan" RBD Publication, Jaipur.

7 J.V. Varshampayan, "Managerial Economics", D.K. Publishers, Lucknow.

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EFM -102 - Financial Management

Unit-I Finance Function: Meaning, Scope, Role, Objectives of Financial Management, and Organization of Finance in corporate enterprises.

Unit-II Capital Structure Theories, Financial Planning and Forecasting.
Sources of Funds in India: Short Term, Medium Term and Long Term.

Unit-III Management of Working Capital: Determinants, Sources and Analysis of Working Capital. Estimating of Working Capital Requirements. Management and Control of Investment in Inventories, Receivables and Cash.

Unit-IV Management of Securities: Underwriting arrangements, timing and pricing of issue, right issue. Capital Budgeting: Pay Back Period, Return on Investment, Net Present Value Method Proposals Under Uncertainty and Certainty

Unit-V Cost of Capital and its Computation. Dividend Policy, Theories and methods of dividend payment, retained earnings.

Books Recommended:

1. Khan & Jain, Financial Management.
2. I.M. Panday, Financial Management.
3. S.C. Kuchhal, Corporation Finance.
4. M.R. Agrawal, Financial Management (English & Hindi Version)
5. Agarwal & Agarwal, Financial Management (English & Hindi Version)
6. आर एस कुलश्रेष्ठ, निगमों का वित्तीय प्रबंध

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EFM 103 - Rural Economics

Unit-I Rural Scenario of Indian Economy: Basic features of Rural Economy.

Unit-II Agricultural Finance: Concept of Crop loan-its need and importance. Linking Credit with marketing.

Agricultural Marketing; Need and Importance. Problem of Agricultural Marketing. Suggestion to overcome the problems of Agricultural Marketing and Rural Development.

Unit-III Rural Industries Definition and Legal Framework. Institutional Assistance of Rural Industries. Importance, Problem and Prospects of Small Scale & Cottage Industries (MSME). Role of Khadi and Gramodyog in Rural Employment Generation. Role of District Industrial Centres (DICs) in the Rural Industries.

Unit-IV Need and importance of rural infrastructure. A detailed study of Rural Roads, Rural Electrification, Supply of Drinking Water and Rural Marketing.

Unit-V Social infrastructure: Education & Health, Institutional Framework of Rural infrastructure: Panchayati Raj Institutions & NGO's.

Books Recommended:

1. Rudar Datt & K.P.M. Sundharam. Indian Economy, S. Chand & Sons, New Delhi.
2. Vasant Desai, Organisation & Management of small scale industries, Himalya, Publishing House, Mumbai.
3. H.R. Swami & B.P. Gupta, Rural development & Cooperation, Ramesh Book Depot, Jaipur
4. Vasant Desai, Study of Rural Economics, Himalaya Publishing House, Delhi.
5. NABARD Bank News Review, Mumbai

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EFM 201 – Macro Economics Analysis

Unit-I Introduction to Macro Economics –Macro-economic issues in an economy.

Unit-II National Income Determination : Actual and potential GDP, aggregate expenditure - consumption function, investment function, equilibrium GDP, concepts of MPS, APS, MPC, APC, Autonomous expenditure, the concept of multiplier.

National Income Determination in an Open Economy With Government – Fiscal Policy – Impact of changes in Government expenditure and taxes, Net exports and equilibrium GDP.

Unit-III GDP and Price level in short and long run – Aggregate demand (AD) and Aggregate supply (AS), multiplier analysis with AD curve and price level changes, aggregate supply in short and long run. Keynesian theory of Income, output and employment.

Unit-IV Money in a Modern Economy – Concepts of money in a modern economy, monetary aggregates, demand for money, quantity theory of money, liquidity preference and rate of interest, money supply, credit creation and monetary policy.

Unit-V Business cycles : Various theories of business cycles alongwith recent trends, phases in business cycles. Impact of business cycles in an economy, measures of stabilization.

Books Recommended:

1. Mankiw N. Gregory, "Macroeconomic", McMillan Worth Publishers, Newyork.
2. Dornbusch Rudiger and Stanley Fisher, "Macroeconomic", McGraw Hill.
3. Deepashree, Vanita Agarwal, "Macro Economics", Ane Books Pvt. Ltd., New Delhi.
4. M.C. Vaish, "Macro Economic Theory", Vikas Publishing House (P) Limited.
5. Sunil Chandra Bhaduri, "Macro Economics", New Central B.K. Agency (P) Limited
6. Blanchard. "Macro Economics", Pearson Education India.
7. J.V. Vaishampayan, Macro Economics, D.K. Publishers, Lucknow.
8. N.D. Mathur and Meenakshi Anand-Macro Economic Theory, Shivam Book House Pvt. Ltd., Jaipur

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EFM 202 - Financial Analysis & Control

Unit-I Financial Analysis: Meaning, Objectives, Importance and Limitations. Analysis and Interpretation of Financial Statements.

Unit-II Ratio Analysis: Liquidity, Profitability, Activity Ratios and Capital Structure Ratios. Fund Flow and Cash Flow Analysis.

Unit-III Financial Planning: Capitalization, Capital Structure, Trading on Equity and Financial and Operating Leverages.

Unit-IV Financial Forecasting of Funds: The Cash Flow System. The projected balance sheet, Long term financial planning.

Unit-V Project Planning: Profit Objectives, Computation of Income, Cost-Volume Profit Analysis: Profit Planning: Feasibility Assessment. Management of Income: Retained earnings and dividend policies, bonus issue.

References:

1. M.Y. Khan, Financial Sciences.
2. I.M. Panday, Financial Management.
3. J.K. Dietrich, Financial services & financial Intuition.
4. R.W. Johnson, Financial Management.
5. Agarwal & Agarwal, Financial Management (English & Hindi Version)
6. M.R. Agarwal : Financial Management (Hindi & Hindi Version)
7. आर.एस. कुलश्रेष्ठ : निगमों का वित्तीय प्रबंध

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EFM 203 - Rural Marketing

Unit-I **Rural Marketing:** Nature, characteristics and the potential of rural markets in India; Socio-cultural, economic and other environmental factors affecting rural marketing; Attitudes and behavior of rural consumers and farmers.

Unit-II **Marketing of Consumer Durable and Non-Durable Goods and Services in Rural Markets:** Product planning, pricing, promotion and management of distribution channels for marketing durable and non-durable goods in rural areas: Media planning; Planning and organizing personal selling in rural markets.

Marketing of Agricultural Inputs: Marketing of fertilizers, pesticides, seeds, tractors and other agricultural implements in rural areas, Role of Subsidies in Agriculture Inputs.

Unit-III **Agricultural Marketing:** Classification of agricultural products with particular reference to seasonality and perishability; Market structure for agricultural product and its performance; Processing facilities for different agricultural products; Role and types of warehousing.

Unit-IV **Agriculture Price Determination and Commodity Trading:** Role of Agricultural Cost and Prices Commission: Role of Central and State Government Institutions and organizations in agricultural marketing; Unique features of commodity markets in India.

Unit-V Problems of Agricultural Marketing in India and Challenges. Suggestion to overcome the problem. **Co-operative Marketing:** Nature, scope and role of co-operative marketing in India and Rajasthan.

Books Recommended

1. T.P. Gopalaswamy : Rural Marketing, Vikas Publishing House Pvt. Ltd., New Delhi.
2. S.K. Velayudhan : Rural Marketing, Response Books, New Delhi.
3. Sukhpal Singh : Rural Marketing Management, Vikas Publishing House, New Delhi.

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EFM 301 – Economic Administration and Policy

Unit-I The Concept of Economic Administration: Nature, Scope, Objectives and Techniques of Economic Administration and Constitutional Provisions in India.

Unit-II Present Economic Policies and Planning: Fiscal and Monetary policies. Industrial Policy, Economic Controls, Role of SEZ in Industrial Development
Planning Commission: Formulation and Evaluation of Plans

Unit-III Administration of Financial Resources: Central and State Financial Relations, The Constitutional Provisions, VAT, Service Tax, GST.

Unit-IV Present Finance Commission: Its recommendations and effects on fiscal policy of the Government, Administration of Public Debt of India. The External resources and problems.

Unit-V Financial Administration of the Indian Union: Centre, State and Local Finances: Parliament and Public Accountability: The role of Estimates Committee, Public Accounts Committee, Comptroller & Auditor General of India, Leakage in Financial Administration. .

References:

1. Chanda, Ashok : Indian Administration
2. Bhargava, R.N.: Indian Public Finance
3. Prem Chand A:Control of Public Expenditure in India
4. Lewis, W.A.: Principles of Economics
5. Tandon, B.C. :Economic Planning
6. Mishira Puri : Indian Economy

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EFM 302 - Public Finance

Unit-I Meaning, Nature and Scope of Public Finance. Principles of Public Finance. Role of public finance in augmenting allocative efficiency, distributive justice and economic stability in the economy. Present Fiscal Policy in India, Fiscal deficit and impact on Indian Economy.

Unit-II Objective and importance of public expenditure; theoretical and economic classification of public expenditure, Canons of public expenditure, Effects of public expenditure on production consumption, distribution, Major trends in public expenditure in India.

Unit-III Meaning and significance, sources of public revenue. Functional and economic classification of public expenditure, Effects of Public Expenditure on production and distribution. Major trends in public expenditure in India. Public revenue, functional and economic classification of public revenue.

Unit-IV Taxation: Canons of taxation, the incidence and impact of taxation, Effects of taxation Measurement of degree of progression of taxes. Overall progressiveness of the whole tax system, problems of tax evasion and black money. Public Debt: Meaning, classification, theories, causes of high debt burden in India.

Concept of Federal Finance, Financial Relations between Central and State Government in India. Major criteria for transfer of funds. Adequacy of revenue in relation to functions of State Government.

Unit-V Salient features of State finance growth and distribution of revenue and expenditure under major economic heads, Problem of burden of debt to the centre overdrafts. Current Issues: VAT, GST, concept and implications.

Books Recommended:

1. H.L. Bhatia Public Finance, Vikas Publishing House Pvt. Ltd. Delhi.
2. B.P. Tyagi Public Finance, Jai Prakash Nath & Co. Meerut
3. Musgrave R.A. and Musgrave P.A.: Public Finance Theory and Practice, Tata McGraw Hill Delhi.

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EFM 303 : Research Methodology

Unit-I Research: Meaning, types, objectives, significance, research process.

Unit-II Formulating a Research Problem: Reviewing the literature, identifying variables, constructing hypotheses.

Unit-III Conceptualising a Research Design: Research design, difference between quantitative and qualitative study design.

Unit-IV Constructing an Instrument for Data Collection: selecting a method of data collection, collecting data using attitudinal scales, establishing the validity and reliability.

Unit-V Collecting and processing the data, editing, coding, tabulation, processing and displaying.

Sample Selection: Concepts, types of sampling. Format of research report, presentation, footnote, endnote, bibliography, references and webliography.

Books Recommended

1. Kothari, C.R. and Gaurav Jain: Research Methodology – Methods and Techniques, Wishwa Publication, New Delhi.
2. John Miter and William Wasserman: Fundamental Statistics for Business and Economics."
3. John E. Ullmann: Quantitative Methods in Management.
4. N.P. Agarwal: Quantitative Techniques: Ramesh Book depot, Jaipur
5. D.N. Ellhance : Fundamental of Statistics.
6. कैलाश नाथ नागर सांख्यिकी के मूल तत्व

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EFM 401 - Indian Banking System

Unit-I Structure of Indian Banking System : Central bank - Commercial banks -Cooperative banks - Regional Rural Banks-Local Area Banks: Difference between scheduled and non scheduled bank, Role of banking system in the economic growth and development

Unit-II Private sector banks in India: Their progress and performance after 1969. Foreign banks in India: Their progress and performance, Regulation of Foreign banks in India, Comparative study of Public and Private Sector Banks.

Unit-III Social control over banks, Nationalisation of banks - Arguments for and against nationalisation, Objectives of nationalisation, Progress of nationalized banks pertaining to branch expansion, deposit mobilization, credit development and priority sector lending: Lead Bank Scheme

Unit-IV State Bank of India, Subsidiary Banks to State Bank of India. Role of State Bank of India : As an agent of the RBI, as a commercial bank, its role in financing various sector. Progress and Performance of SBI.

Evolution of the Reserve Bank of India, Organization and Management of the RBI, Functions of the RBI, Credit Control Mechanism.

Unit-V Rationale and objectives of financial reforms, Recommendations of the Narasimham Committee I & II , Capital adequacy norms, Provisioning, Non Performing Assets (NPAs).

Recommended Books :

1. Financial Sector Reforms and India's Economic Development: N.A.Majumdar
2. Central Banking and Economic Development: Vasant Desai
3. Monetary Economics: S.B. Gupta
4. Banking in India - S. Panandikar
5. Banking S.N. Maheshwari
6. Report on Trends and Progress of Banking in India: Reserve Bank of India Publication.
7. Annual Reports of Banks
8. Indian banking system - Dr. Rita Swami
9. Indian Banking System - Dr. B.R. Sangle, Dr. G.T. Sangle, Dr. Kayande Patil and Prof. N.C Pawar
10. Indian Banking System - Prof. S.V. Joshi, Dr. C.P. Rodrigues and Prof. Vipul S.

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EFM 402 – Economy of Rajasthan

Unit-I Basic Characteristics of the Economy of Rajasthan. position of Rajasthan in Indian Economy. Rajasthan's Physiographic, Population, Occupational Structure. Causes of low literacy rates in Rajasthan.

Unit-II Main causes of population growth in Rajasthan. Government Measures towards Population Control. Human Resource Development in Rajasthan.

Unit-III Natural Resources: Land, Water, Livestock and Wildlife. Mineral Resources and New Mineral Policy of Rajasthan.

Agriculture: Land Utilisation, Cropping Pattern and Main Crops in Rajasthan. Agriculture Development during Five year Plans Land Reforms in Rajasthan.

Unit-IV Industry: Salient Features. Role & Importance of Small Scale Industries in the Industrial Development of Rajasthan. Main problem of small scale industries and suggestions to improve them. . Tourism Development in Rajasthan. Main Features of Tourism in Rajasthan.

Unit-V Poverty and Unemployment in Rajasthan, its Causes and Remedies. Economic Reforms in Rajasthan. Growth, Development and Planning with reference to Rajasthan, Major Development Projects of Rajasthan – Public-Private partnership model

References:

1. L.N. Nathuramka: Economy of Rajasthan
2. Government of Rajasthan: Economic Survey of Rajasthan (Latest)
3. Government of Rajasthan: Basic Statistics of Rajasthan- Latest
4. Government of Rajasthan: Statistical Abstract of Rajasthan- Latest
5. Government of Rajasthan : Five Year Plan Documents
6. G.S Bhatia: Economy of Rajasthan

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EFM 403 – DISSERTATION AND VIVA-VOCE

Dissertation	50
Viva-Voce	50

EFM A01- Public Enterprises

Unit-I Introduction: The changing role of public enterprises under different types of economic systems: the social and economic benefits of public ownerships; scope, rationale and objectives of the public sector in the present day economy.

Unit-II Patterns of Public Enterprise: Public corporation; government companies; quasi corporation, departmental undertaking; commodity boards, control boards and local authorities; mixed corporation, joint sector undertaking; leasing and other forms of association in ownership and management between the state and private entrepreneurs. Functional role of public enterprises.

Unit-III Governing Boards: Merits and demerits of functional and policy boards, internal organization: decentralization; delegation of authority and span of control; line and staff functions, the composition, size and tenure of governing boards.

Disinvestment and privatization in public enterprises, Case studies in power sector, infrastructure sector, telecom sector.

Unit-IV Financial Administration: Assessment and disbursement of compensation; pattern of the share holdings and borrowing; investment policy, price, and profit policy; budgeting; purchases and sales policies; compensation; evaluation and the criteria of efficiency. Workers participation role in the administration of public enterprises, role of trade unions.

Unit-V Control on Public Enterprises : Parliamentary, Presidential, Ministerial, Controller and Auditors Generals' Control, autonomy and accountability in public enterprises, Efficiency audit and expert reviews, users' committees and other advisory organizations; interrelations of public undertakings.

Books Recommended:

1. Hanson, A.H.: Public Enterprises and Economic Development.
2. Hanson, A.H.: Managerial problem in public enterprise.
3. Shukla, M.C.: Administrative in Business.
4. Om Prakash: Theory and working of State Corporation (with special reference to India).

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EFM A02 – Indian Economic Development and Policy

UNIT I : Economic Development and its Determinants

Approaches to economic development and its measurement — sustainable development; Role of State, market and other institutions; Indicators of development — PQLI, Human Development Index (HDI), gender development indices - Objectives and strategy of planning; Failures and achievements of Plan.

UNIT II: Demographic Features, Poverty and Inequality

Broad demographic features of Indian population; Rural-urban migration; Urbanization and civic amenities; Poverty and Inequality; Energy; Social infrastructure — education and health; Environment; Financing of infrastructure — Financial Institutions.

UNIT III: Agriculture and Industry

Institutional structure — land reforms in India; Technological change in agriculture — pricing of agricultural inputs and output; Terms of trade between agriculture and industry; Agricultural finance policy; Agricultural marketing and warehousing; Issues in food security — policies for sustainable agriculture - industrial policy; Public sector enterprises and their performance; Problem of sick units in India; Privatisation and disinvestment debate; Growth and pattern of industrialization; Small scale sector; Productivity in industrial sector; Exit policy — issues in labour market reforms; Approaches for employment generation.

UNIT IV : Public Finances

Fiscal federalism — Centre-state financial relations; Finances of central government; Finances of state governments; Parallel economy; Problems relating to fiscal policy; Fiscal sector reforms in India.

UNIV V : Money, Banking and Economic Reforms

Analysis of price behaviour in India; Financial sector reforms; Interest rate policy; Review of monetary policy of RBI; Money and capital markets; Working of SEBI in India; Rationale of internal and external reforms; Globalisation of Indian economy; W.T.O. and its impact on different sectors of the economy; Need for and issues in good governance; Issues in competition and safety nets in Indian economy.

REFERENCES:

1. Ahluwalia, I. J. and I.M.D. Little (Eds) (1999), India's Economic Reforms and Development, Oxford University Press, New Delhi.
2. Bardhan, P.K. (1999), the Political Economy of Development in India Oxford University Press, New Delhi.
3. Bawa, R.S. and P.S. Raikhy, (1997), Structural Changes in Indian Economy, Gurunanak Dev University Press, Amritsar
4. Chakravarty, S. (1987), Development Planning: The Indian Experience, Oxford University Press, New Delhi
5. [illegible]

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EFM A03 – Industrial Economics

Unit-I Nature and Scope of Industrial Economics, Rationale of Industrialization and Foundation of Modern Industry.

Unit-II Industrial Efficiency Concepts. Determinants, Measurement Efficiency and Decisions-Making Process. Competition Act 2002. Growth and Forms of Industrial Combinations-Horizontal and Vertical integration and Merger. Diversification trends.

Unit-III Industrial Finance: The Need for Finance, Type of Finance, Source of Industrial Finance Choice of Funding Internal Vs External Sources, Role of lending institutions in India's industrial development.

Unit-IV Industrial Location Analysis. The Determinant of Industrial Location. Approaches to Industrial Location Analysis, Operational approaches to industrial location, Industrial Location trends in India and backward area development.

Industrial Productivity: The concept, measurement and determinants. MSME's and their performance. Industrial development in Rajasthan-Existing infrastructure, Govt. Policy Problem of large and small industries.

Unit-V Government Regulation of Industry: The Need for Government Intervention in Industry, The Government Regulations of industries, Social Control over industry. The legal frame work of Industrial Regulation in India. Appraisal of Industrial Policy of India. Specially recent Industrial Policy.

Books Recommended:

1 S.C Kuchhal: industrial Economics

2 R.S kulshrestra: Industrial Economics (Hindi and English)

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EFM A04- Quantitative Techniques

Unit-I Meaning and Scope of Quantitative Techniques: Role of Quantitative Techniques in Business and Industry.

Unit-II Correlation Analysis : Definition and concept types and measures of studying correlations and methods. Regression analysis: Simple and multiple; its importance and application to business. Simple Partial and Multiple Correlations.

Unit-III Research and Research Design : Meaning, need of research, characteristics of good research design, identification of problem.

Unit-IV Source of primary and secondary data: Primary data collection techniques, schedule, questionnaire and interview and observation. Scaling Techniques : Purpose of scaling, techniques, Types of scales – Nominal, Ordinal, Interval and Ratio Scale.

Unit-V Sampling theory and its significance. Sampling analysis in case of large and small samples. Tests of significance-z, 't' and 'f' tests. Hypothesis testing,Theory of Attributes, Chi-Square and Analysis of Variance.

Note: The candidate shall be permitted to use battery operated pocket calculator that should not have more than 12 digit 6 functions and 2 memories and should be noiseless and cordless

Book Recommended

1. Kothari, C.R. and Gaurav Jain: Research Methodology – Methods and TEchniques, Wishwa Publication, New Delhi.
2. John Miter and William Wasserman: Fundamental Statistics for Business and Economics."
3. John E. Ullmann: Quantitative Methods in Management.
4. N P. Agarwal: Quantitative Techniques: Ramesh Book depot, Jaipur
5. D N. Elliame Fundamental of Statistics.

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EFM A05- India's Foreign Trade

Unit-I India's Foreign Trade: Pattern and structure of India's foreign trade; India's trade in services. Terms of trade, India on the world trading map; Analysis of thrus: export products and markers. Export promotion measures.

Unit-II Procedural and Documentary Framework – An Overview. Trade operations and documentation, Procedure for getting started in export – import business.

Unit-III Foreign Trade Finance and Insurance: Pre-shipment and post-shipment finance: Sources and schemes of foreign trade finance. Exim Bank, ECGC.

Unit-IV Foreign Exchange Facilities and Regulations Foreign exchange facilities and exchange rate mechanism: Regulatory framework – FEMA and its objectives and provisions: Other acts and regulations.

Unit-V Foreign Investments: India's foreign investment policy and flows: India's investments abroad – pattern and structure; Indian Joint ventures in foreign countries and their operations. FDI : Rationale and government policy.

Balance of Payment Account India's Balance of payment account, current account deficit and adjustment policies; foreign reserves and debt situation.

Books Recommended:

1. Ministry of Commerce. Export Import Policy, Government of India, New Delhi.
2. Nayyar Deepak, Foreign Trade Sector, Planning and Industrialization in India.

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EFM A06 -Industrial Development in Rajasthan

Unit-I **Introduction:** Need, scope and significance of industrial development in Rajasthan, Retrospect's and prospect of industrial development in Rajasthan. Infrastructure facilities for the industrial development in Rajasthan.

Unit-II **Main Industries in Rajasthan:** Sugar, Cement, Salt, Fertilizer, Oilseed Processing, Textile, Jem & Jewellary, Marble etc.

Unit-III Govt. Agencies for the Industrial development in Rajasthan. Industrial Policy of Rajasthan, Promotional Schemes, Bureau of Industrial Promotion and Regulations.

Unit-IV **Financial Resources:** Role of financial institutions, Role of FDI & FII in the Industrial Development.

Industrial Areas and Industrial Estates. Problems and suggestions of Industries in Rajasthan

Unit-V Industrial Environment in Rajasthan. A case study of RIICO, RFC, DICs.

Books Recommended:

1. L.N. Nathuramka: Economy of Rajasthan
2. Government of Rajasthan: Economic Survey of Rajasthan (Latest)
3. Government of Rajasthan: Basic Statistics of Rajasthan- Latest
4. Government of Rajasthan: Statistical Abstract of Rajasthan- Latest
5. Government of Rajasthan : Five Year Plan Documents

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EFM A07- Agricultural Economics

Unit-I Nature and Scope of Agricultural Economics. Rationale of Agriculture in Indian Economy. Agriculture Efficiency: Concept, Its Measurement. Agricultural Growth and Development in plan period with special reference to two immediate previous plans.

Unit-II Agricultural Productivity: Concept, Measurement and Determinants. Risk and uncertainty factors in agriculture sector. Agricultural Inputs: Seeds, Fertilizer, Pesticides, Irrigation and Power.

Unit-III Agricultural Finance: Institutional and non Institutional Finance, Kishan Credit Card and Crop Insurance.

Unit-IV Agricultural Price: Price Policy, Support Price, Procurement Price, Rationale of Subsidy in Agriculture, Input Cost and Price Policy.
Agriculture Marketing: Problems and Challenges, Export of Agriculture Product.

Unit-V Infrastructure Development in Agriculture. New Agriculture Policy: Green and White Revolution. Investment in Agriculture Sector.

Books Recommended:

1. Sukhpal Singh: Rural Marketing Management, Vikas Publishing House, New Delhi.
2. Ruddar Dutt, K.P.M. Sundharam, Indian Economy, S. Chand & Sons, New Delhi.

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EFM A08 -Operations Research

Unit-I Operations Research: Concept and significance of operations research: Evolution of operations research: steps in designing operations research studies; Operations research models.

Unit-II Linear Programming and its Applications: Graphic method and Simplex method; Duality problem; Transportation problem; Assignment problem.

Unit-III Game Theory: Meaning, two person zero sum game, mix. Strategies.
Queuing Theory: Meaning, concept and problem related with queuing theory.
Assignment: Solving the problem, cases of unbalanced problems, unacceptable assignment.

Unit-IV Simulation: Application of simulation techniques; Monte-Carlo approach.

Unit-V Net-work Analysis: Introduction to PERT and CPM; Application areas of PERT and CPM.
Decision Theory: Maximum, Minimax and maximax expected pay off and regret, Decision tree analysis

References:

1. N.P Agarwal: Operational Research, Ramesh Book Depot Jaipur
2. Sharma J.K., Operations Research – Theory and application MacMillan India Limited, New Delhi.
3. Taha Hamady: Operations Research An introduction prentice Hall, Delhi.
4. Kapoor, V.K. : Operational research, Sultan Chand and Sons, New Delhi.
5. Nag, N.K., Quantitative Methods, Kalyani Publisher, Jaipur.

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EFM A09- Economic Environment in India

Unit-I Economic Environment- Meaning, factors affecting Economic Environment, Basic features of India Economy.

Unit-II Economic Policies- Agriculture Policy, Industrial Policy, Commercial Policy, Fiscal Policy.

Economic Planning- Meaning, Importance. Objectives & Techniques of Planning.

Unit-III Significance of Agriculture in Indian Economy, and New Agriculture Strategy, Agriculture Finance (Specially Kisan Credit Card), Nature and Causes of risk and uncertainty in agriculture, Measures to control risk and uncertainty. Agriculture & W.T.O

Unit-IV Foreign Trade, Volume, Composition and Direction, Export Promotion.

Unit-V Indian Economic Problems: Poverty, Unemployment, Economic Disparities and Population Explosion.

Books Recommended:

1. Ruddar Dutt & K.P.M. Sundharam : Bhartiya Arthvivastha
2. A.N. Agrawal: Bhartiya Arthvivastha
3. Laxminarayan Nathuramka: Indian Economy
4. Chaudhary Charan Singh: Bharat ki Bkayanaha Arthvivastha Sthiti
5. Ruddar Dutt & Sundharam : Indian Economy
6. A.N. Agarwal: Indian Economy
7. N.L. Agarwal: Bhartiya Krishi Ka Arthtantra
8. Mishra and Puri: Indian Economy (Hindi & English Version)
9. N.D. Mathur : Economic Environment in India, Shivam Book House (P) Ltd., Jaipur.

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EFM A10- Development Economics

Unit-I Nature and importance of economics development, common characteristics of under developed countries

Unit-II Innovation and Development, Labour and capital saving innovations- choice of techniques. Natural Resources, Economic Development and Environmental Degradation.

Human Development: Its role, progress and direction, poverty, inequality, unemployment measures MNREGA. Agriculture and Food Management in India. Population Policy.

Unit-III Infrastructure development its role and growth. Inclusive growth and distributing justices.

Unit-IV Foreign Investment and Economic Development, Stages of Economic Growth, Various Economic Growth Models.

Unit-V Fiscal Developments and Public Finance for accumulation of capital and acceleration of growth. Financial Resources, Policy Response and Future Prospects.

Books Recommended:

2. Simon Kuznets: Economics Growth and Structure (HEB)
3. Amlan Datta: paths to Economic Growth (Allied Publishers).
4. Enke Dobb: Economic Development (Prentice Hall).
5. Maurice Dabb: Economics Growth and Planning (Routledge and Kegan Paul)
6. Mahalanobis: Talks on Planning
7. Five Year Plans: Government of India.
8. Economics Survey: Government of India.

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EFM A11 - Infrastructure Management

Unit-I An overview of infrastructure: Meaning and scope, existence and availability, Infrastructural Gaps.

Unit-II Components of infrastructure: Physical, economic and social infrastructure.

Unit-III Transmission, Trading Access and Exchange Energy, Petroleum and Gas, Coal, Railways, Roads, Civil Aviation, Ports, Telecommunication. Urban Infrastructure, Health, Education and Drinking Water.

Unit-IV Investment and Financing of infrastructure projects, financial structure and corporate governance, Role of Foreign Investment, Policies and strategies during and after reforms (LPG Regime)

Unit-V Problems of Rural Infrastructure, Financing Scenario in India
Positions of infrastructure in Rajasthan-Challenges and efforts made by Government in Rajasthan.

Books Recommended:

1. Lawis, W.A.: The Theory of Economic Growth.
2. Planning Commission, Eleventh Five Year Plan (2007-12,) Vol.II
3. Centre for Science and Development: The State of India's Environment, 1982, Ch.9.
4. Government of India, Economic Survey
5. Ministry of Railways: Explanatory Memorandum on the Railway Budget
6. Planning Commission, Eleventh Five Year Plan (2007-12), Vol.II, Social Sector Services.
7. Government of India, Economic Survey
8. World Bank Reports
9. Peter Berman & Rajeev Ahuja (2008), Government Health Spending in India.
10. Economic and Political Weekly.

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EFM A12 – Regional Economics

UNIT – I Objectives and scope of regional economic analysis — Inter-disciplinary aspects of regional economics — The regional economic problems — Causes.

UNIT – II Theories of regional economic development: Cumulative causation (Perroux, Myrdal, Hirschman) — Export base theory - Central place theory (Christaller), Sector theory (ColinKuznets) - Stage theory (Rostow).

UNIT – III Theory of location — Weber's theory of location — Spatial dispersion of progress — Dispersion of innovation and technical progress — Sectoral growth centres — Area — Urban bias.

UNIT – IV Regional disparities — Trends in regional income disparities — Inter-state variations of poverty and unemployment — Comparative analysis of industrial development in different states — Agricultural development in different stages.

UNIT – V Regional imbalances — Regional economic advantages and regional optimization and financial institution in India — Inter-state disparity and fiscal devaluation in India — Problems of developing the backward area — Regional planning in India during the plan period — Area approach - Integrated overall development — Regional planning in rural India under various plan period.

REFERENCES:

1. Richardson (1960), Elements of Regional Economics, Penguin Books, London.
2. Myrdal G (1968), Economic theory and Underdeveloped Regions, Vora, New Delhi.
3. Misra R.P (1974), Regional Development Planning in India, Vikas, New Delhi.
4. Brahmananda, P.R. and Panchmukhi, (2001), Development Experience in the Indian Economy, Bookwell, New Delhi.

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EFM A13 - International Business Environment

Unit-I Meaning, scope, significance of international business environment.

Unit-II An overview of different environment : Economic environment, political and regulatory environment, demographic environment, social/cultural environment, Business environment.

Unit-III International Financial institutions : IMF and International Liquidity , World Bank and its affiliate, Asian Development Bank.

Unit-IV International Investment: Types, significance, factors affecting International investment.

Multinational Corporation: Meaning, importance, dominance of MNCs, code of conduct, multinational companies in India.

Unit-V Globalization: Meaning, features, stages, essential conditions for globalization, merits and demerits of globalization.

Books Recommended:

1. Oxford handbook of International business- Rugman, Alan M., Brewer, Thamas L.
2. International Business: environment and operations – John Daniels, Lee Radebaugh, Daniel Sulivan.
3. Doing business anywhere the essential guide to going global - Travis, T. John Wiley & Sons (2007).
4. International business- Dowling. P; Liesch. P; Gray, and Hill, C.
5. International business- Competing in Global markets- Charles W.L Hill, McGraw Hill, 2005
6. International Business Environment : Francis Cherunilam, Himalaya Publishing House.

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EFM A14- International Finance

Unit-I International Finance: Meaning, Subject-matter, Scope and Problems of International Finance, Multinational Financial System, Transfer pricing mechanism and Operations.

Unit-II International Trade: Necessity, Significance and Problems of International Trade, the Comparative Cost Theory of International Trade, Balance of Payments-Items and Causes of Disequilibrium and their Remedies. Methods of International Payments.

Unit-III Documentary Credit: Meaning, Characteristics, Parties, Types, procedures and Documents Used in a Documentary Credit. Exchange Rates: Theories, Fluctuations and Quotations, Indian system of foreign exchange rate and currency basket system relating to hard and soft currency.

Unit-IV Forward Exchange: Procedure, Problem and Benefits of Dealings in Forward Exchange. Exchange Control: Meaning, Methods and Exchange Control in India. Short-Term Sources of Finance: The Role of Discounting and Accepting Houses. Long Term Sources of Finance: The Export Import Bank of U.S.A, Japan and India.

Unit-V Insurance of Exporter's Credit: The Export credit and Guarantee Scheme in U.K and India, Export Credit & Guarantee Corporation and its role in promoting Indian exports.

Book Recommended:

1.International Finance	Avadhani V.A.
2.Management of Indian Financial Institutions	Srivastava R.M.
3.Financial Management	Ravi M. Kishore
4.Foreign Exchange	G.S Lall
5.Multinational Financial Management	Alan Shapir
6.An Introduction of International Economy	B.O Soderstion
7.Introduction to International Economy	D.M Mithani

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EFM A15- Project Management

Unit-I Project Planning: concept and objectives of project planning. Monitoring and control of investment projects. Relevance of social cost benefits analysis. Identification of investment opportunities. Pre-feasibility studies.

Unit-II Project preparation: Technical feasibility, estimation of costs, demand analysis and commercial viability, risk analysis, collaboration arrangements, financial planning, estimation of fund requirements, sources of funds. Loan syndication for the project. Tax considerations in project preparation and the legal aspects.

Unit-III Project Appraisal: Business criterion of growth liquidity and profitability social cost benefit analysis in public and private sectors, investment criterion and choice of techniques. Estimation of shadow prices and social discount rate.

Unit-IV Review/Control-Evaluation of project/PERT/CPM.

Cost and Time Management issues in Project planning and management.

Unit-V Financial Services: Need for financial services, various types of financial services. Fund Based and Non-Fund Characteristics and role of financial intermediaries

Books Recommended:

1. Khan M.Y Financial Services.4th ed. McGraw Hill New Delhi 2001.
2. Prasanna Chandra, Project Preparation Appraisal and Implementation. 5th ed. Tata McGraw Hill. 2002
3. Dietrich J.K. Financial Services and Financial institutions: Value Creation in Theory and Practice. Prectice Hall New Jersey 1996
4. Clifford Gray, project Management. Richard D. Irwin 2005.
5. N P Agarwal project management , RBD Jaipur.
6. M R Agarwal , project management , Garima publication Jaipur

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EFM A16- Economic Growth and Development

Unit I: Basics in Economic Growth

Modern economic growth –basic features, trends and patterns- relevance of historical experience to contemporary Under Developed countries- limited relevance- factors for – differing initial conditions- role of international migration and international trade.

Unit II: Growth and Development

Growth and development- conceptual issues. Issues in measurement- national income and per capita income – International comparison of per capita incomes – measurement of purchasing power parity. GNP- a biased index of development and welfare- construction of poverty weighted index of social welfare. Alternative measures of development – human development index- gender based development index, gender empowerment measure- international poverty index, global hunger index- social sector and development- Education and health.

Unit III: Growth Theories - I

Approach to the study of economic development – linear stage theory, structural change models, Neo Marxian dependency approach, false paradigm model, dualistic approach, neo-liberal free market approach, endogenous growth theory.

Unit IV: Growth Theories - II

Growth models: Harrod-Domar-knife edge equilibrium problem. Cambridge models- Joan Robinson, Kaldor, Neoclassical growth models- Solow swan Meade – criticism of neoclassical theory-emergence of endogenous growth models. Technological progress- embodied and disembodied – Hicks and Harrod version, production function approach to growth, total factor productivity and growth accounting.

Unit V: Development Policies

Development and environment: Market based approach to environmental analysis. Harvesting of renewable nonrenewable resources, Measuring environmental values. economic growth and environment – sustainable development- policy measures. Ill effects- rain forest destruction, green house gases, global warming, climate change- policy- policy options in developing and underdeveloped countries.

Books Recommended

1. Debraj Ray, (1998). Development Economics Oxford University Press.
2. Simon Kuznets, (1966). Economic Growth, Rate structure and Spread, Yale University Press.
4. Michael P. Tadaro,(1998). Economic Development Longman,
5. Adam Szirmai, (2005). Dynamics of socio economic development-An introduction, Cambridge University Press.
6. Amartya Kumar Sen, Growth Economics, Penguin Harmondsworth
7. Gerald Meir, (2003). Leading Issues in Economic Development, Oxford University Press.
8. A P. Thirwall, (1994). Growth and Development ELBS

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EFM B01 – Business Budgeting

Unit-I Budgeting: Meaning, Origin and significance: Business budgets, Surplus budgets, Deficit budgets and its limitations in Public/Private sector institutions; Budget as an instrument of corporate planning; Framing of Government and Business Budget; Budget organization, Budget Committee and Time framework; Annual, Half-Yearly, Quarterly, Monthly, Weakly and Daily Budgets.

Unit-II Operational Budgets: Feature of sound business budgeting; Materials budget; Labour budget, Overhead budget.

Unit-III Financial budgets; (Detailed study of various methods of preparing cash budgets) Practical application of flexible budgeting; Master budget, Human Resource budgeting, Budgeting of Time and other Scarce (Economic) Resources.

Unit-IV Performance Budgeting: The concept, evolution and its applicability to Government and business with special reference to India. Steps in the preparation of performance budgets, follow-up, Evaluation (including Concurrent Evaluation) and Monitoring: Information management, success and limitations of performance budgeting in India with special focus on Banks, Financial Institutions and Public Enterprises, budgetory control.

Unit-V Zero base budgeting-its theory and practice with special reference to India.

Budgeting and Management Reports: Financial forecasting and Investment decisions, External reporting of security markets. Government (Planners/Policy-Matters) and other agencies, Preparation of various performance, Reports for presentation to various levels of management, Timeliness, Reliability and Relevance of such reports and their practical formutations.

Books Recommended

1 व्यावसायिक बजटन एम.आर. अग्रवाल

2 व्यावसायिक बजटन एवं पूंजी व्यय निर्णय अग्रवाल विजय, सुरोलिया

3 व्यावसायिक बजटन ओसवाल दण्डन, शर्मा चिरानिया

4 Business Budgeting Agarwal, Vijay & Surolia

5 Business Budgeting : Oswal, Sharma

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EFM B02 : Export Finance

Unit - I: Global Trade & Finance — Foreign Trade Policy. Procedure & Documentation; Balance of Payment — Visible & Invisible Trade, Customs & Excise — Procedure & Documentation; Shipment Finance — Pre & Post, Sources of Funds: Financing Instruments; Forex & Export Management.

Unit-II: Pre-Shipment Finance - Forms of Credit, Purpose, Selection Criteria, Credit Terms; Domestic Currency Loans; Letter of Credit — Types & Procedures; Export Bills — Purchase, Negotiation, Discounting, Rediscounting: Procedures of Settlement.

Unit -III: Post Shipment Finance — Forms of Credit, Purpose, Selection Criteria, Credit Terms; Foreign Currency Loans — Merits & Limitations, Procedures, Repayment; Credit Risk — Assessment & Management.

Unit-IV: Financing Strategies — Import Vs Export Financing Strategies — Framework, Determinants, Implementation & Management; Financial Collaboration - Competitive Advantage, Market Expansion,; Hybrid Financing Strategies.

Unit-V: Financing Institutions & Export Promotion — Role of World Trade Organization, Economic Unions, Reserve Bank of India, EXIM Bank of India, Export Credit Guarantee Corporation, Banks & Financial Institutions; Export Promotion — Export Councils & Boards, Export Oriented Units, Special Economic Zones, Economic Promotion Zones, Economic Processing Zones, Agricultural Export Processing Zones; Logistics Financing for Export Promotion - Issues & Challenges.

Books REcommended

1. Anders Grath (2008),The Handbook of International Trade and Finance, Kogan Page Publishers2008 Reprint
2. James Calvin Baker (2003), Financing International Trade, Greenwood Publishing Group. 2003 latest edition
3. Nabhi's Manual, "New Import Export Policy and Handbook of Procedures', Vol.1 2002-07: As Amended Upto 4.4.2002, Oscar Publications.
4. David Grant, Douglas M. Lambert, James R. Stock, Lisa M Ellram, (2005) 'Fundamentals of Logistics Management', Mc Graw Hill. 2006 reprint

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EFM B03 - Security Analysis

Unit-I Introduction: Meaning and significance of security analysis, type of securities, Investment: Nature and scope of investment analysis, Elements of investments avenues of investment, Approaches to investment analysis, concept of return and risk, Security return and risk analysis, Measurement of risk and return.

Unit-II Financial Assets: Types and their characteristics, Source of financial information.

Unit-III Public Issue: SEBI guidelines on public issue, Size of issue, Pricing of issue, Promoters contribution Appointment of Merchant Bankers, Underwriters, Brokers, Registrars, and Managers, Bankers & Allotment of shares.

Unit-IV Secondary Market: Role, Importance, Types of brokers, Trading mechanism, Listing of security, Depository - Role and Need Depository Act – 1996.

Valuation of Security: Bonds, Debentures, Preference shares, Equity Shares.

Unit-V Fundamental Analysis: Economic Analysis, Industry Analysis and Company Analysis. Technical Analysis: Trends, Indicators, Indices and Moving Averages applied in Technical Analysis.

Reference books:-

1. Security analysis and portfolio management .... P. Pandian
2. Investment analysis and portfolio management – madhumati. Rangarajan
3. Security analysis and portfolio management – Fiscer and jorden

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EFM B04 - Quantitative Techniques

Unit-I Meaning and Scope of Quantitative Techniques: Role of Quantitative Techniques in Business and industry.

Unit-II Correlation Analysis : Definition and concept types and measures of studying correlations and methods. Regression analysis: Simple and multiple; its importance and application to business Simple, Partial and Multiple correlations.

Unit-III Research and Research Design : Meaning, need of research, characteristics of good research design, identification of problem.

Unit-IV Source of primary and secondary data: Primary data collection techniques, schedules, questionnaire and interview and observation. Scaling Techniques: Purpose of scaling, techniques, types of scales – Nominal, Ordinal, Interval and Ratio scale.

Unit-V Sampling theory and its significance. Sampling analysis in case of large and small samples. Tests of significance-z 't' and 'f' tests. Hypothesis testing. Theory of attributes, Chi-Square and analysis of Variance.

Note: The candidate shall be permitted to use battery operated pocket calculator that should not have more than 12 digits 6 functions and 2 memories and should be noiseless and cordless.

Book Recommended

1. Kothari, C.R. and Gaurav Jain: Research Methodology – Methods and TEchniques, Wishwa Publication, New Delhi.
2. John Miter and William Wasserman: Fundamental Statistics for Business and Economics."
3. John E. Ullmann: Quantitative Methods in Management
4. N.P. Agarwal: Quantitative Techniques: Ramesh Book depot, Jaipur
5. D.N. Ellhame: Fundamental of Statistics.
6. [illegible] नाथ नागर सांख्यिकी के मूल तत्व

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EFM B05- Capital Expenditure Decisions

Unit-I Capital expenditure planning phases, Qualitative factors and judgment, Strategic aspects of Investment decisions.

Production decisions: Utilization of full production capacity. Starting a new product in place of old. Determination of product mix on the basis of key factor.

Unit-II Capital expenditure and investment ranking techniques, Practical application of Pay-back. Average Rate of Return and Discounted cash flow (Time-adjusted) Techniques, Present value, Net present value, Profitability index, Benefit-Cost, Relation Internal Rate of return and Terminal value method,

Unit-III Capital budgeting under uncertainty: Inflation, Deflation and Indexation vis-à-vis capital budgeting.

Unit-IV Investment Decisions: Investment timing and duration, Replacement of an existing asset. Investment decisions under Inflation, Investment decisions under capital Rationing.

Unit-V Risk analysis in Capital budgeting: Nature of risk, conventional techniques to handle risk, Sensitivity analysis, Statistical techniques to handle risk, Decision trees for sequential investment decisions.

Books Recommended :

1. व्यावसायिक बजटन : एम.आर. अग्रवाल
2. व्यावसायिक बजटन एवं पूंजी व्यय निर्णय : अग्रवाल, विजय, सुरोलिया
3. व्यावसायिक बजटन : ओसवाल, टंडन शर्मा, चिरानिया
4. Business Budgeting : Agarwal, Vijay, Surolia
5. Business Budgeting : Oswal, Sharma
6. वित्तीय प्रबंध के मूलतत्व : जाट, गुप्ता, मेन्दीरत्ता, सैनी, मिश्रा
7. वित्तीय प्रबंध एवं वित्तीय विश्लेषण : अग्रवाल, अग्रवाल
8. Management Accounting : Man Mohan Goyal
9. Financial Management Accounting : Ravi M. Kishore
10. Financial Management : M.Y. Khan and T.R. Jain

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EFM B06 - Portfolio Management

Unit-I Portfolio Analysis: Estimated rate of return and standards deviation of portfolio, marketwise risk and return optimization.

Unit-II Single index model, portfolio total risk, portfolio market risk and unique risk. Sharps optimization solution.

Unit-III Capital Market Theories: Capital market line and security market line, risk free lending and borrowings, factors model, arbitrages price theory, two factors and multifactor model, principal arbitrage portfolios.

Unit-IV Efficient Market Hypothesis:

Portfolio Performance Evaluation: Measurement of return, risk adjusted measure of return, market timing, evaluation criteria and processors.

Unit-V Mutual Funds : Concept, objectives functions and types of mutual funds, Assets Management companies.

Books Recommended:

1. Security analysis and portfolio management P. Pandian.
2. Investment analysis portfolio management, Madhumati Ranganrajan.
3. Security analysis and portfolio management, Fiscer and Jorden.

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EFM B07 - Financial System in India

Unit-I Concept of Financial System; Economic Development and Financial System; Growth of Indian Financial System, Present Composition.

Unit-II Money Market: Emerging Structure of Indian Money Market; Instruments of Money Market; NBFC's and Mutual Funds – Regulatory Guidelines;
Commercial Banks – Role in Industrial Finance and Working Capital Finance.

Unit-III Capital Market: Concept, Structure and Functions of Capital Market; Primary Market-Instruments of Issue and Methods of Flotation; Secondary Market – Concept, Market Players, Trading System and Settlement.

Unit-IV Indian Institutional Structure – Indian Financial Institutions: Development Banks-IFCI, ICICI, SFCs, SIDBI and IDBI: Investment Institutions –UTI and other Mutual Funds; Insurance Organization- Life Insurance Corporation of India.

Unit-V International Institutional Structure-International Financial Institutions: Organization, Management; Functions and Working of International Financial Institutions-International Monetary Fund (IMF), International Banks of Reconstructions and Development (IBRD). International Development Association (IDA), and Asian Development Bank (ADB).

Books Recommended:

1. Machiraju; Indian Financial System, Vikas, New Delhi.
2. Rangrajan C., Reform of the Financial Sector: Choices and Lessons; RBI Bulletin Dec., 1994.
3. RBI, Annual Report.
4. Ali Ber, Robert, Z; Money Banking and Economy, WWN & Co., New York.
5. Report of the Committee on Banking Sector, 1998.
6. Report on Trend and Progress of Banking in India (Latest).
7. RBI Bulletin 1991 and latest.
8. SEBI Main Guidelines and Classifications.

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EFM B08 - Operation Research

Unit-I Operations Research: Concept and significance of operations research: Evolution of operations research: steps in designing operations research studies; Operations research models.

Unit-II Linear Programming and its Applications: Graphic method and Simplex method; Duality problem; Transportation problem; Assignment problem.

Unit-III Game Theory: Meaning, two person zero sum game, mix. Strategies.

Queuing Theory: Meaning, concept and problem related with queuing theory.

Assignment: Solving the problem, cases of unbalanced problems, unacceptable assignment.

Unit-IV Simulation: Application of simulation techniques; Monte-Carlo approach.

Unit-V Net-work Analysis: Introduction to PERT and CPM; Application areas of PERT and CPM.

Decision Theory: Maximum, Minimax and maximax expected pay off and regret. Decision tree analysis

References:

1. N.P Agarwal: Operational Research, Ramesh Book Depot Jaipur
2. Sharma J.K., Operations Research – Theory and application MacMillan India Limited. New Delhi.
3. Taha Hamady: Operations Research – An introduction prentice Hall, Delhi.
4. Kapoor, V.K. : Operational research, Sultan Chand and Sons. New Delhi.
5. Nag, N.K.: Quantitative Methods, Kalyani Publisher, Jaipur.

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EFM B09 - International Banking

Unit-I International Banking – Concept and origin of International Banking Institutions with special reference to Central Banking System.

Unit-II Study of International Monetary and regional financial institutions.

Unit-III The I.M.F., objects, organization, capital, achievements and failure. International liquidity and SDR.

World Bank and its affiliates. The Asian Development Bank.

Unit-IV The London, New York and Singapore Money Markets, Features and Characteristics.

Unit-V Off Shore banking, the Organisation of Central Banking in the United Kingdom, United States of America, Japan and Brazil.

Books Recommended:

1. DeCock : *Central Banking*
2. Sen. S.N.: Central Banking on Underdevelopment Economic
3. Sayers, R.S. : *Modern Banking*
4. Annual Report o Central Banks of Different Countries
5. Chandler, L.V.: *Economic of Money and Banking*
6. Kent R.P.: *Money and Banking*
7. Brain Tew: *International Institutions.*

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EFM B10 – Bank Management

Unit-I The Banking structure in India : Commercial Banking : Structure and evolution, the nationalisation of Banks, Banks in the new millennium challenges.

Unit-II Central Banking System : Management and organisation of RBI, function of RBI, supervisory norms for banks.

Credit Management: Objectives, importance, credit culture and common credit problems. Loan and advances, types of loans, cash, credit, overdraft and term loan. Primary and collateral securities, modes of creating charges on securities. Concept of Hypothecation, Bank guarantee, letter of credit.

Unit-III Non performing assets (NPA) management, prudential norms, capital adequacy, income recognition and asset classification, corrective measures in managing NPAs.

Unit-IV Marketing of banking services: Financial services, characteristics of financial services, strategy of marketing – Market segmentation, Marketing Research and Customer Analysis, promotion and advertising of services.

Unit-V Quality circles : Concept, quality circles in Banks – process, importance and objectives. Steps involved in quality circles, quality audit and time management, Management Information System in Banks.

Book Recommended

1. R. Parameswarn and S. Natrajan-Indian Banking-Vikas, New Delhi.
2. R.M Srivastava-Management of Financial Institutions, Himalaya, Mumbai
3. Vasant Desai : Bank Management
4. Bharat V. Pathak Indian Financial System.

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EFM B11 - Investment Management

Unit-I Investment Concept, Investment and Gambling, Influencing factor of investment decision: Financial decision Vs Investment, Process of Investment Program.

Unit-II Investment Avenues: Investment Classification: Bonds, Preference Shares, Equity Shares, Public Issue, Private Placement, Right Issue, Government Securities, Post Office Deposits, Real Estates, venture Capital, Mutual Fund, Precious Metals, Life Insurance etc.

Risk & Return: Meaning and Concept of Return, Various Techniques Used in Measurement of Return. Classification of Risk, Measurement (SD & Variance) and Management of Risk

Unit-III Valuation & Analysis of Securities: Bond Theories & Valuation Models, Valuation of Bonds, Preference Share, Equity Shares, Real Estate

Unit-IV Investment and Tax Planning: Exemption and Deduction, Equity Analysis & Equity Research Report.

Unit-V Fundamental Analysis, Technical Analysis, Interpreting Research Report.

Book Recommended

1. Prasanna Chandra- Investment and Portfolio Management
2. S.K Evein- Security Analysis and Portfolio Management
3. V.K Bhalla- Investment Management.
4. Preeti Singh – Investment Management

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EFM B12 – Fund Management in Banks

UNIT I: Nature and Scope of Fund Management — Allocation of funds — Ill of Misallocation of funds Based Committee Norms — Management of capital Funds in Commercial Banks; Meaning and function of capital funds; Necessity of adequate capital funds; Standard to measure capital adequacy; Pre-sent position in India with respect to capital adequacy

UNIT II: Liquidity Management in Commercial Funds and Asset Liability Management Theories of liquidity Management; Priorities in the employment of bank funds: Problems in resource allocation in India. Management of capital Funds in Commercial Banks; Meaning and function of capital funds; Necessity of adequate capital funds: Standard to measure capital adequacy; Present position in India with respect to capital adequacy.

UNIT III: Management of Reserves: Nature and purpose of primary reserves; Legal reserves-nature and function; Working reserve-nature and function; cash management in commercial banks. secondary Reserves: Nature and function of secondary reserves; factors influencing secondary reserves: Estimation and management of secondary reserves.

UNIT IV: Management of Bank Deposits: Relevance of marketing approach to deposit mobilization In banks: Concept of bank marketing; Formulating marketing strategies for commercial banks-opportunity analysis, target market, competitive positioning; Implementing marketing strategy.

UNIT V: Management of Bank Loans: Characteristics of commercial loans: Loan policy in a commercial bank, evaluating loan application - credit information, credit analysis, credit decision; Priority sector lending policies of commercial banks in India. Management of Bank Investments. Nature and principles of security investment of commercial banks; formulating investment policy: Volume and pattern of investment of commercial banks in India.- Structureand pattern of income and expenditure in commercial banks in India

Books Recommended:

1. Jadhav, Narendra: Challenges to Indian Banking ed. Macmillan, New Delhi
2. Joel, Bessis, Risk Management in Banking John Wiley.
3. Sinkey, Joseph F. Jr. Commercial Banks Financial Management. Prentices Hall Delhi.
4. Smith, E.R Fire Insurance Theory & Practice, Stone & Cox Turner, H.S. Principles of Marine Insurance Store and Cox
5. S. singh Yogesh Singh, Risk Management in Banks, Excel Books, 2008 Bharati V. Rathok, Indian Financial System, Pearson Edn, 2006
6. Neelam C. Gulati "Principle of Banking Management" Excel Books, New Delhi 2010
7. P. Subba Rao "Principles of Practices of Bank Management, Himalaya Publishing House Bombay 1988

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EFM B13- Merchant Banking & Financial Services

Unit-I Financial system - Introduction, Contemporary Trends in its Growth and Development, Regulatory Framework, Financial Services: Nature and Introduction.

Unit-II Merchant Banking - Functions, Merchant Banking in India, SEBI guidelines for Merchant Bankers, Role of merchant bankers in fund raising -Managing public issue, Pre and Post issue ,Book Building - Private placement-raising of funds through bonds and public deposits.

Unit-III Security Markets - Legal Environment: SEBI Act, 1992, Securities Contract Regulation Act 1956, Companies Act 2013 (various provisions relating to securities). RBI rules and guidelines for FII'- Types of Markets: Primary and Secondary market, primary market - its role and functions-Methods of selling securities in primary market-New financial instruments.

New Issues - SEBI guidelines for public issues - pricing of issue, promoters contribution, appointment and role of merchant bankers, underwriters, brokers, registrars and managers, bankers etc., Underwriting of issues: Allotment of shares, Procedures for new issues, e-trading.. Secondary market - Role, importance. organization of stock exchanges- listing of securities in stock exchanges; Trading mechanism-Screen based trading: insider trading; Take-over: Internet based trading.

Unit-IV Mutual Funds - Types - Schemes - Role of Private and Public Sector Funds - Evaluation of Performance of Fund Manager - SEBI Guidelines on Mutual Funds - Depositories - Role and need: The depositories Act 1996; SEBI (Depositories and Participants Regulation) 1996; SEBI (Custodian of Securities) Regulation 1996; National Securities Depository Ltd. (NSDL); Depository participant.

Unit-V Activities of Other Financial Service Providers - Credit Rating Agencies - Nature - Factors considered - Rating procedure - Instruments rated - Revisions in rating, Non Banking Finance Companies, Leasing Companies- Lease rental determination - Break even lease rentals - Factoring Service - Recourse and Non Recourse factoring: Venture Capital Funds - Role and Progress in India

Books Recommended:

1. Machi Raju, MR: Merchant Banking; Wiley Eastern Ltd.; New Delhi.(Text Book)
2. Dalton, John M,: How the stock Market works, Prentice Flail, New Delhi.
3. Gupta, L.C.: Stock Exchange Trading in India; Society for Capital Market Research and Development, Delhi.
4. Machi Raju, H.R: Working of Stock Exchanges in India; Wiley Eastern Ltd.: New Delhi
5. Website of bseindia.com, nse-india.com
6. Chandratre KR., et al: Capital issue. SEBI & Listing; Bharat Publishing House, New Delhi.
7. Donald E. Fisher, Ronald J.Jordan Security Analysis and Portfolio Management, Prentice Hall, New Delhi

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EFM B14 - Treasury & Derivatives Management

Unit-I Debt Instruments: Fundamental Features , Indian Debt Markets, Market Segments, Participants - Secondary Market for Debt instruments , Bond Market , SEBI (Disclosure and Investor Protection) Guidelines 2000

Unit-II Central Govt Bonds : G Secs, Tenor and Yields , Primary Issuance Process, Participants, SGL Accounts , Dealers, Secondary Market , Negotiated Dealing System , T bills , Cut off Yields , State Govt Bonds , Call Money Markets , Participants Corporate Debt : Bonds , Market Segments, Issue Management and Book Building, Terms of Debenture Issue , Credit Rating.

Unit-III Guidelines for Commercial Paper, Repos , Yield Curves and Term Structure of Interest Rates, Duration , Fixed Income Derivatives

Introduction to Derivatives: Products , Participants , Exchange Traded , Derivatives at NSE, Distinction between Futures and Forwards and Options-Index derivatives , Payoffs in Futures and Options , Cost Carry Model , Black and Scholes Model of Option Valuation

Unit-IV Strategies : Simple strategies of Hedging, Speculation and Arbitrage from Index Futures and Stock Futures , Long stock, short Nifty; short stock and long Nifty; Bullish index and long Nifty; Bearish index, short Nifty Futures; Strategies using Options : Bullish Index, Buy Nifty calls and sell Nifty puts-Bull spreads , Buy a call and sell another , Put/Call Parity with spot options arbitrage.

Unit-V Trading & Clearance: Trading system , Trader Workstation , Clearing entities , Open position calculation , Margin and settlement , Regulatory Framework , Risk Management.

Books Recommended:

1. Hull J C, Options, Futures and Other Derivatives, Prentice Hall, NJ 2002 (Text Book)
2. Baye and Jansen, "Money, Banking and Financial Markets- An economics approach, AITBS Publishers & Distributors, Delhi, 1996
3. Marshal JF, "Futures and Options Contracting: Theory and Practice' south Western Publishing Company, NY 1991
4. Kolb R W, Futures, Options and Swaps, Blackwell Publishers, NY 2002
5. Rules, Regulations and Bye-laws (F&O Segment) of NSE & NSCCL

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EFM B15 - Monetary Policy

Unit-I Money and Economic System, Characteristics of Money. Its static and dynamic function, Role of money in a capitalistic, socialistic and planned economy.
Concepts of Money- M1, M2, M3, M4 Demand for money in developed and under-developed economies, Determinants of the supply of money.

Unit-II Value of money (Theories): Commodity theory of money transaction, Quantity theory of money and the Marshallian version, Fisher equation.

Unit-III Cash balance approach to quantity of money, theory of saving and investment. Liquidity theory of interest.

Unit-IV Trade Cycle-Nature and Phases. The theories of trade cycles, Control of trade cycles, Multiplier and accelerator.

Unit-V Monetary Policy: Objects of Monetary Policy under static, cyclical and growth setting, Monetary expansion, Target and indicator of monetary policy, Monetary Policy n India, Structure on Interest rate in India. Coordination and Conflicts of Monetary policy with other policy

Book Recommended:

1. Paul Einzig: Monetary Policy L; End and Means.
2. Sethi: Problems of Monetary Policy in underdeveloped Economy.
3. Kolhatkar: Modern Theory of Money.
4. Iyenger: Monetary Policy and Economic Growth.
5. Hansen: Monetary Theory in Pratice.
6. C. Rangarajan: Monetary Policy.

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EFM B16 – Social Finance for Inclusive Growth

UNIT-I: Financial Markets: Accessibility of Financial Markets to poor in India-Demand and supply issues.

UNIT-II : Innovative Financial Products: Financial innovations beyond microcredit, urban finance, low income housing finance, Micro Enterprise Financing Innovations.

UNIT-III: Finance constraints faced by microenterprises: Financing constraints faced by microenterprises, restricting access to finance, Financial market innovations supporting MSME finance, financing startup and venture capital fund, credit guarantee mechanisms.

UNIT-IV: Impact Investing : Value creation at the bottom of the pyramid, balancing the needs of investors as well as social entrepreneurs. Funding options for innovations.

UNIT-V: Capital Markets and Access to Finance: Financial innovations to support savings and Investments of asset poor households. frameowkr for managing inflation risks, etc. global and Indian experiences. Micro-SIP & Pension, investment linked insurance products. Investment and insurance-linked products: Credit-insurance based financing arrangement.

Books Recommended:

1. Somnath – Microfinance, Excel Books.
2. Indian Institute of Banking and Finance, Inclusive Growth
3. V.V. RAviKumar – New Trends in Banking, ICFAI Press.
4. Principles and Practice of Banking _ IIBF, Macmillan Publishing.
5. Sameer Kochham, R. Chandrashekar, Financial Inclusion
6. M.A. Kohok, Advanced Financial Management, Everest Publishing.

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EFM C01 - Cooperative Project Planning

Unit-I Project-Meaning, Objectives and Importance of Cooperative Project Planning, Project Identification. Formulation of Project – Steps involved in Project Formulation, Internal and External constraints,

Unit-II Feasibility Analysis of a cooperative project. Implementation of Cooperative Project and use of Net-work techniques.

Procedures and Formalities of registration of projects in the Cooperative Sector.

Unit-III Project technology with emphasis on: indigenous technology. Location, Size. Plan Layout of Projects. Projects Financing-internal and external sources.

Unit-IV Cost Concepts, Meaning and Importance of Demand Forecasting, various techniques of demand forecasting

Unit-V Pricing policy and Profit Planning in the Cooperative Sector. Specific studies of Cooperative-Sugar, Dairy and Housing Projects.

Books Recommended:

1. Dennis, A. Celiners: Completes Guide of Project Management, Management Guide, U.S.A.
2. M.D. Vidwn: Cooperative Law in India, Committee for Cooperative Training, 1969.
3. N.P. Agarwal : Project Management, Ramesh Book Depot, Jaipur.

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EFM C02 - Cooperative Movement in Rajasthan

Unit-I Introduction: Evolution of Cooperative Movement in Rajasthan before Independence. Cooperatives during plans. Implementation of Cooperative Principles in Rajasthan.

Unit-II A detailed study of the Rajasthan Cooperative Societies Act, 1965 as amended upto date. Shodha Ram Committee 1976, Mirdha Committee, Shivraman Committee (CRAFICARD) with special reference to Rajasthan.

Unit-III Cooperative institution in Rajasthan, Cooperative Credit – short term, medium – term and long term Credit Societies – PACS, CCBS, Apex Bank, PLDB, and SLDB. Cooperative Banks, Urban Cooperative Banks.

Unit-IV Role of the State Government in the growth of Cooperative Movement. Drawback of development of cooperative movement in the State and suggestions for its progress.

Unit-V Critical evaluation of following Apex organization:

(i) RAJFED

(ii) CONFED

(iii) The Rajasthan State Cooperative Housing Financing Society.

(iv) The Rajasthan State Cooperative Union.

Books Recommended:

1. तिवाडी, चौधरी एवं चौधरी: राजस्थान में सहकारी कानून प्रकाशन
2. बी.एस. माथुर: भारत में सहकारिता
3. बी.पी. गुप्ता: सहकारिता के सिद्धात एवं व्यवहार

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EFM C03- Rural Credit in Finance

UNIT-I: **Role and Characteristics of Indian Agriculture** :Introduction. Role of Agriculture in Economic Development, Characteristics of Indian Agriculture.

UNIT-II: **Critical Review of Agricultural Finance** :Role of Credit in Agriculture, Agricultural Finance in India, Classification of Agricultural Finance, Significance of Cp. Credit, Some Issues of the Present System. **Financial Intermediaries In Agriculture:** Functions, Structure and Performance.

UNIT-III: **Cooperative Banks:** Concept and special features of co-operative banking, Structure of co-operative credit system in India, Primary Level Credit Institutions (PACs, LAMPs. MPCS, FSS) their functioning and problems, District Central Cooperative Banks Structure and functions , Apex Co-operative Banks Structure and functions , Impact of liberalization on Co-operative Banks with particular reference to de-regulation of interest rates and prudential norms.

UNIV-IV: **Theories of Agricultural Finance** :Risk and Uncertainty Theory, Demand and Supply Theory, Business Vs. Social and Moral Theory, Cost Theory, Productive Vs. Consumption , — The concept of 3 C's, 7 P's and 3 R's of credit, Credit Analysis, Kind Loans Vs. Cash Loans, Principle of Micro- and Macro-Finance, Principle of Supervised Credit, Principle of Crop Loan. Principle of Co-op. Credit, Principle of Better Credit.

UNIT-V: **Rural Finance and Microfinance:** Players and Approaches; Microfinance& Rural Finance — Lessons from microfinance and historical interventions, Rural finance: approach, delivery channels and actors involved, and linkages, Triangle of microfinance

Books Recommended:

1. A. Ranga Reddy, Agricultural Development Rural Credit And Problems of Its Recovery, Mittal Publications.
2. Barry, P.J., and P.N. Ellinger, Theories of Agricultural Finance, Jugale, Atlantic Publishers
3. Ross, S.A., R.W. Westerfield, B.D. Jordan, Essentials of Corporate Finance. The McGraw-Hill/Irvin, 2011.
4. Keown, A.J., Martin, J.W., Petty and D.F. Scott. Foundations of Finance. 7th ed. Prentice Hall, 2010.

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EFM C04 - Quantitative Techniques

Unit-I Meaning and Scope of Quantitative Techniques: Role of Quantitative Techniques in Business and industry.

Unit-II Correlation Analysis : Definition and concept types and measures of studying correlations and methods. Regression analysis: Simple and multiple; its importance and application to business Simple, Partial and Multiple Correlations.

Unit-III Research and Research Design : Meaning, need of research, characteristics of good research design, identification of problem.

Unit-IV Source of primary and secondary data: Primary data collection techniques, schedules, questionnaire and interview and observation. Scaling Techniques: Purpose of scaling, techniques, types of scales – Nominal, Ordinal, Interval and Ratio Scale.

Unit-V Sampling theory and its significance. Sampling analysis in case of large and small samples. Tests of significance-z, 't' and 'f' tests. Hypothesis testing. Theory of attributes, Chi-Square and Analysis of Variance.

Note: The candidate shall be permitted to use battery operated pocket calculator that should not have more than 12 digits functions and 2 memories and should be noiseless and cordless.

Book Recommended

1. Kothari, C.R. and Gaurav Jain: Research Methodology – Methods and TEchniques, Wishwa Publication, New Delhi.
2. John Miter and William Wasserman: Fundamental Statistics for Business and Economics
3. John E. Ullmann: Quantitative Methods in Management.
4. N.P. Agarwal: Quantitative Techniques: Ramesh Book depot, Jaipur
5. D.N. Elhance: Fundamental of Statistics.
6. कैलाश नाथ नागर सांख्यिकी के मूल तत्व

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EFM C05 - Co-operative Movement in India

Unit-I Evolution of Cooperative Movement in India. Cooperative Movement before Independence and during the plans.

Unit-II Role of Cooperatives in Globalization; Globalization and Cooperative Sector in India

Unit-III Organisation of the Non-Credit Cooperative Societies: Marketing Cooperative, Consumers Cooperative, Industrial Cooperative, Housing Cooperative, Producer Cooperatives

Government Control over Cooperative – Legal & Administrative, Vaidyanathan Committee Report.

Unit-IV Critical Evaluation of following Cooperative organization: National Cooperative Development Corporation, National Cooperative Dairy Development Corporation., Anand Cooperative Dairy Federation Gujrat, IFFCO Indian Farmers Fertilizers Cooperative Organisation.

Unit-V Cooperative Movement in Rajasthan-An overview of problem and present position.

References:

1. G.S. Kamat: New Dimensions of Cooperative Management
2. I.I.O: Cooperative Management & Administration
3. B.C. Mehta: Consumer Cooperation in India
4. अग्रवाल, माथुर एवं गुप्ता – सहकारी चिन्तन एवं ग्रामीण विकास, रमेश बुक डिपो।

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EFM C06 - Financing Cooperative Project

Unit-I Meaning, importance and role of finance in a project. Need and nature of financial support required for improving, promoting and sustaining a project.

Unit-II Concepts of product orient credit/lending. Calculation of financial requirements in a project.

Unit-III Internal and external constraints of a project. Sources of finance for a projects : non-institutional and institutional-commercial Banks, Financial Institutions, and Development Banks.

Unit-IV Short –term, Medium term and Long sources of finance. Requirement of working capital.

Capital Budgeting. Project approach to financing-concepts, objectives and choice of a project.

Unit-V Project formulation and appraisal-technical, economic and financial aspects of the projects.

Social cost benefits analysis. Different concepts and techniques used in the appraisal Project management. Monitoring and evaluation of project-types of evaluation.

Lessons to be drawn from the failure and success of project.

References:

1. G.S. Kamat: New Dimensions of Cooperative Management
2. I.L.O Cooperative Management & Administration
3. B.C Mehta: Consumer Cooperation in India

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EFM C07 - Micro Finance

Unit-I Meaning and definition of micro-finance, Salient features of micro-finance, benefit of micro-finance, target groups in micro-finance. Role of micro-finance in poverty alleviation in rural areas.

Unit-II Credit requirement for farm, non-farm, activities, for livelihood of poor person. Need for saving, credit & insurance-role of financial intermediation (Such as SHG, MFFIs)

Unit-III Formal financial institutions and rural credit such as CB, RRBs, CCBs, MFIs.

Unit-IV Micro-finance institutions. Functions and impact.

Unit-V Micro- finance and SHGs, collective action for poverty alleviation and empowerment of rural people. Issue of SHs grading, role of federation of SHG. Issues of SHGs information problem, joint liabilities group (JLG), collection of information from SHGs & there reporting to financing institutions.

Books Recommended:

1. Information Asymmetry and trust a frame work for studying Micro-finance in India, M.S Sharma working paper IIM Ahmadabad.
2. Development of rural poor through self help group by Shanker Chatterjee. EBSA Publishers, Jaipur
3. Rural Transformation- infrastructure and micro-finance by Harsh Bhargav and Deepak Kumar, ICFAI University Press, Hyderabad.
4. Microfinance in India-a state of the sector report, 2007 by Prabhu Ghate. A SAGE publication, New Delhi.
5. Rural Transformation-socio economic issues by Harsh Bhargav and Deepak Kumar, ICFAI University Press, Hyderabad.
6. Rural credit and Micro –finance by Katuri Nageshwar Rao, ICGAI, University Press, Hyderdabad

Dy. Registrar (Academic) University of Rajasthan JAIPUR Raj.

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EFM C08 - Operation Research

Unit-I Operations Research: Concept and significance of operations research: Evolution of operations research: steps in designing operations research studies; Operations research models.

Unit-II Linear Programming and its Applications: Graphic method and Simplex method; Duality problem; Transportation problem; Assignment problem.

Unit-III Game Theory: Meaning, two person zero sum game, mix. Strategies.

Queuing Theory: Meaning, concept and problem related with queuing theory.

Assignment: Solving the problem, cases of unbalanced problems, unacceptable assignment.

Unit-IV Simulation: Application of simulation techniques; Monte-Carlo approach.

Unit-V Net-work Analysis: Introduction to PERT and CPM; Application areas of PERT and CPM.

Decision Theory: Maximum, Minimax and maximax expected pay off and regret, Decision tree analysis

References:

1. N.P Agarwal: Operational Research, Ramesh Book Depot Jaipur
2. Sharma J K., Operations Research – Theory and application MacMillan India Limited, New Delhi
3. Taha Humady: Operations Research – An introduction prentice Hall, Delhi.
4. Kapoor, V.K. : Operational research, Sultan Chand and Sons, New Delhi.
5. Nag, N.K : Quantitative Methods, Kalyani Publisher, Jaipur.

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EFM C09 - Cooperation & Agriculture Organization

Unit-I Concept of co-operation: Characteristics and Basic Principles of Co-operation Comparative study of different economic organizations. Co-operative as a balancing factor between public and private sector. Role of co-operation in the development of agriculture.

Unit-II Management of Co-operative Societies: Concept of Democratic Management and its merits and demerits, . Role of the General Body and Board of Directors. Functions, powers & duties of the Board President, Secretary/Managing Director/Management of the Society. Need of Bureaucratic managers in co-operative organizations-merits and demerits.

Unit-III Organisation of Agriculture: Contribution of agriculture in developing countries, its problems and prospects in Indian Economy.

Unit-IV Farm Credit: Need for credit, Sources of credit, Role of Co-operative Institution in the field of farm credit. Need and importance of Kisan Credit Card, Crop Insurance Policy.

Economics of Farm Labour Use: Factor affecting labour efficiency in agriculture with special reference to availability of surplus labour in developing countries.

Unit-V Marketing of Agricultural Products: Importance of co-operative marketing of agriculture produce. Linking of credit with marketing, its problems and prospects. Agricultural Planning and Agricultural Development in India. Agricultural development in plan periods causes of slow development and suggestions.

Books Recommended:

1 Schultz, T.W : Economic Organisation of Agriculture.
2. Desai,B.M., Desai, M.D.: The New Strategy of Agricultural Development in Operation.
3. Jain, S.C.: Agriculture Planning in Developed Countries.
4. Shukla, Tara: Economic of Under Development Agriculture.
5 Kulkarni, K.R.: Theory and Practice of Co-operation in India and abroad
6 Reserve Bank in India: Rural Credit Follow-up surveys.
7 Agrawal, N.L. : Bhartiya KRishi Arthtantra, Rajasthan Hindi Grant Akademy, Jaipur
8. Gupta, Dr. N.L. Rajasthan Mein Krishi Vikas, Rajasthan Hindi Granth Akademy Jaipur
9 B.S. Mathur : Cooperation, Sahitya Prakashan, Agra.
10 सहकारी चिन्तनएवं ग्रामीण विकास, अग्रवाल, माथुरएवं गुप्ता, रमेश बुक डिपो, जयपुर।

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EFM C10 – Cooperative Sector Management

Unit-I Definition and principles of management, Concept of Co-operative Management. Comparison between Principles of Co-operation and Management functions in Co-operation.

Unit-II Professionalisation of Co-operative Management-its merits, demerits and limitation of Professional Management in Co-operative Institutions. Government Control over Co-operatives: Legal and Administrative.

Organisation Structure of Co-operatives. Organisation Chart for Short term Medium term and Long term Credit Institutions. Management of Co-operative Banks.

Unit-III Leadership in Co-operatives. Characteristics of a good Leadership in Co-operative Sector. Federal Structure of Co-operative Organisation-Control Over Co-operatives: Audit and Co-operative Supervision.

Unit-IV Concept of Cooperative Education and Co-operative Training- Needs and Importance in Modern era. Difference between co-operative education and cooperative training, Role of National Co-operative Union of India in the co-operative training system..

Unit-V Role of Institutional framework of co-operative education and training, Merits and demerits of democratic governance.

Books Recommended

1 G.S. Kamat:New Dimensions of Co-operative Management.
2. G.S. Kamat: Cases in Co-operative Management
3 I.L.O.:Co-operative Management & Administration

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EFM C11 - Cooperative Law

Unit-I Co-operative Legislation in India: Historical Development of Legislation, Co-operative Societies Act 1904 and 1912 as amended upto-date.

Unit-II Main Findings of Committee on Co-operative Law, 1956 (S.T. Raj Committee).

Unit-III Co-operative Legislation in Rajasthan: A detailed study of the Rajasthan Co-operative Societies Act 1965 as amended upto-date.

Unit-IV Banking Regulation Act, 1949 as applied to Co-operative Banks.
Implementation of Co-operative Law in India and Rajasthan.

Unit-V RBI & NABARD. A Brief study of the following institutions: National Co-operative Consumers Federation (NCCF), National Co-operative Development Corporation (NCDC), National Cooperative Union of India (NCUI), Indian Farmers Fertilizers Cooperative (IFFCO), National Agriculture Co-operative Marketing Federation (NAFED), National Institute of Co-operative Management (Vaikunth Mehta Institute, Pune) (VMNICM), National Co-operative Dairy Federation.

Books Recommended:

1. *Co-operative Societies Act-1904.*
2. Co-operative Societies Act, 1912 as amended upto date.
3. Rajasthan Co-operative Societies ac, 1965, as amended upto-date.
4. Report of the Committee on Co-operation (Mirdha Committee).
5. Committee on Co-operative Law (S.T. Raja Committee).
6. Report of the Committee on Co-operative Administration, 1963.
7. Co-operative Law in India, M.D. Vidwans
8. Annual Report of the specific institutions.

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EFM C12 - Agriculture-Entrepreneurship

Unit-I: Rural Entrepreneurship : Concept of rural entrepreneurship, Endowment of skill sets and Natural resources in rural India, aims of rural entrepreneurship, barriers to entrepreneurship in rural India.

Unit-II: Skill Development : Process of entrepreneurship, rural applicbility, skills required to succeed, Government training programmes and Public Private Partnership

Unit-III: Women Entrepreneurship: Primary goals for development, Women's role in economy, factors that support women's participation in rural entrepreneurship.

Unit-IV: ICT and Rural Entrepreneurship: Rural ICT initiatives, Needs to create rural ICT entrepreneurs, how IT is changing rural India, Rural BPO.

Unit-V: Case Study, Corporate intervention and entrepreneurship Development.

Books Recommended:

1. N.P. Singh, Entrepreneurship Development, Theories and Practices.
2. Vasant Desai, Projects : Profile and process.
3. Vasant Desai, Entrepreneurship and Technology
4. Mishra and Puri, Economic Environment in Business
5. Deepak Walokar, Women Entrepreneurs.

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EFM C13 - International Cooperative Movement

Unit-I Concept and Philosophy of Co-operation. Evolution of Co-operative Movement at International Level. International accepted Principal of Co-operation. Co-operative Credit System at International Level.

Unit-II Problem and Prospects of Co-operative Movement Study of International Cooperative Alliance (ICA). Co-operation is a middle way between Capitalism and Socialism.

Unit-III Origin and Growth of Consumers Co-operative Movement in the World. Role of Robert Owen in the Development of Co-operative Movement. Consumers Co-operative Movement in England. Origin and objectives of Rochdale Equitable Pioneer Society.

Unit-IV Progress of Retail Consumers Co-operative and Co-operative Wholesale Societies. Factors leading to the success of Consumers Co-operative Movement in England. Its problem and remedies.

Unit-V Co-operative Credit Movement in Germany. Credit Structure in India, Comparison of Co-operating Credit Movement between India & Germany.

Principal and Working of Raiffeisen Societies/Banks. Characteristics of Co-operative Dairy Societies in Denmark.

<u>References:</u>

B.S Mathur :Co-operation

G.S Kamat :Dimensions of Co-operative Management.

K.K. Taimani :Co-operative Organisation and Management.

I.L.O. :Co-operative Management and Organisation.

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EFM C14 – Management of Agricultural Marketing

UNIT-I: Agricultural input marketing : Agricultural input marketing — meaning and importance; Management of distribution channels for agricultural input marketing; Agricultural Inputs and their types — farm and non-farm, role of cooperative, public and private sectors in agri-input marketing.

UNIT-II: Seed Marketing: Seed- Importance of seed input; Types of seeds- hybrid, high yielding and quality seeds; Demand and supply of seeds; Seed marketing channels, pricing, export & import of seeds; Role of National Seed Corporation and State Seed Corporation.

UNIT-III: Fertilizers Marketing: Chemical Fertilizers- Product' , export-import, supply of chemical fertilizers, Demand/consumption, Prices a d pricing policy; subsidy on fertilizers; marketing system — marketing channels, problems in distribution; Role of IFFCO and KRIBCO in fertilizer marketing,

UNIT-IV: Electricity: Plant Protection Chemicals- production consumption, marketing system — marketing channels; marketing and distribution system; pricing of electricity subsidy on electricity.

UNIT-V: Farm Machinery: Farm Machinery- Production, supply and distribution channels of farm Agro-industries Corporation and marketing of farm machines / implements/equipments.

Books Recommended

1. Acharya SS & Agarwal, Agricultural Marketing in India, 4th Ed. Oxford & IBH
2. Singh Sukhpal, Rural Marketing-Focus on Agricultural Inputs. Vikas Publishing House.
3. Singh A.K. & Pandey S., Rural Marketing New Age.
4. Gopalan and Mueen, Indian Rural Markets and Marketing Practices, Recent Developments. ICFAI University Press.
5. K.K Tiwari, D.N.D., Agricultural Marketing – NewTrends and Techniques, D.N.D Publications.

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EFM C15 - Management of Cooperative Business

Unit-I Meaning and concept of Co-operative Business. Role and Importance of Co-operative Business in the present era. Main Characteristics of Co-operative Business.

Unit-II Introduction to Managing Co-operative Business, Emergence, Endurance and Growth of Co-operatives Salient and Unique Management Challenges of Co-operative Business.

Unit-III Concept and definition of Management, Essential Elements of Management. Basic Principles of Co-operative v/s Management Principles. Relation of Management Principles with Co-operation and Distinction between Private Management and Co-operative Management.

Unit-IV Concept and Importance of Democratic Management in Co-operative Institutions. Composition and Role of General Body and Board of Directors/ Executive Committee, Functions and duties of Board of Directors. Role of Registrar/ Managing Director in Co-operative Institutions. Concepts of Ideal Managerial Organisation.

Unit-V Need of Professional Management. Role and Importance of Professional Management in Co-operative Institutions. Limitations of Professional Management in Co-operatives. Induction of Bureaucracy in Co-operative Institutions. Deputation and Nomination of Government Officers. Its advantages and Disadvantages. Shortcomings of Co-operative Management and suggestions for its Improvement.

Books Recommended

B.S. Mathur : Co-operation

B.P. Gupta : Theory and Practice of Co-operation

G.S. Kamat : New Dimensions of Co-operative Management

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EFM C16 - Agricultural Finance and Project Management

UNIT-I: Role and Importance of Agricultural Finance. Agricultural Finance- meaning, Financial Institutions and credit flow to rural/priority sector. Agricultural lending — Direct and Indirect Financing - Development of Rural Institutional Lending - Branch expansion, demand and supply of institutional agricultural credit and Over dues and Loan waiving.

Role of Cooperatives: Financing through Co-operatives, NABARD and Commercial Banks and RRBs. Lead Bank Scheme District Credit Plan and lending to agriculture/priority sector. Micro-Financing and, Role of NGO's, and SHG's.

UNIT-II: Lending to farmers: Lending to farmers, Estimation Technical feasibility, Economic viability and repaying capacity of borrowers and appraisal of credit proposals.

UNIT-III: Project Approach: Project Approach in financing agriculture. Financial, economic and environmental appraisal of investment projects. Identification, preparation, appraisal, financing and implementation of projects.

UNIV-IV: Project Appraisal Techniques: Project Appraisal techniques — Undiscounted measures. Time value of money — Use of discounted measures - B-C ratio, NPV and IRR. Agreements, supervision, monitoring and evaluation phases in appraising agricultural investment' projects.

UNIT-V: Risks in financing agriculture: Risk management strategies and coping mechanism. Crop Insurance programmes – review of different crop insurance schemes — yield loss and weather based insurance and their applications. Case Study Analysis of an Agricultural project, Financial Risk and risk management strategies — crop insurance schemes, Financial instruments and methods:7 E bunking, Kisan Cards and core banking.

Books Recommended:

1. Dhubashi PR, Policy and Performance Agricultural and Rural Development in Post Independent India. Sage Publishing.
2. Muniraj R, Farm Finance for Development, Oxford & IBH Publ.
3. Gupta SC, Development Banking for Rural Development, Deep & Deep Publishers.
4. Gittinger JP, Economic Analysis of Agricultural Projects. The Johns Hopkins Univ. Press

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SYLLABUS

B.Sc. Bio-Technology

B.Sc. Part-I Examination 2021
B.Sc. Part-II Examination 2022
B.Sc. Part-III Examination 2023

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B.Sc. Biotechnology Integrated (Annual Scheme)

Concept

Biotechnology is not a single subject as it being project all around. Biotechnology is a term of convenience for an integrated approach using a conglomerate of several disciplines such as botany, zoology, microbiology, biochemistry and chemistry, molecular biology, genetics, plant breeding, pharmacology medicine, information and computer science and others. Biotechnology, is a collection of tools, and is about problem- solving, where expert from different disciplines collaborate to find a solution to an identified problem, such as pest control, nutritional enhancement, an improved drug a vaccine or an antibody, and the like. While there can be a department of biotechnology with expertise in all relevant areas.

For bringing thrust to Biotechnology sector in Rajasthan it is imperative that-

1. State of Rajasthan is an attractive destination for the biotechnology Industry.
2. Create and upgrade biotechnology infrastructure.
3. Create a quality infrastructure for research and commercial activities.
4. Promote biotechnology education by devising suitable courses which are focused to meet the demand of biotech Industry in general and development in Rajasthan in particular.

Priority areas of Biotechnology declared in the Biotech Policy of Government of Rajasthan are:

1. Plant biotechnology,
2. Medical biotechnology,
3. Biodiversity and prospecting,
4. Animal Biotechnology,
5. Bioprocessing, and
6. Bioinformatics.

of taking a B.Sc. Biotechnology Integrated after three years or counting to obtain M.Sc. Biotechnology Integrated.

Prerequisites of laboratory-

Some basic minimum equipment required to run the course shall include as follows:

1. Well-equipped library facility with Internet connectivity.
2. Glassware, chemicals and reagents necessary to run the course.
3. Minimum equipment required:
    a. Laminar Flow Hoods/clean benches.
    b. Microscopes compound (8 no)
    c. Centrifuges - one high speed, one microfuge
    d. UV-visible spectrophotometer
    e. Colorimeter
    f. pH meter
    g. BOD incubator
    h. Micro- and regular balance
    i. Autoclave
    j. Glass distillation apparatus
    k. Computers
    l. Cold cabinet/ cold room.
    m. Refrigerator and Deep freeze
    n. DNA/RNA, protein electrophoresis apparatus.
    o. Culture racks with light arrangements
    p. Shakers
    q. Incubators

Prerequisites of admission to the course:

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The number of papers and maximum marks for each paper together with the minimum marks required for a pass are shown against each subject separately. It will be necessary for a candidate to pass in theory part as well as practical part of a subject/paper, wherever prescribed. Separately, classification of successful shall be as follows:

First Division 60% of the aggregate marks prescribed at (a) Part First Examination excluding those obtained in the Second division 48% compulsory subject, (b) part Second Examination (c)Part Third Examination taken together.

All the rest will be declared to have passed the examination if they obtain a minimum pass marks in each subject viz. 36%.No division shall be awarded at the First and the Second Year Examination

B.Sc. Biotechnology Integrated Programme:

{B.Sc.: Bachelor of science/master of Science.}

Level: Biotechnology Undergraduate Course / Biotechnology two years or 4 semesters for postgraduate/ 5 years for complete course or 10 Semester

Aims & Content:

Candidates will be trained in the basic part biotechnology and in the skills of self-education, critical evaluation, problem recognition and problem solving in science. There is an emphasis on integrating theory with extensive practical training.

Candidates will have:

1. Excellent skills in the science of medical biotechnology.
2. Generic skills including teamwork, oral and written presentation.
3. An awareness of the social, economic and ethical aspects of biotechnology management.

Objectives:

- Understand modern biotechnology - practices and approaches with an emphasis in technology application in pharmaceutical, medical, industrial, environmental and agricultural areas.
- Become familiar with public policy, biosafety, and intellectual property rights issues related to biotechnology applications nationally and globally.
- Gain experience with standard molecular tools and approaches utilized: manipulate genes, gene products and organisms.
- Develop skills in international teamwork and research collaboration

1. Candidates who have passed 12th standard examination under 10+2 system of Rajasthan State Higher Secondary Board, CBSE or any equivalent examination of any recognized Board with physics, Chemistry & Biology or Physics, Chemistry & mathematics in one and the same attempt with not less than 50% marks together.

2. Candidates who have appeared for and are expecting their result on or before 31st June of the respective final qualifying examinations are also eligible to apply.

3. The admission could be through entrance test or open merit.

General

The B.Sc. - M.Sc. Integrated biotechnology shall be a 5 year course. However the candidate will have the possibility of obtaining degree of B.Sc. Integrated Biotechnology after completion of three year course or alternatively to continue for the M.Sc. Biotechnology Integrated proposed here.

Admission to the M.Sc. Biotechnology Integrated can be for a 5 years integrated course at once level of entry, where facilities and faculty shall exist for conducting such course. Admission for B.Sc. Biotechnology Integrated could be done separately where graduate level facilities are available and M.Sc. Biotechnology should only be run at the Institution fully equipped to the course.

Admission to M.Sc. Biotechnology Integrated shall be restricted to B.Sc. Biotechnology Integrated student. University may decide suitable admission process. Procedure for filling such seats by competitive examination or through merit could be decided. List of Practicals to be carried out is appended and these require some basic equipments which must be present in the institution, starting the course. It is imperative that that only such institutions which can run the practical prescribed should have the affiliation to open these courses.

Details of the equipment are appended which are essential to run course successfully and it is intended that due consideration is given while granting affiliation to run course of Integrated biotechnology or one continuous course of M.Sc. Biotechnology Integrated that such facilities exists in the institution(Appendix I). The University shall appoint head examiner for each practical proposed here,who will formulate a skeleton question paper as well as possible exercises to be given in the examination. There can be 50 percent choice of exercises to be given in each question but it will be compulsory to conduct the practical examination on the basis of question paper sent by the university. If the compliance of the University question paper and exercises proposed is not done, the matter shall be reported in the COC/BOS and Academic council and University may initiate appropriate action against such institutions who did not give prescribed exercise set by the head examiner appointed for setting the question paper for the practical. This is being proposed in order to maintain adequate level of study and examination in professional courses.

Skills that a biotechnology integrated student obtain by the time they have finished their undergraduate programme:

- Understanding of the fundamentals of chemistry and biology and the key principles of biochemistry and molecular biology.
- Awareness of the major issues at the forefront of the discipline.
- Ability to access primary papers critically.
- Good "quantitative" skills such as the ability to accurately and reproducibly prepare reagents for experiments.
- Ability to dissect a problem in to its key features.
- Ability to design experiments and understand the Limitations of the experimental approach.
- Ability to interpret experimental data and identify consistent and inconsistent components.
- Ability to design follow-up experiments.
- Ability to work safely and effectively in a laboratory.
- Awareness of the available resources and how to use them.
- Ability to use computers as information and research tools.
- Ability to collaborate with other researchers.
- Ability to use oral, written and visual presentations to present their work to both a science literate and a science non-literate audience.
- Ability to think in an integrated manner and look at problems from different perspectives.
- Awareness of the ethical issues in the molecular life sciences.

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Scheme of Examination

B.Sc. Biotechnology: Scheme of examination

1. *Each theory paper shall carry 50 marks and will be of 3 hrs duration. Minimum passing marks shall be 17.*
2. *The theory question paper will be divided into two parts A and B. Part A of question paper shall be compulsory and contain 10 (ten) very short answer type questions of 20 words covering entire syllabus. Each carrying 1 (one) mark, with a total of 10 marks.*
3. *Part B of question paper will have 4 questions,* one question with internal choice from each unit /section. Students are required to attempt four questions in all from Part B, selecting not more than one question from each section. *Each question will carry 10 marks, with a total of 40 marks.*

Year: I Year

Theory

S.No.	Code	Subject I	T	L	MM
1.	BT-101	Microbiology	2	3	50
2.	BT-102	Cell Biology	2	3	50
3.	BT-103	Biostatistics & Computer Application	2	3	50
		Practical based on above subject	4	4	75
		Total			225

S.No.	Code	Subject II			
1.	BT-201	Developmental Biology	2	3	50
2.	BT-202	Immunology	2	3	50
3.	BT-203	Bioanalytical techniques and Instrumentation	2	3	50
		Practical based on above subjects	4	4	75
		Total			225

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S.No.	Code	Subject III			
1.	BT-301	Energy Resources &Utilization	2	3	50
2.	BT-302	Biochemistry-I	2	3	50
3.	BT-303	Plant and Animal Physiology	2	3	50
		Practical based on above subjects	4	4	75
		Total			225

Year: II Year

S.No.	Code	Subject I	T	L Hrs.	Exam MM
1.	BT-401	Molecular Genetics	2	3	50
2.	BT-402	Food and Dairy Technology	2	3	50
3.	BT-403	Bio resources and waste management	2	3	50
		Practical based on above subjects	4	4	75
		Total			225

S.No.	Code	Subject II	T	L Hrs.	Exam MM
1.	BT-501	Biochemistry II	2	3	50
2.	BT-502	Plant Secondary metabolites	2	3	50
3.	BT-503	Environmental biotechnology	2	3	50
		Practical based on above subjects	4	4	75

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	Total		225

S.No.	Code	Subject III	T	L Hrs.	Exam	MM
1.	601	Industrial Biotechnology	2	3		50
2.	602	Recombinant DNA Technology	2	3		50
3.	603	Behavioral Sciences & Basic Communication Skills	2	3		50
		Practical based on above subjects	4	4		75
		Industrial training/project work in Institute itself* (It will be assessed by separate examiner)				75
		Total				**300**

Year: III Year

Theory

S.No.	Code	Subject I	T	L Hrs.	Exam	MM
1.	701	Genomics & Proteomics	2	3		50
2.	702	Plant biotechnology	3	3		50
3.	703	Animal biotechnology	3	3		50
		Practical based on above subjects	4	4		75
						225
		Total				

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Code	Subject II	

1.	801	Medical biotechnology	3	3	50
2.	802	Fundamentals of bioinformatics and nanotechnology	2	3	50
3.	803	Bioethics and IPR	2	3	50
		Practical based on above subjects	4	4	75
4.	804	Industrial training/project work in Institute itself* (It will be assessed by separate examiner)			75
		Total			300
		Subject III			
5.	805	Critical Reasoning, Scientific writing and presentation	2		50
6.	806	Industrial relations and entrepreneurship	2	4	50
		Student shall study for two and half years and shall work in his own institute /elsewhere in an industry or institution of learning having adequate facilities on intensive training in any one of the branches of biotechnology . He/she will submit a dissertation of about 50 to 100 pages which will be evaluated by a separate external practical examiner.			
	807	Dissertation will have 200 marks			200
		Distributed as below (1) 50 marks viva voce. (2) 150 Dissertation - its conten			

quality style of presentation. Remuneration will be Rs. 35(Thirty five per student) and examiner will not examine more than 20 candidates per batch. only one external examiner will be appointed for each center

Total	300
Total marks for all the three years	2250

BT 101: MICROBIOLOGY

Section-A A

General introduction: Microbial diversity and taxonomy. Prokaryotes Types of Microorganisms.

Classification: Haeckel's three kingdom concept, Whitakers five kingdom concept. Bergey's manual of determinative bacteriology, Basic Concept in Taxonomy **Characteristics and structure of microbes:**Algae, fungi,mycoplasma, Viruses Protozoans and Helminthes

Section-B B

Bacteriology :Morphology and ultra-structure of bacteria-morphological types, Cell Wall-Archaebacteria, gram negative ,gram positive, Structure and function of cilia, chromosome,carboxysomes, plasmids, Bacterial spores, structure,formation and germination. Diversity of bacterial nutrition: Autotrophic,heterotrophic,bacterial genetics plasmids nonconjugative,metabolizable,resistant

Section-C C

Gene transfer In bacteria: Conjugation, transformation, transduction. **Growth** microbial population: Batch culture of microbes, Simple continuous culture of microbes,growth curve aerobic and anaerobic growth,and effect of environment on microbial growth: temperature,pH, radiation and atmosphere.

Enumeration of microbes:Culture media, total cell count isolation,classification and identification of microbes,bacteria-selective culture techniques,fungi-culture techniques, virus-plaque assays,animalculture,and tissue culture.

Section -D

Microbial Metabolism: Metabolic pathways and bioenergetics, production of secondary metabolites and their application in industry microbial products.

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Food Microbiology: Overall general idea, spoilage & preservation. **Environmental Microbiology:** Recycling of biomaterials production of Biogas. Leaching ones by microorganisms, bio fertilizers, bio pesticide, pollution control through use of consortium of microorganisms.

Books:

1. Microbial Physiology, 4th ed. by Albert G. Moat & John W. Foster by Wiley
2. Microbiology by Pelczar, M.J. Chan ECS & Krieg NR-Tata McGraw Hill.
3. Foundation in Microbiology by Talaro K, Talaro A, CassidaPlezar and Reid W.C.Brown Pub.
4. Microbiology by nester
5. General Microbiology by R.Y. Stanier
6. General Microbiology by Prescott.
7. General Microbiology by Brock.
8. Food Microbiology by Frazier

Other Books

- IntroductoryMicrobiology:F.C. Ross,Columbus Charles E. Metrill.
- Modern Concept of Microbiology H.D. Kumar and S Kumar Vikas Publishing House, New Delhi.
- Microbiology. M.J. Pelczar, C.E.C. Sun and N.R. Krieg, Tata McGraw Hill, New Delhi
- Microbiology: K.L. Burdon and R.P Williams, McMillanworth Publishers
- Microbiology B.D. Davis et al. Harper and row Publishers.
- Microbiology E.W. Nester et al. Sunders International edition.
- *Principles of fermentation Technology: P.F. Stanbury and A Whittaker* .Pegamon Press.
- Fundamental Principles of Bacteriology: A.J. Salle, Tata McGraw Hill

BT102: Cell Biology

Section A

The Cell structural Organization: Development of cell theory, Eukaryotic cells, the nucleus and cell cycle (Mitosis and meiosis). The ultra-structure of the cytoplasm- Cytoskeleton

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elements, Endoplasmic reticulum & Golgi complex, membrane organelles, mitochondria, chloroplast, lysosome, Ribosomes, vacuoles and peroxisomes.

Section B

Transport Across Cell Membrane: Molecular organization of cell membrane, passive and active transport, Na-K pump, $Ca2^{+}$ATPase pumps, Lysosomal and Vacuolar membrane ATP dependent proton pumps, Co-transport into prokaryotic cells, endocytosis and exocytosis, entry of viruses and toxins into cells.
Receptors and models of extra cellular signaling: Cytosolic, nuclear and membrane bound receptors, examples of receptors,autocrine, paracrine and endocrine model of action.

Section C

Signal Transduction: Signal amplification, different model of signal amplifications, cyclic AMP, role of inositol phosphatase messengers, Biosynthesis of inositol triphosphates, cyclic GMP and Glycoproteins in signal transduction, Calcium models of signal amplification, phosphorylation, of protein Kinases.

Section D

Cell Culture: Techniques of propagation of prokaryotic and eukaryotic cells, Cell lines, generation of cell lines, maintenance of stock cells, characterization of cells, immunochemistry, morphological analysis techniques in cell culture, primary cultures, contamination, differentiation, three dimensional cultures.

Books:

1. Cell & Molecular Biology by De Robertis, Lea and Febiger
2. Cell & Molecular Biology by H.Baltimore, WH Freeman
3. Cell & Biology by Kimball T.W. Wesley Pub.

BT-103: Biostatistics & Computer Application

Section A

Statistics as statistical data: various types of data (Raw data, grouped data); Representation of **data** using frequency distribution diagram(Simple/Multiple/Subdivided bar diagram, Pie **diagram)**,Graphs (Histogram, polygon, curve)

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Section B

Measure of central tendency: Mean (Definition & simple problems); Median, Quartiles (Definition, Graphical calculation); Mode (Definition, graphical calculation); Standard deviation; Standard errors, Students-T-Test, ANOVA 1) one way, 2) two way followed by t test (pair wise)

Section C

Introduction to computers: Overview and functions of a computer system Input and output devices; Storage devices: Hard disk, Diskette, Magnetic tape, RAID, ZIP devices, Digital tape, CD-ROM, DVD (capacity and access time)

Main Circuit Board of a PC: Chips, Ports, Expansion; Slots; Memory: Register, buffer, RAM, ROM, PROM, EPROM, EEPROM (comparison); Types of Processing: Batch, Real-Time, Online and Offline.

Section D

Working Knowledge of window 1997 onwards, Windows 2003.MS Word, Excel, PowerPoint Presentations. Use of scanners for preparation of reports.Internet awareness.Conversant with e Journals and books. Retrieval of electronic resources through Internet.

Texts/References:

1. Biostatistics, Daniel, W.W., 1987. New York, John Wiley Sons.
2. An introduction to Biostatistics, 3rd edition, Sundarrao, P.S.S and Richards, J. Christian Medical College, Vellore
3. Statistical Analysis of epidemiological data, Selvin, S., 1991. New York University Press.
4. Statistics for Biology, Boston, Bishop, O.N. Houghton, Mifflin.
5. The Principles of scientific research, Freedman, P. New York, Pergamon Press.
6. Statistics for Biologists, Campbell, R.C., 1998. Cambridge University Press.
7. Statistics for medicine, Colton, T., 1974. Little Brow, Boston
8. Introduction to Computers Data processing & Networking
9. Computer Fundamentals – P.K. Sinha

BT-201: DEVELOPMENTAL BIOLOGY

Section A

Plant development, plant versus animal development, development of plant embryo, development of seeding; shoot apex organization vegetative and floral apex, root, shoot, leaf and flower development Programmed cell death, ageing and senescence.

Section B

Genes and their role in development, signal transduction in development, cell division cycle,

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cytoskeleton, cell adhesion and the extracellular matrix: Unicellular models, sporulation in Bacillus subtilis.mating type switching in yeast aggregation and culmination in Dictyosteliumdiscoideum

Section C

Sex-gametes and fertilization, germ line specjation, germ cell migration, gametogenesis, gastrulation in invertebrate and vertebrate,cell, lineage, Axis specification in vertebrates, fate of ectoderm, mesoderm and endoderm.

Section D

Cell differentiation mechanism and factors affecting developmental gradient in Hydra, axial gradients in Drosophiladevelopment.Organogenesis in invertebrates and vertebrates.

Books:

R M. Twyman 2001 Development Biology. Viva Books private Ltd. New Delhi
Gilbert S. 1997 Development Biology, 6th edition, senior Associate Inc. Slack JMV 1991, From egg to embryo, Second edition Cambridge University Press U.K.
Wolpert L. 1997 Principles of Development. Oxford UniversityPress.Oxford University.

BT 202: IMMUNOLOGY

Section - A

Historical Background: Humoral and Cellular components of the immune system.Innateimmunity.Skin and mucosal surface, Physiological Barriers,Phagocytic Barriers, Inflammation, Adaptiveimmunity.Immune Dysfunction and its consequences; Allergy and Asthma,

Cells and Organs of Immune System: Lymphoid cells: Stem cells, B and T Lymphocytes, Natural killer cells, mononuclear phagocytes. Granulocytic cells. **Organs.** Thymus Bone Marrow,Lymphatic System, Lymph nodes spleen

ction -B

Antigens-Antibody: Antigens Structure, properties, types, Epitopes, Haptens, Antibodies: Structure and function, Antibody mediated functions, Antibody classes and biological Activities, Monoclonal Antibodies

Antigen-Antibody Interaction: Precipitation reaction, Agglutination, Radioimmunoassay;ELISA , Western Blotting
Major Histocompatibility Complex, General Structure and function of MHC, MHC Molecules and genes, Antigen Processing and presentation, T-Cell receptors, T-Cell Maturation and Differentiation, B-Cell Generation, Activation & Differentiation

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Section C

Immune Effector Mechanism: Cytokinesis (Properties,receptors,antagonists& secretion) the complement system (functions, components, activation regulation and deficiencies. Cell mediated effector responsesCytotoxic T-Cells, natural killer cells, antibody-dependent cell-mediated cytotoxicity.Inflammation Hypersensitive reaction (Type I, II, III and delayed type(DTH).

Section D

Immunology in Health & Disease viral, bacterial and protozoan Vaccines AIDS and other immunodeficiency's
Transplantation and Autoimmunity: Orange specific autoimmune diseases, systemic autoimmune diseases. Graftrejection, evidence and mechanism of graft rejection prevention of graft rejection, immunosuppressive drugs, HLA and diseases,mechanism of immunity to tumor antigens.Autoimmunity in human pathogenic mechanism, experimental models of autoimmune disease, treatment of autoimmune disorders.

Reference Books:

1. Roitt, I, Essential immunology, Blackwell Se Pub. Oxford. III Ed.
2. Benjamin E and Leskowitz S. Immunology a short course Wiley Liss NY, to 1991
3. Richard A. Goldshy et.al. Immunology, 5th Ed., W.H. Freeman and Ce., NY 2003.
4. PraveshC.Sen Gupta, Clinical Immunology. Oxford India, 2003, (2 vols.).
5. Kuby J. Immunology, II ed (1994) W.H. Freeman and Co. NY
6. Klans D.Elgret (1996), Immunology-understanding of immune System. Wiley-Liss.NY
7. Topley and Wilson's (1995) Text Book on Principles of Bacteriology,virology and

BT203: BIOANALYTICAL TECHNIQUES & INSTRUMENTAION

Section A

Solution and Buffers: Preparation of solutions, concept of pH and buffer, types of buffers and **their preparation**, pH meter.

Cell fractionation techniques, ultra filtration, dialysis and reverse osmosis.

Microscopy – Principle and application of Dissecting and compound Microscope, phase contrast, **Fluorescence** and Electron microscopy (SEM and TEM)

Microtomy – types of microtome, material preparation and fixation – Embedding – block **making; Steps** involved in sectioning, staining and mounting; Cytophotometry; cryostat.

Section B

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Spectroscopy- Basic principles, Instrument Design, Methods & Applications of UV-Visible spectrophotometer

IR & Raman spectroscopy – Basic principle, theory and qualitative interpretation of I.R. spectra, quantitative methods

Fluorescence spectroscopy- Principle, Instrument Design, Methods & Applications

Centrifugation & Ultracentrifugation-Basic principles, Forces involved, RCF Centrifugation, techniques-principal, types and applications.

Flow Cytometer: Introduction to flow cytometer- Fluorochromes and fluorescence

Section C

Chromatography-Basic Concepts of Adsorption & Partition Chromatography, Principle Experimental set-up, Methodology & Applications of all types of Adsorption & Partition Chromatography methods-chromatography using paper, thin layer, gas(GC,GLC), HPLC, Ion Chromatography

Section D

Electrophoresis- Principle, Electrophoretic mobility(EPM) estimation, factors affecting EPM, Instrument design & set-up, Methodology & Applications of Free & Zone (Paper, Cellulose acetate, Agarose& Starch gel, Pulse-field, PAGE, SDS-PAGE, Capillary) Electrophoresis techniques, Principle, Experimental set-up, Methodology & Applications isoelectric focusing, 2D electrophoresis

Tracer techniques: Radioactive isotope – Half life, GM counter, Liquid scintillation counter, Autoradiography

Books recommended:

1. Fundamentals of Physics, 9th edition (2010). David Halliday, Robert resnick,Jearl Walker John Wiley & Sons.,USA.

2.C.R. Cantor and P.R. Schermer, Biophysical Chemistry (Parts I &3). W.H. Freeman,1980.

3. T.G. Cooper: The Tools of Biochemistry, Wiley Inter-Science, 1997.

BT – 301: ENERGY RESOURCES AND UTILIZATION

Section - A

Introduction: Nature: crude and bio-crude, Synthetic fuels and their manufacture, Bio-fuels and their synthesis History Properties of coal, Agriwaste as bio-fuels. Briquetting

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Environmental audit. Carbon sequestration. Carbon credits.

Section - B

Gasiform Coal: Gasification technologies, Steam/Oxygen and Stem /Air Gasification; Hydrogasification and Catalytic gasification Underground Gasification.

Biofuels:Biomass production, Biofuel resource production and improvement of biofuels,Solid, liquid biofuels,hydrocarbons from plants, biodiesel, bio-ethanol, non-edible oils as bio-fuel resources. Euro I, II, III standards of the fuel.

Section - C

Conversion Fundamentals: Pyrolysis including vacuum pyrolysis; Gasification, Gas shift and synthesis; Direct Liquefaction; Comparison of synthetic Fuel and bio-fuels.

Conversion: Ethanol production technologies; biochemical conversion; thermal Conversion .Catalysts: Environmental Aspects-Environmental effect and their measure; Air pollution control, water Management.

Section - D

Economic and Perspective: Large Scale production and conversion technology for the bio-fuel resources bio-refineries. Economic considerations resources process and product considerations. Industrial furnaces used in Chemical Process Industry. Fuels for the future, Hybrid fuels and economy.

Text/Reference Books:

Probstein R.F and Hill, NY.

Sarkar,S Fuels and Combustion, 2nd Ed., Orient Longman, 1990

BT-302: BIOCHEMISTRY I

Section - A

Acid & Bases: mole concept, Molarity & Normality, weak acids, Ampholyte, pH, Calculations of pH from H & OH concentrations , measurements of pH The law of mass action association and Ionic product of water, Henderson - Hassel Balch equation , Titration curve &pK values, **Buffers &** Stability of their pH , numerical problems

Introduction to biomolecules: Concept of biomolecules, polymerization, formation of polymers chemical bonds (weak interactions)

Section B

Carbohydrates: Introduction, Definition, properties and biological importance, Classification, chemical reactions, structure of monosaccharide, disaccharides & polysaccharides

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Amino acids and protein: Introduction, Definition and properties of amino acids, Structure of 20 amino acid, Classification based on structure, polarity and nutritional requirement of amino acid, chemical reactions. Proteins: Classification, primary secondary tertiary and quaternary structure, protein sequencing, biological function, protein nucleic acid interactions, helix coil transitions, zipper model, protein folding, Ramchandran plot, Bonds involved in protein structure

Section C

Lipids: Introduction, Classification, Fatty acids [Classification, Physical property ,Chemical property, Sap value, acid value, iodine number, rancidity] phosphoglycerides (e.g., lecithin),sphingolipids (e.g., Cerebrosides), Steroids (Cholesterol), Bile acids, bile salts, plasma lipoproteins

Nucleic acids: Nucleic acid: Purine & pyrimidine bases, nucleosides & nucleotides , double helical structure of DNA , conformational parameters of nucleic acids & their constituents, nucleic acids geometrics, glycosides bond rotational isomers and those puckering backbone rotational isomers and ribose puckering forces stabilizing ordered forms, base pairing, base stacking, Chargaff's rule, DNA polymorphism , DNA supercoiling , hyperchromicity, circular DNA, Types & structure of RNA, m RNA, tRNA, rRNA& modified nucleotides, tertiary structure of nucleic acids.

Section D

Enzymes: Nomenclature and classification, co-enzymes and co-factors, reaction and derivation of Michaelis-Menten equation kinetics and allosteric regulation of enzymes, isozymes; mode of catalysis.
Vitamins: Their structure, properties and biological structures.

Suggested readings:

1. Lehninger, Albert L. 1978. Biochemistry. M/s Worth Publishers Inc. New York.
2. Lehninger, Albert L. 1978. Principles of Biochemistry. M/s Worth Publishers Inc., New York.
3. Matthews& Van Holde, 2nd Biochemistry. Benjamin Cummings Pub. Co.
4. Stayer, L.,4th Ed. Biochemistry
5. Rawn, 1989 Biochemistry
6. Voet&Voet, 1991 Biochemistry

BT-303: Plant & Animal Physiology

Section A

Photosynthesis:

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Light harvesting complexes; mechanisms of electron transport; photoprotective mechanisms; CO_2 fixation-C_3, C_4 and CAM pathways.

Respiration and photorespiration: Citric acid cycle; plant mitochondrial electron transport and ATP synthesis; alternate oxidase; photorespiratory pathway.

Nitrogen metabolism: Nitrate and ammonium assimilation; amino acid biosynthesis

Plant hormones: Biosynthesis, storage, breakdown and transport; physiological effects and mechanisms of action.

Sensory photobiology: Structure, function and mechanisms of action of phytochromes, cryptochromes and phototropins; stomatal movement; photoperiodism and biological clocks.

Section B

Solute transport and photoassimilate translocation: Uptake, transport and translocation of water, ions, solutes and macromolecules from soil, through cells, across membranes, through xylem and phloem; transpiration; mechanisms of loading and unloading of photoassimilates.

Secondary metabolites - Biosynthesis of terpenes, phenols and nitrogenous compounds and their roles.

Stress physiology: Responses of plants to biotic (pathogen and insects) and abiotic (water, temperature and salt) stresses; mechanisms of resistance to biotic stress and tolerance to abiotic stress

Section C

Blood and circulation: Blood corpuscles, haemopoiesis and formed elements, plasma function, blood volume, blood volume regulation, blood groups, haemoglobin, immunity, haemostasis.

Cardiovascular System: Comparative anatomy of heart structure, myogenic heart, specialized tissue, ECG – its principle and significance, cardiac cycle, heart as a pump, blood pressure, neural and chemical regulation of all above.

Respiratory system: Comparison of respiration in different species, anatomical considerations, transport of gases, exchange of gases, waste elimination, neural and chemical regulation of respiration.

Nervous system: Neurons, action potential, gross neuroanatomy of the brain and spinal cord, central and peripheral nervous system, neural control of muscle tone and posture

Section D

Sense organs: Vision, hearing and tactile response

Excretory system: Comparative physiology of excretion, kidney, urine formation, urine concentration, waste elimination, micturition, regulation of water balance, blood volume, blood pressure, electrolyte balance, acid-base balance.

Thermoregulation: Comfort zone, body temperature – physical, chemical, neural regulation, acclimatization.

Stress and adaptation

Digestive system: Digestion, absorption, energy balance, BMR

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Endocrinology and reproduction: Endocrine glands, basic mechanism of hormone action, hormones and diseases; reproductive processes, neuroendocrine regulation.

Books:

1. Buchanan, B.B., Gruissem, W. and Jones, R.L. 2000. Biochemistry and Molecular Biology of Plants, American Society of Plant Physiplogists, Maryland, USA.
2. Dennis, D.T., Turpin, D.H., Lefebvre, D.D. and Layzell, D.B. (Eds) 1997. Plant Metabolism (second edition). Longman Essex, England.
3. Galston, A.W. 1989. Life Processes in Plants. Scientific American Library, Springer-Verlag, New York, USA.
4. Hooykaas, P.J.J., Hall M.A. and Libbenga, K.R. (eds) 1999. Biochemistry and Molecular Biology of Plant Hormones, Elsevier, Amsterdam, The Netherlands.
5. Hopkins, W.G. 1995. Introduction to Plant Physiology. John Wiley & Sons, Inc., New York, USA.
6. Lodish, H., Berk, A., Zipursky, S.L., Matsudaira P., Baltimore, D. and Darnell, J. 2000. Molecular Cell Biology (fourth edition). W.H. Freeman and Company, New York, USA.
7. Moore, T.C. 1989. Biochemistry and Physiology of Plant Hormones (second edition). Springer-Verlag, New York, USA.
8. Nobel, P.S. 1999. Physiochemical and Environmental Plant Physiology (second edition), Academic Press, San Diego, USA.
9. Salisbury, F.B. and Ross, C.W. 1992. Plaut Physiology (4th edition). Wadsworth Publishing Co., California, USA.
10. Singhal, G.S., Renger, G., Sopory, S.K., Irrgang, K.D. and Govindjee1999., Concepts in Photobiology : Photosynthesis and Photomorphogenesis. Narosa Publishing House, New Delhi.
11. Taiz, L. and Zeiger, E. 1998. Plant Physiology (2nd edition). Sinauer Associates, Inc., Publishers, Massachusetts, USA.
12. Thomas, B. and Vince-Prue, D. (1997) Photoperiodism in Plants (second edition). Academic Press, San Diego. USA.
13. Westhoff, P. (1998) Molecular Plant Development from Gene to Plant. Oxford University Press, Oxford, UK.
14. Plant Secondary Metabolites by K.G. Ranawat
15. Eckert Animal Physiology Mechanisms and Adaptation. R. Eckert (ed), 5th Biochemical Adaptation. P.W. Hochachka and G.N. Somero (eds), Priceton Univ. Press, Princeton, New Jersey. edition, W.H. Freeman and Company, New York.
16. General and Comparative Animal Physiology, W.S. Hoar (ed), Prentice Hall of Indian.
17. Animal Physiology: Adaptation and Environment. K.S. SchiemdtNeilsen (ed), University Press, Cambridge, UK.
18. A regulatory Systems Approach. Strand, F.L. Physiology: Macmillan Publishing Co., New York.

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19. Practical Biochemistry, L. Lummer (ed), Tata McGraw Hill
20. Environmental and Metabolic Animal Physiology, C.L. Prosser (ed), Wiley-Liss Inc.,
Animal physiology by guyton

B.Sc. Biotechnology Part I

List of practical's based upon above syllabus

1. Study of Laboratory rules and safety regulations
2. Basic techniques of sterilization
3. Types of culture media and their preparations for microbes- Bacteria, Fungi, Algae, Protozoa
4. Isolation of microorganisms from air, water and soil
5. Isolation techniques
   a. Spread plate
   b. Streak plate
   c. Pour plate
   d. Serial dilution
6. Growth Curve
7. Study of mitosis stages by squash preparation of onion root.
8. Study of meiosis by squash preparation of Datura anthers/*Tradescentia* anthers/cockroach testis/grasshopper testis.
9. Study of permanent slides of various plant and animal tissues
10. Exercise based on statistical methods for biologists .
11. Computer – Getting familiar with the hardware, booting & operating
12. Tutorials operating systems: DOS, Windows 98/XP, UNIX etc.
13. File handling: copy, rename, delete, type etc. Directory structure: make, rename, move directory
14. Word Processing (Microsoft Word): Creating, Saving & Operating a document, Editing, *Inserting, Deleting, Formatting, Moving & Copying Text, Find & Replace, Spell Checker* & Grammar Checker, Document Enhancement (Borders, Shading, Header, Footer), Printing document (Page layout, Margins), Introduction to the use of Wizards & Templates, Working with Graphics (WordArt), Working with Tables & Charts, Inserting Files (Pictures, Databases, Spreadsheets)
15. Use of internet – Downloading & Installing software/plugins on Windows 98/XP (Acrobat Reader, Post Scripts Viewer, etc.) Searching/Surfing on the WWW
16. Study of various plant parts and their mode of development
17. Study of seed and its germination stages till the formation of seedling in monocot and dicot
18. Study of T.S. of dicot stem, monocot stem, root and leaf.
19. Dissection of flower to study its various parts
20. Permanent slides to study various developmental stages in *Drosophila* Life Cycle
21. Permanent slides to study various developmental stages in Chick (18 hrs., 21 hrs., 36 hrs., 48 hrs., 72 hrs., 96 hrs.,).

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22. Preparation of blood film and microscopic study of stained blood film for identification of cell types.
23. Total Leukocyte counting by Hemocytometer.
24. Radial immune-diffusion technique.
25. ELISA technique.
26. pH Meter: Standardization of pH meter, Preparation of Buffers.
27. Verification of Beer-Lambert's law-using UV-Vis spectrophotometer.
    a. Change in absorbance with concentration of potassium permanganate.
    b. Absorption maxima– change in absorbance in potassium permanganate with
    a. wavelength
28. Principle of TLC and paper chromatography.
29. Column chromatography for protein /pigment.
30. Microscopy- Compound Light Microscope: Principle,Parts and Function.
31. Sterilization: Principles and Operations- Autoclave, Hot air oven, Filtration, Laminar Air Flow.
32. Principles and operations of Incubators and Shakers.
33. Principles and operations of Centrifuge.
34. Industrial visits- In Rajasthan Go sewa sangh and Project report Preparation.
35. Determination of λ (wavelength) maxima of given solution.
36. Qualitative estimation of Carbohydrates, Proteins and Lipids.
37. Determine the vitamin C content in citrus fruit by titration method.
38. Quantitative estimation of protein by Biuret method in serum sample.
39. Effect of substrate concentration on activity of any enzyme and determination of its Km value.
40. Extraction of chloroplast pigments from leaves and preparation of the absorption spectrum of chlorophylls and carotenoids.
41. To determine the chlorophyll a/ chlorophyll b ratio in C3and C4 plants.
42. Preparation of the standard curve of protein (BSA) and estimation of the protein content in extracts of plant material by Lowry's or Bradford's method.
43. Determination of RBC in given blood sample.
44. Determination of packed cell volume in given blood sample.
45. Determination of the glucose in urine.
46. Study of permanent slides of Mammalian tissue.
47. Introduction to Microtomy

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Second Year

BT-401: MOLECULAR GENETICS

Section A

Mendelian principles: Dominance, segregation, independent assortment, deviation from Mendelian inheritance. Codominance, incomplete dominance, gene interactions and pleiotropy.

Concept of gene: Allele, multiple alleles, pseudo allele, complementation tests. Genome; Basic structure of prokaryotic and eukaryotic genome and its organization

Section B

Macromolecular structure: Structure, types and function of DNA and RNA. Chromosome structure and nucleosome concept; DNA Repair mechanism.

Replication: Prokaryotic and eukaryotic DNA replication. Enzymes and factors required for replication.

Section C

Transcription: Prokaryotic and eukaryotic transcription. Post transcriptional modification of mRNA, rRNA, and tRNA. Reverse transcription

Translation: Concept of Genetic code and its feature Deciphering of Gene code. Prokaryotic and eukaryotic translation, post translational modification,inhibition of transcription and translation.Polymerase Chain Reaction (PCR) Types & Applications

Section D

Mechanism of genetic recombination: Homologous and Non homologous

Mutation elementary concept; types of mutations; Point mutations (Base pair change, frame shift, deletion, etc.) mutagens.

Regulation of gene expression with 'Lac' operon as model.

Gene cloning

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Books:

1. Molecular Genetics of Bacteria by Larry Synder and wendyChampness ASM Press, Washington, 1997.
2. Genetics by Goodenough U. Hold Saunders Inter-National ,1985.

3. Principles of Genetics by Gardener ,E.j, Simmons M.J. Siustd DP.
4. Genes VIII by Benjamin Lewin, Oxford Univ. Press, Oxford, NY, 1994
5. Molecular Biology by Freirelder D. joners&Barilett Pub. Inc.

BT - 402 : FOOD AND DAIRY TECHNOLOGY

Section -A

Microbial role in food processes, operation and production new protein foods- mushroom, food yeasts, algal proteins

Fermentation as a method for preparing and preservingfoods.Food additives like coloring flavors and vitamins.

Organisms and their use for production of fermented foods and beverages: Picking, alcoholic beverages, cheese, sauerkraut, idli, vinegar.

Section -B

Deoxygenating and DE sugaring by glucose oxidase, beer mashing and chill proofing or cheese making by protease in and various other enzyme catalytic action in food processing Classification of fruit juice.

Post-harvest technology and process of food preservation.

Section -C

Milk:Definition, composition, chemical and functional properties of milk components : physicochemical properties of milk protein, aggregation of Casein, micelles, factors affecting milk composition, milk secretion and lactation.

Micro-organisms: Importance in dairy science and technology. Microbial spoilage of milk, hydrolytic rancidity in milk and milk product, autoxidation of milk fats and effects on milk quality.

Section -D

Milk processing operation: Milk pasteurization, Homogenization & Sterilization. Effect of processing of milk component and their functional properties.

Skimming of milk, Cream & Cream characteristics, manufacture of yoghurt and other fermented milk product Ice cream manufacture, Butter making technology, technology of cheese and processing of concentrated milks and dried milk powder. 5. Milk quality control, sanitation in the dairy plant, adulteration of milk, dairy equipment maintenance and waste disposal.

Books

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1. Ftizer, Food Microbiology, THM Publications.
2. Heller. Genettic Engineering of food: Detection of Genetic Modifications, Wiley Publications.
3. Lel A. et. al. Microorganism & Fermentations - N.Y. Chemical. Rehm, Biotechnology set Wiley Publication
4. KeshavTrehan Biotechnology, New Age International Pvt Ltd.,2002

BT- 403: BIORESOURCE AND WASTE MANAGEMENT

Section -A

1. General:Bio resources: Biomass of food, fuels and chemical

2.Biodiversity and its characterization, use of Global positioning system in bio resource management.

3. Generation of Solid Waste: Goals and objectives of solid waste management, classification of solid waste. Solid waste generation factors influencing generation of solid waste. Characteristics of solid waste, analysis of solid waste, Problems associated with solid waste Disposal

Section -B

4. Onsite Handling, Storage and Processing: Public Health and Aesthetics onsite Handling, onsite Storage, Dustbins. Community Containers, Container Locations, Onsite Processing Methods.

5. Solid waste collection, transfer and transport: Collection System equipment and labor requirement, collection routes, options for transfer and transport systems.

Section -C

6. Processing and Disposal methods: Processing techniques and methods of disposal, sanitary land filling, composting and incineration, Bioremediation.Overview of methods of vermicomposting

7. Recovery of resources, conversion products and energy: Material, recovery, energy generation and recovery operation reuse in other industry

Section -D

8. Industrial solid waste: Nature, treatment and disposal methods.

9. Bio waste including medical waste: Disposal and safety regulations.

Text/References:

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1. G. Techobanogious, H. Theisen and R. Blassen- Solid waste engineering, Principles and Management issue, McGraw Hill Book Co., New York 77.
2. C.L. Mantell, Solid Waste Management John Wiley, New york, 1975
3. Bhide and Sundershen, Solid waste Management in Developing Counteries .
4. Books :
5. Molecular Genetics of Bacteria by Larry Synder and Wendy Champness. Asm Press, Washington, 1997.
6. Genetics by Goodenugh U. Hold Saunders International, 1985
7. Principles of Genetics by Garener, E.j., Simmons M.J. Slustad DP
8. Genes VI Benjamin Lewin, Oxford Univ. Press, Oxford NY, 1994.
9. Molecular Biology by Freifelder D., Jones &Barilett Pub. Inc.

BT 501: BIOCHEMISTRY – II

Section -A

Introduction to metabolism: Anabolism & catabolism, exothermic & endothermic reaction, Oxidation & reduction Reactions, Redox potential

Carbohydrate metabolisms: Glycolysis, Fermentation, Citric acid cycle, Oxidative Phosphorylation & ETC, Gluconeogenesis, Pentose phosphate pathway, Glyoxylate shunt, Glycogen metabolism – glycogenolysis and glycogenesis.

Section -B

Lipid metabolisms: Oxidation of fatty acids, Fatty acid synthesis, Biosynthesis of triacylglycerol's ,Biosynthesis of Membrane phospholipids ,Biosynthesis of Cholesterol , Biosynthesis of Steroids , biosynthesis of Ketone bodies.

Section C

Photosynthesis: Structure and organization of Chloroplast, Basic information on 'light' and 'dark' reactions of photosynthesis and differences in photosynthesis process of C3+C4 and CAM plants, photorespiration.

Amino acid metabolisms: Metabolic fate of amino group, Transamination, deamination and racemization, Decarboxylation and oxidative degradation of amino acid, Nitrogen excretion and urea cycle.

Section D

Nucleotide metabolisms: Biosynthesis of purine by De novo and salvage pathway, Biosynthesis of pyrimidine nucleotide by De novo and salvage pathway.Phosphorus and sulphur regulation.

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Books:

Principles of Biochemistry:Lehninger, 3rd ed. McMilklan Biochemistry: G. Zubay

Biochemistry :Stryer, 5th ed., 2001, W.H. Freeman

Biochemistry : Garret and Grasirii Pub. Somders College

BT -502: PLANT SECONDARY METABOLITES

Section -A

Introduction, secondary plant products in nature and their occurrence, type and uses. Basic tools and techniques used in isolation and separation.

Section –B

Production in vitro- optimization selection effect of metabolism on secondary metabolite-production, production under stress factors.

Production of alkaloids, steroids and saponins. Mechanism and control by different factors, detoxification of secondary metabolites.

Section -C

Production of secondary metabolites by bioconversion genetic transformation for production of secondary metabolite.Large scale production in bioreactor.Commercial production of secondary metabolites using cell cultures.Use of bioreactors, immobilized cells.Biotransformation.Applications and limitations.Cryopreservation and ex situ conservation of germplasm.Microbial secondary metabolites, their occurrence types and uses.

Section -D

Sources and type of antitumor compounds, food additives and insecticides.Products obtained in traditional medicinal systems and their significance in plant biotechnology.Biotechnological approach on production of secondary metabolites e.g. ginkolides from cell cultures of *Ginkgo biloba* L.Use of immobilized cell systems for the production of industrially important chemicals.

Genetic regulation of metabolic.Gene expression in response to environmental stimuli, Regulation of gene expression.Analysis of metabolic control and the structure metabolic.

BOOK RECOMMENDED:

Secondary Metabolites- K G.Ramawat .Oxford Press. Reprint 2000

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BT - 503: ENVIRONMENTAL BIOTECHNOLOGY

Section -A

1. Components of Environment - Hydrosphere, lithosphere, atmosphere

2. Energy transfer in an Ecosystem, Food chain, food web, Bio-geochemical cycles (N, C, and P cycles).

3 Environmental pollution and degradation – Pollution of air, water , land and noise with reference to their causes, nature of pollutions, impact and control strategies.

4 Global Environmental Problems – Greenhouse Effects, Acid rain, El Nino, Ozone depletion, Deforestation,, salinization, biodiversity loss; chemical and radiation hazards.

Section -B

5. Waste water: communal, sewage and industrial effluents: type of wastes, properties and step involved in aerobic and anaerobic treatments

6. Principle and design aspects of various waste treatment methods, with advance bioreactor configuration: activated sludge process, trickling filter, fluidized expanded reactor, up flow anaerobic sludge blanket reactor, contract process, fixed/packed reactor, hybrid rectors, sequential batch reactors.

Section -C

7. Kinetic models for biological waste treatment: Bioconversions of agricultural and of highly organic waste material into gainfully utilizable product, Biogas, H2, cellular and food and feed stocks.

8. Process strategies for Bioremediation through microbes and plant. Bioremediation by industries, impact for process in global Bioremediation industry, exploiting microbial metabolism Bioremediation of organic contaminants, heavy metals and nitrogenous wastes.

Section -D

9. Environmental monitoring (Bio indications, Biomarkers, Biosensors) Environmental Protection Act

10. Waste disposal and management, legislation of environmental problems, microbiological and biochemical aspects of waste water treatment processes, microbial strain improvement with view to develop scavengers, bioremediation. Environmental laws, national movements on sustainable developments, environmental policies and conservation, IUCN role in environmental protection

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References:

1 J. Winter. Environmental Processes I-III, 2nd Ed., Wiley Publications.

2 Metcalf Eddy - Waste water Biotechnology.

3 Ted Munn, Encyclopedia of Global Environmental Changes, 5 Vol. Set Wiley Publications.

4 Metcalf Eddy - Waste water Engineering - 3rd ed., THM publications.

5 R.S. Ramalho - Introduction to waste water treatment

BT 601: INDUSTRIAL BIOTECHNOLOGY

Section A

Introduction to bioprocess technology, basic principles of fermentation technology. Range of microbial fermentation processes. Recombinant DNA technology assisted products. Flow chart of typical industrial fermentation process.Concept of value addition shelf life improvement. Low volume high value and High volume low value products.

Bioreactor/Fermenter – types & operation of Bioreactors, Construction, Design & Operation **Materials** of Constructions, Components of the fermenters & their specifications

Types of Bioprocess: Bio-transformations (enzyme, whole cell), Batch fed batch, cell cycle and continuous fermentation processes. Monad model and constitutive equations used for expressing growth, substrate consumption and product formation, solid state fermentation

Section B

Technology of Microbial cell maintenance – steps to maintain microbial culture in an aseptic & sterile environment (how to inoculate, preserve & maintain), Strain preservation, maintenance and strain improvement by mutation of gene transfer processes

Industrial production of Ethyl alcohol, Acetic Acid (Vinegar), Citric acid, lactic acid, α-amylase, protease penicillin, tetracycline and vitamin B12, With reference to easily available raw materials, Production of herbal drugs. Antibiotics, amino acids, vitamins, ethanol, vaccines (FMD, DTP, New Castle disease), Single cell protein (Methanolic yeast, Spirulina).

Section C

Enzyme technology – nature of enzymes, application of enzymes, limitations of microbial cells used as catalysts in fermentation, multi enzyme reactors, genetic engineering & protein engineering of enzymes, cloning strategy for enzymes technology of enzyme production, use of

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immobilized cells and enzymes (Calcium alginate beads, polyacrylamide), industrial applications of immobilized enzymes.

Application of enzymes in Medical/pharmaceutical, and in food industry.Industrial applications of amylases and proteases.Production of amino acids and antibiotics by immobilised enzymes/cells.Use of microbial enzymes in leather, paper and dairy industry.

Biological fuel generation – photosynthesis, sources of biomass, ethanol from biomass, methane from biomass, hydrogen, microbial recovery of petroleum

Section D

Biotechnology in specific medical & industrial applications - Retting of jute, microbial process for immunization (Production of monoclonal antibodies), Deterioration of paper, textiles, painted surfaces and their prevention, Bio-films, microbial biopolymers, bio surfactants, Microbial culture selection with high yield potential.

Fermented Foods: Yoghurt, Buttermilk, Idli, Dosa, Cheese, Tempeh. Plant cell suspension culture for the production of food additives-Saffron and Capsaicin, Microbial polysaccharides and polyesters; production of xanthenes gum and polyhydroxyalkon des (PHA)

Books:

1. Harrison G. Roger, Paul Todd, Scott R. Rudge, Demetri P. Petrides, "Bio separation Science and
1. Engineering" Oxford University press, 2003.(Unit I, II).
2. Treybal E. Robert, "Mass-Transfer Operations", 3rd ed., McGraw Hill International Edition, Singapore, 1980.(Unit IV).
3. Doran M. Paulines, "Bioprocess Engineering Principles", 8th ed., Academic press, New York, 2003.
4. (Unit V).
5. Belter A Paul and Cussler E. L, Wei-Shou Hu., " Bioseparations: Downstream Processing for
6. Biotechnology ", A Wiley-Interscience Publication, John Wiley & sons, New York, 1988. (Unit III)
7. Ladisch, M.R., "Bioseparation Engineering: Priciples, Practice and Economics", A Wiley-Interscience Publication, John Wiley & sons, New York, 2001.
8. MccabeL.Warren, Smith C. Julian and Peter Harriott, "Unit Operations of Chemical Engineering", 6th ed., McGraw Hill International Edition, New York, 2001
9. Prescott, Dunn, "Industrial Microbiology", Agrobias (India), Jodhpur, 2002.
10. Casida L.E., "Industrial Microbiology", John wiley& Sons, 1968.

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11. Biochemistry by Jeremy M.Berg, John L.Tymozko, LubertStyer, Fifth edition, W.H.Freeman and Company, 1514 pages.
12. WulfCrueger, AnnelieseCrueger, "Biotechnology: A Text Book of Industrial Microbiology", Panima publishing corporation, New Delhi, 2003.(Unit I, II: Vitamins, III, IV and V)
13. Stanbury, P.F., Allan Whitaker and S.J. Hall. 1997. Principles of Fermentation Technology. Adityabooks private Ltd., New Delhi.

BT 602: RECOMBINANT DNA TECHNOLOGY

Section A

Milestones of recombinant DNA Technology- Introduction and Historical perspective and early experiments.
Recombinant DNA Tools: Enzymes (Restriction enzymes, DNA ligases, DNA Polymerase Reverse Transcriptase, Polynucleotide kinase, End labelling and other enzymes). Cloning hosts (bacteria fungi animal and plant cells).
Gene transfer strategies: DNA mediated gene transfer, vector mediated gene transfer (Plasmid vectors, cosmid, Phagemid, Phage vectors) and *Agrobacterium* mediated gene transfer.

Section B

Experimental model systems:*E. coli,* Yeast, Baculovirus and their applications
DNA Libraries: Making of genomic and c-DNA libraries, their screening strategies for recombinant molecules and major application
Transposons: Concept of prokaryotic and eukaryotic transposition

Section C

Transgenic Technology: Production of transgenic Microbes transgenic Animals and transgenic Plant along with their application in Biotechnology
Requirement of recombinant molecules: in health, pharmaceutical, agriculture and industrial sectors in research laboratories, criteria of purity

Section D

Strategies for the production of recombinant molecule: Rationale for the design of vectors for the over expression of recombinant proteins, selection of suitable promoter sequences, ribosome binding sites, transcription terminator, fusion protein tags, purification tags, protease cleavage sites and enzymes plasmid copy number, inducible expression system

***In vitro* optimization of downstream processing:** Over expression conditions, production of inclusion bodies, solubilization insoluble proteins, Purification protocols and upscaling. Determination of purity and activity of over expressed protein

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Books:

1. An introduction to Genetic Engineering –Desmond S T Nicholl ,Cambridge university press, 2nd Ed.
2. Ausbel S.M, Brent R, Current Protocols in Molecular Biology., Wiley International New York.
3. Bernard R Glick & Jack J Pasternak, ASM press.
4. D.M Glover, DNA cloning, A practical approach.
5. DNA Science by MicklosFreyer
6. Gene cloning and DNA analysis by T.A. Brown
7. Genes V –Benjamin Lewin
8. Maniatis I, FritchhE.F ,&Sambrook J, Molecular cloning.
9. Methods in Enzymology series, vol 152, 185, Academic press inc, Sandiego.
10. Molecular Biology of gene by Watson, Baker, Bell, Gann, Levine, Losick
11. Molecular Biotechnology Principles & Applications of Recombinant DNA, Bernard R Glick & Jack J Pasternak, ASM press.
12. Molecular Biotechnology: Principles and Applications of Recombinant DNA, B.R. Grick and J.J. Pasternak, ASM Press
13. Old R.W & Primrose S.B., Principles of Gene manipulations, Blackwell Scientific publications.
14. Principles of Gene manipulation and Genomics by Primrose and Twyman
15. Principles of Gene Manipulation: An Introduction to Genetic Engineering, R.W. Old and S. B Primrose, Blackwell Science Inc
16. Recombinant DNA, J.D. Watson et al, W.H. Freeman and Company
17. Recombinant DNA: A short Course, Watson J.D, CSHL press Short course in Bacterial Genetics –J. H. Miller
18. Setlow& Hollander A, Genetic Engineering: Principles & Methods, Plenum Press.
19. WinnekeFrom Genes to Clones.

BT 603: Behavioral Science and Basic communication skill

Section A

Behavioral Science : Self Analysis- *SWOT* Analysis, Self Confidence, Self Esteem
Attitude-Change Management, Perceptions- Ideas and Approach
Motivation- Internal and External Self Talk
Goal Setting- Time Management- Vision & Planning, Problem Solving
Creativity- Out of box Thinking – Lateral Thinking
Interpersonal Skill- Team Work- Networking,
Leadership Skill- Role Models- Leadership Style
Stress Management- Emotional Intelligence- Emotional Quotient

Section B

Conflict Resolution- Approaches- Solution

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Presentation Skill- Analytical Thinking, Review
Assertiveness- Stress Management – Quiz
Lateral Thinking (Situational) Team Work , Impromptu (Text Analysis)
Business Plan Presentation- Plan I & Plan II, Chinese Whisper
Self Introduction- GD, Mock Interview, Curriculum Vitae

Section C

Basic Communication Skills-

General Introduction of Communication, The process and importance of Communication, Principle and Benefits of Effective Communication,
Spoken English Communication- Speech Drills, Pronunciation and Accent, Stress and Intonation, Developing Listening Skills, Developing Speaking Skills

Section D

Basic Methods in communication : Developing Reading SkillDeveloping Writing Skill, Progression of Thoughts/ Ideas, Structure of Paragraphs, Structure of Essays.

Books Recommended:

Written communication in English- Sarah Freeman

McMillan Grammer: A Handbook of " Augustine and Joseph"- Orient Longman.

Phil Loweb Koge Page: Creativity and problem solying, New Delhi

Organizational Behavior, Davis, K.

Bates, A.P. and Julian, J.: Sociology- Understanding Social Behaviour

Geoff Petty: How to be better at creativity; Kogan Page, New Delhi 1998

Michael Steven: How to be a better problem solver, Kogan Page, New Delhi-1999

Julia T. Wood, interpersonal Communication everyday encounter

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B.Sc. Biotechnology Part II
List of Practical

1. Isolation of DNA from human cheek cells
2. Isolation and electrophorectic separation of DNA from prokaryote (bacteria)
3. Assessing the purity & Quantity of extracted DNA spectrophotometrically
4. Determination of absorbance maxima for DNA spectrophotometrically
5. Demonstration and handling of PCR
6. Prepare the mount for polytene and lampbrush chromosomes
7. Parameters for quality control analysis of milk
8. Biological characteristics such as Litmus milk test, MBRT test
9. Detection of adulterants, in milk
10. Isolation of protein from milk sample
11. Production of wine from grape juice
12. Educational tour to Dairy/food processing/fermentation industries
13. Field report on Biodiversity Park.
14. Shelf-life management of flowers of importance.
15. Study of Industrially important plants (specimens/products) morphology, botany and uses.
16. Study on disposal and treatment of biomedical waste
17. Waste Water Treatment
18. Preparation of standard curve
19. Quantitative estimation of sugar content in plant sample by Anthrone method
20. Quantitative estimation of protein content in plant sample by Lowry method
21. Quantitative estimation of phenolic content in plant sample by Folin-Ciocateu reagent method given by McDonald
22. Protein profiling by SDS PAGE
23. Isolation of secondary metabolites (aqueous or alcoholic)
24. Qualitative test for:
    a. Alkaloids
    b. Flavanoid
    c. Tanins
    d. Phenols
    e. Saponin
25. Quantitative test for
    a. Alkaloids
    b. Flavanoid
    c. Tanins
    d. Phenols
    e. Saponin
26. To estimate free CO2 in given water sample
27. To determine BOD of given water sample
28. To determine total dissolved solids in water sample
29. MPN determination in water sample

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30. To determine organic content in soil sample
31. Isolation of microorganisms and Screening of industrially important microorganisms
32. Study of growth, substrate utilization and product formation kinetics in shake flask cultures
33. Cell disruption techniques Detergent and Enzyme
34. Membrane based filtration – Ultra Filtration and Micro Filtration
35. Centrifugation and Sedimentation
36. Measurements, micropipetting and sterile handling of the reagents
37. Electrophoretic separation of plasmid isolated by alkali lyses method
38. Restriction digestion of DNA (RFLP analysis)
39. Bacterial DNA ligation
40. Molecular characterization by RAPD marker Detection of a specific sequence using PCR

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Third Year

BT – 701: GENOMICS AND PROTEOMICS

Section -A

1. Basic structure of prokaryotic and eukaryotic genome.

2. Chromatin model, concept of gene, linkage and crossing over, linkage analysis in Drosophila and Neurospora.

Section -B

3. Pedigree analysis in human, Genetic mapping and its tools genetic mapping of complex character.

4.Multigene families in human genome and repetitive DNA, C-Value paradox and complexity of genome.

Section C

Proteomics: Basic principles of protein structure: Protein Structure and Function. Structural and functional proteomics.Designing protein.

Analysis of Proteome: 2D – gel electrophoresis, mass spectroscopy. Modelling of three-dimensional structure of a protein from amino acid sequence.Modelling mutants.

Section D

Protein – protein interactions: Yeast- two hybrid method, GFP Tags, Proteome- wide interaction maps. Understanding of interactions and effects of internal (intracellular) milieu on the activity of the protein and its various complexes and interactions.

Designing genome and proteins: Analysis of nucleic acid / protein sequence and structure data, genome and proteome data using web-based tools.

Applications of mapping: Interrelations of genomics with proteomics. Genomics and proteomics their application to health, agriculture and industry.

Books Recommended

1. **Genetics**: Griffith and Suzuki.

2. **Principles** of Genetics: Gardener 8th Ed., Pring, 2002, Jho.

3. **Genes VIII**:BenzaminLewin 1st Ed., Pring, 2003 Oxford University

4. **Genome**:T.A.Brown, 1999 ,Jhonwiley& Sons.

5. **Statistics** Concept and application: H. frank and S.C. althoen Cambridge University Press.

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6. Statistical Methods: G.W. snedecor and W.G. Cochran

7. Basic Statistics: B.L. Agarwal.

8. Principles and Procedure of Statistics: A Biometrical Approach, R.G.D. Steel and J.H. torrie.

BT- 702: PLANT BIOTECHNOLOGY

Section A

1. Historical background; Terminology used in cell & tissue culture; Basic techniques of cell and tissue culture; Surface sterilization; Aseptic tissue transfer. Concept of totipotency (Dedifferentiation, Redifferentiation).

2. Nutritional requirement of cell in vitro; Various types of nutrient media (Inorganic supplements, Organic supplements, PGR's, Gelling agents, Defined media).Development of explants (Somatic embryogenesis, Organogenesis).

3. Micro propagation and cloning of plants (Process, Limitation, Applications of micro propagation in agriculture, hortlculture & forestry) .

Section B

4. Variability in tissue culture; Soma clonal and other variations (Process, Advantages, Limitation, Screening of soma clonal variants, Verification of soma clones)

5. Haploid production (Techniques, Androgenesis, Gynogenesis, Diplodization of haploids, Applications, Limitation).

6. Production of disease free plants by tissue culture methods (Process, Application, Limitation, and Virus Indexing).

Section C

7. Isolation of cells (From plant, From suspension culture, Mechanical method, Enzymatic method) Single cell cultures and cloning (Bergmann cell plating technique, Filter paper raft nurse technique, Micro culture chamber technique, Micro drop method, Feeder layer technique).

8. Protoplast isolation and hybridization: Protoplast isolation and culture, fusion of protoplast (Mechanical, enzymatic, Purification of protoplast, Checking the quality of protoplast); Somatic hybrids (Somatic hybridization- Chemical, Electrical), Fate of somatic hybridization, Verification of hybridity).

Section D

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9. Genetic transformation: *Agrobacterium tumefecians* induced tumor formation and *A. rhizogenes* induced hairy root, features of TI and RI plasmid, mechanisms of DNA transfer in plants.

10. Genetic engineering: for increasing crop productivity (By manipulation of photosynthesis, Nitrogen fixation, Nutrient uptake efficiency); biotic stress tolerance- (Insects, Fungi, Bacteria, Viruses, Weeds); Abiotic stress (Drought, Flooding, Salt, Temperature); for quality improvement (Protein, Lipids, Carbohydrates, Vitamins, Mineral nutrients).

11. Germ plasm conservation, Identity conservation in genetically modified Crops.

Books /Reference:

1. Dodds. J.H. & Roberts L.W. (1985). Experiments in plant tissue culture, Cambridge Univ. Press.

2. Kumar A and S Roy (2006), Plant biotechnology and its applications in culture. I.K. International, New Delhi.

3. Beversadorf W.D. (1990) Progress in plant cellular & Mol. Boli. (Eds.) HJJ.Nijkamp, Kluwar Acad. Pub. Dordrecht.

4. Green D.A. &Somerspm (1987), Progress in PLant Cellular & Mol. Biol., Kluwar Academic Press Dordrecht.

5. Vasil, I.K. and Thorpe, T.A. 1994. Pliant Cell and Tissue Culture, Kluwer Academic Publishers, The Netherlands

6. Hall R.D. (Ed.) 1999 Plant Cell Culture Protocols. Human Press Inc. New Jersey, USA.

7. Molecular Bilogy of cell. Garland Pulishing Co., Inc.New York, USA.

8. Dixon R.A. (ED) 1987. Plant Cell Culture: A Practical Approach. IRL Press, Oxford.

BT – 703: ANIMAL BIOTECHNOLOGY

Section A

Introduction to animal tissue culture: Milestones in Animal tissue Culture, Concepts and Terminologies, Steps in Cell Culture.

Contamination and Aseptic techniques – Sources of Microbial Contamination, Washing & preparation of glassware, packing & sterilization, media sterilization, Filter sterilization, precautions to maintain aseptic conditions.

Section B

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Laboratory Set up and Media Formulations: Setting up the laboratory , Hazards and safety in the cell culture laboratory, Animal cell culture media ,General cell culture media design ,Natural media, Synthetic media , Consideration in Media formulation, Nutritional components of media The Role of serum in cell culture, Choosing a medium for different cell types.

Key techniques in animal cell culture: Culturing and routine Maintenance of the culture, Tissue Disaggregation, Quantification of cells in cell culture, Cloning and selecting cell lines Physical methods of cell separation.

Section C

Characterization of cell lines: Species verification, Intra-species contamination, Characterization of cell type and stage of differentiation.

Preservation of animal cell lines: Variation and instability in cell line, freezing of cells. Cell viability and Cytotoxicity assay, Cell banks.

Scale Up of animal cell culture: Culture parameters, Scale of anchorage- dependent cells. Suspension culture. Cell culture based vaccines.

Section D

Monoclonal Antibody Production: The limitation of traditional antibody preparation , The basis of hybridoma technology The details of hybridoma technology , Long term storage of hybridoma cell lines ,Contamination , Hybridomas from different species Human hybridomas , Commercial scale production monoclonal antibodies.

The applications of animal cell culture, Stem cells and applications, Organ Culture and tissue Engineering.

Book

Cell and tissue culture: Lab Procedures in Biotechnology, Alan Doyal (ed) J. Bryan Griffth (ed).

Freshney, R. I., 2000, Culture of Animal Cells: A Manual of Basic Technique, Published by Willey & Liss Publication.

Harrison & Rae, 1997, General Techniques of Cell Culture, Cambridge University Press.

BT – 801 : MEDICAL BIOTECHNOLOGY

Section -A

Diseases: Introduction, types: Genetic; Chromosomal aberrations: numerical and structural autoimmune disorders, diseases caused by microbial sources. Mechanism of pathogenecity, pathogenic islands, Molecular basis of diseases Antimicrobial compounds and their mode of action

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Disease prevention: Gene therapy - *Ex-vivo, In vivo, In situ* gene therapy, Strategies of gene therapy: gene augmentation, Vectors used in gene therapy, Biological vectors – retrovirus, adenoviruses, Herpes. Synthetic vectors– liposomes, receptor mediated gene transfer

Characteristics of infectious diseases, Herd immunity.Disease cycle (Source of disease, reservoir, carriers).Transmission of pathogens (Air Borne. contact transmission and vector transmission).

Section -B

- Characteristics of infectious diseases, Herd immunity.

- Disease cycle (Source of disease, reservoir, carriers).

- Transmission of pathogens (Air Borne. contact transmission and vector transmission).

- Bacterial Diseases: Epidemiology, Pathogenicity, Laboratory Diagnosis, Prevention & control of the following diseases: Anthrax, Tuberculosis, Typhoid, Whooping cough, Tetanus, Diphtheria, Leprosy

Section -C

General account of fungal diseases: Mycosis, Subcutaneous and deep.

- General Account of viral & protozoan diseases: Pneumonia, mumps ,Chickenpox, AIDS and Malaria, Leishmaniasis.

- Brief account of sexually transmitted diseases.

Section -D

Disease prevention: Gene therapy - Ex-vivo, In vivo, In situ gene therapy, Strategies of gene therapy: gene augmentation, Vectors used in gene therapy, Biological vectors – retrovirus, adenoviruses, Herpes. Synthetic vectors liposomes, receptor mediated gene transfer.

Drug discovery and Tissue engineering: Introduction to drug discovery. Stem cell based drug discovery, drug screening and toxicology. Therapeutic applications – Parkinson disease - Neurological disorder – limb amputation – heart disease - spinal cord injuries – diabetes –burns - HLA typing- Alzheimer's disease. Ethical considerations.

Nano medicine: Immunotoxins, Targeted drug delivery approach and molecular motors. Antiviral therapy for AIDS, DNA/RNA based diagnosis Hepatitis, CML – bcr/abl, HIV - CD 4 receptor. Microarray technology- genomic and c DNA arrays, application to diseases.

Books Recommended:

1. Text Box of Microbiology R. Ananthanarayanan and C.K. JayaramPaniker, Orient Longman, 1997

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2. Medical Microbiology ,Vol I ; Microbial infection : Mackie and MaCarthy, Churchil Livingstone, 1996

3. Bailey and Scott's Diagnostic Microbiology : Baron EJ, Peterson LR and Finegold SM Mosby, 1990.

4. Broude A.I. (1981) : Medical " Microbiology" ; and Infectious Diseases, W.B. Saunders & Co. Philadelphia.

5J.T. Bushberg. J.A. Scibert, E.M. Leidholdt (JR), J.M. Boone : The Essential Physics of medical Imaging, Lippincott Williams and Wilkins, USA, 2002.

6R.B. Buxton : Introduction to Functional Magnetic Resonance Imagining :Principle & Techniques, Cambridge Univ. Press, UK, 2002.

7. J.Enderle, S. Blancechard& J. Bronzino (Eds) : Introduction to Biomedical Engineering, Academic Press, 2000.

8.John G. webster(Ed): Medical Instrumentation - Application and Design, 3rd Ed, John Wiley & Sons, 1989.

9. J.B. West. (Ed) Best and Taylor's Physiological basis of Medical Practice, 11th Ed., Williams and Wilkins, Baltimore 1985

10. Y.C. Fung: Biomechanics, Spring and Verlag, New York, 1981.

11. S. Oka: Cardiovascular Hemorheology, Cambridge University Press, 1981.

BT - 802 : Fundamentals of Bio information and Nanotechnology

Section A

1. Introduction to Bioinformatics: Nature of Biological data, Bioinformatics and its multidisciplinary approach, Definition of Bioinformatics, History of Bioinformatics, Search engines.

2. Biological databases: Primary, secondary and composite databases. Nucleotide sequence and Protein sequence databases, Structural Databases.

Section B

3 Aspects of Bioinformatics: Types of Alignment- Pairwise, Multiple, Global, Local, Heuristic Methods for sequence alignment- FASTA and BLAST, Multiple Sequence alignment

4 Applications of Bioinformatics, Bioinformatics in India (BTIS net).

Section C

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5 Introduction to Nanotechnology: Nano scale and Richard Feyman's idea of Nanotechnology, Definition and Historical perspective

6 Characterization and properties of nano-material: Structural characterization, Chemical characterization and Properties: Mechanical, optical, electrical and magnetic

Section D

7 Nano materials and applications: Definition, properties and uses of Carbon nanomaterials, Bucky ball, CNT, Dendrimers, quantum Dots, Nanocomposites,Nanocones,Nanotubes, Nanohorns and Nanowires.

8 Applications of Nanotechnology: Nanotechnology in Environment and energy, Medical nanotechnology and Drug Development, Recent advancements in nanotechnology

9 Impact of nanotechnology: Associated Risks and regulations for Society, Health, Environment and Industry.

List of Books:

1. Text book for Bioinformatics by Shankar and Munjal
2. Bioinformatics by Prakash S Iohar
3. Fundamentals and applications of Nanotechnology by MansiKarkare
4. Nanotechnology byEr. RakeshRathi

BT – 803: Bioethics and IPR

Section A

Regulatory Aspects: Direct Non Target effects on beneficial and native organisms, indirect effects, Regulating Recombinant DNA technology, Biohazards

Environmental and Regulatory aspects of using genetically modified plants.

Section B Microorganisms: monitoring of introduced microorganisms, Ecological impacts of GMM released

Biological Weapons, Risk Assessment, Ethics, Biosafety Regulations in INDIA and international activities.

Section C

Intellectual property rights and protection (IPR & IPP): Forms of IPR (copy Right, Patent, Trade Secrets, Trademark, Other rights), Choice of IPP.

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Section D

Patents in Biotechnology: Genes and DNA sequences, Life forms, General Agreement on Tariffs and trade (GATT) Trade related intellectual property rights (TRIPRS); Plant Breeders rights, Internationalconventions, bio piracy, World intellectual property organization:

Text&References:

The Law & Strategy of Biotechnology Patents, Sibley Kenneth,

Safety Considerations for Biotechnology, Paris, OECD, 1992 and latest publications.

Biological Warfare in the 21st century, by M.R. Dano, Brassies London, 1994.

Biosafety Management by P.L. Traynor, Virginia polytechnic Institute Publication, 2000.

Cartagena Protocol on Biosafety, January 2000.

BT - 805: Critical Reasoning, Scientific Writing and Presentation

Section A

Introduction to Critical Reasoning- Critical Thinking and its benefits, understand the Barriers to critical thinking, learn the feature of arguments, Get acquainted with social influences on critical thinking.

Language of Critical Thinking- to understand the language of critical thinking,

Characteristics of Critical Discourses- Clarity, Accuracy, Precision, Relevance, Depth, **Breadth,**

Section B

Scientific Writing: Introduction to writing skills, effective Writing Skills, Avoiding Common **Error, Paragraph** Writing , Note taking, Writing assignments,
Letter Writing- Letter writing , Types of Letter, Types of Letter format
Memo, Agenda and Minutes, Notice and Circulars

Section C

Report Writing- Purpose and Scope of a Report , Fundamental Principles of Report Writing, **Project** Report Writing, Summer Internship Reports Writing, Writing E-Mails, Brochure, **leaflets,**

Section D
Presentation and Professional Skills- Presentation, Meetings, Planning and Getting started, **Design** and Layout of Presentation, Information Packaging, Making the presentation

Text & References:

Michael Steven: How to be a better problem solver, Kogan Page, New Delhi. 1999

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Geoff Petty: How to be better at creativity; Kogan Page, New Delhi, 1999
Phil Lowe Koge Page: Creativity and Problem Solving, New Delhi, 1996
Bensley, Alan D.: Critical Thinking in Psychology A Unified Skills Approach, (1998), Brooks/Cole
Publishing Company.
Business Communication, Raman –Prakash, Oxford
Creative English for Communication, Krishnaswamy N, Macmillan
Textbook of Business Communication, Ramaswami S, Macmillan
Effective Writing, Withrow, Cambridge
Writing Skills, Coe/Rycroft/Ernest, Cambridge

BT - 806: INDUSTRIALIZATION AND ENTREPRENEURSHIP

Section -A

Principle of Management - The topic mentioned below are to be covered with respect to Bio industries and Bio products.

Management - meaning and importance, evolution of management thoughts.

Function of management:

i. Planning - meaning and importance, steps in the process of planning, Decision making.

ii. Organizing - process of organizing, types of organizational structures, informal organizations

Section -B

iii. Directing - Communication process barriers to effective Communication, Mediation - theories of Motivation, Leadership style.

Iv. Controlling - Control techniques.

Personnel Management: Manpower planning, source of recruitment, selection and training of staff, job evaluation, merit rating, performance appraisal, wage administration and system of wage payment, incentive, trade unions and industrial relation.

Section -C

Purchases and Stores Management : Concepts of quotations, tenders and comparative statement, Inspection and quality control, inventory - Carrying cost and fixed cost of inventers, BEP analysis stores management, functions of storekeeper, methods of inventory - LIFO, FIFO.

Marketing, Management : Concept of selling, marketing, market research, Pricing-methods, penetration and Skimming pricing, Physical distribution methods, advertising and Sales promotion.

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Section -D

Export and Import Management: Concept of international trade, duties and antidumping duty, cost involved in exporting a product, pricing of export product. Government assistance for export promotion, export house, export promotion counsel, MODVAT, patent and patent rights.

Management Laws: Concept of Contract act, offer and acceptance, type of Contract, Void Contract, Concept of Guarantee and warranty, introduction of MRTP and FERA.

Work Study: Work Measurement time and motion study, flow process chart, flow diagram, Sio chart, string Chart therbligs.

Quality Management: T'QM, quality management, ISO Systems.

Reference Books:

1. Management for Business and Industry - C.S. George Jr.

2. Principles of Management - Koontz and O' Donnell.

3. Business Organization and Management _ M.C. Shukla.

4. Basic Biotechnology, Colin and Bjorn Kristiansen, Cambridge University press.

The above syllabus is to be taught keeping in mind the aspect of Commercialization.

Marketing and Management of Biotechnological product. Term work - Minimum five case studies based on the above Syllabus.

BT - 807 : Dissertation Based on Lab and Field Work

Dissertation will have 200 marks distributed a below: (1) 50 marks viva voce (2) 150marks Dissertation

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B.Sc. Biotechnology Part III
List of Practical

1. Electrophoretic separation of plasmid DNA.
2. Gene finding tools and genome annotation- Gen Scan, Net Gene, Hmm gene.
3. Comparison of two given genomes- Mummer.
4. Preparation of stock solutions and Murashige & Skoog media
5. Micro-propagation by adventitious buds
6. Culture of anthers to raise haploids
7. Development of virus free plants from meristematic tips
8. Cell culture in bioreactor suspension
9. Basic set up of Animal tissue culture laboratory
10. Preparation of media, sterilization and practices in tissue culture laboratory
11. To Isolate Cells from whole Blood and its primary culture
12. To Study Cryopreservation
13. WIDAL test
14. Acid Fast Bacilli (AFB) staining
15. To perform BLAST
16. To perform FASTA
17. To study Protein Sequence Database
18. Primer Designing

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SYLLABUS

M.Sc. (CHEMISTRY)

(Semester Scheme)

I & II Semester Examination-2020-21

III & IV Semester Examination-2021-22

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M.Sc. CHEMISTRY

Syllabus :

Credit-based Semester System with continuous assessment.

To acquire a Master degree in Chemistry, a candidate is required to earn minimum of 120 credits with grade E or higher.

Credit registration at least once in all Compulsory Credit Course (CCC) and earning all credits for accumulation of the prescribed minimum credit with grade E or higher grade in all CCC will be binding.

SCHEME OF EXAMINATION:

- Each Semester shall have continuous assessment which shall include internal assessment in theory and practical by internal examination/seminar/oral examination/viva-voce etc, besides assessment of candidate's regularity and performance in the class.
- A candidate has to pass in the continuous assessment as well as EoSE (End of Semester Examination) paper separately.
- Each EoSE of theory paper shall carry 100 marks and will be of 3 hours duration. Candidate has to attempt five (05) questions in all. All questions carrying equal marks.
- Part 'A' of the theory paper shall contain 10 Short Answer Questions of total 20 marks, based on knowledge, understanding and applications of the topics/texts covered in the whole syllabus. Each question will carry two (02) marks for correct answer.
- Part 'B' of the theory paper will have total four questions of 20 marks each, framed by taking one question from each unit with internal choice. The limit of answer will be five pages.
- Each Laboratory EoSE will be of six hours durations and involve laboratory experiments/exercises, record and viva-voce examination with weightage in ratio of 75:25.
- The Practical examination will be conducted by board of examiners consisting of one internal (to be appointed by the Head of Department) and one external examiner (to be appointed by the University).
- The medium of instruction and examination shall be English only.

COURSE STRUCTURE

The Credit Courses of the programme have been classified as below:

- CCC: Compulsory Core Course
- ECC: Elective Core Course
- SSC: Self Study Course
- PRJ: Project Work

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FIRST SEMESTER

S. No	Subject Code	Course Title	Course Category	Credit	Contact Hours/week				EoSE (hrs)
					L	T	P	Th	P
1.	CHE 701	Advanced Inorganic Chemistry-I	CCC	4	4	0	0	3	0
2.	CHE 702	Organic Reaction Mechanism	CCC	4	4	0	0	3	0
3.	CHE 703	Quantum, Surface and Electrochemistry	CCC	4	4	0	0	3	0
4.	CHE 711	Chemistry Core Laboratory-1	CCC	6	0	0	9	0	6
5.	CHE A01	Spectroscopy – I	ECC	4	4	0	0	3	0
6.	CHE A02	Analytical Techniques	ECC	4	4	0	0	3	0
7.	CHE A03	Green and Sustainable Chemistry	ECC	4	4	0	0	3	0
8.	CHE A11	Elective Laboratory-1	ECC	6	0	0	9	0	6

SECOND SEMESTER

S. No	Subject Code	Course Title	Course Category	Credit	Contact Hours/week				EoSE (hrs)
					L	T	P	Th	P
1.	CHE 801	Advanced Inorganic Chemistry – II	CCC	4	4	0	0	3	0
2.	CHE 802	Stereochemistry and Organic Reaction Mechanism - II	CCC	4	4	0	0	3	0
3.	CHE 803	Thermodynamics and Chemical Kinetics	CCC	4	4	0	0	3	0
4.	CHE 811	Chemistry Core Laboratory-2	CCC	6	0	0	9	0	6
5.	CHE A04	Spectroscopy – II	ECC	4	4	0	0	3	0
6.	CHE A05	Environmental Chemistry	ECC	4	4	0	0	3	0
7.	CHE D01	Biomolecules – I	ECC	4	4	0	0	3	0
8.	CHE A12	Elective Laboratory – 2	ECC	6	0	0	9	0	6

THIRD SEMESTER

S. No	Subject Code	Course Title	Course Category	Credit	Contact Hours/week				EoSE (hrs)
					L	T	P	Th	P
1.	CHE 901	Organotransition Metal Chemistry	CCC	4	4	0	0	3	0
2.	CHE 902	Organic Synthesis – I	CCC	4	4	0	0	3	0
3.	CHE 903	Bio-Physical Chemistry	CCC	4	4	0	0	3	0
4.	CHE 911	Core Laboratory – 3	CCC	6	0	0	9	0	6
5.		Theory Elective – 1	ECC	4	4	0	0	3	0
6.		Theory Elective – 2	ECC	4	4	0	0	3	0
7.		Theory Elective – 3	ECC	4	4	0	0	3	0
8.		Elective Laboratory-3	ECC	6	0	0	9	0	6

FOURTH SEMESTER

S. No	Subject Code	Course Title	Course Category	Credit	Contact Hours/week				EoSE (hrs)
					L	T	P	Th	P
1.	CHE X01	Solid States and Nanomaterials	CCC	4	4	0	0	3	0
2.	CHE X02	Organic Synthesis – II	CCC	4	4	0	0	3	0
3.	CHE X03	Advanced Physical Chemistry	CCC	4	4	0	0	3	0
4.		Theory Elective – 1	ECC	4	4	0	0	3	0
5.		Theory Elective – 2	ECC	4	4	0	0	3	0
6.		Theory Elective – 3	ECC	4	4	0	0	3	0
7.		Project Work	PRJ	12					

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Elective Core Courses (ECC) groups

A: Integrated / Allied Chemistry

B: Inorganic Chemistry group

C: Physical Chemistry group

D: Organic Chemistry group

E: Pharmaceutical Chemistry group

S. No.	Course Code	Elective Paper Title	Prerequisite	Semester
1.	CHE A01	Spectroscopy – I		I
2.	CHE A02	Analytical Techniques		I
3.	CHE A03	Green and Sustainable Chemistry		I
4.	CHE A04	Spectroscopy – II		II
5.	CHE A05	Environmental Chemistry		II
6.	CHE B01	Bioinorganic Chemistry	-	III
7.	CHE B02	Supramolecular Chemistry	-	III
8.	CHE B03	Inorganic Polymers	-	III
9.	CHE B04	Advanced Bioinorganic Chemistry	CHE B01	IV
10.	CHE B05	Materials and Industrial Chemistry	-	IV
11.	CHE B06	Photoinorganic Chemistry	-	IV
12.	CHE C01	Advanced Electrochemistry – I	-	III
13.	CHE C02	Advanced Chemical Kinetics – I	-	III
14.	CHE C03	Chemical Analysis	-	III
15.	CHE C04	Advanced Chemical Kinetics – II	CHE C02	IV
16.	CHE C05	Advanced Electrochemistry – II	CHE C01	IV
17.	CHE C06	Advanced Nanoscience and Nanotechnology	-	IV
18.	CHE D01	Biomolecules – I	-	II
19.	CHE D02	Heterocyclic Chemistry – I	-	III
20.	CHE D03	Natural Product – I	-	III
21.	CHE D04	Medicinal Chemistry – I	-	III
22.	CHE D05	Heterocyclic Chemistry – II	CHE D02	IV
23.	CHE D06	Natural Product – II	CHE D03	IV
24.	CHE D07	Medicinal Chemistry – II	CHE D04	IV
25.	CHE E01	Pharmaceutical Chemistry –I		III
26.	CHE E02	Biomolecules II	CHE D01	III
27.	CHE E03	Pharmaceutical Chemistry –II	CHE E01	IV
28.	CHE E04	Advanced Pharmaceutical Chemistry	-	IV
29.	CHE A11	Elective laboratory – 1	-	I
30.	CHE A12	Elective laboratory – 2	-	II
31.	CHE B11	Elective laboratory – 3	-	III
32.	CHE C11	Elective laboratory – 3	-	III
33.	CHE D11	Elective laboratory – 3	-	III
34.	CHE E11	Elective laboratory – 3	-	III
35.	CHE A21	Project Work – PRJ	-	IV

- Department will inform the students about the minimum/maximum number of Elective courses offered to students at the beginning of each semester based on the courses opted by students and availability of faculty.
- In semesters III and IV, Theory elective papers 1-3 to be opted out of one of four elective groups offered (B,C,D,E). Pharma group students may opt D04 and D07 as third elective in III and IV semester, respeively. Elective Laboratory – 3 will be according to the opted Elective Theory group.

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SEMESTER – I

CHE 701: ADVANCED INORGANIC CHEMISTRY – I
(Theories of Bonding, Spectroscopic methods and Nuclear Chemistry)

UNIT - I — 4 Credit (4 hrs/week)

Stereochemistry and Bonding in Main Group Compounds:
Limitations of VSEPR Theory, dπ-pπ bond, Bent rule and energetics of hybridization, some simple reactions of covalently bonded molecules

Metal Ligand Bonding:
Limitation of crystal field theory, molecular orbital theory, and introduction to ligand field theory: σ-bonding in octahedral and tetrahedral complexes, π-bonding and molecular orbital theory.

UNIT - II

Electronic Spectra of Transition Metal Complexes
Spectroscopic ground states, correlation diagrams, Orgel and Tanabe-Sugano diagrams for transition metal complexes (d^1-d^9 states), calculations of Dq, Racah parameters (B) and nephelauxetic ratio (β) parameters, charge transfer spectra.

UNIT - III

Optical Rotatory Dispersion (ORD), Circular Dichroism (CD) and Magnetic Properties of Transition Metal Complexes
Spectroscopic method of assignment of absolute configuration in optically active metal chelates and their stereochemical conformation, anomalous magnetic moments, magnetic exchange coupling and spin crossover.

UNIT – IV

Nuclear and Radiochemistry:
Laws of radioactive decay; Detection of radiations; Geiger-Nuttal rule; GM tubes and their characteristics; Ionization chamber, Proportional counters, Scintillation counters; Solid state detectors; Calibration of counting equipments; Determination of absolute disintegration rates.
Activation analysis: Principles; Various methods of activation; Methodology; Advantages, limitations and applications.

SUGGESTED BOOKS AND REFERENCES

1. Inorganic Chemistry, Principles of structure and Reactivity, 4th Edition; James E. Huheey: Elleu A. Keiter: Richard L. Keiter.
2. Advanced Inorganic Chemistry; F.A. Cotton and G. Wilkinson.
3. Theoretical Inorganic Chemistry; Day and Selbin.
4. Concepts and Models in Inorganic Chemistry; Doughlas Mc Daniel.
5. Physical Methods in Inorganic Chemistry; R. S. Drago.
6. Chemistry of the Elements; N.N. Greenwood and A. Earnshow, Pergamon, 1984.
7. Inorganic Electronic Spectroscopy; A.B.P. Lever, Elsevier, 1968.
8. Comprehensive Coordination Chemistry eds., G. Wilkinson, R.D. Gillard and J.A. Mc Cleverty, Pregamon, 1987; Vol. 2.
9. Nuclear and Radiochemistry; G. Friedlander, J. W. Kennedy, E. S. Macias and J. M. Miller; 3rd Edn., Wiley: NY, 1981.
10. Essentials of Nuclear Chemistry, H. J. Arnikar; 4th Eds., New Age International: N.Delhi, India, 2011.
11. Nuclear and Radiochemistry: Fundamental and Applications, 2 Vols., Jens-Volker Kratz and Karl Heinrich Lieser; 3rd Edn., John Wiley & Sons: UK, 2013.

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CHE 702: ORGANIC REACTION MECHANISM

4 Credit (4 hrs/week)

UNIT- I

Reaction Mechanism: Structure and Reactivity

A review of types of mechanisms and reactions, methods of determining reaction mechanism, thermodynamic and kinetic requirements for reaction, kinetic and thermodynamic control, Hammond's postulate, Curtin-Hammett Principle, Isotope effects. Effects of structure on reactivity, resonance and field effects, steric effects. Quantitative treatment of the effect of structure on reactivity. The Hammett equation and linear free energy relationship, substituent and reaction constants, Taft equation.

Aromaticity: Aromaticity in benzenoid and non-benzenoid compounds, alternant and non-alternant hydrocarbons. Huckel's rule, energy level of π-molecular orbitals, annulenes, anti-aromaticity, homo-aromaticity, PMO approach, energetic and magnetic concept.

UNIT - II

Aliphatic Nucleophilic Substitution

The S_N1, S_N2, mixed S_N1-S_N2 and SET mechanisms. The S_Ni mechanism. The neighbouring group mechanism - participation by π and σ bonds, anchimeric assistance. Classical and nonclassical carbocations, phenonium ions, norbornyl system. Application of NMR spectroscopy in the detection of carbocations. Nucleophilic substitution at the allylic, aliphatic trigonal and a vinylic carbon. Reactivity - effect of substrate structure, attacking nucleophile, leaving group and reaction medium. Ambident nucleophile, regioselectivity.

Aromatic Nucleophilic Substitution

The S_NAr, S_N1, benzyne and $S_{RN}1$ mechanisms. Reactivity - effect of substrate structure, leaving group and attacking nucleophile. The von Richte, Sommelet-Hauser and Smiles rearrangements.

UNIT - III

Aliphatic Electrophilic Substitution

Bimolecular mechanisms - S_E2 and S_Ei. The S_E1 mechanism - electrophilic substitution accompanied by double bond shifts. Effect of substrates, leaving group and solvent polarity on reactivity.

Aromatic Electrophilic Substitution

The arenium ion mechanism, orientation and reactivity, energy profile diagrams.The ortho/para ratio, ipso attack, orientation in other ring systems. Quantitative treatment of reactivity in substrates and electrophiles. Diazonium coupling, Vilsmeir reaction, Gattermann-Koch reaction.

Free Radical Reactions

Types of free radical reactions, free radical substitution mechanism, mechanism at an aromatic substrate, neighbouring group assistance. Reactivity of aliphatic and aromatic substrates at a bridgehead. Reactivity in the attacking radicals. The effect of solvents on reactivity. Allylic halogenations (NBS). Oxidation of aldehydes to carboxylic acids, autooxidation, coupling of alkynes and arylation of aromatic compounds by diazonium salts. Sandmeyer reaction. Free radical rearrangement. Hunsdiecker reaction.

UNIT - IV

Addition to Carbon-Carbon Multiple Bonds

Mechanistic and stereochemical aspects of addition reactions involving electrophiles, nucleophiles and free radicals, regio- and chemoselectivity, orientation and reactivity. Addition to cyclopropane ring. Hydrogenation of double and triple bonds, hydrogenation of aromatic rings. Hydroboration. Michael reaction. Sharpless asymmetric epoxidation.

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Addition to Carbon-Heteroatom Multiple Bonds

Mechanism of metal hydride reduction of saturated and unsaturated carbonyl compounds, acids, esters and nitriles. Addition of Grignard reagent, organozinc and organolithium reagents to carbonyl and unsaturated carbonyl compounds. Wittig reaction. Introduction to condensation reactions involving enolates - Aldol, Knoevenagel, Claisen, Mannich, Benzoin, Perkin and Stobbe reactions.

Elimination Reactions

The E2, El and ElcB mechanisms. Steric orientation of the double bond. Reactivity, effect of substrate structure, the attacking base, the leaving group and the medium. Mechanism and orientation in pyrolytic eliminations.

SUGGESTED BOOKS AND REFERENCES

1. Advanced Organic Chemistry: Reactions Mechanisms and Structure by Jerry March, McGraw Hill.
2. Mechanism and Structure in Organic Chemistry – E. S. Gould (Holt, Rinehart and Winston).
3. Advanced Organic Chemistry Part-A. F.A. Carey and R.J. Sundberg, 5th Ed. Springer (2007).
4. Physical Organic Chemistry – J. Hine.
5. A Guide Book to Mechanism in Organic Chemistry, Peter Sykes. Longman
6. Organic Chemistry – J. Clayden, N. Greeves, S. Warren and P. Wothers. Oxford University Press (2001)
7. Structure and Mechanism in Organic Chemistry. C.K. Ingold. Cornell University Press.
8. Organic Chemistry. R.T. Morrison and R N. Boyd. Prentice-Hall.
9. Modern Organic Reactions. H O House, Benjamin.
10. Principles of Organic Synthesis. R O C Norman and J.M. Coxon. Blackie Academic & Professional.
11. Reaction Mechanism in Organic Chemistry, S.M. Mukherji and S.P. Singh, Macmillan.

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CHE 703: QUANTUM, SURFACE AND ELECTROCHEMISTRY

4 Credit (4 hrs//week)

UNIT – I

Introduction: Historical background – Black body Radiation, de-Broglie concept, Heisenberg's Uncertainty Principle. Postulates of Quantum Mechanics, Operators - Linear, Commutator, Hamiltonian, Hermitian and Angular Momentum Operators, Eigen Value and Eigen Functions, Schrodinger's equation, wave function, physical significance of ψ^2.

Application of Schrodinger's Equation to (i) particle in one dimensional box, (ii) particle in three dimensional box, (iii) Simple Harmonic Oscillator, (iv) Rigid Rotor and (v) Hydrogen atom; Radial and angular wave functions, quantum numbers and their significance.

UNIT-II

Angular Momentum: Ordinary angular momentum, Eigen functions and Eigen values of angular momentum, Ladder Operator, Addition of Angular Momentum; Spin, antisymmetry and Pauli's exclusion principle.

Approximation Method: The Variation theorem, linear variation principle, perturbation method (First order and nondegenarate). Application of variation method and perturbation method to Helium atom.

Molecular Orbital Theory: Basic ideas, criteria of forming MOs, LCAO Concept. Huckel's Molecular Orbital (HMO) theory for conjugated organic systems. Application of HMO to ethylene, allylic, cyclopropanyl, butadiene and cyclobutadiene system.

UNIT - III

Surface Chemistry

Adsorption: Surface tension, capillary action, pressure difference across curved surface (Laplace equation), vapour pressure of droplets (Kelvin equation), Gibbs adsorption isotherm, estimation of surface area (BET equation), surface films on liquids (Electro-kinetic phenomenon)

Micelles : Surface active agents, classification of surface active agents, micellization, hydrophobic interaction , critical micellar concentration (CMC), factors affecting the CMC of surfactants, counter ion binding to micelles, thermodynamics of micellization -phase separation and mass action models, solubilization, micro emulsion, reverse micelles.

UNIT - IV

Electrochemistry

Electrochemistry of solutions, Debye-Huckel-Onsager treatment and its extension, ion solvent interactions. Debye-Huckel-Jerum mode. Thermodynamics of electrified interface equations. Derivation of electro capillarity, Lippmann equations (surface excess), methods of determination. Structure of electrified interfaces, Guoy-Chapman, Stern, Graham Devanatham-Mottwatts, Tobin, Bockris, Devanathan models, Over potentials, exchange, current density, derivation of Butler Volmer equation, Tatel plot. Polarography theory, Ilkovic equation, half wave potential and its significance.

SUGGESTED BOOKS AND REFERENCES

1. Physical Chemistry by P.W. Atkins, ELBS.
2. Introduction to Quantum Chemistry, A.K. Chandra, Tata McGraw Hill.
3. Quantum Chemistry. Ira N. Levine, Prentice Hall.
4. Quantum Chemistry; R.K. Prasad, New Age International
5. Micelles, Theortical and Applied aspects; V. Morai, Plenum Press.
6. Modern Electrochemistry Vol. I & II; J.O.M. Bockris and A.K.N. Reddy Plenum Press, New York.
7. Physical Chemistry by Puri, Sharma and Pathania Vishal Publications.

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CHE 711: CHEMISTRY CORE LAB – I

6 Credit (9 hrs/week)

A. **Qualitative analysis of mixture consisting of eight cationic / anionic radicals including:**
   a. Interfering anionic radical
   b. Insolubles : oxides, sulphates and halides
   c. Less common metal ions : Tl, W, Mo, Se, Te, V, Th, Ti, Zr, Ce, Li

B. **Purification techniques and Qualitative analysis**
   a. Demonstrations of purification, drying and storage of solvents using various techniques – distillation, steam distillation, vacuum distillation, etc.
   b. Separation of Organic binary mixtures [(one liquid and one solid) or (two solids)] using H_2O, HCl, NaOH, $NaHCO_3$, Ether or other reagent and identification of components using chemical tests, IR spectra for functional group identification and preparation of derivatives.

C. **Experiments based on**

Surface tension

i. To study surface tension concentration relationship for solution (Gibbs equation).
ii. To determine the critical micelle concentration (CMC) of SDS and CTAB by surface tension techniques.

Adsorption

i. Adsorption of Oxalic acid
ii. Acetic acid on charcoal

Viscosity, Solubility and Molecular weight determination

i. Experiments based on determination of viscosity of given liquid using Ostwald's viscometer.
ii. Study the variation of viscosity of pure liquid with temperature and determination of temperature coefficient of viscosity of the liquid.
iii. Determination of Solubility of various salts like NaCl, KCl, KNO_3 and $NaNO_3$ at different temperature and draw the solubility Curve.
iv. Determination of molecular weight of given polymer (Polyvinyl alcohol, polystyrene, methyl acrylate, etc.) using viscometer
v. Determination of molecular weight of non-volatile and non-electrolyte/electrolyte by cryoscopic method and to determine the activity coefficient of an electrolyte

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CHE A01: SPECTROSCOPY – I

4 Credit (4 hrs/week)

UNIT - I

Introduction: Interaction of light with matter, mechanism of absorption and emission of radiation.

Microwave Spectroscopy: Classification of molecules, rigid rotor model, effect of isotopic substitution on the transition frequencies, intensities, non-rigid rotor; stark effect, nuclear and electron spin interaction and effect of external field applications.

Vibrational Spectroscopy: Vibrational energies of diatomic molecules, zero point energy, force constant and bond strengths; anharmonicity, Morse potential energy diagram, vibration-rotation spectroscopy. P.Q.R. branches, breakdown of Oppenheimer approximation; vibrations of polyatomic molecules; selection rules, normal modes of vibration, group frequencies, overtones, hot bands, factors affecting the band positions and intensities, far IR region, metal ligand vibrations.

Raman Spectroscopy: Origin, rotational and vibrational Raman Spectra of diatomic molecules.

UNIT - II

Electronic Spectroscopy

Atomic Spectroscopy: Energies of atomic orbitals, vector representation of momenta and vector coupling, spectra of hydrogen atom and alkali metal atoms.

Molecular Spectroscopy: Energy levels, molecular orbitals, vibronic transitions, vibrational progressions and geometry of the excited states, Franck-Condon principle, electronic spectra of polyatomic molecules. Emission spectra; radiative and non-radiative decay, internal conversion, spectra of transition metal complexes, charge-transfer spectra.

Photoelectron Spectroscopy: Photo-electric effect, ionization process, Koopman's theorem, photoelectron spectra of simple molecules, ESCA, chemical information from ESCA; Auger electron spectroscopy-basic idea.

UNIT-III

Magnetic Resonance Spectroscopy

Nuclear Magnetic Resonance: Basic Principle, Spin quantum number, interaction between Spin and a Magnetic Field, Larmor Precession, Relaxation Times; Continuous Wave NMR Spectroscopy, Fourier Transform NMR Spectroscopy; Introduction to Chemical Shift, Spin-spin coupling, Coupling constant. Nuclei other than hydrogen: Nuclei with spin ½ (^{13}C, ^{19}F, ^{31}P, ^{117}Sn, ^{119}Sn, etc.), Nuclei with spin greater than ½ (^{14}N, ^{11}B). Quadrupole effects; factors effecting chemical shift in inorganic compounds - geometry, electronegativity, charge, oxidation state, coordination number. Coupling between two or more than two types of NMR active nucleus in a compound (e.g. $CHFCl_2$, $HPFCl$, $OP(O)FH$, $HP(O)F_2$, BH_4).

Electron Spin Resonance: Basic principles, zero field splitting and Kramer's degeneracy, Isotropic and anisotropic Hyperfine coupling, spin-orbit coupling and significance of g tensors, factors affecting the 'g' value, its applications to the study of free radicals & fast reactions andapplications to transition metal complexes; spin Hamiltonian, spin densities and McConnell relationship. Applications - spin polarization for atoms and transition metal ions.

UNIT-IV

Mossbauer Spectroscopy: Basic principles, spectral parameters and spectrum display, applications of the techniques to the studies of (i) bonding and structures of Fe^{2+} and Fe^{3+} compounds including those

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of intermediate spin; (ii) Sn^{2+} and Sn^{4+} compounds, nature of M-L bond, coordination number, structure; and (iii) detection of oxidation state and in equivalent MB atoms.

Electron Microscopy: Basic principles of Electron Microscopy: SEM, TEM, AFM; and their applications in structural analysis.

SUGGESTED BOOKS AND REFERENCES

1. Fundamentals of Molecular Spectroscopy, Banewell and McCash
2. Modern Spectroscopy, J.M. Hollas, John Wiley.
3. Applied Electron Spectroscopy for Chemical Analysis D. H. Windawi and F.L. Ho, Wiley Interscience.
4. Physical Methods in Chemistry, R.S. Drago, Saunders College.
5. Chemical Applications of Group Theory, F.A. Cotton.
6. Introduction to Molecular Spectroscopy, G.M. Barrow, Mc Graw Hill.
7. Electronic Absorption Spectroscopy and related Techniques, D N Sathyanarayana
8. Basic Principles of Spectroscopy, R. Chang, Mc Graw Hill.
9. Theory and Application of UV Spectroscopy, H.H. Jaffe and M. Orchin, IBH-Oxford.
10. Introduction to Photoelectron Spectroscopy, P.K. Ghosh, John Wiley.
11. Introduction to Magnetic Resonance. A Carrington and A.D. Maclachalan, Harper & Row.
12. NMR Spectroscopy in Inorganic Chemistry, J.A. Iggo, Oxford University Press: Oxford, 1999, pp 1-21; 31-35.
13. NMR, NQR, EPR and Mossbauer Spectroscopy in Inorganic Chemistry, R.V. Parish, Ellis Harwood.

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CHE A02: ANALYTICAL TECHNIQUES

4 Credit (4 hrs/week)

UNIT I

Statistics – Introduction to Chemometrics
Limitations of analytical methods, Errors and classification, Determinant, constant and indeterminate, accuracy, precision, minimization of errors, significant figures and computation rules, mean and standard deviation, distribution of random errors, variance and confidence interval, paired *t*-test, least square method, correlation and regression, linear regression.

UNIT II

Sampling in analysis
Definition, theory, basis and techniques of sampling, sampling statistics, sampling and physical state, crushing and grinding, hazards in sampling, techniques of sampling of gases, fluid, solids, and particulates, minimization of variables, transmission and storage of samples, high pressure ashing techniques (HPAT), particulate matter, its separation in gas stream, filtering and gravity separation, analysis of particulate matter like asbestos, mica, dust and aerosols etc.
Solvent extraction method in analysis
Principle, classification, theory, instrumentation and applications.

UNIT III

Conductometry:
Important laws, definitions, relations, effect of dilution on conductivity, measurement of conductivity, types of conductometric titrations, its applications and limitations.
Potentiometry:
Principle, instrumentation, types of potentiometric titrations and its applications, pH measurements, determination of pH, ion selective electrodes, instrumentation and applications.

UNIT IV

Coulometry:
Introductions, principle, experimental details of coulometry at constant current and constant potential, titrational applications.
Atomic Absorption Spectroscopy:
Introduction, principle, Grotrian diagram, instrumentation, applications, detection limit, sensitivity and disadvantages.

SUGGESTED BOOKS AND REFERENCES

1. Mendham J., Denney R.C., Barnes J. D., Thomas M.J.K., Vogels' text book of quantitative chemical analysis, 6th edition, Prentice Hall, 2000.
2. Skoog Douglas A., Holler F. James, Nieman Timothy A., Principles of instrumental analysis, Saunders College Pub., 1998.
3. Day R. A and A. L. Underwood, Quantitative analysis, Prentice Hall, 1999.
4. Drago R. S., Physical methods in Chemistry, Saunders, 1999.
5. Peters D.G, J. M. Hayes and G. M. Hefige, A brief introduction to Modern chemical analysis, Philadelphia: Saunders, 1976.
6. Ebsworth E.A.V, DWA Rankin and C. Craddock, Structural methods in inorganic chemistry, ELBS.
7. Elian JAD Butter Worth, Photoelectron spectroscopy.
8. Eliel E.L, Stereochemistry of carbon compounds, Tata-McGraw-Hill

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CHE A03: GREEN AND SUSTAINABLE CHEMISTRY

4 Credit (4 hrs/week)

UNIT – I

Introduction, principle and concepts of Green Chemistry

Need for green chemistry; Inception and evolution of green chemistry; Twelve principles of green chemistry with their explanations and examples; Designing a green synthesis using these principles; Green chemistry in day to day life.

UNIT – II

Non-traditional greener alternative approaches

Different approaches to green synthesis: (a) Uses of green reagents in organic synthesis - Dimethyl carbonate, polymer supported reagents - per acids and chromic acid; (b) Green catalysts, role of catalysis in sustainable development, homogeneous and heterogeneous catalysts; Introduction, advantages and applications of - (i) Nanocatalysts, (ii) Phase transfer catalysts, (iii) Biocatalysts, (iv) Organocatalysts, in organic synthesis.

UNIT – III

Applications of non-conventional energy sources

Introduction of microwave induced synthesis: Microwave activation, equipment, time and energy benefits, limitations; Organic transformations under microwaves - Fries rearrangement, Diels-Alder reaction, decarboxylation, saponification of ester, alkylation of reactive methylene compounds; Heterocyclic synthesis - β-Lactams, pyrrole, quinoline.

Introduction of ultrasound assisted green synthesis: Instrumentation, physical aspects, applications in organic transformations.

Electrochemical synthesis: Introduction, synthesis of sebacic acid and adiponitrile.

UNIT – IV

Environmentally Benign Solutions to Organic Solvents

Ionic liquids as green solvents: Introduction, properties and types of ionic liquids. Synthetic applications - Diels-Alder reaction, epoxidation and Heck reaction.

Aqueous phase reactions: Enhancement of selectivity, efficiency. Synthetic applications - 1,3-Dipolar Cycloadditions, Carbon-Carbon bond-forming processes and bromination reactions.

Fluorous solvents in green chemistry: Scope, definition and their synthetic applicability.

Role of supercritical carbon dioxide in green chemistry.

Ethyl lactate as a renewable green solvent: Properties and applications.

SUGGESTED BOOKS AND REFERENCES:

1. P.A.G. Blackie, Organic synthesis in water, Springer.
2. P.T. Anastas, J.C. Warner, Green Chemistry, theory and practice, Oxford University Press.
3. M. Lancaster, Green Chemistry: An introductory text, Royal Society of Chemistry.
4. V. Polshettiwar, T. Asefa, G. Hutchings, Nanocatalysis: Synthesis and applications, Wiley.
5. M.A. Ryan, M. Tinnēsand, Introduction to Green Chemistry, American Chemical Society.
6. P.T. Anastas, Handbook of Green Chemistry, John Wiley and Sons.
7. V.K. Ahluwalia, M. Kidwai, New Trends in Green Chemistry, Springer.

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CHE A11: CHEMISTRY ELECTIVE LAB-1

A. Laboratory Estimations — 6 Credits (9 hrs/week)

i. Estimation of an acid using another standard acid
ii. Estimation of a base using another standard base
iii. Estimation of boric acid
iv. Determination of percentage purity of commercial soda
v. Determination of percentage of $CaCO_3$ in precipitated chalk sample
vi. Determination of percentage purity of caustic soda
vii. Determination of alkali content-antacid tablet using HCl

B. Organic Preparations (single step)

i. Preparation of *p*-bromoacetanilide from acetanilide.
ii. Preparation of *p*-bromoaniline from *p*-bromoacetanilide.
iii. Preparation of *m*-dinitrobenzene from nitrobenzene.
iv. Preparation of *m*-nitroaniline from *m*-dinitrobenzene.
v. Synthesis of adipic acid from cyclohexanol.
vi. Preparation of 1,1-bis-2-naphthol (BINOL) from β-naphthol.
vii. Green synthesis of 7-hydroxy-4-methylcoumarin (Pechmann condensation).
viii. More one step preparations may be carried out according to requirement of curriculum

C. Experiments based on -

Phase Equilibrium:

i. Determination of congruent composition and temperature of a binary system (e.g., diphenylamine-benzophenone system).
ii. To construct the phase diagram for three component system (e.g., chloroform-acetic acid water).
iii. Study of distribution of benzoic acid in benzene and water to show that benzoic acid dimerise in benzene.
iv. Determine the equilibrium constant for the reaction $KI + I_2 \rightarrow KI_3$ by distribution method.

Conductometry

v. Varification of Onsager's equation for strong electrolytes (NaCl, HCl, KNO_3, KCl) and determination of constant A and B.
vi. Determination of the velocity constant, order of the reaction and energy of activation for saponification of ethyl acetate by sodium hydroxide conductometerically.
vii. Determination of the strength of strong and weak acids in a given mixture conductometrically.

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CHE 801: ADVANCED INORGANIC CHEMISTRY– II

(Group Theory, Molecular rearrangement processes & Inorganic reaction mechanisms)

4 Credit (4 hrs/week)

UNIT-I

Symmetry and Group Theory in Chemistry

Symmetry elements and symmetry operation, definition of group, subgroup, conjugacy relation and classes. Point symmetry group. Schonfilies symbols, representations of groups by matrices (representation for the C_{nh}, C_{nv}, etc, group to be worked out explicity). Character of a representation. The great orthogonality theorem (without proof) and its importance. Character tables and their use; spectroscopy. Derivation of character table for C_{2v} and C_{3v} point group. Symmetry aspects of molecular vibrations of H_2O molecule.

UNIT-II

Molecular Rearrangement Processes

Electron transfer reactions (outer and inner sphere), HOMO and LUMO of oxidant and reductant, chemical activation. Precursor complex formation and rearrangement, nature of bridge ligands, fission of successor complexes, Two-electron transfers, Synthesis of coordination compounds using electron transfer reactions, mixed valence complexes and internal electron transfer.

UNIT-III

Inorganic Reaction Mechanism- I

Basic principles; lability, inertness, stability and instability of coordination compounds; general principles and mechanisms of substitution reactions of tetrahedral, square planar, trigonal bipyramidal, square pyramidal and octahedral complexes; potential energy diagrams, transition states and intermediates, isotope effects, Berry's pseudo rotation mechanism, Swain-Scott equation.

UNIT-IV

Inorganic Reaction Mechanism- II

Substitution reactions of octahedral complexes; nature of substitution reactions; Theoretical approach to substitution mechanisms; mechanism of substitution reaction of complexes of cobalt; acid hydrolysis and base hydrolysis of Co (III) complexes.

Substitution reactions of square planar complexes; reaction of Pt (II) complexes; trans effect and its applications to synthesis of complexes; theories of trans effect; mechanism of substitution - kinetics of substitution of Pt(II) complexes; factors affecting the reactivity of square planar complexes.

SUGGESTED BOOKS AND REFERENCES

1. Inorganic Chemistry, Principles of Structure and Reactivity, 4thEdition, James E. Huheey: Elleu A. Keiter: Richard L. Keiter.
2. Advanced Inorganic Chemistry, F.A. Cotton and G. Wilkinson.
3. Theoretical Inorganic Chemistry, Day and Selbin.
4. Concepts and Models in Inorganic Chemistry, Doughlas Mc Daniel.
5. Introductory Quantum Chemistry, A.K. Chandra (Tata McGraw Hill)
6. Chemical Applications of Group Theory, F.A. Cotton.

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CHE 802: STEREOCHEMISTRY AND ORGANIC REACTION MECHANISM II

4 Credit (4 hrs/week)

UNIT I

Stereochemistry

Optical activity and chirality, elements of symmetry, specification of configuration - molecules with more than one chiral center. D/L, R/S and Threo/Erythro nomenclature.

Prochirality, Homotopic and Heterotopic ligands and faces, Enantiotopic groups and faces, Re/Si Nomenclature. Stereospecific and stereoselective reactions.

Optical activity in the absence of chiral carbon (biphenyls, allenes, spiranes, ansa compounds). Chirality due to helicity. Chirality in the compounds containing N, S and P.

Geometrical isomerism in cyclic and condensed systems, Conformational analysis of cycloalkanes, decalins, effect of conformation on reactivity.

Cram's, Prelog's and Horeau's rules. Circular birefringence, CD, ORD, Octant rule, Cotton effect. The axial haloketone rule. Determination of configuration (absolute and relative) and conformation.

UNIT II

Organic Photochemistry

Photochemical excitation – interaction of electromagnetic radiation with organic molecules, types of excitations, fate of excited molecules - Jablonskii diagram, intersystem crossing, energy transfer, photosensitization, quenching, quantum yield, Frank-condon principle.

Photochemical reactions of ketones – Norrish type I cleavage, Norrish type II cleavage; photo reductions; Paterno-Buchi reactions; photochemistry of α,β-unsaturated ketones, β,γ-unsaturated ketones.

Photochemistry of alkenes: intramolecular reactions of the olefinic bond – cis-trans isomerisation (stilbene), cyclization reactions.

Photochemistry of aromatic compounds: photochemical rearrangement, photostationary state, isomerizations.

UNIT III

Pericyclic Reactions

Characteristics and Classification of pericyclic reactions, thermal and photochemical reactions. Molecular orbital symmetry. Woodward-Hoffmann selection rules, Fukui's FMO approach, Woodward-Hoffmann's Conservation of orbital symmetry and correlation diagrams and PMO method.

Electrocyclic reactions: conrotatory and disrotatory motions, 4n, 4n+2 π electron and allyl systems. Valence Tautomerism.

Cycloadditions: antarafacial and suprafacial additions, 4n and 4n+2 π electron systems. Diels-Alder reaction – stereoselectivity (endo, exo), and regioselectivity; normal and inverse electron demand Diels-Alder reactions; asymmetric Diels-Alder reactions; retro-Diels-Alder reactions; 2+2 addition of ketenes, 1,3-dipolar cycloadditions. Cheletropic reactions.

Sigmatropic rearrangements: suprafacial and antarafacial shifts of C-H and C-C bonds. Retention and inversion of configuration. 3,3- and 5,5-sigmatropic rearrangements. Claisen, Cope and aza-Cope rearrangements. Fluxional tautomerism. Ene reaction.

UNIT IV

Molecular Rearrangements

Mechanistic aspects, nature of the migration, migratory aptitudes, memory effects. A detailed study of the following rearrangements: Benzil-benzilic acid rearrangement, Favorskii rearrangement, Neber rearrangement, Beckmann rearrangement, Hoffmann rearrangement, Curtius rearrangement, Lossen

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rearrangement, Wolff rearrangement, Wittig rearrangement, Fritsch-Buttenberg-Wiechell rearrangement, Stevens rearrangement, Chapman rearrangement, Wallach rearrangement. Photochemical rearrangements: rearrangement of 1,4- and 1,5-dienes, di-π methane rearrangement. rearrangement of cyclohexadienone (conjugate and cross conjugate), Dienone-Phenol rearrangement.

SUGGESTED BOOKS AND REFERENCES

1. E. L. Eliel and Samuel H. Wilen, Stereochemistry of Carbon Compounds, Wiley-Interscience, 1994.
2. D. Nasipuri, Stereochemistry of Organic Compounds, Principles and Applications, New Academic Science Ltd., 2012.
3. P. S. Kalsi, Stereochemistry: Conformation and Mechanism, 7th edition, New Age International Publisher Ltd, New Delhi, 2009.
4. J. Clayden, N. Greeves, S. Warren and P. Wothers, Organic Chemistry, Oxford University Press, 2001.
5. Jerry March, Advanced Organic Chemistry: Reactions Mechanisms and Structure, McGraw Hill, 1977.
6. E. S. Gould, Mechanism and Structure in Organic Chemistry, Holt, Rinehart and Winston.
7. FA Carey and RJ Sundberg, Advanced Organic Chemistry Part-A, 5th Ed. Springer (2007).
8. Peter Sykes, A Guide Book to Mechanism in Organic Chemistry, Longman.
9. C.K. Ingold, Structure and Mechanism in Organic Chemistry, Cornell University Press.
10. R.T. Morrison and R.N. Boyd, Organic Chemistry, Prentice-Hall.
11. H.O. House, Benjamin, Modern Organic Reactions.
12. R O C Norman and J.M. Coxon, Principles of Organic Synthesis, Blackie Academic & Professional.
13. S.M. Mukherji and S.P. Singh, Reaction Mechanism in Organic Chemistry, Macmillan.
14. R. B. Woodward and R. Hoffmann, Conservation of Orbital Symmetry, Verlag Chemie: Weinheim (1970).
15. Ian Fleming, Pericyclic Reactions, Oxford Chemistry.
16. S. Sankararaman, Pericyclic Reactions- A Textbook, Wiley-VCH, Weinheim, 2005.
17. Gilbert A and Baggott J., Essentials of Molecular Photochemistry, Blackwell Scientific Publication.
18. Turro N.J., W.A. Benjamin, Molecular Photochemistry.
19. Cox A. and Camp T., Introductory Photochemistry, McGraw Hill.
20. Fleming I., Molecular orbitals and photochemical reactions,
21. Coxon J. and Halton B., Organic Photochemistry, Cambridge University Press.
22. Albright T., Burdet J and Whango M, Orbital interaction in chemistry, Wiley VCH

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CHE 803: THERMODYNAMICS AND CHEMICAL KINETICS

Classical Thermodynamics **UNIT-I** **4 Credit (4 hrs/week)**

Brief resume of concept of laws of thermodynamics, free energy, chemical potential and entropies. Partial molar properties; partial molar free energy, partial molar volume and partial molar heat content and their significances. Determinations of these quantities. Concept and determination of fugacity. Non-ideal systems: Excess functions for non-ideal solutions. Activity, activity coefficient and its determination. Debye-Huckel theory for activity coefficient of electrolytic solutions; determination of activity and activity coefficients; ionic strength.

Application of phase rule to three component systems; second order phase transitions.

Statistical Thermodynamics **UNIT-II**

Concept of distribution, thermodynamic probability and most probable distribution. Ensemble averaging, postulates of ensemble averaging. Canonical, grand canonical and microcanonical ensembles, corresponding distribution laws (using Lagrange's method of undetermined multipliers). Partition functions-translation, rotational, vibrational and electronic partition functions. Calculation of thermodynamic properties in terms of partition functions. Application of partition functions. Heat capacity behavior of solids-chemical equilibria and equilibrium constant in terms of partition functions. Fermi-Dirac statistics, distribution law and applications to metal. Bose-Einstein statistics distribution Law and application to helium.

Chemical Kinetics - I **UNIT-III**

Methods of determining rate laws, collision theory of reaction rates, steric factor, activated complex theory, Arrhenius equation and the activated complex theory; ionic reactions, kinetic salt effects ; steady state kinetics, kinetic and thermodynamic control of reactions, treatment of unimolecular reactions.

Dynamic chain reactions (hydrogen-bromine reaction, pyrolysis of acetaldehyde, decomposition of ethane), photochemical reactions (hydrogen-bromine and hydrogen-chlorine).

Chemical Kinetics - II **UNIT-IV**

General features of fast reactions, study of fast reactions by flow method, relaxation method, flash photolysis and the nuclear magnetic resonance method.

Collision' theory of reaction rates, Arrhenius equation and the effect of temperature on reaction rate. Activated complex theory, Modified collision theory (steric effect)

Dynamics of unimolecular reactions (Lindemann Hinshelwood and Rice-Ramsperger-Kassel-Marcus (RRKM) theories of unimolecular reactions).

SUGGESTED BOOKS AND REFERENCES

1. P. W. Atkins, Physical Chemistry, ELBS.
2. K.J. Laidler, Chemical Kinetics, McGraw Hill.
3. J. Rajaraman and J. Kuriacose, Kinetics and Mechanism of Chemical Transformation, Plenum.
4. Samuel Glasstone, Thermodynamics for Chemist, East West Press.
5. R. P. Rastogi and R. R. Mishra, Introduction to Chemical Thermodynamics, Vikash Publication House.
6. Puri, Sharma and Pathaniya, Principles of Physical Chemistry, Vishal Publication.

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CHE 811: CHEMISTRY CORE LAB -2

6 Credits (9 hrs/week)

A. Inorganic Preparations: Following selected inorganic compounds and their studies by IR spectra, Mössbauer, ESR and Magnetic susceptibility measurements. Handling of air and moisture sensitive compounds under vacuum.

i. Sodium thiosulphate, $Na_2S_2O_3.5H_2O$
ii. $CuCl_2.2DMSO$
iii. Tetraamine cupric sulphate $[Cu(NH_3)_4SO_4].H_2O$
iv. N,N-bis(salicylaldehyde)ethylenediamine, Salen H_2, Co(Salen)
v. Copper glycine complex – *cis*- and *trans*-bis(glycinato)Copper(II)
vi. Cis- and trans-dichlorobis(ethylenediammine)cobalt(III) chloride, $[Co(en)_2Cl_2]Cl$
vii. $Na[Cr(NH_3)_2(SCN)_4]$
viii. $[Ni(NH_3)_6]Cl_2$

B. Two Step Organic Synthesis

i. Aniline → 2,4,6-Tribromoaniline → 1,3,5-Tribromobenzene
ii. Aniline → Diazoaminobenzene → *p*-Aminoazobenzene
iii. Phthalic anhydride → Fluorescein → Eosin
iv. Phthalic anhydride → Phthalimide → Anthranilic acid
v. Acetanilide → *p*-Nitroacetanilide → *p*-Nitroaniline
vi. More two step organic preparations involving general organic reactions may be carried out.

The products to be characterized by m.pt / spectral techniques.

C Experiments based on -

Chemical Kinetics

i. Determination of the primary salt effect on the kinetics of ionic reactions and testing of the Bronsted relationship (iodide ion is oxidized by persulphate ion).
ii. Determination of the effect of (a) Change of temperature (b) Change of concentration of reactant and catalyst and (c) Ionic strength of the media on the velocity constant of hydrolysis of an ester/ionic reactions.
iii. Determination of the velocity constant of hydrolysis of an ester/ionic reaction in micellar media.
iv. Determination of the rate constant for the oxidation of iodide ions by peroxide studying the kinetics as an iodine clock reaction

Thermodynamics

i. Determination of partial molar volume of solute (e.g. KCl) and solvent in a binary mixture.
ii. Determination of the temperature dependence of the solubility of a compound in two solvents having similar intramolecular interactions (benzoic acid in water and in DMSO-water mixture) and calculate the partial molar heat of solution.

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CHE A04: SPECTROSCOPY-II

UNIT I

4 Credit (4 hrs/week)

Ultraviolet and Visible Spectroscopy

Various electronic transitions (185-800 nm) Beer-Lambert law, effect of solvent on electronic transitions, ultraviolet bands for carbonyl compounds, unsaturated carbonyl compounds, dienes, conjugated polyenes. Woodward-Fieser rules for conjugated dienes and carbonyl compounds, ultraviolet spectra of aromatic compounds. Steric effect in biphenyls.

Infrared Spectroscopy

Characteristic vibrational frequencies of aromatic compounds, alcohols, ethers, phenols and amines. Detailed study of vibrational frequencies of carbonyl compounds (ketones, aldehydes, esters, amides, acids, anhydrides, lactones, lactams and conjugated carbonyl compounds). Effect of hydrogen bonding and solvent effect on vibrational frequencies, overtones, combination bands and Fermi resonance.

UNIT II

Mass spectrometry

Introduction, ion production - EI, CI, FD and FAB, factors affecting fragmentation, ion analysis, ion abundance. Mass spectral fragmentation of organic compounds common functional groups, molecular ion peak, metastable peak. McLafferty rearrangement. Ring rule, Nitrogen rule. High resolution mass spectrometery. Examples of mass spectral fragmentation of organic compounds with respect to their structure determination.

UNIT III

Proton Magnetic Resonance Spectroscopy

Chemically nonequivalent protons, chemical shift values and correlation for protons bonded to carbon (aliphatic, olefinic, aldehydic and aromatic) and other nuclei (alcohols, phenols, enols, carboxylic acids, amines, amides and mercapto). Chemical exchange, effect of deuteration. Complex spin-spin interaction between two, three, four and five nuclei (first order spectra). Stereochemistry, hindered rotation. Karplus curve-variation of coupling constant with dihedral angle. Simplification of complex spectra - nuclear magnetic double resonance, NMR shift reagents, solvent effects. Fourier transform technique, nuclear overhauser effect (NOE).

UNIT IV

Carbon-13 NMR Spectroscopy

General consideration, chemical shift (aliphatic, olefinic, alkyne, aromatic, heteroaromatic and carbonyl carbon), coupling constants. Two dimension NMR spectroscopy - COSY, NOESY, DEPT, INEPT, APT and INADEQUATE techniques.

Applications of Spectroscopy - Problems based on UV, IR, NMR spectroscopy and Mass spectrometry for structural elucidation of organic compounds.

SUGGESTED BOOKS AND REFERENCES

1. Spectrometric Identification of Organic Compounds, R.M. Silverstein, G.C. Hassler and T.C. Morrill, John Wiley.
2. Fundamentals of Spectroscopy by Banwell and McCash
3. Introduction to NMR Spectroscopy, R.J. Abraham, J. Fisher and P. Lofitus, Wiley.
4. Application of Spectroscopy of Organic Compounds, J.R Dyer, Prentice Hall.
5. Spectroscopic Methods in Organic Chemistry D.H. Williams, I. Fleming, Tata McGraw-Hill.
6. Organic Spectroscopy, William Kemp, Macmillan.

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CHE A05: ENVIRONMENTAL CHEMISTRY

4 Credit (4 hrs/week)

UNIT-I

Atmospheric Chemistry

Atmospheric layers, Vertical temperature profile, heat/radiation budget of the earth atmosphere systems. Properties of troposphere, thermodynamic derivation of lapse rate. Temperature inversion. Calculation of Global mean temperature of the atmosphere. Pressure variation in atmosphere and scale height. Biogeochemical cycles of carbon, nitrogen, sulphur, phosphorus oxygen. Residence times. Sources of trace atmospheric constituents: nitrogen oxides, sulphur dioxide and other sulphur compounds, carbon oxides, chlorofluorocarbons and other halogen compounds, methane and other hydrocarbons.

Tropospheric Photochemistry

Mechanism of photochemical decomposition of NO_2 and formation of ozone. Formation of oxygen atoms, hydroxyl, hydroperoxy and organic radicals and hydrogen peroxide. Reactions of hydroxyl radicals with methane and other organic compounds. Reactions of OH radicals with SO_2 and NO_2. Formation of Nitrate radical and its reactions. Photochemical smog, meteorological conditions and chemistry of its formation.

UNIT-II

Air Pollution: Air pollutants and their classifications. Aerosols-sources, size distribution and effect on visibility, climate and health.

Acid Rain: Definition, Acid rain precursors and their aqueous and gas phase atmospheric oxidation reactions, damaging effects on aquatic life, plants, buildings and health. Monitoring of SO_2 and NO_x, acid rain control strategies.

Stratospheric Ozone Depletion: Mechanism of ozone formation, Mechanism of catalytic ozone depletion, discovery of Antarctic ozone hole and role of chemistry and meteorology, control Strategies.

Green House Effect : Terrestrial and solar radiation spectra, major green house gases and their sources and global warming potentials. Climate change and consequences.

Urban Air Pollution: Exhaust emissions, damaging effects of carbon monoxide, monitoring of CO, control strategies.

UNIT-III

Aquatic Chemistry and Water Pollution

Redox chemistry in natural waters. Dissolved oxygen, biological oxygen demand, chemical oxygen demand, determination of DO, BOD and COD. Aerobic and anaerobic reactions of organic sulphur and nitrogen compounds in water, acid-base chemistry of fresh water and sea water. Aluminium, nitrate and fluoride in water, petrification, sources of water pollution, treatment of waste and sewage, purification of drinking water, techniques of purification and disinfection.

UNIT-IV

Environmental Toxicology

Toxic Heavy Metals: Mercury, lead, arsenic and cadmium, causes of toxicity, bioaccumulation, sources of heavy metals, chemical speciation of Hg, Pb, As, and Cd, biochemical and damaging effects.

Toxic Organic Compounds: Pesticides, classification, properties and uses of organochlorine and biospheres pesticides, detection and damaging effects.

Polychlorinated Biphenyls: Properties, use and environmental continuation and effects.

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Polynuclear Aromatic Hydrocarbons: Source, structures and as pollutants.
Soil and Environmental Disasters: Soil composition, micro and macronutrients, soil pollution by fertilizers, plastic and metals. Methods of re-mediation of soil. Bhopal gas tragedy, Chernobyl, three mile island, Minamata disease, Sevoso (Italy), London smog.

SUGGESTED BOOKS AND REFERENCES

1. Environmental Chemistry, Colin Baird, W.H. Freeman Co. New York, 1998.
2. Chemistry of Atmospheres. R.P. Wayne, Oxford.
3. Environment Chemistry, A.K. De, Wiley Eastern, 2004.
4. Environmental Chemistry, S.E. Manahan, Lewis Publishers.
5. Introduction to Atmospheric Chemistry, P.V. Hobbs, Cambridge.

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CHE D01: BIOMOLECULES I

4 Credit (4 hrs/week)

UNIT-I

Carbohydrates

Structure and biological functions of derivatives of monosaccharides like, Amino sugars - Glucosamine and N-Acetylglucosamine; Carboxylic acid sugars- Glucuronic acid and Gluconic acid; Sugar phosphates- Adenosine triphosphate (ATP); Sugar alcohols- Maltitol and Lactitol. Structure, nomenclature, properties and reactions of oligosaccharides. Structure and biological functions of derivatives of polysaccharides - chondroitin sulphate, heparin and hyaluronan.

Unit-II

Lipids

Introduction, nomenclature, classification, and physical properties of fatty acids. Chemical properties of fatty acids - methylation of carboxyl groups, halogen addition reactions, transformation of isolene-type fatty acids to conjugated fatty acids and hydrogenation. Nomenclature, classification, structure, and function of triacylglycerols, Phospho- and Glycolipids, Definition and classification of lipoproteins. Involvement of lipids in the formation of biological membranes, Introduction of diol lipids, higher alcohols (Waxes and alkoxy lipids) and Cutin.

UNIT -III

Amino-acids, Peptides and Protein

Peptide bond, Chemical and enzymatic hydrolysis of proteins to peptides. Synthetic Amino Acids Utilized for Increasing the Biological Value of Food (Food Fortification) - Glutamic Acid, Aspartic Acid, Lysine, Methionine, Phenylalanine, Threonine, Tryptophan. General Remarks, Nomenclature, physical properties and sensory properties of Peptides. Structure and use of peptides of interest to food chemists - Glutathione, Carnosine, Anserine and Balenine, Nisin and Lysine Peptides. Secondary structure of proteins-α-helix, β-sheet, forces responsible for holding the secondary structures of proteins.

UNIT-IV

Transmission of Genetic Information from the Gene to the Protein

Nucleic acid structure and function - DNA, double helix, DNA replication, Mutation and DNA repair, RNA, types of RNA, transcription, RNA modification, Genetic code, Translation, Transfer RNA, Steps of translation-initiation, elongation and termination, Chromosome organization, Repetitive DNA sequences.

Prokaryotic regulation of gene expression, Eukaryotic control of gene expression, transcriptional regulations.

BOOKS SUGGESTED:

1. Principles of Biochemistry, A. L. Lehninger, Worth Publishers.
2. Biochemistry, L.Stryer, W.H.Freeman.
3. Biochemistry, J. David Rawn, Neil Patterson.
4. Biochemistry, Voet and Voet, John Wiley.
5. Outlines of Biochemistry, E.E. Conn and P.K. Stumpf, John Wiley.
6. Food Chemistry, H.D. Belitz et.al., Springer

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CHE A12: CHEMISTRY ELECTIVE LAB-2

A. Laboratory Estimations **6 Credits (9 hrs/week)**

i. Estimation of ferric ions in ferric alum.
ii. Estimation of Cr^{3+} ions in tannery waste.
iii. Estimation of available chlorine in bleaching powder.
iv. Analysis of bauxite with respect to Aluminium (gravimetrically).

Synthesis of inorganic compounds and their characterization by IR spectroscopy

i. Sodium hexanitritocobaltate(III), $Na_3[Co(NO_2)_6]$
ii. Sodium tetrathionate $Na_2S_4O_6$
iii. Prussian blue, $Fe_4[Fe(CN)_6]_3$
iv. Pentaamminechlorocobalt(III)chloride, $[CoCl(NH_3)_5]Cl_2$
v. Hexaamminecobalt(III)chloride, $[Co(NH_3)_6]Cl_3$
vi. *Cis*- and *trans*-$K[Cr(C_2O_4)_2(H_2O)_2].2H_2O$

B. Organic Quantitative Analysis

i. Estimation of amines using bromate-bromide solution or acetylation method.
ii. Estimation of phenols using bromate-bromide solution or acetylation method.
iii. Determination of number of hydroxyl groups in an organic compound by acetylation method.
iv. Estimation of sugars using Fehling solution method.
v. Determination of Neutralization Equivalent of given carboxylic acid.
vi. Determination of Iodine number and saponification value of an oil sample.
vii. Estimation of sulphur by Messenger or Fusion method.

C. Potentiometry:

i. Determination of strengths of halides in a mixture potentiometrically.
ii. Determination of the valency of Given ions potentiometrically.
iii. Determination of activity and activity coefficient of the given electrolytes.

Conductometric Experiments

iv. Double displacement & acid base titration
   a. NH_4Cl – NaOH – Mixture of CH_3COOH & HCl
   b. NH_4Cl – NaOH – Mixture of NH_4Cl & HCl
v. Precipitation titration
   a. KCl – $AgNO_3$ – KCl
   b. K_2SO_4 – $BaCl_2$ – K_2SO_4
vi. Determination of dissociation constant of weak acids

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CHE 901: ORGANOTRANSITION METAL CHEMISTRY

4 Credit (4 hrs/week)

UNIT-I

Synthesis, Properties, Structure and Bonding of:
(Giving some specific examples)

(i) η^1- bonded alkyl complexes
(ii) η^1- carbene and carbyne complexes
(iii) η^2- alkene and alkyne complexes
(iv) η^3- allyl complexes
(v) η^4- dienyl complexes
(vi) η^5- dienyl complexes

UNIT-II

Metal nitrosyls, cyanides and isocyanides:
Synthesis, reactions, structure and bonding in metal nitrosyls: nitrosyl complexes, metal cyanides and isocyanides: cyanogens, cyanates and its analogue. Sulfur, selenium and tellurium ion. Diisocyanides, reactions of isocyanide complexes and their uses.

UNIT-III

Synthetic and Catalytic Aspects of Organotransition Metal Chemistry:

(i) Transition metal organometallics in organic synthesis
(ii) Homogenous catalysis by transition metal organometallics
(a) Hydrogenation of alkenes
(b) Hydrosilylation of alkenes
(c) Metathesis of alkenes
(d) Oligomerization and polymerization of alkenes and alkynes
(e) Hydroformylation of alkenes
(f) Acetic acid synthesis and other carbonylation reactions
(g) Oxidation of alkenes

UNIT-IV

Catalysis

(a) Heterogenous catalysis by organotransition metal compounds
(b) Fisher-Tropsch synthesis: Methanation reactions, Synthesis of methanol, gasoline production, function of ZSM-5 Zeolite in stabilization of carbine molecule, application of reaction to industry.
(c) Water gas shift reaction: Role of ZnO/Cr_2O_3 in the reaction, Acetic acid synthesis from water gas shift, Role of Co catalyst.
(d) Fluxional organometallic compounds: Rate of rearrangement, Simple examples of non-rigid molecules in different coordination geometries, classification, future developments.

SUGGESTED BOOKS AND REFERENCES

1. J.P. Collman, L.S. Hegsdus, J.R. Norton and R.G. Finke, Principles and Applications of Organotransition Metal Chemistry, University Science Books, 1987.
2. R.H. Crabtree, The Organometallic Chemistry of Transition Metals, John Willey, 1989.
3. A.J. Pearson, Metalloorganic Chemistry, Wiley, 1985.
4. R. C. Mehrotra and A. Singh, Organometallic Chemistry, New Age International, 1991.
5. J.P. Candlin K. Aayler and D.T Thomson, Reaction of Transition Metal Complexes, Elsevier
6. M.L.H. Green, Organometallic Compounds, Vol. II, Methuen, 1968.

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CHE 902: ORGANIC SYNTHESIS-I

4 Credit (4 hrs/week)

UNIT - I

Enolate Chemistry

Formation of enolates, kinetic and thermodynamic control. Reactions of enolate anions with electrophiles: O vs C alkylation. Enolate condensation reactions: Synthetic applications of inter- and intramolecular Aldol condensations, Claisen, Dieckmann, Knovenagel, Stobbe condensations, Mukaiyama Aldol reaction. Boron enolates. Nozaki-Hiyama-Kishi coupling. Stereoselective enolate reactions: diastereoselection, Zimmermann-Traxler model, Evans model, Noyori open-chain model. Michael addition and related reactions. Baylis-Hillmann reaction, Robinson annulations. α-Halogenation, Reformatski reaction.

UNIT - II

Metal and non-metal mediated oxidation

Mechanism, selectivity, stereochemistry and applications of Oppenauer oxidations, aromatization, dehydrogenation, cleavage of C=C bond, ozonolysis, epoxidation using peracids, Baeyer-Villeger oxidation. Oxidations using $FeCl_3$, DDQ, NBS, lead tetraacetate, selenium dioxide, Ag, Cr and Mn reagents, periodic acid and osmium tetraoxide. DMSO-based oxidations. Oxidation of S, Se and N containing compounds.

Hydroboration: Introduction, preparation of alkyl- and alkenylboranes. Synthetic transformations: protonolysis, hydrohalogenation, coupling, isomerisation and displacement reactions. Preparation of amines and sulfides *via* hydroboration.

UNIT - III

Metal and non-metal mediated reduction

Mechanism, selectivity, stereochemistry and applications of catalytic hydrogenations (using Pd, Pt and Ni catalysts), Clemmensen reduction, Wolff-Kishner reduction, Meerwin-Ponndorf-Verley reduction, dissolving metal reductions, metal hydride reductions ($NaBH_4$, $LiAlH_4$, DIBAL). Stereoselectivity in hydride transfer reductions, Wilkinson's catalysis. Boranes in reduction. Hydrosilylation. Photoreduction.

UNIT – IV

New Synthetic Reactions

a. Metal mediated C-C and C-X coupling reactions: Suzuki, Heck, Stille, Sonogashira cross coupling, Buchwald-Hartwig amination and Negishi, Kumada coupling reactions.
b. C=C Formation Reactions: Shapiro, Bamford-Stevens, McMurrey reactions, Julia-Lythgoe olefination and Peterson's stereoselective olefination.
c. Multicomponent Reactions: Mannich, Biginelli, Hantzsch, Passerini, Ugi reaction.
d. Ring Formation Reactions: Pausan-Khand reaction, Bergman cyclisation, Nazarov cyclisation.
e. Click Chemistry: Criteria for Click reaction, Sharpless azide cycloadditions.
f. Olefin metathesis: Shrocks, Grubb's 1st and 2nd generation catalyst, Grubb-Hoveyda catalyst.
g. Olefin cross metathesis (OCM), ring closing metathesis (RCM), ring opening metathesis (ROM) and applications.
h. Other important synthetic reactions: Eschenmoser-Tanabe fragmentation, Mitsunobu reaction, Stork-enamine reaction.

SUGGESTED BOOKS AND REFERENCES

1. Carey A and Sundberg R.J., Advanced Organic Chemistry, Part B: Reaction and Synthesis, Springer, 2008.

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2. March J, Advanced organic chemistry: Reactions, mechanism and stereochemistry, John Wiley, 2013.
3. Packanyi C., Theoretical organic chemistry, Elsevier, 1997.
4. Kurti L, Czako B, Strategic applications of named reactions in organic synthesis, Academic Press, 2005.
5. Smith M.B., Organic synthesis, McGraw Hill, 2002.
6. Nicolaou E.J., Classics in total synthesis, Chemie Verlag, 1996.
7. Corey E.J. and Cheng X.M., The logic of chemical synthesis, John Wiley & Sons, 1989.
8. Fieser and Fieser, Reagents for organic synthesis, Wiley, 1967.
9. Wipf P, Handbook of reagents for organic synthesis, John Wiley & Sons, 2005.
10. Greene T, Wuts P.G.M., Protecting group in organic synthesis, John Wiley & Sons, 1989.
11. Carruther W., Modern methods of organic synthesis, Cambridge University Press, 1971.
12. Smith W.A., Bochkor A.F., Caple, R., Organic synthesis: The science behind art, RSC, 1998.

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CHE 903: BIO-PHYSICAL CHEMISTRY

4 Credit (4 hrs/week)

UNIT I

Biological Cell and its Constituents:
Biological Cell, Structure and functions of proteins, DNA and RNA in living system, Helix Coil Transition.

Cell Membrane and transport of Ions:
Structure and functions of cell membrane, ion transport through cell membrane, irreversible thermodynamic treatment of membrane transport, Nerve conduction, Domman membrane equilibrium. Active transport mechanisms. Autoanalyzers. Biological Half life, effective half life, Stable isotopes, Radioactive tracer and dilution analysis.

UNIT II

Bioenergetics:
Standard free energy change in biological reactions, Exergonic and endergonic processes, Hydrolysis of ATP, Synthesis of ATP from ADP.

Biopolymer Interactions:
Forces involved in biopolymers interactions, Electrostatic charges and molecular expansions, hydrophobic forces, dispersion forces, Multiple Equilibria and various binding process in biological systems. Hydrogen ion titration curve.

UNIT III

Statistical Methods in Biopolymer:
Chain Configuration of macromolecules, statistical distribution end to end dimensions, calculations of average dimension of various chain structure. Polypeptide and protein structure. Introduction to protein folding problems.

Molecular weights of biopolymers:
Evaluations of size, shape and extent of hydration of biopolymers by various experiments, determination of molecular weight of biopolymers by light scattering, sedimentation, viscosity and osmotic pressure methods. Bio-degradable polymers.

UNIT IV

Biosensors
Definition, Biosensor system, Bio receptors, surface attachment of biological elements. Electro-chemical transducers, placement of biosensors.

Applications:
Glucose monitoring, food analysis, DNA biosensors, microbial biosensors, commercialized biosensors, identification of blood glucose (diabetes) and pregnancy test by colorimetric and electrochemical strip.

SUGGESTED BOOKS AND REFERENCES

1. Sitake and Iqbal, Biophysical Chemistry, Discovery Press, 2003.
2. James P Allen, Biophysical Chemistry, Wiley-Blackwell Publisher, 2008.
3. Alan Cooper, Biophysical Chemistry, RSC Publication, 2004, ISBN: 978-0-85404-480-1.
4. Upadhyay, Biophysical Chemistry, Himalaya Publishing Publication House, 2014.
5. Zhang, Ju and Joseph Wang, Electrochemical Sensors, Biosensors and their Bio-medical Applications, Academic Press, Elsevier, 2008.

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CHE 911: CHEMISTRY CORE LAB – 3

6 Credit (9 hrs/week)

A. Laboratory Estimations

i. Spectrophotometric determination of Iron-phenanthroline complex: Job's method of continuous variations.
ii. Spectrophotometric determination of nickel as nickel dimethyl glyoximate complex.
iii. Find out the stability constant of metal complexes by Bjerrum's Method.
iv. Analyse the given sample of Copper Ferrite ($CuFe_2O_4$) & determine the amount and percentage of Copper and Iron volumetrically.
v. Determination of ferrous (Fe^{2+}) and ferric (Fe^{3+}) ions in the given solution.
vi. Determination of Ca^{2+} and Mg^{2+} ions in a given solution and estimation of total hardness of water.
vii. Estimation of H_2O_2 by iodometric method.
viii. Estimation of Zinc involving Potassium ferrocyanide.
ix. Estimation of sulphate as barium sulphate gravimetrically.
x. Estimate Ni in a given sample complexometrically using mureoxide as an indicator.
xi. Analysis of the given sample of iron ore & determination of Silica – Gravimetrically, Iron Volumetrically to find out their percentages in the given sample.
xii. Estimation of Iron in Portland cement.

B. Separation & Purification Techniques:

i. Extraction of organic compound using separating funnel, Soxhlet extraction method
ii. Purification of organic compounds using Chromatographic methods
iii. Isolation of caffeine, casein, chlorophyll.

Quantitative estimations

iv. Estimation of number of Functional groups (phenol, amino, methoxy groups) in given organic compounds
v. Estimation of amino acids and sugar in given samples.
vi. Estimation of citric acid / vitamin C in citrus juice.

C. Chemical Analysis

i. Determine the dissolved oxygen (DO) of the given water sample.
ii. Determine the biological oxygen demand (BOD) of the given water sample.
iii. Determine the Chemical Oxygen Demand (COD) of the given water sample
iv. Determine the Nitrate (NO_3^-) in drinking water sample.
v. Determine the phenolic substance in the waste water sample.
vi. Determine the amount of free Chlorine in given water sample.
Determine the amount of Fluoride in given water sample.
Determine the dissolved CO_2 in the given water sample.

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CHE B01: BIOINORGANIC CHEMISTRY

4 Credit (4 hrs/week)

UNIT - I

Metals in Life Processes:

Role of metal ions in biological systems; essential and non-essential elements- macro minerals and essential trace elements- synergism and antagonism among essential trace elements; active transport of Na, K, Mg and Ca ions across the biological membrane; elements of bioenergetics with special reference to elements of high energy phosphate bond.

UNIT - II

Electron Carriers and Photosynthesis:

(a) Electron transfer in biology: Structure and functions of electron transfer proteins. Cytochromes and respiratory chain, iron-sulphur proteins rubredoxin and ferridoxins. Synthetic models for Fe_4S_4 cluster only.

(b) Photosynthetic pigments: Photochemistry of chlorophyll molecules, mechanism of photosynthesis, Calvin cycle and Quantum efficiency. Function of photosystem- I and photosystem-II. Cyclic and noncyclic phototphosphorylation.

UNIT - III

Transport and Storage of Dioxygen:

Haem proteins and oxygen uptake. Structure and function of haemoglobin, mygolobin. Structural model for dioxygen binding-co-operativity, Perutz mechanism and Bohr effect; non-haem oxygen carriers in some lower animals, haemocyanin and haemerythrin. Model synthetic complexes of iron, cobalt and copper.

UNIT - IV

Nitrogen Fixation:

Nitrogen in biosphere, nitrogen cycle, role of microorganisms in nitrification, nitrogen fixation in soils. Biological nitrogen fixation and its mechanism, nitrogenase, Chemical nitrogen fixation and other nitrogenase model systems.

SUGGESTED BOOKS AND REFRENCES

1. S. J. Lippard and J. M. Berg, Principles of Bioinogranic Chemistry, University Science Books, Mill Valley, CA, 1994.
2. H.v.I. Bertini, H.B. Gray, S.J. Lippard and J.S. Valentine, Bioinorganic Chemistry, University Science Books, Mill Valley, CA (USA), 1994.
3. P.S. Kalsi and J.P. Kalsi, Bio-organic, Bio-inorganic and Supramolecular Chemistry, New Age International, 2010
4. G.L. Eichhorn (ed.), Inorganic Biochemistry vol. I and II, Elsevier Scientific Publishing Co., Amsterdam 1973.
5. Stephen J. Lippard (ed.), Progress in Inorganic Chemistry, Vol 18 and 38, Wiley, 2009.

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CHE B02: SUPRAMOLECULAR CHEMISTRY

4 Credit (4 hrs/week)

UNIT-I

Introduction

Definition and development of supramolecular chemistry, classification of supramolecular host-guest compounds. Nature of supramolecular interactions: ion-ion interactions, ion-dipole interactions, dipole-dipole interactions. Cation binding hosts, binding of anions, binding of neutral molecules, binding of organic molecules.

UNIT-II

Molecular Recognition and Crystal Engineering

Receptors, design and synthesis of co receptors and multiple recognition. Hydrogen bonds, strong, weak and very weak H-bonds, utilization of H-bonds to create supramolecular structures, use of H-bonds in crystal engineering and molecular recognition.

UNIT-III

Supramolecular Reactivity and Catalysis

Supramolecular metallocatalysis, biomolecular and abiotic catalysis. Transport processes and carrier design, cation carriers, anion carriers, coupled transport processes.

UNIT-IV

Devices and Chemistry

Supramolecular devices, supramolecular photochemistry, molecular and supramolecular photonic devices, photosensitive molecular receptors. Supramolecular chemistry of Fullerene, Fullerene as guests, Fullerene as hosts, Fullerene as superconducting intercalation compounds.

SUGGESTED BOOKS AND REFERENCES

1. J.M. Lehn, Supramolecular Chemistry – Concept and Perspectives, VCH, 2006.
2. J.W. Steed and J.L. Atwood, Supramolecular Chemistry, John Wiley & Sons. Inc., 2009.
3. Bio-organic, Bio-inorganic and Supramolecular Chemistry, P.S. Kalsi and J.P. Kalsi, New Age International, 2010.

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CHE B03: INORGANIC POLYMERS

4 Credit (4 hrs/week)

UNIT-I

Basic Concepts

Classification by connectivity, and classification by dimensionality, metal/backbone classification of metal-containing polymers, linear inorganic polymer.

Unit-II

Synthesis and Characterization

Step-growth synthesis, chain polymerization, ring-opening polymerization, reductive coupling and other redox polymerization reactions, Inorganic polymer characterization: average molecular masses, and characterizing methods using Gel permeation chromatography and viscosity, degree of polymerization

Unit-III

Applications

Polysiloxane and polyphosphazene elastomers, inorganic medical polymers: polysiloxanes and polyphosphazene as bio polymers, Inorganic polymer conductivity: main group inorganic polymers, metal-containing polymers, Luminescent inorganic polymers: Ruthenium polymers for solar energy conversion.

Unit-IV

Polymetallocenes

Introduction, Polymetallocenes with short spacers obtained by condensation routes, ring-opening polymerization (ROP) of strained Metallocenophanes, thermal ROP of silicon-bridged [1]Ferrocenophanes, thermal ROP of other strained metallocenophanes, transition metal catalyzed ROP of strained metallocenophanes.

SUGGESTED BOOKS AND REFERENCES

1. Ronald D. Archer, Inorganic and Organometallic Polymers, Wiley-VCH
2. J.E. Huheey, Inorganic Chemistry, Harper Row.
3. M.F. Lappert and G.J. Leigh, Developments in Inorganic Polymer Chemistry, ACS Publications, 1963.
4. N.H. Ray, Inorganic Polymers, Academic Press, NY, 1979.
5. F.W. Billimeyer Jr., Textbook of Polymer Science, Wiley, NY, 1977.
6. H.R. Alcock and F.W. Lambe, Contemporary Polymer Chemistry, Prentice Hall
7. I. Manners, Synthetic Metal-Containing Polymers, Wiley-VCH, Weinheim, 2004.
8. A. S. Abd-El-Aziz, I. Manners Eds., Frontiers in Transition Metal-Containing Polymers, Wiley-Interscience, 2007.

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CHE C01: ADVANCED ELECTROCHEMISTRY- I

4 Credit (4 hrs/week)

UNIT-I

Fuel Cells

Electrochemical Generators (Fuel Cells): Hydrogen oxygen cells. Hydrogen Air Cell, Hydrocarbon air cell, alkaline fuel cell, Phosphoric acid fuel cell, Direct NaOH fuel cells, applications of fuel cells.

Electro-chemical Energy Storage

Properties of Electrochemical energy storages: measure of battery performance, Charging and discharging of batteries, Storage density, Energy density.

Classical Batteries: (i) Lead Acid (ii) Nickel-Cadmium (iii) Zinc – Manganese dioxide. Modern Batteries: (i) Zinc- Air (ii) Nickel- Metal hydride (iii) Lithium Battery. Future electricity stores: Storage in (i) Hydrogen (ii) alkali metals (iii) Non-aqueous solutions

UNIT-II

Corrosion and Passivity

Electrochemical mechanism of corrosion of metals, thermodynamics and stability of metals, potential - pH (or Pourbaix) Diaphragms, uses and abuses, corrosion current and corrosion potential - Evans diagrams.

Measurement of corrosion rate: weight loss method and Electrochemical method. Inhibition of Corrosion (i) by addition of substrates to the electrolyte environment (ii) By charging corroding method from external source, anodic protection, organic inhibitors. The Fuller theory, Green Inhibitors.

Passivation : Structure of passivation films, mechanism of passivation, spontaneous passivation, nature's method for stabilizing surfaces.

UNIT-III

Bio-electrochemistry and Bioelectrocatalysis

Membrane potential, simplistic and modern theory, Electrical conductance in biological organisms, electrochemical mechanism of nervous systems, enzymes as electrodes, Biosensors, Bio-electrocatalysis. Enzymes as biological catalysts, immobilization, methods of immobilization.

UNIT-IV

Kinetics of Electrode Process

Essentials of electrode reaction, significance of current density and overpotential in electrode processes, Standard rate constant (k^0) and Electron Transfer coefficient (α) and its significance, exchange current density. Criteria of irreversibility information from irreversible wave. Koutecky's method, Meits Israel and Gelling's method for determining kinetic parameters for quasireversible and irreversible waves.

SUGGESTED BOOKS AND REFERENCES

1. John O'M. Bockris and Amulya K.N. Reddy, Modern Electrochemistry, Volume 2A & 2B, Springer, 20
2. Brett CMA and Brett AMO, Electrochemistry: Principle and Applications, Oxford Press, 2005.
3. Joseph Wang, Analytical Electrochemistry, Wiley-VCH Publication, 1985.
4. Zhang, Ju and Joseph Wang, Electrochemical Sensors, Biosensors and their Bio-medical Applic Academic Press, Elsevier, 2008.
5. A.J. Fry and W.E. Britton, Topics in Organic Electrochemistry, Plenum publishing press, New York, 19
6. M. M. Baizer and H. Lund, Organic Electrochemistry, Marcel Dekker, New York, 1985.

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CHE C02: ADVANCED CHEMICAL KINETICS-I

4 Credit (4 hrs/week)

UNIT I

Kinetics of Atmospheric Reactions

Physical structure of atmosphere. Chemical composition of atmosphere, Kinetics and mechanism of NO_x, ClO_x cycles and $H_2 + O_2$ reaction. Mechanism of general methane oxidation. Kinetics and mechanism of low temperature oxidation of methane.

UNIT - II

Radiation Chemistry

Radiation chemistry and Photochemistry. Radiation chemistry of water and aqueous solutions. Hydrogen atom and hydroxyl radical-oxidizing and reducing conditions. Kinetics and mechanism of photochemical and photosensitized reactions (one example in each case). Stern-Volmer equation and its application. Hole-concept in the presence of semi-conductor photo-catalysts. Kinetics of exchange reactions (mathematical analysis).

UNIT - III

Dynamics of Gas-Surface Reactions

Adsorption/desorption, kinetics and transition state theory, Dissociative adsorption and precursor state. Mechanism of Langmuir's adsorption of the oxidation of carbon monoxide to carbon dioxide. True and apparent activation energies. Industrial importance of heterogeneous catalysis.

Transition State:

A brief aspect of statistical mechanics and transition state theory, application in calculation of the second order rate constant for reactions with collision for (i) atom + atom (2) atom + molecule (3) molecule (for both linear and non-linear molecules) + molecule reactions. Static solvent effects and thermodynamic formulations. Adiabatic electron transfer reactions, energy surfaces.

UNIT - IV

Enzymes and Inhibitors

Enzyme catalyzed models of 1:2 type enzyme-substrate systems. Kinetics of one enzyme-Two substrate systems and their experimental characteristics. Enzyme inhibitors and their experimental characteristics. Kinetics of enzyme inhibited reactions.

Micelles Catalysis and Inhibition

(a) Micelles and their classification, Kinetics and mechanism of micelle catalyzed reactions (first and second order). Various type of micelle catalyzed reactions. Micelle inhibited reactions.

(b) Kinetics and Mechanism of Substitution Reaction: Classification of ligand substitution mechanism, anation and base catalysed Kinetics of anation reactions. Aquation and acid catalysed Kinetics of aquation reactions (octahedral complexes).

SUGGESTED BOOKS AND REFERENCES

1. Henry Taube, S Lippard (Ed.), Progress in Inorganic Chemistry, Vol 30, John Wiley & Sons, NY, 19
2. R. Lumry and R.W. Raymond, Electron transfer reaction, Inter-Science Publication, 1997.
3. N.L. Bender, Mechanism of homogeneous Catalysis from protein to protein, Wiley, 1971.
4. A.G. Sykes, Kinetics of Inorganic reactions, Pergamon Press, 1966.
5. S.W. Benson, Jacob Kleinberg, R. Kent Murmana, R.T.M. Fraser, John Bauman, Mechanism of Inorganic Reactions, Academic Press, 1965.
6. H.Taube, Electron transfer reactions in solution, Academic Press, London, 1970.

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CHE C03: CHEMICAL ANALYSIS

4 Credit (4 hrs/week)

UNIT-I

Water Analysis

Sources of water pollution domestic, industrial, agricultural soil and radioactive wastes as sources of pollution. Objectives of analysis-parameter for analysis color, turbidity, total solids, conductivity, acidity, alkalinity, hardness, chloride, sulphate, fluoride, silica, phosphates and different forms of nitrogen. Heavy metal pollution-public health significance of cadmium, chromium, copper, lead, zinc, manganese, mercury and arsenic. General survey of instrumental technique for the analysis of heavy metals in aqueous systems. (Measurement of DO, BOD and COD). Pesticides as water pollutants and analysis. Water pollution laws and standards.

UNIT-II

Food Analysis

Moisture, ash, crude protein, fat, crude fiber, carbohydrates, calcium, potassium, sodium and phosphate. Food adulteration-common adulterants in food, contamination of food stuffs. Microscopic examination of foods for adulterants. Pesticide analysis in food products. Extraction and purification of sample: HPLC, Gas chromatography for organophosphates. Thin-layer chromatography for identification of chlorinated pesticides in food products.

UNIT-III

Soil and Fuel Analysis

(a) Analysis of soil, moisture, pH, total nitrogen, phosphorus, silica, lime, magnesia, manganese, sulphur and alkali salts.

(b) Fuel analysis: liquid and gas. Ultimate and proximate analysis, heating values-grading of coal. Liquid fuels flash point, aniline point, octane number and carbon residue. Gaseous fuels-producer gas and water gas-calorific value.

UNIT-IV

Body Fluids and Drug Analysis

Composition of blood collection and preservation of samples. Serum electrolytes, blood glucose, blood urea nitrogen, uric acid albumin, globulins acid and alkaline phosphatases, Immunoassay: Principle of radio immunoassay (RIA) and applications. The blood gas analysis trace elements in the body.

Narcotics and dangerous drugs classification of drugs. Screening by gas and thin layer chromatography and spectrophotometric measurements.

SUGGESTED BOOKS AND REFERENCES

1. G.D. Christian, P.K. Dasgupta, K.A. Schug, Analytical Chemistry, Wiley, 7th edn., 2013.
2. D.A. Skoog, D.M. West and F.J. Hooler, S.R. Crouch, Fundamentals of Analytical Chemistry, 9th edn., 2014.
3. J.H. Kennedy, Analytical Chemistry – Principles, Saunders College Publishing, New York, 2nd edn., 1990.
4. L.G. Hargis, Analytical Chemistry - Principles and Techniques, Prentice Hall, 1988.
5. R.A. Day, Jr. and A.L. Underwood, Quantitative Analysis, 6th edn., Prentice Hall, 1991.
6. S.M. Khopkar, Environmental Solution, Wiley Eastern.
7. S.M. Khopkar, Basic Concepts of analysis Chemistry, New Age International, 1998.
8. Alka L. Gupta, Analytical Chemistry, Pragati Publication, 2014.
9. D C Das, Analytical Chemistry, Prentice Hall India Learning Private Limited, 2010.

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CHE D02: HETEROCYCLIC CHEMISTRY– I

4 Credit (4 hrs/week)

UNIT-I

Nomenclature of Heterocycles
Replacement and systematic nomenclature (Hantzsch-Widman system) for monocyclic, fused, spiro and bridged heterocycles.

Aromatic Heterocycles
General chemical behaviour of aromatic heterocycles, classification (structural type), criteria of aromaticity (bond lengths, ring current and chemical shifts in ^{1}H NMR-spectra, empirical resonance energy, delocalization energy and Dewar resonance energy, diamagnetic susceptibility exaltations). Heteroaromatic reactivity.

UNIT-II

Non-aromatic Heterocycles
Strain - bond angle and torsional strains and their consequences in small ring heterocycles. Conformation of six-membered heterocycles with reference to molecular geometry, barrier to ring inversion, pyramidal inversion and 1,3-diaxial interactions. Stereo-electronic effects; anomeric and related effects. Attractive interactions - hydrogen bonding and intermolecular nucleophilic electrophilic interactions.

UNIT - III

Small Ring Heterocycles
Three-membered and Four-membered Heterocycles: Synthesis and reactions of aziridines, oxiranes, thiiranes, oxaziridines, azetidines, oxetanes, thietanes and azetedinones.

UNIT-IV

Five-membered Heterocycles with Two Heteroatoms
Synthesis and reactions of 1,2- & 1,3-diazoles, oxazoles, thiazoles and azaphospholes.

Benzo-fused five-membered Heterocycles
Synthesis, reactions and medicinal applications of benzopyrroles, benzofuráns, benzothiophenes and benzimidazoles.

SUGGESTED BOOKS AND REFERENCES

1. R.R. Gupta, M. Kumar and V. Gupta, Heterocyclic Chemistry Vol. 1& 2. Springer India, 1998 & 1999.
2. T Eicher and S. Hauptmann, The Chemistry of Heterocycles, Wiley-VCH, 2003.
3. J.A. Joule, K. Mills and G.F Smith, Heterocyclic Chemistry, Chapman and Hall, 1995.
4. T.L. Gilchrist, Heterocyclic Chemistry, Longman Scientific & Technical, 1992.
5. G.R. Newkome and W.W. Paudler, Contemporary Heterocyclic Chemistry, Wiley-Inter Science, 1982.
6. R.M. Acheson, An Introduction to the Heterocyclic Compounds, John Wiley, 1977.
7. A.R. Katritzky, C.W. Rees and E.F.V. Scriven (Eds.), Comprehensive Heterocyclic Chemistry II, ISBN: 9780080965185, Elsevier, 1996.

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CHE D03: NATURAL PRODUCTS – I

4 Credit (4 hrs/week)

UNIT- I

Terpenoids and Carotenoids

Introduction, occurrence, nomenclature, general methods of structure determination, isoprene rule, stereochemistry and synthesis of following representative molecules: Citral, Geraniol, α-Terpineol, Menthol, Farnesol, Zingiberene, Phytol, and Abietic acid. Biosynthesis of Terpenoids. General methods of structure determination of β-Carotene and Lycopene.

UNIT-II

Alkaloids

Introduction, occurrence, nomenclature, classification based on structure, isolation, general methods of structure elucidation of alkaloids, stereochemistry and synthesis of the following: Narcotine, Quinine, Reserpine and Morphine.

UNIT - III

Steroids

Occurrence, nomenclature, basic skeleton, Diel's hydrocarbon and stereochemistry. Isolation, structure determination and synthesis of Cholesterol, Bile acids, Androsterone, Testosterone, Estrogen and Progesterone. Biosynthesis of cholesterol.

Plant Hormones

Introduction, occurrence, isolation and physiological effects of Auxins, Gibberellins (Synthesis of GA_3), Cytokinins and Abscisic acid.

Nutraceuticals and Natural Products

Occurrence, isolation, biological function and structure elucidation (by spectroscopic methods) of Curcumin, Silymarin, 5-hydroxytryptophan, Chlorogenic acid and Vinpocetine.

UNIT-IV

Natural Pigments

Occurrence, nomenclature and general methods of structure determination. Isolation, structure determination and synthesis of Luteolin, Quercetin, Luteolin, Diadzein, Genistein, and Cyanidin chloride.

Porphyrins: Structure, reactions and synthesis of haemoglobin, chlorophyll, chlorins, bacteriochlorins and purpurin anhydride. Photosensitizers in Photodynamic Therapy.

SUGGESTED BOOKS AND REFERENCES

1. J. Mann, R.S. Davidson, J.B. Hobbs, D.V. Banthrope and J.B. Harborne, Natural Products, Chemistry and Biological Significance, Prentice Hall, 1994.
2. I. L. Finar, Organic Chemistry: Vol. 2, ELBS, Longman, 1996.
3. M. Norgradi, Stereoselective Synthesis; A Practical Approach, Wiley-VCH, 1994.
4. S.V. Bhat, B.A. Nagasampagi and M. Sivakumar, Chemistry of Natural Products, Narosa Publishing House, 2015.
5. Ed. Kurt Hostettmann, M.P. Gupta and A. Marston, Chemistry, Biological and Pharmacological Properties of Medicinal Plants from the Americas, Harwood Academic Publishers, 1999.
6. B.A. Bohm, Introduction to Flavonoids, Harwood Academic Publishers, 1998.
7. Atta-ur-Rahman and M.L. Choudhary, New Trends in Natural Products Chemistry, Harwood Academic Publishers, 1998.

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CHE D04: MEDICINAL CHEMISTRY - I

4 Credit (4 hrs/week)

UNIT-I

Drug Design

Development of new drugs, procedures followed in drug design, concepts of prodrugs and soft drugs, structure-activity relationship (SAR and QSAR). Factors affecting bioactivity –resonance, inductive effect, isosterism, bio-isosterism, spatial consideration. Theories of drug activity. Elementary treatment of drug receptor interactions.

UNIT-II

Pharmacodynamics : Definition, Receptors and specificity, agonists and antagonists, Site(s) of drug action, Mechanism of Drug action: therapeutic and side effects, elementary treatment of enzyme stimulation, enzyme inhibition, membrane active drugs, Drug metabolism, xenobiotics, biotransformation significance of drug metabolism in medicinal chemistry.

Pharmacokinetics : Introduction to drug absorption, disposition and elimination using pharmacokinetics, Clinical Pharmacokinetics: bioavailabilty, volume of distribution, clearance, elimination, Design and optimization of dosage regimen, Therapeutic drug monitoring, importance of pharmacokinetics and pharmacodynamics in drug development process.

UNIT-III

Posology : Definition, dose-response relationship, potency and effective dose 50 (ED 50), minimal effective concentration, efficacy: time-response graph, onset, duration and termination of action.

Drug Toxicity and Poisoning : Types of therapeutic drug toxicity, Mechanism of Toxicity, Dose response complexities, Therapeutic Index, Lethal Dose 50 (LD 50), Adverse drug effects, Principles of treatment of poisoning, Mechanism of Detoxification and testing.

UNIT-IV

Bio-statistics : Introduction its role and use, Collection, Organization: Graphics and pictorial representation of data, Sampling: Random and non random sampling methods, standard deviation and coefficient of variation, Probability, student t-test, F-Test, chi square test, correlation and regression.

SUGGESTED BOOKS AND REFERENCES

1. J. Stringer, Basic Concepts in Pharmacology, 3rd edn., McGraw-Hill Professional, 2005.
2. B. Katzung, Basic and clinical pharmacology, 11th edn., McGraw-Hill medical, 2009.
3. Goodman & Gilman, Pharmacological basis of Therapeutics, McGraw-Hill, 2005.
4. A. Burger & M.E. Wolff (Ed.), Medicinal Chemistry and Drug Discovery, Vol-1, John Wiley, 1994.
5. S.S. Pandeya & J.R Dimmock, Introduction to drug design, New Age International, 2000.
6. D. Lednicer, Strategies for organic drug Synthesis and Design, John Wiley, 1998.
7. Graham & Patrick, Introduction to medicinal Chemistry, 3rd edn., OUP, 2005.
8. Bernard Rosner, Fundamental of Biostatistics, 8th edn, CENGAGE Learning Custom Publisher, 2016.
9. Skoog & West, Fundamentals of analytical chemistry, CENGAGE, 2013.
10. J. Susan Milton, Statistical methods in biological and health sciences, Tata McGraw-Hill Int. Edition, 1984.
11. J. Susan Milton, Introduction to statistics, Tata McGraw-Hill Int. Edition, 1996.
12. B.K. Mahajan, Methods in Biostatistics, JayPee Brothers, New Delhi, 2002.

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CHE E01: PHARMACEUTICAL CHEMISTRY I

4 Credit (4 hrs/week)

UNIT- I

Chemistry of acids and bases

Dissociation of weak acids and bases, Hydrolysis of salts, Amphiprotic salts, Buffer solutions, Buffer capacity, Biological buffers, Ionization of drugs, pKa values of drug molecules, pH indicators .

Partition coefficient and biopharmacy

Experimental measurement of partition coefficient , Drug absorption, distribution and bioavailability , Passive diffusion, The pH partition hypothesis, Active transport mechanisms, The action of local anaesthetics, Excretion and reabsorption of drugs.

UNIT- II

Drug metabolism

Metabolic pathways, Cytochromes P450, Enzyme induction and inhibition, Drug conjugation reactions (Phase 2) Glucuronic acid conjugation. Sulfate conjugation, Amino acid conjugation, Metabolic pathways for common drugs Amfetamines, Barbiturates, Phenothiazines, Sulfonamides, Cocaine, Phenmetrazine, Ephedrine and caffeine, Factors affecting drug metabolism.

UNIT III

Stability of drugs and medicines

Oxidation, Stability of free radicals, Prevention of oxidative deterioration, Autoxidation of fats and oils, Ageing, Hydrolysis, Examples of drugs susceptible to hydrolysis, Other mechanisms of degradation.

UNIT IV

Kinetics of drug stability

Rate, order and molecularity, Rate equations and first-order reactions, Half-life, Shelf-life, Second-order reactions, Zero-order reactions, Reaction rates and temperature .

BOOKS AND REFERENCES

1. Essentials of Pharmaceutical Chemistry (third edition) by Donald Cairns, Pharmaceutical Press
2. Organic Medicinal and Pharmaceutical Chemistry, John M. Beale, Jr., John H. Block, Wolters Kluwer
3. Ansel's Pharmaceutical Dosage Forms and Drug Delivery Systems, Loyd V Allen, Wolters Kluwer
4. Drug delivery: principles and applications, Binghe Wang, Teruna Siahaan, Richard soltero, John Wiley & Sons

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CHE E02: BIOMOLECULES II

4 Credit (4 hrs/week)

UNIT-I

Fuel Molecule Metabolism

Glycogenesis and glycogenolysis. Aerobic Respiration, glycolysis and regulation of glycolysis, citric acid cycle, regulation of the citric acid cycle, Electron transport chain Oxidative Phosphorylation , Regulation of Oxidative Phosphorylation, oxidative stress, anaerobic pathways, Lactic acid fermentation, pentose phosphate pathway.

UNIT-II

Enzymes

General Remarks, Isolation and Nomenclature of enzymes Enzyme structure and function, Factors that affects enzyme function- enzyme kinetics, Michaelis–Menten kinetics, Cooperativity, Control of enzyme activity- feedback regulation, enzyme inhibition, covalent modification. Enzyme Cofactors Theory of Enzyme Catalysis and Enzymatic Analysis.

UNIT-III

Marine Biomolecules and Application

Introduction and history of marine biomolecules, Discovery and development of marine pharmaceuticals, Isolation and screening of marine biomolecules, Occurence, Structure and function of furanone, kainic acid , tyrian purple, ziconotide and dolastatin,

UNIT-IV

Fungal Biomolecules and Biomolecules of Mushrooms

Fungi as cell factories, Fungal Biofilms: an overview, Fungal biomolecules for food industry. Bioactive biomolecules of mushrooms: food function and medicinal effect of mushroom fungi. Biomolecules and nanotechnology.

BOOKS AND REFERENCES

1. www.mhpracticeplus.com/BBFLS_MCAT/mca88351_V1
2. Biomolecules and Nanotechnology, David S. Goodsell,American Scientist
3. Food Chemistry, H.D. Belitz et.al., Springer
4. Fungal Biomolecules: Sources, Applications and Recent Developments, V.K. Gupta et.al. Wiley-Blackwell
5. http://booksite.elsevier.com/9780120885305/casestudies/02-Ch27-P088830web.pdf
6. Bioactive biomoleoules of mushrooms: Food function and medicinal effect of mushroom fungi, Takashi Mizuno, Food Reviews International Volume 11, 1995

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CHE B11: CHEMISTRY ELECTIVE LAB-3

Inorganic chemistry group

1. **Chromatographic separation** and identification by paper chromatography and determination of Rf values:
   a. Cadmium and Copper.
   b. Zinc and Mangnese.
   c. Arsenic, Antimony and Tin.
   d. Lithium, Sodium and Potassium.
   e. Fe^{3+} , Al^{3+} and Cr^{3+}
   f. Ca^{2+} , Sr^{2+} and Ba^{2+}
   g. Ni^{2+} , Co^{2+}, Mn^{2+} and Zn^{2+}
   h. Cu^{2+} , Fe^{3+}, Ni^{2+} and Ti^{4+}

2. **Cerimetric titration :**
   a. Standardization of ceric sulphate solution using ferrous ammonium sulphate as intermediate solution
   b. Determination of the percentage of $H_2C_2O_2$ in oxalic acid crystals.
   c. Determination of percentage purity of a sample of sodium nitrite.

2. **Quantitative analysis:**
   Separation and determination of two metal ions involving Volumetric and Gravimetric methods:
   b. Copper – Nickel
   c. Copper – Zinc
   d. Iron– Nickel

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CHE C11: CHEMISTRY ELECTIVE LAB-3

Physical Chemistry group

A. Chemical Kinetics

i. Determining the energy of activation and entropy of activation in $KMnO_4$-benzyl alcohol reaction measuring the rate constant at least at three temperatures.
ii. Determining the Formation Constant for the [Ce^{+4}-H_3PO_2] intermediate complex and also the rate constant of its decomposition.
iii. Determine the rate constant in bleaching of malachite green in the basic medium.
iv. Determine the order with respect to Ag (I) in the oxidation of Mn (II) by $S_2O_8^{-2}$ and the rate constant for the unanalyzed reaction.
v. Investigate the autocatalysed reaction between $KMnO_4$ and Oxalic Acid.
vi. Kinetics of enzyme catalyzed reactions.
vii. Flowing clock reaction (Ref: Experiments in physical Chemistry by Snowmaker). Oscillatory reaction

B. Spectrophotometry / Colorimetry

i. Verify Beer's Law for the solution of potassium permanganate ($KMnO_4$) and determine the concentration of the given aqueous solution of unknown concentration of this salt.
ii. Determine the pH of the solution employing methyl red indicator spectrophotometrically.
iii. Determine indicator constant (pKa) of methyl red, spectrophotometrically.
iv. Determine stability constant of $FeSCN^{+2}$ complex ion spectrophotometrically keeping strength constant.

C. Electrochemistry

i. Identification and Estimation of metal ions such as Cu^{+2},Cd^{+2}, Ni^{+2}Voltammetrically.
ii. To plot a cyclic voltammogram of a reversible system and calculate the number of electron in the redox process.
iii. To plot a voltammogram of a organic compound (such as nitroaniline, picric acid, m-dinitrobenzene) and verification of RandelSevcik equation (current vs scan rate and current vs concentration)
iv. Determination of the strength of strong and weak acids in a given mixture using a potentiometer/pH meter.
v. Determination of the formation constant of silver-ammonia complex and stoichiometry of the complex potentiometrically.

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CHE D11: CHEMISTRY ELECTIVE LAB-3

Organic Chemistry group

A. Multi-step Organic synthesis based on Name Reactions

The exercise should illustrate the use of organic reagents and mechanism. Purification of products by chromatographic techniques.

i. Photochemical reaction :
   (Benzophenone → Benzpinacol → Benzpinacolone)
ii. Beckman Rearrangement : Benzanilide from benzene
   (Benzene → Benzophenone → Benzophenone oxime → Benzanilide)
iii. Benzilic acid rearrangement : Benzilic acid from benzoin
   (Benzoin → Benzil → Benzilic acid).
iv. Synthesis of heterocyclic compounds
   a. Skraup synthesis: Preparation of quinoline from aniline
   b. Fisher Indole synthesis: Preparation of 2-phenylindole from phenylhydrazine.
v. Diazocoupling: Phthalic anhydride → Phthalamide → anthranilic acid → methyl red.
vi. More Name reaction based organic synthesis based on curricula may also be carried out.

B. **Qualitative analysis:** Separation of three component organic mixture and identification of its components, Preparation of their derivatives and verification with the help of IR and NMR spectral data provided

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CHE E11: CHEMISTRY ELECTIVE LAB-3

Pharmaceutical Chemistry group

i. Identification reactions of ions such as aluminium, ammonium salts, arsenic, calcium and sodium chloride.
ii. Identification reactions of functional groups such as Alkaloids, Barbiturates (non nitrogen substituted, Lactates, Tartrates.
iii. Assay of Hydrogen Peroxide Solution and Isolation of Bismuth from Pepto-Bismol
iv. The Isolation of Lactose from Milk
v. Assay for Galacturonic Acid
vi. Separation of Fatty Acids and Glycerol and Extraction of Glycerol
vii. Color Reactions of Proteins-Biuret Reaction, Ninhydrin Reaction, Xanthoproteic,Ehrlich Diazo Reaction
viii. Pharmacopoeal qualifications of active pharmaceutical ingredients such as chloral hydrate, hexobarbital, caffeine, acetyl salicylic acid, atropine sulphate and quinine hydrochloride
ix. Preparations of Benzocaine and Acetaminophen
x. Assay of Sulfadiazine Tablets and Assay of Amitriptyline HCl
xi. Thiamine Assay of Vitamin B Complex Tablets
xii. Determination of Vitamin C content of Commercial Tablets

Books suggested

1. Experiments in Pharmaceutical Chemistry, Second Edition, Charles Dickson, CRC Press
2. Pharmaceutical Chemistry I- laboratory Experiments and Commentary, Attila Almasi et.al, EU Social Fund Project

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CHE X01: SOLID STATES AND NANOMATERIALS

4 Credit (4 hrs/week)

UNIT-I

Solid State Chemistry

Introduction to the solid state, defects of solids, classification of imperfections, Electronic defects, atomic defects, Lattice imperfections, thermodynamics of Schottky defect and Frenkel defect. Electrical, optical, magnetic and thermal properties of inorganic materials.

Solid State Reactions: general principles, types; sintering; nucleation; Factors influencing the reactivity of solids; co-precipitation as a precursor to solid state reactions, kinetics of solid state reactions.

UNIT-II

Superconductors

Superconductors, with special emphasis on the synthesis and structure of high temperature superconductors; solid state LASERS (Ruby, YAG and tunable lasers): Inorganic phosphor materials; synthesis and advantages of optical fibers over conducting fibres, diffusion in solids, catalysis and zone refining of metals.

UNIT-III

Diffraction Methods

A. X-ray Diffraction

Bragg condition, Miller indices, Laue Method, Bragg method, Debye Scherrer method of X-ray structural analysis of crystals, index reflections, identification of unit cells from systematic absences in diffraction pattern, Structure of simple lattices and X-ray intensities, structure factor and its relation to intensity and electron density, phase problem; description of the procedure for an X-ray structure analysis, absolute configuration of molecules.

B. Electron Diffraction

Scattering intensity vs. scattering angle, Wierl equation, measurement technique, elucidation of structure of simple gas phase molecules, low energy electron difffraction and structure of surfaces.

UNIT-IV

Nanomaterials

Various preparative approaches and techniques; characteristic differences of nanomaterials over bulk materials; dynamic light scattering, atomic force microscopy and characterization of nanomaterials; imaging techniques: electron microscopy (Scanning Electron Microscopy, Transmittance Electron Microscopy). Applications of nanomaterials.

SUGGESTED BOOKS AND REFERENCES

1. H.V. Keer, Principles of the Solid State; Wiley Eastern Ltd.; New Delhi, 1993.
2. A.R. West, Solid State Chemistry and its Applications; 2nd Edn, John Wiley and Sons, 2014.
3. N. B. Hannay, Treatise on Solid State Chemistry; Plenum, 1976.
4. A. K. Cheetham and P. Day, Eds. Solid State Chemistry Techniques; Clarendon Press, Oxford, 1987.
5. John Wulff, The structure and properties of materials, John Wiley & Sons, Trans edition, 1966.
6. L. V. Azaroff, J. J. Brophy, Electronic processes in materials, Mc Craw Hill, 1967.
7. D. K. Chakrabarty, Solid State Chemistry, New Wiley Eastern, 2009.
8. M.C. Day, J. Selbin, Theoretical Inorganic Chemistry, Reinhold Publishing, NewYork, 1962.
9. A.W. Adamson and A.P. Gast, Physical Chemistry of Surfaces, Wiley-Interscience; 6th Ed 1997.
10. G. Timp, Ed. Nanotechnology; Springer-Verlag: N. Y., 1999
11. B. D. Fahlman, Materials Chemistry, Springer, 2007.

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CHE X02: ORGANIC SYNTHESIS – II

4 Credit (4 hrs/week)

UNIT-I

Heterosynthetic Analysis

An introduction to synthons and synthetic equivalents. Disconnection approach, good disconnections, functional group inter-conversions, importance of the order of events in organic synthesis. One group C-X disconnections. Chemoselectivity. Two group C-X disconnections.

Reversal of polarity (Umpolung), generation of acyl anion equivalent-1,3-dithiane from carbonyl compounds, use of methylthio-methylsulfoxide via cyanide ion and cyanohydrin ethers, nitro compounds and metallated vinyl ethers.

Protecting Groups: Principle of protection of carbonyl, hydroxyl, amino and carboxyl groups.

Enamines: Preparation and synthetic applications

UNIT –II

One Group C-C Disconnections

One group C-C disconnection involving alcohols and carbonyl compounds, regioselectivity. Alkene synthesis, use of acetylenes, aliphatic nitro compounds in organic synthesis.

Two group C-C Disconnections

Diels-Alder reaction. 1,3-Difunctionalised compounds; α,β-unsaturated carbonyl compounds; control in carbonyl condensation; 1,5-difunctionalised compounds, Michael addition and Robinson annulation.

1,2-Difunctionalised compounds. Radical reactions in synthesis. 1,4-Difunctionalised compounds. Reconnections. 1,6-Difunctionalised compounds.

UNIT III

Ring Synthesis

Introduction to ring synthesis of saturated heterocycles. General strategy and stereoselectivity. 3-Membered rings from cyclisations and insertion reactions. Rerarrangements in synthesis. 4-Membered rings from photocycloadditions and use of ketenes.

Five-membered rings from 1,4- and 1,6-dicarbonyl compounds. Pericyclic rearrangements and special methods. 6-Membered rings from carbonyl condensations, Diels-Alder reactions and reduction of aromatic compounds. Synthesis of aromatic Heterocycles.

UNIT IV

Asymmetric Synthesis

Concepts of prochirality, enantioselectivity and diastereoselectivity. Methods for determination of enantiomer purity. Stereogenic skeletal bond forming reactions, synthesis of a racemate and resolution. Asymmetric synthesis, enantiomeric excess, chiral pool, chiral auxiliaries, chiral reagents and chiral catalysts.

Organic Transformations by C-H functionalization

Introduction to C-H Activation and C-H functionalization, Transition metal catalyzed C-C bond and C-X bond formation *via* C-H functionalization. Metal free organic transformations via C-H functionalization.

SUGGESTED BOOKS AND REFERENCES

1. Smith M.B., Organic synthesis, McGraw Hill, 2002.
2. Warren S. & Wyatt P., Organic synthesis: The disconnection approach 2nd edn., John Wiley & Sons, 2008.

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3. Warren S, Wyatt P, Workbook for Organic Synthesis: The Disconnection Approach, 2nd edn., John Wiley & Sons, 2009. ISBN: 978-0-470-71227-6
4. Warren S., Designing organic synthesis: The synthon approach, Wiley, 1978 (Reprinted 2002).
5. Jonathan Clayden, Nick Greeves, Stuart Warren and Peter Wothers, Organic Chemistry, Oxford University Press, 2001.
6. Fuhrhop J and Li G, Organic Synthesis – Concepts, Methods and Starting Materials, Wiley-VCH, 2003.
7. Kalsi P S, Organic synthesis through disconnection approach, Scientific International, 2014
8. Carruther W., Modern Methods of Organic Synthesis, Cambridge University Press, 2004.
9. House H.O., Modern Synthetic Reactions: Organic chemistry monograph series, W.A. Benjamin, 1972.
10. Xiao-Feng Wu, Transition Metal-Catalyzed Heterocycle Synthesis via C-H Activation, Wiley, 2015. ISBN: 978-3-527-33888-7.

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CHE X03: ADVANCED PHYSICAL CHEMISTRY

4 Credit (4 hrs/week)

UNIT-I

Quantum Mechanical aspects of Chemical bonding:

Molecular orbital (MO) theory: LCAO concept, orbital interaction diagram, MO energy levels, orbital symmetry, MO of simple organic molecules like ethelene, allylic compounds, cyclobutadiene, butadiene and benzene. Application of MO Theory to Hydrogen Molecule Ion (H_2^+). Born Oppenheimer's Approximation. Valence Bond (VB) Theory and its application to H_2 molecule. Extended HMO Theory, Advanced techniques in PMO and FMO theory. Introduction to Molecular mechanics, semiempirical, *ab* initio Hartree-Fock, DFT methods.

UNIT-II

Non Equilibrium Thermodynamics and Magnetochemistry:

Thermodynamic criteria of non-equilibirium state, Entropy production and entropy flow, Entropy balanced equations for different irreversible states (e.g. Heat flow, chemical reaction etc), transformations of generalized fluxes and forces, non-equilibirium stationary state, phenomenological equation, Microscopic reversibility and Onsager's reciprocity relations, electro-kinetics phenomenon and electrical conduction.

Magnetochemistry: Introduction, Magnetic Susceptibility and its determination, theories of paramagmetism and ferromagnetism, effect of temperature on magnetic behavior of substances.

UNIT-III

Macromolecules – I

Basic Concepts: Monomers, repeat units, degree of polymerization, linear, branched and network polymers. Classification: condensation, addition, radical, ATRP, RAFT, polymerization. Polymerization conditions and polymer reactions. Polymerization in homogeneous systems. Measurement of molecular weights by viscosity, light scattering, osmotic pressure and ultracentrifugation methods.

UNIT-IV

Macromolecules – II

Chemical Analysis of polymers by spectroscopic methods. X-ray diffraction study of polymers. Morphology and order in crystalline polymers-configurations of polymer chains. Crystal structures of polymers. The glass transition temperature, effects of molecular weight, chemical structure, branching and cross linking. Polyethylene, polyvinylchloride, polyamides, polyesters, phenolic resins and epoxy resins polymers. Functional polymers – fire retarding polymers and electrically conducting polymers. Biomedical applications of polymers – contact lens, dental polymers, artificial heart, kidney, skin and blood cells.

SUGGESTED BOOKS AND REFERENCES

1. R. Bahadur, Principles of polymer Science, Narosa Publication, 2002.
2. V. R. Gowariker, N.V. Vishwanathan and Jayadev Sreedhar, Introduction to Polymer Science, New Age International, 1986.
3. R. P. Rastogi and R. R. Mishra, Introduction to Chemical Thermodynamics, Vikash Publication House, 2000.
4. Gurdeep Raj, Advanced Physical Chemistry, KrishnaPrakashan, 2003.
5. A K Chandra, Quantum Chemistry, Tata McGraw Hill, 2011.

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CHE B04: ADVANCED BIOINORGANIC CHEMISTRY

4 Credit (4 hrs/week)

UNIT-I

Metalloenzymes:

Structure and functions of the following enzymes: carbonicanhydrase, carboxypeptidase, alchoholdehydrogenase, catalalse and peroxidase, cytochrome P-450, super oxide dismutase and xanthin oxidase, coenzyme, vitamin B12.

UNIT-II

Metal Storage and Transport:

Iron storage and transport for mammalia systems, transferrin, ferritin, Transport of iron in microorganism, siderophores, types of siderophores - The catecholate siderophores (eg: enterobactin) and hydroxamate siderophores (eg: ferrichrome), Mechanism involved in binding of Iron(III) siderophores complexes to receptors and the release of Iron into the Cytoplasm. Other storage & transport systems: ceruloplasmin and serum albumin for copper, metalothioneins and phytochepatins.

UNIT-III

Metal/Nucleic Acid Interactions

Metal complexes of polynucleotide, nucleosides and nucleic acids (DNA and RNA), Fundamental interactions with nucleic acids, Fundamental reactions of transition metal complexes with nucleic acids, Applications of different Metal Complexes that bind nucleic acids.

UNIT-IV

Metal Deficiency and Diseases:

Iron, zinc and copper deficiency, metal ion toxicity, copper over load and Wilson's disease, iron toxicity, toxicity of arsenic, cadmium, mercury and lead, metal complexes in medicine – chelation therapy – BAL, penicillamine, polyamino carboxyclic acids and desferrioxamine – gold compounds and rheumatoid arthritis – platinum complexes as anticancer, drugs – metal complexes in radio diagnosis and magnetic resonance imaging.

SUGGESTED BOOKS AND REFRENCES

1. S. J Lippard & J. M. Berg, Principles of Bioinorganic Chemistry, University Science Books.
2. S. J. Lippard, Progress in Inorganic Chemistry, Vols. 18 and 38, Wiley-Interscience.
3. I Bertini, H.B. Gray. S.J. Lippard and J. S. Valentine, Bioinorganic Chemistry, University Science Books.
4. G.L. Eichhorn (Ed.), Inorganic Biochemistry Vols I and II Elsevier.

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CHE B05 – MATERIALS AND INDUSTRIAL CHEMISTRY

4 Credit (4 hrs/week)

UNIT – I

Industrial Chemistry : Ferrous and non-ferrous metal industries - quality control methods, general principles applied in studying an industry; manufacture of iron, steel and alloy steels; introduction to metallurgy; metallurgy of iron, aluminium, copper, gold and silver; contaminants; waste management; recycling and pollution control; deformation in metals; modes of failure analysis; an overview of corrosion & its protection; industrial shaping of metals.

UNIT –II

Cement : Classification of cement, manufacture of portland cement, setting and hardening of cement, chemical constitution of portland cement and their characteristics, special cements and their uses, Cement Industries in India.

Ceramics : Classification of ceramics, basic raw materials, manufacture and applications, components imparting colours, comparison of pottery porcelain and china ware. Glass-raw materials, manufacture and applications: special glass, optical, borosilicate, flint and coloured glasses.

UNIT III

Chemistry of Selective Materials

Solid electrolytes: AgI, $RhAg_4I_5$, β-Alumina – NASICON – Principles and Applications of solid electrolytes.

Ferroelectric, piezoelectric and pyroelectric materials – principle, properties and applications. LED – principle – types – advantages and disadvantages of LED displays

Liquid crystal display LCD – properties – twisted nematic field display – Advantages and disadvantages of LCD – comparison of LCD & LED.

Shape Memory alloys (SMA) – classification – working principles. Non-linear optical materials – second harmonic generators

UNIT IV

Chemistry of Inorganic Materials : Refractories – characterization properties and applications. Microscopic composites; dispersion strengthened and particle – reinforced, fibre- reinforced composites, macroscopic composites. Nanocrystalline phase, preparation procedures, special properties and applications.

SUGGESTED BOOKS AND REFERENCES

1. Harold H. Trimm, William Hunter III, Harold Henry Trimm, Industrial Chemistry: New Applications, Processes and Systems, Apple Academic Press, Inc., 2011
2. Fontana and Greene, Corrosion Engineering; McGraw Hill Publication, 1986.
3. E. Stocchi, Industrial Chemistry, Vol-I, Ellis Horwood Ltd. UK, 1990.
4. R.M. Felder, R.W. Rousseau, Elementary Principles of Chemical Processes, Wiley, New Delhi.
5. George Austin, Shreve's Chemical Process Industries, McGraw-Hill Book Company, 1985.
6. R.M.E. Diamant, Applied Chemistry for Engineer, Pitman Publishing, 3rd Edition, 1972.
7. Alan Heaton, An Introduction to Industrial Chemistry, Springer, 1996.
8. R.N. Sherve, "Chemical process industries", McGraw-Hill, Kogakulsha Ltd., Tokyo, 1984.
9. Riegels Hand Book of Industrial Chemistry, 9th edition, J.A. Kent (Ed), New York, 1992
10. J.A. Kent, Riegel's Handbook of Industrial Chemistry, CBS Publishers, New Delhi.
11. Mark Anthony Benvenuto, Industrial Chemistry, de Gruyter GmbH, 2013.
12. S.S. Dara, S.S. Umare, A Textbook of Engineering Chemistry, S. Chand & Company Ltd. New Delhi, 2013.
13. Study Material in vocational subject, Industrial Chemistry (UGC Sponsored).

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CHE B06: PHOTOINORGANIC CHEMISTRY

4 Credit (4 hrs/week)

UNIT-I

Basic Concept

Introduction, Photochemical laws and photochemical kinetics. Physical properties of the electronically excited molecules; Photophysical processes in electronically excited molecules

UNIT-II

Photophysical Properties

Photophysical kinetics of Biomolecular processes; kinetics of collisonal quenching: Stern-Volmer Equation, Concentration dependence of quenching and excimer formation, charge transfer mechanism and energy transfer mechanism.

UNIT-III

Photochemical Reactions

Photoelectochemistry of excited state redox reactions. Photosensitization. Types of Photochemical reactions; substitution, decomposition and fragmentation, rearrangement, and redox reactions, photochemistry of metallocenes.

UNIT-IV

Redox Reactions by Excited Metal Complexes

Redox reactions of metal complexes in excited states, excited electron transfer, examples using $[Ru(bpy)_3]^{2+}$ complex and $[Fe(bpy)_3]^{3+}$ complex. Role of spin-orbit coupling, life-times of excited states in these complexes.

Metal Complex Sensitizers: Electron relay, semiconductor supported metal oxide systems, water-photolysis, nitrogen fixation and carbon dioxide reduction.

SUGGESTED BOOKS AND REFERENCES:

1. K.K.Rohatagi-Mukherjee, Fundamentals of Photochemistry, WileyEastern, 1986
2. A.W. Adamson and P.D. Fleischauer, Concepts of Inorganic Photochemistry, Wiley, NY, 1975.
3. G.L.Geoffrey and M.S. Wrighton, Organometallic Photochemistry, Academic Press, 1979.
4. Inorganic Photochemistry, J. Chem. Educ. vol. 60 No. 10, 1983.
5. Coordination Chem. Revs., vol. 39, 121, 1231, 1981; 14, 321,1975; 97, 313, 1990.
6. V. Balzari and V. Carassiti, Photochemistry of Coordination Compounds, Academic Press, 1970.
7. G.J. Ferraudi, Elements in Inorganic Photochemistry, Wiley, NY, 1988.
8. S.J. Lippard, ed., Progress in Inorganic Chemistry, Vol. 30. Wiley, 2009.

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CHE C04: ADVANCED CHEMICAL KINETICS - II

4 Credit (4 hrs/week)

UNIT - I

Induced Phenomena:

Induced reactions, kinetics of Induced reactions and their characteristics. Induction factor and its mechanistic significance. Mechanism of –

(i) Fe (II) induced oxidation of iodide by Cr (VI).

(ii) As (III) induced oxidation of Mn (II) by chromate in acid solutions.

(iii) Kinetics and mechanism of induced reactions in metal complexes (octahedral complexes of cobalt (III) only).

UNIT II

Metal-ion Catalysis: Kinetics and Mechanism of following Reactions

(i) When reaction rate is independent of one of the reactants in presence of metal ion catalyst.

(ii) When reaction rate is retarded by one of the products in presence of metal ion catalyst.

(iii) When metal ion catalysis indicates an intermediate species.

(iv) Cyclodextrines are acting as catalyst mode of catalysis. Analysis of one full case study of B-cyclodextrine, catalysed reaction, Hydroformylation reaction

UNIT – III

Oscillatory Reactions: Autocatalysis and oscillatory reactions, thermodynamics approach of oscillatory reactions, Kinetics and mechanism of Belousov-Zhabotinski (B-Z) reaction

Substitution Reaction: Classification of ligand substitution reaction, Kinetics and mechanism of Anation reaction, base catalyzed reaction and acid catalyzed reaction. Kinetics and mechanism of 1:1, 1:2 and 1:3 metal-substrate complexes as intermediates.

UNIT – IV

Electron Transfer Reactions in Metal Complexes:

Inner-sphere and outer-sphere reactions, Mechanism of inner sphere and outer sphere mode of electron transfer reactions. Henry Taube's classical reaction, its kinetics and mechanism, experimental analysis by chromatographic and spectroscopic techniques. Pattern of reaction via adjacent and remote attacks, linkage isomerism.

Marcus -Cross-relation in outer-sphere reactions, (no mathematical derivation) in following reactions-

$Fe(CN)_6^{4-} + Fe(CN)_6^{3-} = Fe(CN)_6^{3-} + Fe(CN)_6^{4-}$

$Ce(IV) + Fe(CN)_6^{4-} = Ce(III) + Fe(CN)_6^{3-}$

Bridged outer-sphere electron transfer mechanism.

SUGGESTED BOOKS AND REFEREN

1. Henry Taube, S Lippard (Ed.), Progress in Inorganic Chemistry, Vol 30, John Wiley & Sons, NY, 1982.
2. R. Lumry and R.W. Raymond, Electron transfer reaction, Inter-Science Publication, 1997.
3. M. L. Bender, Mechanism of homogeneous Catalysis from protein to protein, Wiley, 1971.
4. A. G. Sykes, Kinetics of Inorganic reactions, Pergamon Press, 1966.
5. S. W. Benson, Jacob Kleinberg, R. Kent Murmana, R. T. M. Fraser, John Bauman, Mechanism of Inorganic Reactions, Academic Press, 1965.
6. H Taube, Electron transfer reactions in solution, Academic Press, London, 1970.

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CHE C05: ADVANCED ELECTROCHEMISTRY – II

4 Credit (4 hrs/week)

UNIT-I

Electrochemical analysis

Introduction to electrochemical methods, electrochemical cells, diffusion controlled limiting current, voltage scanning polarography, shape and interpretation of polarographic wave, current –voltage relationship during electrolysis. General Principle and applications of Linear Sweep Voltammetry (LSV), Cyclic Voltammetry (CV), Square Wave Voltammetry (SWV), and Differential pulse Voltammetry (DPV). Stripping voltammetry: Principle, classification and Applications.

UNIT-II

Electro-catalysis

Chemical catalysis and Electro-catalysis, cathodic and anodic electro catalysis; electrocatalysis of mixed oxides of titanium dopped with rare earth oxides (Ebonex); Electrolysis in simple redox reactions. Electrocatalysis of bimettalic nanostructured materials.

Photoelectrochemistry: introduction, Principle of photoelectrochemistry, types of photoassisted redox reaction, organic photo-electrochemical reactions. Examples of some abnormal electro-organic synthesis.

UNIT-III

Electro-organic Synthesis

Types of electro organic reactions, constant current and constant potential electrolysis, cell design, effect of variable, nature of medium, nature of electrode materials, over-voltage, effect of redox couple, application to sewage waste water treatment, electro-chemical incineration of human waste in combined space. Electro-organic synthesis of novel drugs.

UNIT-IV

Electrochemical Sensors

Electrochemical Sensors for Nitric Oxide (NO), pesticides, glucose and superoxide species, Electrochemical sensors based on carbon nano tubes and their applications.

Energy Options: Hydrogen Economy, Introduction, Hydrogen Production, Hydrogen Transmission, storage and distribution, Hydrogen fueled equipments, local electricity production from hydrogen, Hazards and safety aspects of hydrogen.

SUGGESTED BOOKS AND REFERENCES

1. Joseph Wang, Analytical Electrochemistry, Wiley-VCH Publication, 1998.
2. Zhang, Ju and Joseph Wang, Electrochemical Sensors, Biosensors and their Bio-medical Applications, Academic Press, Elsevier, 2008.
3. A. J. Fry and W. E. Britton, Topics in Organic Electrochemistry, Plenum publishing press, New York, 1981.
4. Baizer Organic Electrochemistry, Marcel Dekker Press, 1980.
5. D. K Sharma, Electrochemical Incineration of human waste in confined Spaces, Lambert Publication, Germany, 2012.
6. Bockris and Reddy, Modern Electrochemistry, Volume 2A & 2B, Springer.
7. Brett and Brett, Electrochemistry: Principle and Applications, Oxford Press, 2005.

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CHE C06: ADVANCED NANOSCIENCE AND NANOTECHNOLOGY

4 Credit (4 hrs/week)

UNIT-I

Nanoscience and Nanotechnology

Basic concepts of Nano science and technology, Quantum wire, Quantum well, Quantum dot, Properties and technological advantages of Nano materials, Material processing by Sol, Gel method, Chemical Vapour deposition and Physical Vapour deposition methods

UNIT II

Synthesis

Top-down (Nanolithography, CVD), Bottom-up (Sol-get processing, chemical synthesis). Wet Deposition techniques, Self-assembly (Supramolecular approach), Characterization TEM, SEM and SPM technique, Fluorescence Microscopy and Imaging.

Use of bacteria, fungi, Actinomycetes for nanoparticle synthesis, Magnetotactic bacteria for natural synthesis of magnetic nanoparticles; Viruses as components for the formation of nanostructured materials; Synthesis process and application, Role of plants in nanoparticle synthesis.

UNIT III

Nanoscale Carbon

Introduction –Carbon molecules-nature of the carbon bond-new carbon structures-discovery of C60-structure of C60 and its crystal- From a Graphene Sheet to a Nanotube, Single wall and Multi walled Nanotubes, Zigzag and Armchair Nanotubes, Euler's Theorem in Cylindrical and Defective Nanotubes.

History Molecular and Super molecular Structure-Intrinsic properties of individual carbon nano tubes-Synthesis -Arcing in the present and absent of catalyze-laser method-Chemical Vapour Deposition - ball milling.

UNIT IV

Applications

Solar energy conversion and catalysis, Polymers with a special architecture, Liquid crystalline systems, Applications in displays and other devices, Advanced organic materials for data storage, Photonics, Plasmonics, Chemical, electrochemical and biosensors, Nanomedicine, Nanofoods, Nano-cosmetics and Nanobiotechnology.

SUGGESTED BOOKS AND REFERENCES

1. B. Vishwanathan, Nano materials, Narosa Publication, 2009.
2. Foster Lynn E, Nanotechnology, Pearson education, 2005.
3. T. Varghese and K M Balakrishna, Nanotechnology, Thomas Atlantic Publication, 2005.
4. J.J. Ramsden, Nanotechnology: An Introduction, Elesevier Publication, 2004.
5. B.K. Parathasarathy, An Introduction to Nanotechnology, Isha publication, 2007.
6. K.K. Chattopadhyay, Introduction to Nanoscience and Nanotechnology, PHI Publication, 2009.
7. Frank Owens, Introduction to Nanotechnology, Wiley, 2007.

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CHE D06: NATURAL PRODUCTS – II

4 Credit (4 hrs/week)

UNIT-I

Extraction Techniques for Natural Products

Supercritical Fluid Extraction – Introduction, Principle of Solvent-Free Extraction Process, Applications to the extraction of natural products.

Microwave Assisted Extraction – Introduction, Principle of the method and heating mechanism Instrumentation, Applications to the extraction of natural products.

Ultrasound Assisted Extraction – Introduction, Principle of the method, Instrumentation, Applications to the extraction of natural products.

Pressurised Solvent Extraction- Introduction, instrumentation, Applications to the extraction of natural products

UNIT –II

Isolation and Separation of Natural Products

Isolation of Natural Products by Low-Pressure Column Chromatography – Introduction, Separation Processes (Adsorption & Size Exclusion), Types of Stationary Phases: Adsorption Stationary Phases and Size-Exclusion Stationary Phases. Column Operation - Selection of Stationary Phase, Column Packing and Equilibration, Sample Application, Column Development and detection.

Planar Chromatography - Introduction, Basic Principles of TLC, Mechanisms of Separation, Applications of TLC, System Selection and Choice of Development. Detection of Natural Products in TLC: Ultraviolet detection and Spray Detection. Preparative Thin-Layer Chromatography (PTLC) - Introduction, Scale Up from Analytical to PTLC, Commercially Available PTLC Plates, Sample Application, Development and Detection, Desorption and Recovery of Natural Products. Assessment of purity by TLC. Techniques for Detection of Phytochemical Groups in Extracts. .

UNIT -III

Biosynthesis of Natural Products

Introduction, Applications of Condensation reaction, Alkylation Reactions and Wagner-Meerwein Rearrangements to synthesis of natural products. Mevalonate biosynthetic pathway. Biosynthesis of fatty acids, aromatic rings and Pyridoxal Phosphate.

UNIT –IV

Structure elucidation of Some Naturally occurring compounds

Structure elucidation of ferulic acid, beta-sitosterol, stigmasterol, curcumine, plumericin, Abietic acid, taxol, lanosterol, lupeol, strychnine, camptothecin, Usnic acid and quercetin by IR, UV, NMR and mass spectral data.

SUGGESTED BOOKS AND REFERENCES

1. J. Mann, Secondary Metabolism, 2nd Edition, Oxford University Press, 1987.
2. J. Mann, Chemical aspects of Biosynthesis, Oxford University Press, 1995.
3. P. Yates, W.A. Benjamin, Structure Determination, Inc., New York, 1967.
4. E. Manitto, Biosynthesis of Natural Products. John Wiley & Sons, 1981.
5. From Biosynthesis to Total Synthesis: Strategies and Tactics for Natural Products, Alexandros L. Zografos, Wiley, ISBN: 978-1-118-75173-2
6. Natural Products Isolation, Edited by Satyajit D. Sarker, Humana Press Inc. New Jersey, 2006 Second Edition.
7. Natural Products Chemistry: Sources, Separations and Structures, R Cooper, G Nicola, CRC press, 2015.
8. Recent Extraction Techniques for Natural Products: Microwave-assisted Extraction and Pressurised Solvent Extraction, B. Kaufmann and P. Christen, *Phytochem. Anal.* 13, 105–113 (2002).
9. https://www2.chemistry.msu.edu/faculty/reusch/virttxtjml/lipids.htm#synth

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CHE D07: MEDICINAL CHEMISTRY – II

4 Credit (4 hrs/week)

UNIT-I

Antineoplastic agents : Introduction to cancer chemotherapy, Classification of antineoplastic agents, role of alkylating agents and antimetabolites in treatment of cancer. Carcinolytic antibiotics and mitotic inhibitors. Synthesis of Cyclophosphamide, Melphalan, Fluorouracil. Recent development in cancer chemotherapy.

Local Antiinfective drugs : Introduction. Synthesis and general mode of action of Furazolidone, Ciprofloxacin, Dapsone, Isoniazid, Fluconazole. Antimalarials: Synthesis and general mode of action of Chloroquin.

UNIT-II

Cardiovascular Drugs : Introduction, Classification and general mode of action, Cardiovascular disease, drug inhibitors of peripheral sympathetic function, Synthesis of Sorbitrate, Diltiazem, Verapamil, Methyldopa, Atinolol.

Diuretics : Introduction, Classification and general mode of action, Synthesis of Acetazolamide, Chlorothiazide, Frusemide, Spironolactone, Triamterene.

Hypoglycaemic Agents : Introduction, General mode of action, Insulin and insulin preparations, Oral hypoglycemic agents: Classification, Synthesis of Tolbutamide.

UNIT-III

Psychoactive drugs : Introduction, Neurotransmitters, CNS depressants, general anaesthetics, mode of action of hypnotics, sedatives, antianxiety drugs.

Anticonvulsant Drugs : Introduction, Classification and general mode of action, synthesis of Phenytoin sodium, Troxidone, Ethosuximide, Primidone.

Antiviral Drugs : Introduction, Classification and general mode of action, synthesis of Amantadine Hydrochloride, Idoxuridine, Methisazone.

UNIT-IV

Antibiotics : Antibiotics inhibiting protein synthesis, β-lactam rings. Synthesis of Penicillin-G, Ampicillin, Amoxycillin, Chloramphenicol, Cephalosporin, Tetracyclin and Streptomycin.

Antihistamines : Introduction, Classification and general mode of action, Synthesis of Pheniramine, Promethazine, Ranitidine, Sodium Cromoglycate.

Analgesics and Antipyretics : Classification, Nonnarcotic analgesic. Synthesis of Mefenamic acid, Diclofenac.

SUGGESTED BOOKS AND REFERENCES

1. J. Stringer, Basic Concepts in Pharmacology (3rd edn.), McGraw-Hill Professional, 2005.
2. B. Katzung, Basic and clinical pharmacology (11th edn.), McGraw-Hill medical, 2009.
3. A. Burger, M.E. Wolff, Medicinal Chemistry and Drug Discovery, Vol-1, John Wiley, 1994.
4. Goodman & Gilman, Pharmacological basis of Therapeutics, McGraw-Hill, 2005.
5. S.S. Pandeya & J.R Dimmock, Introduction to drug design, New Age International, 2000.
6. A. Kar, Medicinal Chemistry, New Age International, 2007.
7. H. Singh & V. K. Kapoor, Medicinal and Pharmaceutical Chemistry, Vallabh Prakashan, New Delhi, 2001.
8. D. Lednicer, Strategies for organic drug Synthesis and Design, John Wiley, 1998.
9. A. Gringauz, Introduction to Medicinal Chemistry: How drugs act and Why? John Wiley and Sons, 1997.
10. Graham and Patrick, Introduction to medicinal Chemistry (3rd edn.), OUP, 2005.

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CHE E03: PHARMACEUTICAL CHEMISTRY II

4 Credit (4 hrs/week)

Unit I

Dosage Form Design

Need for dosage form, General considerations for dosage form design, Definition and types of pharmaceuticals ingredients and excipients, Flavouring, sweetening and colouring pharmaceuticals,Preservatives -sterilization and preservation, preservative selection, general consideration, and mode of action

Unit II

Solid Modified –Release Drug Delivery System

Rationale for extended release pharmaceuticals, Drug candidates for extended-release products, Extended-release technology for oral dosage forms, Delayed- release oral dosage forms.

Transdermal drug delivery systems

Transdermal drug delivery systems- introduction, factors affecting percutaneous absorption, percutaneous absorption enhancers, Advantages and disadvantages of TDDSs

Unit III

Novel Dosage Forms

Novel drug delivery systems- introduction and composition, Iontophoresis (IP) and phonophoresis, Mucoadhesive system, Medicated gums, Intravaginal drug delivery system, Intrauterine progesterone drug delivery system , Bioadhesive vaginal gel, Dinoprostone Vaginal Insert, Estring Long-acting parenteral systems, Liposomes as drug delivery vehicles

Unit IV

Products of Biotechnology

Introduction, Techniques for the production of biotechnologic products, Products of biotechnology such as Anticoagulant Drug: Lepirudin (Refludan) Antisense Drugs: Fomivirsen Sodium (Vitravene), Erythropoietins, Epoetin Alfa, Growth Factor: Becaplermin, Human Growth Hormone, Systemic Growth Hormone, Interferons and Interleukins

BOOKS AND REFERENCES

1. Organic Medicinal and Pharmaceutical Chemistry, John M. Beale, Jr., John H. Block, Wolters Kluwer
2. Ansel's Pharmaceutical Dosage Forms and Drug Delivery Systems, Loyd V Allen, Wolters Kluwer
3. Drug delivery : principles and applications , Binghe Wang, Teruna Siahaan, Richard soltero, John Wiley & Sons,

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CHE E04: ADVANCED PHARMACEUTICAL CHEMISTRY

4 Credit (4 hrs/week)

UNIT-I

Biotechnological Applications of Enzymes

Large-scale production and purification of enzymes, techniques and methods of immobilization of enzymes, effect of immobilization on enzyme activity, application of immobilized enzymes, use of enzymes in food and drink industry-brewing and cheese-making, syrups from crown starch, enzymes as targets for drug design. Clinical uses of enzymes, enzyme therapy, enzymes and recombinant DNA technology.

UNIT II

Prodrugs Approaches to Drug Delivery

Introduction, Basic concepts: definition and applications, Prodrug design considerations, Prodrugs of various functional groups- Ester prodrugs of compounds containing -COOH or -OH, Prodrugs of compounds containing amides, imides, and other acidic NH (Mannich bases and N-a-Acyloxyalkyl derivatives, Prodrugs of amines, Prodrugs for compounds containing carbonyl groups

UNIT III

Radiopharmaceutical:

Introduction, Background information, Therapeutic use of radiopharmaceuticals, Representative radiopharmaceutical drugs and primary uses, Mode of actions of some important radiopharmaceuticals such as Technetium-99 m, Strontium-89 Chloride, Yttrium-90 and Thallous-201 Chloride.

UNIT IV

Non radioactive Pharmaceuticals in Nuclear Medicine

Introduction, Mode of action and use of Acetazolamide, Cimetidine, Dipyridamole Adenosine, Furosemide and Vitamin B12, Practice of nuclear pharmacy, Procurement and storage.

SUGGESTED BOOKS AND REFERENCES

1. Bioorganic Chemistry: A chemical Approach to Enzyme Action, Hermann Dugas and C. Penny, Springer Verlag.
2. Understanding Enzymes, Trevor Palmer, Prentice Hall.
3. Enzyme Chemistry: Impact and Applications, Ed. Collin J Suckling, Chemistry.
4. Drug Delivery: Principles and Applications, BingheWanget.al., Wiley Interscience
5. Pharmaceutical Dosage Forms and Drug Delivery Systems, Loyd V. Allen junior et al., Wolters Kluwel

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CHE A21: PROJECT WORK

Project Work: 12 Credits (180 hrs)
EoSE: Max. Marks: 100

Project report duly signed by the project guide will be submitted at the end of Project work.
The EoSE assessment of the Project Work shall be as per University guidelines.

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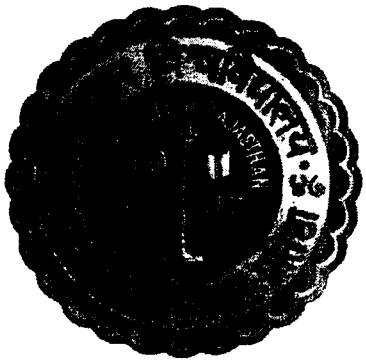

University of Rajasthan
Jaipur

SYLLABUS

M.Sc. Geography

(Semester Scheme)

I & II SEMESTER -2020-21

III & IV SEMESTER -2021-22

Raj | Jai

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M.A. / M.SC. GEOGRAPHY

First Semester

S.No.	Subject Code	Course Title	Course Category	Credit	Contact Hours Per Week			EOSE Duration (Hrs.)	
					L	T	P	THY	P
1.	Geo 101	Evolution of Geographical Thoughts (upto 1800 AD)	CCC	4	3	1	0	3	
2.	Geo 102	Structural and Dynamic basis of Geomorphology	CCC	4	3	1	0	3	
3.	Geo 103	Principles and Theory of Economic Geography	CCC	4	3	1	0	3	
4.	Geo 111	Practical	CCC	6	0	0	9	4	
5.		**Elective – I**	ECC	4	3	1	0	3	
	GEO A01	Man and Natural Environment							
	GEO A02	Cultural Geography							
6.		**Elective – II**	ECC	4	3	1	0	3	
	GEO B01	Population Geography							
	GEO B02	Quantitative Techniques in Geography							
7.		**Elective – III**	ECC	4	3	1	0	3	
	GEO C01	Geography of Rural Development							
	GEO C02	Geography of Soils							
8.		**Elective – Practical**	ECC						
	GEO D01	Practical		6	0	0	9	4	
	GEO D02	Practical		6	0	0	9	4	
		Total Credit		**36**					

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I SEMESTER

Paper code: Geo 101: Evolution of Geographical Thoughts (upto 1800 AD)

Section-A

Beginnings and geosophical nature of geography: ancient Indian geographical thought (the puranic geography), Ancient classical period: contribution of Greeks scholars (Herodotus and Eratosthenes), Greeko-Roman scholar (Posidonius), Romans scholars (Strabo and Ptolemy), and Chinese scholars.

Section-B

Implications of dark age in Europe, development and nature of Geography during medieval period: Contributions of Al-Biruni, Al Muquaddassi, Al-Masudi and Al Idris, Ibn Battuta and Ibn Khaldun.

Section-C

Impact of renaissance on geography: main inventions, discoveries and explorations, cosmographic tradition and position of geography among sciences: Sebastian Munster, Philip Cluverious, Nathanael Carpenter, Varenius, Anton Friedrich Busching, Immanuel Kant and Conrad Malte Brun.

Readings Recommended:

Adhikari, S. 2009: Fundamentals of Geographical Thought. Chaitanya Publishing House, Allahabad.

बंसल, सुरेश चन्द 2008: भौगोलिक चिन्तन के मूल तत्व। मीनाक्षी प्रकाशन, मेरठ।

Dickinson, R.E. 1967. The Markers of Modern geography. Routledge & Kegan Paul Limited. London.

Dear, M.J. and Flusty, S. (ed.) 2002: The spaces of Post modernity: Readings in Human Geography, Blackwell Publishers Ltd, Oxford.

Dikshit, R.D. 2004. Geographical Thought. A Critical History of Ideas. Prentice-Hall of India, New Delhi (in English and Hindi).

जैन, एस.एम. 2005: भौगोलिक चिन्तन एवं विधि तंत्र। साहित्य भवन पब्लिकेशन्स, आगरा।

Hartshorne, R. 1987: Perspective on the Nature of Geography Scientific Publishers, Jodhpur (Copyright 1959 by the Association of American).

Holt-Jensen, A. 1988. Geography: History and Concepts- A Student's Guide. Sage, Los Angees (Fourth Edition)

James, P.E.: All Possible Worlds 1972: A History of Geographical Ideas: Odessey Press, 622 pages.

Johnston, R, Gregory D, Pratt G, Watts M. and Whatmore S. (2003): The Dictionary of Human Geography. Blackwell Publishers, Oxford. 5th Edition.

कौशिक, एस.डी. 2005-06, भौगोलिक विचारधाराऐं एवं विधि तंत्र। रस्तोगी पब्लिकेशन्स, मेरठ, आठवां संस्करण (पुनमुद्रित)।

मौर्य, एस.डी. 2007, भौगोलिक चिन्तन का इतिहास, प्रयाग पुस्तक भवन, इलाहाबाद।

Majid. H. 2004. Evolution of Geographical Thought. Rawat Publications, Jaipur (Reprinted 2007- Revised & Enlarged).

सक्सेना, एल.के. व तिवारी, ए.के. 2003, भौगोलिक चिनतन। राजस्थान हिन्दी ग्रन्थ अकादमी, जयपुर।

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Paper code: Geo 102: Structural and Dynamic Basis of Geomorphology

Section-A

Interior structure of the earth, thermal state of the earth's interior, Isostasy: views of Airy, Pratt, Hayford and Bowie, Joly and Holmes, Origin of the continents and oceans, earth movements: eperiogenic and orogenic- Mountain building theories of Jeffreys, Kober, Joly, Daly, Holmes and Plate Tectonics.

Section-B

Definition, nature and scope of geomorphology, major concepts in geomorphology, Denudation: weathering, mass movements, erosion and sediment regimes, various models of landscape evolution: Davis, Penck, King, Hacks, Morisawa, Schumn.

Section-C

Topographies: fluvial, glacial-periglacial, Aeolian, karst and coastal, element of slope and various models of slope development: Wood, Davis, Penck, King, Strahler.

Readings Recommended:

Chorley, R.J. 1972: Spatial Analysis in Geomorphology. Methuen, London.
Cooke, R.U. and Doornkamp, J.C. (1974): Geomorphology in Environmental Management-A introduction. Clarendon Press, Oxford.
Dury, G.H.; 1959: The Face of the Earth. Penguin Harmondsworth.
Fairbridge, R.W. 1986: Encyclopedia of Geomorphology. Reinhodts, New York.
Garner, H.F. 1974: The Origin of Landscape-A Synthesis of Geomorphology. Oxford University Press, London.
Goudie, A. 1993: The Nature of the Environment. Oxford & Blackwell, London.
Mitchell, C.W. 1973: Terrain Evaluation. Longman, London.
Ollier, C.D. 1979: Weathering. Longman, London.
Pitty, A.F. 1971: Introduction to Geomorphology. Methuen, London.
प्रदास, गायत्री 2004: भू-आकृति विज्ञान। शारदा पुस्तक भवन, इलाहाबाद।
Sparks, B.W. 1960: Geomorphology. Longman, London.
Sharma, H.S. (ed) 1980: Perspectives in Geomorphology. Concept Publishing Company, New Delhi (VOL I to IV).
Skinner, B.J. & Porter, S.C. 1995: The Dynamic Earth. John Wiley, New York.
Stoddart, D.R. (ed) 1996: Process and Form in Geomorphology. Routledge. New York.
Singh, S. 1998: Geomorphology. Prayag Publication, Allahabad.
Spark, B.W. 2004: Geomorphology, Longmans, London.
Thornbury, W.D. 1960: Principles of Geomorphology. John Wiley, New York.
Young, A. 1972: Slopes. Longmans, London.

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Paper code: Geo 103: Principles and Theory of Economic Geography

Section-A

Changing nature of economic geography, approaches to economic geography, agricultural typology-with special reference to: subsistence plantation agriculture, mediterranean agriculture, mixed farming, commercial grain farming, livestock rearing.

Section-B

Energy resources: detailed study of conventional and non-conventional energy resources, spatial patterns and supply problems, industries: iron & steel, alluminium industry, paper and pulp, cotton textile, chemical fertilizer and auto mobile.

Section-C

Decision making process: location decision-behavioural view, international trade: major regional trade and economic integration block, major trends and patters, economic region: concept and methods of delineation, need of economic regionalization for area development and planning-economic regions of India.

Readings Recommended:

Alexander, J.W. 2001: Economic Geography. Prentice Hall of India, New Delhi.

Bengston, N.A. and Royen, M.V.: Fundamentals of Economic Geography (Prentice Hall New York).

Boesh, H.: A Geography of World Economy.

Chapman, K and Walker, D. 1991: Industrial Location: Principles and Policies... Blackwell Oxford.

Grigg, D. 1995: An Introduction to Agricultural Geography. Second edition, Routeledge, London.

James, O. W. and Peter, O. M. 1986: Economic Geography. John Wiley and Sons, New York.

Jarret, H. R. 1977: A Geography of Manufacturing. Trans-Atlantic Publishers, London.

Leong, G.C. and Morgan, G.C. 1982: Human and Economic Geography, Oxford University Press, London.

Lloyod, P.E. and Dicken, P. 1977: Location in Space: A Theoretical Approach to Economic Geography. Harper & Row, Publishers, London.

Mandal, R. B. 1982: Land Utilization - Theory and Practice. Concept Publishing Company, New Delhi.

Scott, A. J. 1988: New Industrial Spaces. Pion, London.

Shafi, M. 2000: Agricultural Geography of South Asia. Macmillan, New Delhi.

Singh J. and Dhillon, S.S. 2004: Agricultural Geography. Tata Mc-Graw-Hill, New Delhi.

Singh, Kashi Nath and Siddiqui, A.R. 2012: Economic Geography, Prayag Pustak Bhawan, Allahabad.

Smith, D. M. 1981: Industrial Location - An Economic Geographical Analysis. John Wiley, New York.

Wheeler, J.O. and Muller, O.P. 1995: Economic Geography. John Wiley, New York.

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Paper code: Geo 111: Practical

Minimum Marks: 36	**Bifurcation of Marks**	**Max. Marks: 100**
Written Test on Lab.Work (4 Questions)	60	4 Hours
Record Work & Viva-Voce	25+15	
Total	100	

N.B.: In written test there shall be 2 questions from each section. Candidates have to answer 4 questions selecting at least one question from each section. All questions carry equal marks. Examination be conducted in batches of not more than 20 candidates in any case. 09 hours for teaching practicals be provided for a batch of 20 students per week.

Section-A

Elementary trigonometry, classification of map projections and their specific uses. Mathematical constriction of projections: cylindrical equal area, Mercator's and Gall's stereographic

Section-B

conical (with one standard parallel, two standard parallels, Bonne's, polyconic and modified polyconic (international).

Section-C

Mathematical construction of projections: zenithal (equidistant-polar and equatorial case, equal area-polar and equatorial case, Gnomonic-polar and equatorial case, stereographic-polar and equatorial case and orthographic- polar and equatorial case).

Readings Recommended:

चौहान, पी.आर. 2005: प्रयोगात्मक भूगोल। वसुन्धरा प्रकाशन, गोरखपुर।

Dickinson, G.C. 1973: Statistical Mapping and Mapping Statistics. London.

Khullar, D.R 2000: Essentials of Practical Geography. New Academic publishing Co., Jalandhar.

Robinson, A.H. et al. 2004: Elements of Cartography. John Wiley & Sons, Inc., New York.

Rampal, K.K. 1993: Mapping and Compilation: Methods and Techniques. Concept Publishing Company, New Delhi.

शर्मा, जे.पी. 2010-11: प्रयोगात्मक भूगोल की रूपरेखा। रस्तोगी पब्लिकेशन्स, मेरठ।

Singh, R.L. and Singh, R.P.B. 1991: Elements of Practical Geography. Kalyani Publishers, New Delhi.

तिवारी, आर.सी. एवं सुधाकर, त्रिपाठी 2009: प्रयोगात्मक भूगोल। प्रयाग पुस्तक भवन, इलाहाबाद।

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Paper code: Geo A01: Man and Natural Environment

Section-A

Definition and scope of environmental geography, its relation with other subjects, elements of the environment, man and environmental relationships: environmental determinism, possiblisim and neo determinism, biosphere and its components, concept of ecology and ecological succession, types of ecosystems, energy flow in the ecosystem, soil system, geobiochemical cycles, major biomes of the world.

Section-B

Environmental degradation and natural disasters, environmental crises: ozone depletion, green house gas effects, El-Nino, global warming and climate change, water scarcity, acid rain, sea level change; desertification, environmental pollutions: water, air soil, noise and radioactive.

Section-C

Environmental quality, sustainable development, environmental management, soil and forest resources management, water management, wildlife conservation, biodiversity and its conservation, environmental awareness and education, international efforts of environmental conservation.

Readings Recommended:

Agarwal, A. and Narain, S. 1977: Dying Wisdom: Rise, Fall and Potential of India's Traditional Water Harvesting System. Centre for Science and Environment, New Delhi.

Economic and social commission for Asia and the Pacific United Nations 1989: Guidelines for the preparation of National Master Water Plans.

Govt. of India, 1980: Ministry of Energy and Irrigation. Rashtriya Barh Ayog (Report-National Commission of Floods. Vol. I & II, New Delhi).

Govt. of India, 1972: Ministry of Agriculture Report of the Irrigation Commission. Vol I & IV, New Delhi).

Gulhati, N.D. 1972: Development of Inter-State Rivers: Law and Practice in India. Allied Pub., Bombay.

International Water Resource Association and Central Board of Irrigation & Power, Water of Human Needs, 1975: Vols. I to V Proceedings of the Second World Congress on Wather Resources, 12-16 December, New Delhi.

Jones, J.A. 1997: Global Hydrology: Processes, Resources and Environmental Management. Longman.

Kates, R.W. and Burton, I. (ed.) 1980: Geography, Resource and Environment Management, Ottowa.

Krutilla, John V. and Eckstein, O. 1958: Multiple Purpose River Development: Studies in Applied Economic Analysis. John Hopkin's Press, Boston.

Law, B.C. (ed.) 1968: Mountains and Rivers of India IGU. National Committee for Geography, Calcutta.

Matter, J.R., 1984: Water Resources Distribution, Use and Management. John Wiley, Marylane.

Michael, A.M. 1978: Irrigation: Theory and Practices. Vikas Publishing House pvt., New Delhi.

Newson, M. 1992: Land, Water and Development River Basin systems and their Sustainable Management. Routledge, London.

Pareira, H.D. 1973: Landuse and Water Resources. Cambridge University Press, Cambridge.

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Rao, K.L. 1979: India's Water Wealth. Orient Longman, New Delhi.
सिंह, जगदीश 2003: पर्यावरण एवं संविकास। ज्ञानोदय प्रकाशन, गोरखपुर।
शर्मा, पी.डी. 2009: पारिस्थितिकी एवं पर्यावरण। रस्तोगी पब्लिकेशन, मेरठ।
Singh, R.A. and Singh, S.R. 1979: Water Management: Principles and Practices. Tara Publication, Varanasi.
Singh, Savindra 2006: Environmental Geography. Prayag Pustak Bhawan, Allahabad.
Smith, K. 1972: Water in Britain. A Study in Applied Hydrology and Resource Geography. McMillan, London.
श्रीवास्तव, वी.के. एवं राव, बी.पी. 2002: पर्यावरण और पारिस्थितिकी। वसुन्धरा प्रकाशन, गोरखपुर।
Tideman, E.M. 1996: Watershed Management. Guidelines for Indian Conditions, Omega, New Delhi.
Tebbutt, T.H.Y. (ed.) 1985: Advances in Water Engineering. Elsevier Applied Science Pub., London.
Todd, D.K. 1959: Ground Water Hydrology. John Wiley, New York.
U.S.D.A. 1955: The Year Book of Agriculture: Water. Oxford and I.B.H. Publishing Co., New Delhi.
Verghese, B.G. 1990: Water of Hope: Integrated Water Resource Development and Regional Co-operation within the Himalayan-Ganga. Brahmaputra-Barak Basin, Oxford IBH, New Delhi.
White, G.F.L. 1977: Environmental Effects of Complex River Development. Westriver Press, Boulder, Colorado.

Paper code: Geo A02: Cultural Geography

Section-A

Definition, nature and scope of cultural geography, the evolutionary approaches and conceptual framework, evolution of man and human society from Palaeolithic to Pleistocene period, rise and dominance of *homo-sapiens* and their spatial distribution over the continents, distribution and characteristics of primary races of the world, zone and stata theory.

Section-B

Beginning of plant domestication, animal domestication and their regions, evolution of civilization: Mesopotamian, Nile, Indus and Hwang Ho Valley with respect to racial, Ethnic, religious, linguistic, demographic and organizational characteristics. School of cultural determinism, cultural adaptation, assimilation, integration diffusion and Environmental perception. Major cultural hearths, realms and regions of the world, basic similarities and differences.

Section-C

Major linguistic families and their distribution in the world, bases of cultural diversity: race, religion, language and nationalism, culture and environment, human settlements-origin, types, pattern and distribution, westernization, sanskritization and cultural urbanization.

Readings Recommended:

Anderson, J. 2009: Understanding Cultural Geography-Places and traces. Routledge, USA.
Anderson, K., Domosh, M., Pile, S. and Thrift, N. (eds.) 2003: Handbook of Cultural Geography. Sage Publications, London.
Ahmad, Aijazuddin 1999: Social Geography. Rawat Publication, New Delhi.
Crang, Mike 1999: Cultural Geography. Routledge, London.

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Chapman, K. 1979: People, Pattern and Process-An Introduction to Human Geography. Edward Arnold Ltd., London.
Dreze Jean, Sen, Amartya 1996: Economic Development and Social Opportunity. Oxford University press, New Delhi.
Dubey, S.C. 199: Indian Society. National Book Trust, New Delhi.
Haq, Mahbubul: Reflection on Human Development. Oxford University Press. New Delhi.
Mitchell, D. 2000: Cultural Geography: A Critical Introduction. Blackwell Publishers, Inc. USA.
Norton, W. 2006: Cultural Geography. Environments. Landscapes. Identities. Inequalities. Oxford University Press, Toronto. 2nd Edition.
प्रसाद, गायत्री 1991: सांस्कृतिक भूगोल। शारदा पुस्तक भण्डार, इलाहाबाद।
Robertson, Iain, and Penny Richards 2003: Introduction in Studying cultural landscapes, ed. Iain Robertson and Richards, 1-18.
Rubenstain, J.M. and Becon, J.M. 1990: Cultural Geography, John Wiley and Sons Inc., New York.
रजवी, मुनीरुद्दीन 2001: सांस्कृतिक भूगोल। रावतसन्स [illegible] अलावली, जयपुर।
Scott, A. J. 1997: The Cultural Economy of Cities, International Journal of Urban and Regional Research, 21(2), 323-339.
Saberwal, Vasant K. 1996: Pastoral Politics: Gaddi grazing, degradation, and biodiversity conservation in Himachal Pradesh, India. Conservation Biology 10, no. 3: 741-749.
Sen, Amartya and Dreze Jean 1996: Indian Development Selected Regional Perspectives. Oxford University Press.
Sopher, D. 1980: An Exploration of India: Geographical Perspectives on Society and Culture. Cornell University Press, Ithaca, New York.
Smith, D.M. 1977: Human Geography; A Welfare Approach. Edward Arnold Publication, London.
Spencer, J.E. and Thomas, W.L. 1969: Cultural Geography. John Wiley and Sons inc., New York.
Subb Rao. Personality of India 1958: Pre and Proto Historic Foundation of India and Pakistan. M.S. University, Baroda, Vadodara.
Wagner, P.L. & Mikesell, H.W. (eds.) Readings in Cultural Geography.
Miljerkee. A.B. and Aijazuddin, A. 1985: India-Culture, Society and Economy. Inter India publications, New Delhi.
Broke, J.C. and Webb, J.W. 1978: A Geography of Mankind, McGraw Hill, New York.

Paper code: Geo 801: Population Geography

Section-A

Population Geography: definition, nature and scope and interdisciplinary study, theories of population growth – pre-Malthusian views, Malthus' theory, Marxist theory, Optimum population theory, demographic transition model, world population distribution, growth trends and determinants.

Section-B

Migration: history, theories, trends and patterns of international and internal migration, population dynamics: fertility and mortality- measurement, determinants and distribution, world population composition and characteristics, world population urbanization, trend pattern and challenges.

Section-C

India- population characteristics and relationship with development; population control movement and policies; urbanization and populatin explosion; post independence

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development-reproductive and child health programme, contemporary issues- ageing of population; declining sex ration; hiv/aids.

Readings Recommended:

Bhende, Asha, A. and Kanitkar, 2002: Principles of Population Studies. 14th Edition, Himalaya Publishing House, Mumbai.
Chandna, R.C. 2013: Population Geography. Kalyani Publishers, Delhi.
Chandna, R.C. 2006: Jansankhya Bhugol. Kalyani Publishers, Delhi.
Garnier, J.B. 1978: Geography of Population, Longman, U.K.
Hassan, M.I. 2005: Population Geography. Rawat Publication, Jaipur.
Kundu, A. Lopamudra, R.S. 2012: Migration and Exclusionary Urbanisation in India. Enonomic & Political Weekly, XLVII (26/27): 219-227.
Kundu, A. 2006: Trends & patterns of urbanization and their economic implications. India Publications, London.
Newbold, K.B. 2010: Population Geography: Tools and Issues. Rowman & Littlefield Coporation, New Delhi.
Premi, M.K. 1991: India's Population Heading Towards a Billion. B.R. Publishing Coporation, New Delhi.
Rural Urban Dynamics and the Millennium Development Goals 2013: Global Monitoring Report.
Woods, R. 1997: Theoretical Population Geography. Longman, U.K.
Weeks, J.R. 1988: Population: An Introduction to Concepts and Issues. Springer, Wadsworth.
www.un.org/esa/population/publications/worldageing19502050/
www.who.int/ageing/en/
India.unfpa.org/drive/NationalPopulation-Policy2000.pdf
UNAIDS Report on Global AIDS Epidemic, 2010

Paper code: Geo B02: Quantitative Techniques in Geography

Section-A

Probability: theory of. probabilites- law of addition and multiplication probabilites of destribution: normal, bionomial, poisson-sampling: basic concepts, sample units and design, sampling frame and procedures, standard error and sample size, testing the adequancy of samples, hypothesis testing: needs and types of hypotheses-goodness of fit and significance and confidence levels-parametric and non-parametric procedures; contingency tables, chi-square test, bionmial test, t-test, mann-whitney U test.

Section-B

Bivariate analysis; forms of relation and measuring the strength of association and relation-construction and meanings of scatter diagram simple linear and regression analyses-spearman's tank and product moment correlation cefficients-the ordinary least square method of fitting a regression line-construction of regression line: interpolation, prediction, explanation and residual-statistical tests of significance of the estimates; residuals and their mapping.

Section-C

Multivariate analysis; basics of multiple regression-partial correlation coefficient regression analysis, analysis of variance and anova-testing the overall significance of a regression auto correlation-multicolliniarity-basis principles and elements of factor Analysis and principal

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component analysis, surface and models: gravity potential; model-spatial interpolation and trend surface analysis-simulation models: random walk and diffusion models-markov chain model similarity indices and region building-construction of thiessen polygons.

Readings Recommended:

Gupta, S.P. 1979: Statistical Methods. Sultan Chand & Sons, New Delhi
Mahmood, A. 1998: Statistical Methods in Geographical Studies. Rajesh Publication, New Delhi.
Nagar, K.N. 1992: Sankhiki Ke Mool Tatva. Meenakshi Prakashan, Meerut.
Unwin, D. 1981: Introductory spatial Analysis. Methuen, London.
Gregory, S. 1978: Statistical Methods and Geographer. Longman, Landon.
Hammond R. and McCullagh, P.S. 1974: Quantitative Techniques in Geography: An Introduction. Clearendan Press, Oxford.
John, P. Cole and Cuchlanie, A.M King 1968: Quantitative Geography, John Wiley, London.
Johnston, R.J. 1973: Multivariate Statistical Analysis in Geography. Longman, London.
Kautsoniannis 1973: Theory of Economitrics. Macmillan, London.
Maurice Yeats 1974: An Introduction to Quantitave Analysis in Human Geography. McGraw Hill, New York.
Peter Haggett, Andrew D. Cliff & Allan Frey 1977: Location Methods. Vol. I and II, Edward Arnold, London.

Paper code: Geo C01: Geography of Rural Development

Section-A

Geography and rural development; agriculture and rural development, rural land use; agriculture pastoral, forestory and land use competition. Landuse and landscape. Approaches to rural development, growth centre approach infrastructure reformist. Rural settlement, housing, population and employment rural transport, service provision, derivation, recreation; health and nutrition.

Section-B

Rural planning and land management; resource development and integrated rural development: crop and soil management live stock range and management; water management, ecological management.

Section-C

Rural development in Rajasthan; rural development schemes irrigation and land development schemes, drought prone areas schemes, desert development programme; integrated rural development in Rajasthan, MNREGA and tribal areas development; wasteland development.

Readings Recommended:

Glig, A.W. 1985: An introduction to Rural Geography. Anrold London.
Association of Country Councils 1979: Rural Deprivation, London ACC.
Allan, J.A. 1980: Remote Sensing in Land in Landuse Studies, Geography 65.
Tweari, A.K. (ed.) 1988: Desertification: Monitoring and Control, Scientific Pubs, Jodhpur.
Anderson, J.R.L.J. 1977: Hardardar-Agricultural Decision Analysis, Ames, Lows State University Press.
Andrease, B. 1981: Farming Development and Space-World Agricultural Geography, New York, Water Cryter.
Morgan, W.B. and RJA 1971: Munon-Agricultural Geography. London Methuen.

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Pacione, M. 1981: Rural Geography London, Parpur Clark, (ed) and Row 1984-Register of Research in Rural Geography Licester: Rural Geography Study Group.
Bowler, I.R. 1948: Agricultural Geography-Progress in Human Geography-8.
Newbury, Pa. 1980: Geography of Agriculture-Plymouth Macodonald and Evans.
Grigg, D.B. 1974: The Agricultural Systems of the World, Cambridge University Press.
Grigg, D.B. 1984: An Introduction to Agricultural Geography, London Hutchinson.
Jones, A. 1975: Rural Housing. The Agricultural Tied College, London Bell.
Lassey, W.R. 1977: Planning in Rural Environment, New York, Mcgraw Hill.
Lavery, P. (ed.) 1974: Recreational Geography, Newton Abbot; David and Charles.
Leasdale, R. 1981: Settlement systems in sparsely populated regions & Homes (ed.) and Oxford, Pergamon.
Menab, A. 1984: Integrated Rural Development, Glaucester Glancesser College of Arts.

Paper code: Geo C02: Geography of Soils

Section-A

Soils: Definition, origin. Pedology, distinction between soil and sediment, Weathering and soils: soil formation: soil forming factors, soil profile. Soil taxonomy

Section-B

Physical properties of soils - texture, structure, colour, porosity and permeability, Chemical properties of soils - soil clays. Cation exchange, Humus, organic matter, pH, Soil biochemistry.

Section-C

Classification of tropical soils. Major soils in India – Black, soils and red soils – their characteristics and distribution. Soils and environmental problems — soil erosion, salinazation, pollution

Recommended Readings:

Miller, R. W. and Donahue, R. L. (1990): Soils, Prentice-Hall of India
Pitty, A. F. (1978): Geography and soil properties. University Press.
Bridges, E. M. (1986): Principles and Applications of Soil Geography, Halsted Press.
Daji, J. A. (1970): A textbook of soil science, Asia Pub. House
Bunting, B. T. (1976). The Geography of soils, Hutchinson, London
Brikeland, P. W. (1984). Soils and geomorphology, Oxford University Press

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Paper code: Geo D01: Practical

Minimum Marks: 36	Bifurcation of Marks	Max. Marks: 100
Written Test on Lab.Work (4 Questions)	60	4 Hours
Record Work & Viva-Voce	25+15	
Total	100	

N.B.: In written test there shall be 2 questions from each section. Candidates have to answer 4 questions selecting at least one question from each section. All questions carry equal marks. Examination be conducted in batches of not more than 20 candidates in any case. 09 hours for teaching practicals be provided for a batch of 20 students per week.

Section-A

History of cartography, types of maps, enlargement and reduction and finding of area on map using planimeter.

Section-B

Study of geological maps and preparation of their cross sections and interpretation, interpretation of weather maps and weather forecast.

Section-C

Conventional: Projection Sinusoidal and Mollweide, map policy of India and projections used for map output in India.

Readings Recommended:

चौहान, पी.आर. 2005: प्रयोगात्मक भूगोल। वसुन्धरा प्रकाशन, गोरखपुर।

Dickinson, G.C. 1973: Statistical Mapping and Mapping Statistics. London.

Khullar, D.R 2000: Essentials of Practical Geography. New Academic publishing Co., Jalandhar.

Robinson, A.H. et al. 2004: Elements of Cartography. John Wiley & Sons, Inc., New York.

Rampal, K.K. 1993: Mapping and Compilation: Methods and Techniques. Concept Publishing Company, New Delhi.

शर्मा, जे.पी. 2010-11: प्रयोगात्मक भूगोल की रूपरेखा। रस्तोगी पब्लिकेशन्स, मेरठ।

Singh, R.L. and Singh, R.P.B. 1991: Elements of Practical Geography. Kalyani Publishers, New Delhi.

तिवारी, आर.सी. एवं सुधाकर, त्रिपाठी 2009: प्रयोगात्मक भूगोल। प्रयाग पुस्तक भवन, इलाहाबाद।

Paper code: Geo D02: Practical

Minimum Marks: 36	Bifurcation of Marks	Max. Marks: 100
Written Test on Lab.Work (4 Questions)	60	4 Hours
Record Work & Viva-Voce	25+15	
Total	100	

N.B.: In written test there shall be 2 questions from each section. Candidates have to answer 4 questions selecting at least one question from each section. All questions carry equal marks. Examination be conducted in batches of not more than 20 candidates in any case. 09 hours for teaching practicals be provided for a batch of 20 students per week.

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Section-A

Elementary knowledge of computer, software & hardware, file format, graphic in computer.

Section-B

Elements of digital cartography, data input, data capture, scanning, digitization and map compilation.

Section-C

Map though autoCade, ArcGIS, GIS, QGIS, Erdas and Arcmap.

Readings Recommended:

चुनियाल, डी.डी. 2004: दूरसम्वेदन तथा भौगोलिक सूचना प्रणाली। शारदा पुस्तक प्रकाशन, इलाहाबाद।

Cromley, R.G. 1992: Digital Cartography, Prentice Hall, Englewood Cliffs, N.J.

Demers, M.N. 1997: Fundamental of Geographical Information Systems. John Wiley & Sons, Inc., New York.

Dickinson, G.C. 1973: Statistical Mapping and Mapping Statistics. London.

Joseph, G. 2005: Fundamentals of Remote Sensing. Universities Press (India) Private Limited, Hyderabad.

Khullar, D.R 2000: Essentials of Practical Geography. New Academic publishing Co., Jalandhar.

Nag, P. 1992: Thematic Cartography and Remote Sensing, Concept publishing company, New Delhi.

Robinson, A.H. et al. 2004: Elements of Cartography. John Wiley & Sons, Inc., New York.

Rampal, K.K. 1993: Mapping and Compilation: Methods and Techniques. Concept Publishing Company, New Delhi.

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M.A. / M.SC. GEOGRAPHY
Second Semester

S.No.	Subject Code	Course Title	Course Category	Credit	Contact Hours Per Week			EOSE Duration (Hrs.)	
					L	T	P	THY	P
1.	Geo 201	Modern and Contemporary Geographical Thought (19th century onwards)	CCC	4	3	1	0	3	
2.	Geo 202	Principals of Climatology	CCC	4	3	1	0	3	
3.	Geo 203	Principles and Theory of Economic Geography	CCC	4	3	1	0	3	
4.	Geo 211	Practical	CCC	6	0	0	9	4	
5.		**Elective – I**	ECC	4	3	1	0	3	
	GEO A01	Geography of Rural Settlements							
	GEO A02	Plant Geography with Special Reference to Tropics							
6.		**Elective – II**	ECC	4	3	1	0	3	
	GEO B01	Geography of Tourism and Recreation							
	GEO B02	Geographical Perspectives on Sustainable Development							
7.		**Elective – III**	ECC	4	3	1	0	3	
	GEO C01	Geography of Tribes with Special Reference to Rajasthan							
	GEO C02	Geography of Crime							
8.		**Elective – Practical**	ECC						
	GEO D01	Practical		6	0	0	9	4	
	GEO D02	Practical		6	0	0	9	4	
		Total Credit		36					

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II SEMESTER

Paper code: Geo 201: Modern and Contemporary Geographical Thought (19th century onwards)

Section A

Definition, scope, purpose and philosophy of geography, themes and basic concepts in geography; impact of Darwinism on Geographical thoughts, Foundations of modern geography: German school (Humboldt, Ritter, Ratzel, Richthofen, Hettner, Schluter), French school (Blache, Brunhes) British school (Mackinder) and Russian scholars during the 19th century, focus on geography as a science of chorology and landscape morphology.

Section B

Rise of Anglo American School of geography: (Semple and Hartshorne) implications of geography as spatial science, relationship between geography, economics and planning (regional science) paradigms and revolutions: quantitative revolution, behaviouralism, radical geography, approaches of integrated geography and modern synthesis.

Section C

Philosophical pluralism: empiricism, positivism, humanistic geography (idealism, phenomenologism and existentialism) and structuralism, post-modernism and various paradigms/ schools of geographical thought during post-modern period, dualism in geography: physical and human geography, systematic and regional geography environmentalism and possibilism, qualitative and quantitative, idiographic and nomothetic, Indian geography: development, emerging trends and professional challenges.

Recommended Readings:

Dear, M.J. and Flusty, S. (ed.) 2002: The spaces of Post modernity: Readings in Human Geography. Blackwell Publishers Ltd. Oxford.

Dikshit, R. D. 2004: Geographical Thought. A Critical History of Ideas. Prentice-Hall of India Private Limited, New Delhi.

Doi, R. D. 2002: Geographic Thought: A Spectrum of Compilation to Coherence. University Book House (Pvt.) Ltd., Jaipur.

Dikshit, R. D. 1994 (ed.): The Art and Science of Geography – Integrated Readings. Prentice-Hall of India Private Limited, New Delhi.

Haggett, P. 2001: Geography: A Global Synthesis. Prentic-Hall Pearson Educational, New York.

Hartshorne, R. 1987: Perspective on the Nature of Geography. Scientific Publishers, Jodhpur (Copyright 1959 by the Association of American Geographers.

Holt-Jensen, A. 2009: Geography: History and Concepts – A Student's Guide, SAGE, Los Angeles, London.

Haggett, P. 1983: Geography: A Modern Synthesis. Harper and Row, New York.

Harvey, D. 1969: Explanation in Geography. Arnold, London.

जैन, एस.एम. 2005: भौगोलिक चिन्तन एवं विधि तंत्र। साहित्य भवन पब्लिकेशन्स, आगरा।

Johnston, R. J. 1983: Philosophy and Human Geography. Edward Arnold (Publishers) Ltd. London.

Johnston, R. J. and Sidway, J. D. 2004: Geography and Geographers. Arnold, London.

Johnston, R. Gregory D. Pratt G, Watts M. and Whatmore S. (2003): The Dictionary of Human Geography. Blackwell Publishers, Oxford.

Johnston, R.J. 1985: The Future of Geography. Methuen and Company Ltd., New York.

Kapoor, A 2001: Voice of Concern. The Concept Publishing Company, New Delhi.

Minca, C. 2001 (ed): Postmodern Geography. Blackwell Publishers Ltd, Oxford.

सोर्म, एस.डी. 2007: भौगोलिक चिन्तन का इतिहास। प्रयाग पुस्तक भवन, इलाहाबाद।

Peet, R. 2003: Radical Geography. Rawat Publishers, Jaipur.

Peet, R. 1998: Modern Geographical Thought. Blakkwell Publishers Ltd, Oxford.

Soja, E. (1989): Post-modern Geographies. Verso Press, London. Reprinted 1997: Rawat Publications, Jaipur and New Delhi.

Taylor, G 1960: Geography in the Twentith Century. Methuen & Co. Ltd. Londo

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Paper Code: Geo 202: Principles of Climatology

Section A

Earth-atmospheric system: components, characteristics and interactions, Current trends in climatology, Recent concerns – climate change and its impact, Microclimatology – influencing factors – forest and urban climates, Agro climatology – soil-plant-climate relationship.

Section B

Air masses: origin, classification, types, Fronts: Frontogenesis and Frontolysis – classification of fronts, Extra-tropical cyclones: formation, impact, Weather forecasting: traditional and modern techniques

Section C

Basis of climatic classification, Koppen's system of climatic classification – salient features, distribution of types, Thornthwaite's scheme of climatic classification – application, Comparative analysis of Koppen and Thornthwaite classifications, The Monsoon: characteristics, economic importance, A Origin of monsoon: classical and recent views, Prediction of monsoon: problems and prospects.

Recommended Readings:

Barry, R.S. & Chorley, R.J. (1971): Atmosphere, Weather and Climate, ELBS, Methuen & Co. Ltd., U.S.A.

Griffiths, J.F.(1966): Applied Climatology-An Introduction, Oxford University Press, London.

Harp, H.J. and Trinidade, O.D. (eds) (1990): Climate and Development, Springer Verlag, U.S.A.

Lal, D.S.(1997):Climatology, Sharda Pustak Bhawan, Allahabad.

Mather, J. R.(1974): Climatology: Fundamentals and Applications, McGraw Hill Book Co. New York.

McBoyle, G.(1973): Climate in Review, Houghton Mifflin Co., Boston.

Oliver, J.E. and Hidose, J.J. (1984): Climatology - An Introduction, Charles and Merrill, U.S.A.

Robinson, P.J. and Hendersen-Sellers, A.(1999): Contemporary Climatology, Pearson Education, London

Subrahmanyam, V.P.(ed)(1983):Contribution to Indian Geography, Heritage Publishers, New Delhi , a) Vol. III - General Climatology b) Vol. IV- Applied Climatology

Further Reading:

Bhutani, Smita, Our Atmosphere, Kalyani Publishers, Ludhiana, 2000.

Critchfield, H.J., General Climatology, Prentice Hall, N.J., 1975.

Frederick K. and Edward J. Tarbuck, The Atmosphere: An Introduction to Meteorology, Prentice Hall of India Pvt. Ltd., New Delhi, 1995.

Lydolph, P.E., The Climate of the Earth, Rowman Nad Allanheld, Totowa, New Jersey, 1985.

Rumney, G.R., Climatology and the World Climates, Macmillan, London, 1968.

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Strahler, A.N., Modern Physical Geography, John Wiley and Sons, New York, Singapore, 1987.
Thompson Russell D.. Applied Climatology - Principles & Practice, John Willey, New York, 1997.
Trewartha, G.T., An Introduction to Climate, McGraw Hill, New York, 1980, Fifth Edition (International Student Edition).

Paper code: Geo 203: Principles and Theory of Economic Geography

Section A

Simple model of economy, environmental relations of the economy, spatial structure of economy, geographical basis of economic activities, evolution of world economic system.

Section B

Manufacturing: factors of production, theories of plant location: Weber's Least cost theory, Losch's economics of location, Isard's space economy, Smith's spatial margins, webber's uncertainty effect, industries-iron & steel, alluminium, paper and pulp, cotton textile, chemical industries-fertilizer, spatial variation in transport costs: location of transport routes and structure of transport costs.

Section C

Spatial organisation of land use: laws of return, concept of rent, Vonthunen's general theory of landuse, dynamic agricultural location theory, Thunian location theory in the late 20th century world, classical central place theory: range of good, threshold, central place system and hierarchy, Christaller's hexagonal trade areas, loss and uniform plain, modification of Christaller's model.

Recommended Readings :

Alexander, J.W. 1988: Economic Geography. Prentice Hall, India, New Delhi.
Berry, B.J.L. et al 1976: Geography of Economic System. Prentice hall, Englewood, Cliff.
गोरम अलका: आर्थिक भूगोल। रस्तोगी प्रकाशन, मेरठ।
Guha and Chaterjee 1989: A New Approach to Economic Geography.
Huntington, Ellsworth1940: Principles of Economic Geography. New York: John Wiley and Sons, Inc.
Hartshorn, T.A. and Alexander, J.W. 2000: Economic Geography. Prentice Hall, New Delhi.
Hodder B.W. and Lee, R.1974: Economic Geography. Methuen, London.
[illegible] 2000: संसाधन भूगोल। वसुन्धरा प्रकाशन, गोरखपुर।
[illegible] Concept Publishing Co., New Delhi
काशीनाथ सिंह, जगदीश सिंह: आर्थिक भूगोल के मूल तत्व। वसुन्धरा, गोरखपुर।
Leong, G.C. and Morgan, G.C. 1982: Human and Economic Geography. Oxford University Press, London.
Lloyod, P.E. and Dicken, P. 1977: Location in Space: A Theoretical Approach to Economic Geography. Harper & Row, Publishers, London.
Ramesh, A. 1984: Contributions to Indian Geography. Volume V, Resource Geography, Heritage Publishers, New Delhi.
श्रीवास्तव, वी.के. एवं राय, बी.पी. 2002: आर्थिक भूगोल। वसुन्धरा प्रकाशन।
Siddhartha, K. 1999: Economic Geography. Kisalaya Publication Pvt. Ltd., Patna.
Sihag, M.S. and Sihag, Savita, 2011: Resource Geography. Gauttam Book Company, Jaipur.
Wheeler, J.O. et al 1995: Economic Geography. John Wiley, New York.
Zimmeman, E.W. 1951: World Resources and Industries. Harper & Co. New York.

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Paper Code: Geo 211: Practical

Minimum Marks: 36	Bifurcation of marks	Max. Marks: 100
Written Test on Lab. Work (4 Questions)	32	4 hours
Record Work & Viva-Voce	16+08	
Project Report & Viva-Voce	16+08	
Internal Assessment	20	
Total	100	

N.B. In written test there shall be 2 questions from each section. Candidates have to answ 4 questions selecting at least one question from each section. All questions carry equ marks. Examination be conducted in batches of not more than 20 candidates in ar case. 12 hours of teaching practicals be provided for a batch of 20 students per week.

SYLLABUS

Section A

Preparation of frequency table, graphical representation of data: histogram, frequenc polygon, frequency curve and cumulative frequency curve or ogive, finding skewnes computation of mean, median and mode, dispersions: mean and standard deviation an computation of correlations: Karl Pearson's and Spearman's rank, coefficient of variability theoretical basis of nearest neighbour analysis and exercises.

Section B

Locational analysis of urban centres, measurement of disparities, using latest data base: state district, tehsil and development block level, preparation of choropleth, isopleths an isochrone map, population potential surface map, population pyramids map and cartograms.

Section C

Three dimensional diagrams: spherical and block pile, drawing of polygraphs, semi-log ant log graphs, network analysis, trilinear chart, circular graph, climatograph, annual wate budget graphs (surplus and deficiency).

Project Report: A candidate is to prepare project report of a village area for one week away from the Headquarter of the institution. The marking on the project report will be awarded by the external examiner in consultation with the Internal examiner concerned. The project should be based on primary data obtained by the candidate. The data should be represented by suitable cartographic methods.

Books recommended

Dickinson, G.C. 1973: Statistical Mapping and Mapping Statistics. London.

Lawrence, G.R.P. 1971: Cartographic Methods. Methuen, London.

Mahmood, A. 1998: Statistical Methods in Geographical Studies. Rajesh Publications, New Delhi.

Robinson, A.H. et al. 2004: Elements of Cartography. John Wiley & Sons, Inc., New York.

Rampal, K.K. 1993: Mapping and Compilation: Methods and Techniques. Concept Publishing Company, New Delhi.

शर्मा, जे.पी. 2010–11: प्रयोगात्मक भूगोल की रूपरेखा। रस्तोगी पब्लिकेशन्स, मेरठ।

Singh, R.L. and Singh RPB 1991: Elements of Practical Geography. Kalyani Publishers, New

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Paper code: Geo A01: Geography of Rural Settlements

Section A

Significance and scope of settlement geography; Development of settlement geography. Methodological advances in the study of settlement geography; Approaches to the study of settlements: Evolutionary, spatial, and ecological; Types of settlement: Clustered and dispersed.

Section B

Rural Settlements: Definition and characteristics; Site and situation. The evolution of field boundaries and field patterns. Types and materials of farm fencing; Folk housing and folk architecture; Traditional building materials.

Section C

Indian Village: Nature and characteristics; A model of Indian village by Spate; Study of rural settlements in India with special reference to their morphological characteristics; Approaches to the morphogenesis of Indian villages. Orientation and segregation of castes in villages; Dichotomy in built environment: Mohammad Habib and Budha Prakash Debate; Study of landscape as a text.

Recommended Readings:

Ahmad, E. 1979. Social and Geographical Aspects of Geography of Human Settlements. New Delhi: Classical Publications.

Ambrose, P. 1970. Concepts in Geography; Settlement Patterns. London: Longmans. Census of India, 1961. House Types and Settlement Patterns of Villages in India. New Delhi.

Chisholm, M. 1969. Rural Settlements and Land Use. London: Hutchinson.

Christaller, C. W. 1966. Central Places in Southern Germany. Englewood Cliffs N. J: Prentice Hall. Clout, H. D. 1972. Rural Geography: Introductory Survey. Oxford: Pergamon.

Cox, K. R. 1972. Man, Location and Behavior: An Introduction to Human Geography. New York: John Wiley and Sons.

Duncan, J. S. 1990. The City as Text: The Politics of Landscape Interpretation in the Kandya Kingdom. Cambridge: Cambridge University Press.

Eidt, R. C., K. N. Singh, and R. P. B. Singh, 1977. Man, Culture and Settlement. Varanasi: Kalyani Publishers.

Hudson, R. S. 1970. A Geography of Settlements. Estover, Plymouth: Macdonald and Evans.

James, P. E. and C. F. Jones, 1954. American Geography: Inventory and Prospects. Syracuse: Syracuse University Press.

John E. Bush. 1962. The Morphology of Indian Cities. In Roy Turner (Ed.) India's Urban Future. Bombay: Oxford University Press.

King, A. D. (ed.) 1980. Building and Society: Essays on the Social Development of the Built Environment. London: Routledge and Kegan Paul.

Mayer, H. M. and C. F. Kohn. 1959. Readings in Urban Geography. Chicago: University of Chicago Press.

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Mukerji, A. B. 1976. Rural Settlements of the Chandigarh Siwalik Hills (India): A Morphogenetic Analysis. Geografiska Annaler, 58(2): 95-115.
Mukerji, A. B. 1984. Progress in Rural Settlement Geography. In A Survey of Research in Geography 1972 – 75. New Delhi: Concept Publishing Company.
Mukherji, R. K. 1968. Man and His Habitation: A Study in Social Ecology. Bombay: Popular Prakashan. Noble, W. A. 1969. Approaches toward an Understanding of Traditional South Asian Peasant Dwellings. Professional Geographer, 21(4): 264-272.
Noble. A.G. 2007. Traditional buildings: A Global Survey of Structural Forms and Cultural Functions. London: I.B. Tauris
Rapoport. A. 1965. House, Form and Culture, Englewood Cliff JN: Prentice Hall.
Ray. A. 1964. Villages. Towns and Secular Buildings in Ancient India. Calcutta: Firma K. L. Mukhopadhyaya.
Singh, J. P. and Khan, M. 2002. Mystical Space, Cosmology and Landscape: Towards a Cultural Geography of India. New Delhi: Manak Publication.
Singh, K. N. 1968. The Territorial Basis of Medieval Town and Village Settlement in Eastern Uttar Pradesh. Annals of the Association of American Geographers, 58(2):218-226.
Singh, R. L. and K. N. Singh (eds.) 1975. Readings in Rural Settlement Geography. Varanasi: The National Geographical Society of India, B. H. U.
Smailes, A. E. 1969. The Indian City: A Descriptive Model. Geographische Zeitschrift. September, pp181 – 182.
Spate, O. H. K. 1952. The Indian Village. Geography, 37: 142-152.
United Nations Centre for Human Settlements (HABITAT), 1966. An Urbanising World, Global Report on Human Settlements. Oxford: Oxford University Press.
Verma, L. N. 2008. Adhiwas Bhugol (4th Edition). Jaipur: Rajasthan Hindi Granth Academy.
Wagner, P. L. and Mikesell, M. W. (Eds.). 1962. Readings in Cultural Geography. Chicago: University of Chicago Press.

Paper code: Geo A02: Plant Geography with Special Reference to Tropics

Section A

Evolution as a discipline, scope and content, Links with other disciplines, Relevance to Geography, Recent trends and need for phytogeographical research, Distinguishing characteristics. Indigenous and exotic flora, Bio-diversity of the tropics.

Section B

Terrestrial - forests, grasslands, deserts, Marine and aquatic – mangroves, coastal, Vegetation types of India.

Section C

Degradation and depletion of tropical vegetation, Need for conservation and management, Methods - protected area network – effectiveness, Green belts and zones in urban areas.

Recommended Readings:

Akin, W.E. (1991): Global patterns – Climate, vegetation soils, University of Oklahama Press, U.S.A.
Ewusie, J.Y. (1980): Elements of Tropical Ecology, Heinemann Educational Books Inc. London.
Furley, P.A. and Newey, W.N. (1983): Geography of the biosphere, Butterworth & Co. Ltd., London.
Kellman, M.C. (1975): Plant Geography, Methuen & Co. Ltd., London.
Mani, M.S. (1974): Ecology and Biogeography in India. The Hague: Dr. W. Junk Publishers

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Lars, N. (1985): Basic Biogeography, Longman, London.
Slaymaker,O. and Spencer, T. (1998): Geography and Global Environment Change, Addison Wesley Longman Ltd., UK.
Smithson, P. et al (2002): The Fundamentals of The Physical Environment, Routledge, London.

Books for further reading:

Ali, S. (1990): Notes on National Forest Policy 1988, Encology, 5(3), August, 1990, 20—22.
Bharucha, F.R. (1983): A text-book of the plant geography of India, Oxford University Press, Bombay.
Dikshit, K.R. (1991): Environment, Forest Ecology and Man in the Western Ghats – The Case of Mahabaleshwar Plateau, Rawat Publ., New Delhi.
Forest Survey of India (1987-1999): The State of Forest Reports, Dehradun.
Ganeshaiah, K. N. et al (ed) (2001): Tropical Ecosystems – Structure, Diversity and Human welfare. Oxford & IBH Publ. Co., New Delhi.
Geethakrishnan, K.P. (1994): National Forest Policy, 1988, Encology, 5(3), 15-20.
Meher-Homji, V.M. (1987): Vegetation types of Peninsular India in relation to environment conditions, in Explorations in the Tropics, Prof. K.R. Dikshit Fel.Vol.Comm., Pune, 3-19.
Meyers, A.A. and Giller, P.S. (1988): Analytical Biogeography – An Integrated Approach to the Study of Animal and Plant Distribution, Chapman and Hall, London, New York.
O'riordan, T. et al (2002): Biodiversity, Sustainability and Human Communities Protecting beyond the Protected, Cambridge Univ. Press, U.K.
Puri, G.S. (1980): Indian Forest Ecology, Vols.2, New Delhi: Oxford.
Sharma, N.P. (ed.) (1992): Managing World's Forests, Kendall Hunt Publ. Co., Iowa.
Walter, H. (1973): Vegetation of the Earth in relation to climate and eco-physiological conditions, English Univ. Press Ltd., London.

Paper code: Geo B01: Geography of Tourism and Recreation

Section A

Leisure, recreation and tourism - definitions and relationships- Tourist Mobility and Gazes- Space and Place Context, Evolution of Tourism- historical origins- modernisation- mass tourism- Globalisation and Tourism- opportunities, risks and constraints, Contemporary world patterns- core regions in Global North and South, Tourism and Tourism Spaces- Approaches- areas of research- Role of tourism in development.

Section B

The nature of tourism production- Tourism capitalist relationships and regulation theory Dynamics of globalization, Organisation – Models of production- micro firms and MNCs- Spatial fixity and factors of, Supply- Infrastructure, services and marketing, Tourism labour process-flexibilisation- spatio-social context, Tourism consumption-motivational factors- commodification of tourists' experiences, typologies of tourists' consumptions– Spatial context.

Section C

Impact of tourism- Changing perspective- Commodification of places- Environmental dimension, Economic impact-Employment, labour, Sectoral linkages and hierarchy, Social construction of tourism places- Commodification of culture- Stages; Structuring of tourists' gazes and place image- Tourists- community relationships, Tourism impact assessment, Tourism development in Rajasthan: Policy and perspective.

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Recommended Readings:

Banerjee-Guha, S. (2003): Contemporary Tourism Policy and Costal Districts of Maharashtra: A Critique, unpublished report, Equations. Banglore, on project conducted at the Department of Geography, University of Mumbai.

Bhardwaj, D. S. and Chaudhary, M. (1997): Contemporary issues in Tourism, Himalaya, Mumbai

Bhatia, A.K. (1989): Tourism Development, Principles and Practices, Sterling, Banglore.

Bhatia, A.K. (1991): Internationational Tourism: Fundamentals and Practices, Sterling, New Delhi.

Chris Ryan. (1991): Recreational Tourism, a Social Science Perspective, Routledge, London.

Cosgrove, I. And Jackson, R. (1972): The Geography of Recreation and Leisure, Hutchinson, London.

Garg, N.K. (1996): Tourism and Economic Development. Avishkar, Jaipur.

Hall, C.M. and Page, S. J. (1999): The Geography of Tourism and Recreation, Environment, Place and Space, Routledge, London.

Hall, C.M. and Page, S.J. (2001): Tourism in South and South-east Asia: Issues and Cases, Butterworth, Heinemann, Oxford.

Hunter, C. and Green, H. (1995): Tourism and the Environment, A Sustainable Relationship.

Kaul, R.K. (1985): Dynamics of Tourism and Recreation, Inter India, New Delhi.

Pearce, D. (1987): Tourism Today-- A Geographical Analysis, Longman Scientific and Technical, New York.

Pearce, D. (1989): Tourist Development, Longman Scientific and Technical, New York.

Robinson, H. (1976): Geography of Tourism, Macdonald and Evans, London.

Shaw, G. and Williams, A.M. (1994): Criticai Issues in Tourism, a Geographical Perspective, Blackwell, Oxford, U.K.

Shaw, G. and Williams, A.M. (2004): Tourism and Tourism Spaces, Sage.

Sinha, P.C. (1997): International Encyclopedia of Tourism Management, Vol. 1-12, Anmol, New Delhi.

Books for further reading:

Baggio R. and Klobas J. (2011): Quantitative Methods in Tourism, A Handbook. Aspects of Tourism. Channel View Publications, UK, USA, Canada.

Batra, G.S. and Donghal, R.C. (2002): Tourism promotion and Development, Deep and Deep, New Delhi

Becken S. and Hay J., (2012): Climate Change and Tourism, From Policy to Practice, Earthscan: Routledge, Tourism Environment and Development Series, London and New York.

Chattopadhyay, K. (1995): Economic Impact of Tourism Development, Avishkar, Jaipur.

Foster, D. (1986): Travel and Tourism Management, Macmillan, Hampshire.

Fullagar S., Markwell K., Wilson E., (2010): Slow Tourism, Experiences and Mobilities, Aspects of Tourism. Channel View Publications, Bristol, Buffalo, Toronto.

Holder A and Fennell D. (ed.) (2013): The Routledge Handbook of Tourism and the Environment, Routledge, Taylor and Francis Group, London and New York.

Kaiser, C, Jr., Helber, L.E. (1977): Tourism Planning and Development, CBI Publishing Co. Inc. Boston.

Kaur, J.(1985):Himalayan Pilgrimmages and New Tourism, Himalayan Books, New

Kumar, R.B. (1995): Coastal Tourism and Environment, Avishkar, Jaipur.

Lavery, P. (1971): Recreational Geography, Donglas David and Charles Ltd., Vancouver

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Hall R.C, and Morrison, A.M. (1985): The Tourism System: An introductory Text, Prentice Hall International Englewood Cliff, New Jersey.
Modi, S (2002): Tourism and Society, Rawat, Jaipur.
Neumeyer, M.H. and Neumeyer, E.S. (1949): Leisure and Recreation, A. S. Barner and Company, New York.
Newsome D and Dowling R. (ed.) (2010): Geotourism: The Tourism of Geology and Landscape, Goodfellow Publishers Ltd, Oxford.
Singh, S.(1995): Profile of Indian Tourism, Avishkar, Jaipur
Singh, S.N.(1986):Geography of Tourism and Recreation, Inter India, New Delhi
Yadav, Hrishikesh, (ed.) (1995): Sangati Sahyadrichai, Sahyadri Prakashan, Mumbai.
Yeoman I., et. al. (2012): 2050 – Tomorrow's Tourism, Aspects of Tourism, Channel View Publications, Bristol, Buffalo, Toronto.

Paper code: Geo B02: Geographical Perspectives on Sustainable Development

Section A

Sustainable Development: Definition, concept and historical developments; difference between economic growth, economic development and sustainable development; economic theories of sustainable development, reconciliation between political and theoretical discourses.

Section B

Geography and Sustainable Development: Sustainable development in disciplinary perspective, sustainable development and geographical agenda, geography and the pursuit of sustainable development. Sustainable Development and the Spatial Scale and Spatial Interaction : Structuring global scale, achieving sustainable development at local, regional, national and global scales, sustainable development and open economies, interaction between different spatial scales.

Section C

Climate change, Energy, and Sustainable Development: Climate change as a threat to sustainable development, current and future climate regimes, mitigating climate change. Sustainable Development and International Relations: International relations theories, climate change and global discourse, discourses in conflict at international forums. Future Perspectives : Existing strategies for sustainable development, consensus and contest, challenge of sustainable development, sustainable development and societal change.

Recommended Readings:

Adams, W.M. (2001), Green Development : Environment and Sustainability in Developing Countries, 2nd edition, Routledge, London.
Barbier, E.B. (1987), The Concept of Sustainable Development, Environmental Conservation, 14(2), 101-110.
Daly, H.E. (1999), "Towards Some Operational Principles of Sustainable Development", Ecological Economics, 2(1), 1-6.
World Commission on Environment and Development (1987), Our Common Future, Oxford University Press. Oxford.
Purvis, M. and Alan Grainger (2004), Exploring Sustainable Development : Geographical Perspectives, Earthscan, London.

Further Readings:

Bhoovigyan Vikas Foundation (2001), International Conference on Sustainable Life Styles

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and Sustainable Development, Contributory Papers, New Delhi.
World Development Report (2003), Sustainable Development in a Dynamic World, Oxford University Press, Delhi.

Paper code: Geo C01: Geography of Tribes with Special Reference to Rajasthan

Section A

Tribes and tribal communities- Perspectives in time and space.: (A Historical Perspective)

Race, Ethnicity and Tribes – Contemporary Global Distribution of Tribes, Differentials in tribal living Location, environment, economy, society and culture of tribes, Social organisation and control.

Section B

Tribes in Rajasthan

Tribes of Rajasthan- Locational and environmental, – Demography of tribes : Major and minor areas of concentration – Characteristics and classification. Differentials in characteristics - Economic activities and associated status Occupational characteristics of tribals in Rajasthan – Social mobility – Case studies. Issues of integration and marginalization – Analysis of development projects and the placement or Displacement and resettlement of tribals.

Section C

Tribals and mainstream development

Study of scheduled and non scheduled tribes, Tribals in various sectors of economy and society, Tribal movements – Historical perspectives – Social, economic, political and ecological issues. Tribal Development Policies in India- Colonial and post- colonial policies: Nature, parameters and objectives - Impact of such policies on tribals- A Review.

Recommended Readings:

Bhange, N.P.(1993): Tribal Commission and Committees in India, Himalaya Publishing House, Bombay.
Boss, N.K.(1971): Tribal life in India, National Book Trust,New Delhi.
Chkravarty,M. Mukherjee,D,(2009), Indian Tribes, SAraswat library, Calcutta.
Chaudhury, B.(1982): Tribal Development in India: poblemsand Prospects,
Chaudhary SN (ed) (2012), Tribal Health and Nutrition, Rawat Publication, Jaipur
Pati, R N. and Jena B (1989) Tribal Development in India, Ashish Publishing House, New Delhi.
T. Prasad (1979): Tribal Geography. An Introductory Bibliography, Classical Publications, New Delhi.
Ramaswami, VS (1988): Tribal Economy; Problems and Prospects, Chugh Publications, Allahabad.
Singh, K.S.(1982): Tribal Movement in India, Manohar Publications, New Delhi.
Singh, S.(1969): Tribal Situation in India, Indian Institute of Advanced Study, Simla
Vivelo, F.R. (1978): Cultural Anthropology, McGraw Hill, New York.
Waterlow, C. (1967): Tribe, State and Community, London
Vyas,N.N. and Mann,R.S.(2008), Indian Tribes in Transition, Rawat Publications, Jaipur
Vyas, N.N. and Mann, R.S.(2008), Indian Tribes of Northern Mato Grosso Brazil, Rawat Publications, Jaipur

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Paper code: Geo C02: Geography of Crime

Section A

Spatio-Social Perspectives on Crime:

Crime as a socially constructed and spatially embeded act – Concept, Definitions Typologies of Crime- Interrelation with social inequality and underdevelopment. Teleological bases- Dynamics of value system and morality -institutional regulation of criminality and deviance, Evolution of political, legal and judiciary systems - Democracy and secularisation – Social justice, human rights and Crime. Capitalist modes of production – Flexibilisation of economy – Time and space convergence and post-modernity- Neoliberalism – spatial dimension of crime – Contemporary trends. Theories of Crime and space–Anomie; Cultural transmission, Crowding; labeling and conflict theory; Power differential, A Critical review.

Section B

Place and Space in Crime

Emplacement in Crime- The built environment, Local subculture and locales of crime - Mobility conditions and places of crime and criminals – regional patterns of crime in India. Systemic violence- implications of sex, age, religion, race, caste and class: illustrations of sexual violence, child abuse, racist violence; homophobic violence, elder abuse – World trends. Geographies of crime and fear- Use of space; Place, space and social identity – socio-spatial exclusion. Gender and crime- patriarchy and sexual violence– Femininity, masculinity and spatial expression of fear of violence – Rapes, domestic violence, - homosexuality and crime.

Section C

Scale, Power, Social Space and Crime; Inter-relations

International Order and Crime- Patterns of flesh trade, drug trafficking – Geopolitics, war and crime- Partition and violence. World patterns of terrorism – terrorism and violence in India. Ethnic strife in South Asia – Communal riots in India - State Oppression, peoples'. Protest and violence – Indian examples. Crime, Justice and the state – Police, prosecution, Judiciary, legislation and administration efficacy in space and society- Indian context.

Recommended Readings:

Pain Rachel, Barke Michael, Fuller Duncan, et. al., (2001), 'Introducing Social Geographies', London, Arnold.

Clinard Marshall B. and Abbott, D. J. (1973), 'Crime in Developing Countries: A Comparative Perspective, Wiley International, 1973.

Herbert, D. (1982): The Geography of Urban Crime, Longman London.

Humpheries, D. and Wallace, Don (1980): Capital Accumulation and Urban Crime, Social Problems, Vol. 28, No. 2, pp. 179-193.

Newman, O. (1973): Defensible Space, Crime Prevention Through Urban Design, Architectural Press, London.

Ahmad, A. (1999): Social Geography, Rawat Publishers.

Daniels, S. and Lee, R. (eds.)(1996): Exploring Human Geography, Arnold.

Castells, M., (1996): The Rise of the Network Society, Basil Blackwell, 1996.

Dear, M.J. and Flusty, S. (2000): The Spaces of Postmodernity, Blackwell.

Vincent J. Del Casino, (2009): Social Geography- Critical Introduction to Geography, Wiley-Blackwell

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Chris Hamnett (ed.), (1996): Social Geography A Reader, Arnold.
Shaban Abdul, 2010, 'Mumbai Political Economy of Crime and Space', Hyderabad, Orient Blackswan Further Reading
Crawford. A. (1998). 'Crime Prevention and Community Safety', London, Longman
Evans. D. Fyfe. N R. and Herbert, D. T., (eds.)(1992) Crime. Policing and Place', London Routledge
McLaughlin, E, (eds.) (1996), 'The Problem of Crime', London Sage
Pain, R, (2000), 'Place, social relations and the fear of crime, a review', Progress in Human Geography 24(3)
Yarwood. R, and Gardner. G, (2000) Fear of crime, cultural threat and the countryside Area 32(4). 403- 12
Clinard. Marshall B. (1961): Sociology of Deviant Behaviour, Holt, Rinehart and Winston, New York
United Nations Interregional Crime and Justice Research Institute (1990): Essays on Crime and Development, Publication No. 36, Rome.
Radzinowicz, L. (1966): Ideology and Crime, Heinemann
Wilson, J. and Kelling, G. (1997): Broken Windows, in Dunham, R. and Alper, G. (eds.), Critical Issues in Policing, Waveland Press, Illinois, pp. 424-437.
Shaban, Abdul (2007): Mumbai: Space, Crime and its Political Economy, Project Report submitted to BRS, TISS, Mumbai. - Theories of Crime, Entire report.
Malcu, L. (1995): Social Movements and Social Classes, Sage
J. O'Loughlin and Friedricks, J. (1996): 'Social Polarization in Post– Industrial Metropolises', Water de Gruyter.
Peet, R. (1977): 'Radical Geography', Maaroufa Press.
Harvey, D. (1996): 'Justice, Nature and the Geography of Difference', Basil Blackwell.
Thoms, D.C. (1992): 'Fragmenting Societies', Routledge,
Babcock. B (1984): 'Unfairly Structured Cities ', Basil Blackwell.
Castells. M. (1988): 'Information Technology: Economic Restructuring and Urban Development', Basil Blackwell.
Harvey, D. (1989): 'The Condition of Post Modernity', Basil Blackwell.
Harvey D. 2001, 'Spaces of Capital Towards a critical Geography', Edinburgh University Press
Sibley, D. (1995): 'Geographies of Exclusion', Routledge.
David Atkinson, Peter Jackson, David Sibley and Neil Washbourne, (2005): Cultural Geography: A Critical Dictionary of Key Concepts, I.B. Taurus
Steve, P. and Michael, K. (1993): Places and the Politics of Identity, Routledge, U.K.
Herod Andrew and Wright Melisa, (eds.), 2002, 'Geographies of Power-Placing Scale', Blackwell
Bagchi Amiya Kumar (1982), 'The Political Economy of under-development', Cambridge University Press, Cambridge.
G. S. Bajpai (ed.), 2002. 'Development without disorders: Criminological view points, Vishwavidyalaya prakashan.
Websites:
www.jstor - article by W. Lawrence Neuman and Ronald J. Berger 1988.
Competing perspectives on cross-National Crime: An Evaluation of Theory and Evidence - source Sociological Quarterly. 1988. 29(2). Pgs. 281-313.
www.google (Crime and Development in Africa by Lamin Sesay

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Paper code: Geo D01: Practical

Minimum Marks: 36	**Bifurcation of Marks**	**Max. Marks: 100**
Written Test on Lab.Work (4 Questions)	60	4 Hours
Record Work & Viva-Voce	25+15	
Total	100	

N.B.: In written test there shall be 2 questions from each section. Candidates have to answer 4 questions selecting at least one question from each section. All questions carry equal marks. Examination be conducted in batches of not more than 20 candidates in any case. 09 hours for teaching practicals be provided for a batch of 20 students per week.

Section A

Design of questionnaire (Field based): Types: closed and open-ended, Planning, designing and constructing questionnaire for field work- quantifiable data based and perceptional qualitative data based, ethnographic survey method,

Section B

Data recording – codification for computer based analysis, Data compilation and analysis.
Settlement Hierarchy: Population and functional – rank-size and primacy: distinction- Construction- Interpretation, Use of NATMO maps for understanding settlement hierarchy – applications.

Section C

Network Analysis: Topological graphs -Connectivity- Calculations of Alpha, beta and gamma indices, Mapping of relative accessibility and connectivity – Matrices- point of minimum aggregate travel distance.

Recommended Readings:

Gregory, S. (1971): Statistical Methods and Geographer, Longman, London.
King, C. A. M. (1978): Techniques in Geomorphology, Edward Arnold, London. Taylor, Peter J. (1977): Quantitative Methods in Geography, Houghton and Mifflin co., Boston
Monkhouse. F.J. and Wilkinson, H.R. (1971): Maps and Diagrams, Methuen, London
Cole, J.R and King , C.A.M. (1968): Quantitative Geography, John Wiley And Sons, London.
Goudie, A. (1981): Geomorphological Techniques, George Alien And Unwin, London.
Hammond, R. And McCullagh, P.S., (1974): Quantitative Techniques in Geography: An Introduction, Oxford University Press, London.
Yeates, M, (1974): An Introduction to Quantitative Analysis in Human Geography, McGraw Hill Book Co., New York.
Mahmood Aslam, (1977): Statistical Methods in Geographical Studies, Rejesh Publication, New Delhi.
Rogerson P.A. (2010). 3rd Ed. Statistical Methods for Geography, a Students Guide, Sage.
Ebdon, David, (1985): Statistics in Geography: A Practical Approach , Wiley-Blackwell, New York.

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Fotheringham,A.S., Brunsdon, C., Charlton,M : (2000) Quantitative Geography: Perspectives on Spatial Data Analysis, Sage Publication Ltd, London,
Baily, T.C., and Gatrell, A. C, (1995): Interactive Spatial Data Analysis, Prentice Hall, London
Griffith , D. A. , Layne, L.J.,(2002): A Casebook for Spatial Statistical Data Analysis: A Compilation of Analyses of Different Thematic Data Sets , Amazon.com
Chen, Y.Q. and Lee Y.C., (ed.) (2003): Geographical Data Acquisition , New York
Vallentine G. Clifford,N. (2010), Key Methods in Geography, Sage.
Delyser D., Herbert S., Aitken S. (eds.) (2010), The Sage Handbook of Qualitative Research, Sage. 19.
Cloke, P., Cook, I, Crang, P., et.al. (2004), Practising Human Geography, Sage.

Paper code: Geo D02: Practical

Minimum Marks: 36	**Bifurcation of Marks**	**Max. Marks: 100**
Written Test on Lab.Work (4 Questions)	60	4 Hours
Record Work & Viva-Voce	25+15	
Total	100	

N.B.: In written test there shall be 2 questions from each section. Candidates have to answer 4 questions selecting at least one question from each section. All questions carry equal marks. Examination be conducted in batches of not more than 20 candidates in any case. 09 hours for teaching practicals be provided for a batch of 20 students per week.

Section-A

Network Analysis: Topological graphs -Connectivity- Calculations of Alpha, beta and gamma indices, Mapping of relative accessibility and connectivity – Matrices- point of minimum aggregate travel distance.

Section-B

Mental Maps and diagrams: Typology of distance and direction of space- Construction of Maps, Imagining Place and space: Perception – mapping and interpretation, Interpreting political context of maps, cartographic techniques, diagrams, pictures and cartoons.

Section-C

Techniques Regionalization and Patterns: Identification of regional boundaries, Boundary girdle technique and synthetic mapping, Index of concentration: location quotient and concentration, Index of similarity and dissimilarity and inequality- Construction and applicability of Lorenz curve- Interpretations – Calculation of Ginni's co-efficient of concentration

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Recommended Readings:

Gregory, S. (1971): Statistical Methods and Geographer, Longman, London.
King, C. A. M. (1978): Techniques in Geomorphology, Edward Arnold, London. Taylor.
Peter J. (1977): Quantitative Methods in Geography, Houghton and Mifflin co., Boston
Monkhouse. F.J. and Wilkinson, H.R. (1971): Maps and Diagrams, Methuen, London
Cole, J.R and King , C.A.M. (1968): Quantitative Geography, John Wiley And Sons, London.
Goudie, A. (1981): Geomorphological Techniques, George Alien And Unwin, London.
Hammond, R. And McCullagh, P.S., (1974): Quantitative Techniques in Geography: An Introduction, Oxford University Press, London.
Yeates, M, (1974): An Introduction to Quantitative Analysis in Human Geography, McGraw Hill Book Co., New York.
Mahmood Aslam, (1977): Statistical Methods in Geographical Studies, Rejesh Publication, New Delhi.
Rogerson P.A. (2010), 3rd Ed. Statistical Methods for Geography, a Students Guide, Sage.
Ebdon, David, (1985): Statistics in Geography: A Practical Approach , Wiley-Blackwell, New York.

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M.A. / M.SC. GEOGRAPHY
III Semester

S.No.	Subject Code	Course Title	Course Category	Credit	Contact Hours Per Week			EOSE Duration (Hrs.)	
					L	T	P	THY	P
1.	Geo 301	Advanced Geography of India	CCC	4	3	1	0	3	
2.	Geo 302	Fundamentals of Natural Hazards and Disaster Management	CCC	4	3	1	0	3	
3.	Geo 303	Urban Geography	CCC	4	3	1	0	3	
4.	Geo 311	Practical	CCC	6	0	0	9	4	
5.		Elective – I	ECC	4	3	1	0	3	
	GEO A01	Research Methodology							
	GEO A02	Political Geography							
6.		**Elective – II**	ECC	4	3	1	0	3	
	GEO B01	Advanced Geomorphology							
	GEO B02	Contemporary Issues in Human Geography							
7.		**Elective – III**	ECC	4	3	1	0	3	
	GEO C01	Marketing Geography							
	GEO C02	Social Geography							
8.		**Elective – Practical**	ECC						
	GEO D01	Project Work		6	0	0	9	4	
		Total Credit		**36**					

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III SEMESTER

***Paper code: Geo 301: Advanced Geography of India**

Section A

Geological structure and its relation with distribution of minerals, physiographic divisions; climate - various seasons and weather associated with these seasons, mechanism ofIndian monsoon, major climatic regions; soil: characteristics, distribution and major soil regions; drainage system and watersheds.

Section B

Resource potential and evaluation, water resources & Multi-purpose irrigational projects, vegetational resources, agriculture: typology, major crops, changing pattern of crops and green revolution, animal resources, mineral resources, human resources & population policies.

Section C

Resources development and utilization: power, industries and transport, river basins of India, riverine problems of sharing water and their planning, industrial regions and economic regions of India, regional problems.

Recommended Readings:

Bansil, B.C. 1975: Agricultural Problems in India, Delhi.

Deshpande, C.D. 1992: India-A Regional Interpretation. Northen Book Centre, New Delhi.

Gopal Krishnan, R. 2001: Geography of India. Jawaher Publishers & Distributions, New Delhi.

Govt. of India: National Atlas of India, NATMO Publication, Calcutta.

Govt. of India 1965: The Gazetteer of India, Vol. I & II Publication Division, New Delhi.

India 2004, Ministry of Information and Broad Casting. Govt. of India, New Delhi.

Khullar, D.R. 2006: India a comprehensive Geography. Kalyani Publishers, New Delhi.

Krishna, D. 1971: The New Agricultural Strategy. Delhi.

Kurdue, A. & Raza, Moonis: Indian Economy the Regional Dimension.

मलैरिया, सी. 1999: आधुनिक भारत का वृहत् भूगोल। साहित्य भवन पब्लिकेशन्स, आगरा।

Mahesh Chand and V.V. Puri, Regional Planning in India.

Md. Noor., Perspectives in Agricultural Geography. New Delhi.

Misra, R.P., Regional Planning: Concepts, Techniques and Policies

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Paper Code: Geo 302: Fundamentals of Natural Hazards and Disaster Management

Section-A

Concept of Hazards, Risk, Vulnerability and Disaster. Types of Hazards : Natural, man-made. Natural Disasters : Floods, drought and desertification, earthquakes, landslides, avalanches, cyclones, forest fires.

Section-B

Regional Dimension of Hazard : Occurrence and trends with special reference to northwest India. Case Studies : Floods in Delhi, Major Fires in Kolkata, Earthquakes in Bhuj, Rail Accidents in India.

Section-C

Disaster Management : Concepts relating to the Pre-disaster phase, emergency phase, post-disaster phase. Disaster Management Mechanism in India : Agencies, Plans and Policies.

Recommended Readings :

Allan, S., Adam, B. and Carter, C. (eds.) (2000), Environmental Risks and the Media, Routledge, London.

Ambala-Bertrand, J.M. (1993), Political Economy of Large Natural Disasters : With Special Reference to Developing Countries, Clarendon Press, Oxford.

Blaikie, P and Others (1994), At Risk : Natural Hazards, People's Vulnerability and Disasters, Routledge, London.

Burton, I., Kates, R.W. and White, G.F. (1993), Environment as Hazard, 2nd edition, Guilford Press, New York.

Hewitt K. (1997), Regions of Risk : A Geographical Introduction to Disasters, Longman, London.

Kasperson, J.X., Kasperson, R.E. and Turner, B. L. (1995), Regions at Risk : Comparisons of Threatened Environments, United Nation University Press, Tokyo.

Mitchell, J.K. (ed.), (1999), Crucibles of Hazard : Mega-Cities and Disasters in Transition, United Nations University Press, New York.

Quarantelli, E.L. (ed.), (1998), What is a Disaster? Perspective on the Question, Routledge, London.

Schneid, T. and Collins, L. (1998), Disaster Management and Preparedness, Lewis Publishers, Washington, D.C.

Godschalk, D.R. et.al. (1999), Natural Hazard Mitigation: Recasting Disaster Policy and Planning, Island Press, Washington, D.C.

Paraswamam, S. and Umikrishnan, P.V. (2000), India : Disaster Report, Oxford University Press, New Delhi.

Kapur, Anu and Others (2005), Disasters in India : Studies of Grim Reality, Rawat, Jaipur.

Gupta, M.C., Gupta, L.C., Tamini, B.K., Sharma, Vinod, K. (2000), Manual on Natural Disaster Management in India, National Disaster Management Centre, New Delhi.

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Paper Code: Geo 303: Urban Geography

Section A

Meaning, aims, importance and scope of urban geography, factors affecting recent trends the growth of town cities different historical periods during neolithic period, greek and roman period. dark ages, medieval period renaissance period, industrial revolution. and modern times, chief characteristics of the towns, trends of urbanisation in the world, urbanisation in india since 1901 and its problems, definitions of urban centres, chief characteristics of modern town, city conurbation metropolian and megalopolis, spatial pattern and distribution of urban centres origin and evolution of urban settlement, types of cities-central placed, urban transportation.

Section B

Functions and functional classification of towns, urban rank-size relationship, concept of urban economic functions and its urban hierarchy based on functions law of promate city, urban morphology, unplanned growth of towns, urban master plans, morphology of indian cities, functional structure of towns, characteristics of C.B.C. residential area, and other functional areas central place theory (christaller and losch) and models of urban structure theori of urban structure (burgess, hoyt, harris & ullman, mann, white).

Section C

Centrifugal and centripetal forces in urban geography. development of suburbs, rural, urban fringe, satellite towns, ring towns, sphere of urbac influence (umland) and its delimitation control of urban problems: environmental, urban poverty, slums, transportation, housing, crime, principles of town planning, preparation of a master plan, study of master plan of Jaipur city, principles of regional planning.

Recommended Readings:

A.E. Smailes: The Geography of Towns. Hutchinson, University Library, London.
Abercrombie: Town and Country-Planning. Oxford University Press, London.
बंसल, एस.सी. 2010: नगरीय भूगोल, मीनाक्षी प्रकाशन, मेरठ।
Carter, Harold 1995: The Study of Urban Geography, Arnold (Publisher) Pvt. Ltd., London.
Dickinson, R.E.: City Region and Regionalism. Routleged and Kegon Paul London.
Herrold M. Mayer: Readings in Urban Geography, Central Book Depot, Allahabad.
N.V. Sovani: Urbanization and Urban India. Asia publishing House, Bombay.
P.C. Malhotra: Survey of Bhopal City and Bairagarh (Asia publishing Bombay)
R.L. Singh: Banglore as Urban Survey. National Geographical Society of India, B.H.U., Varansi.
Shah Manzoor Alam: Hyderabad and Secuderabad, Twin City Studies in Urban Geography. Allied Published, Delhi.
Singh, R.L.: Banars A study in Urban Geography. Student Friends, Allahabad.
Toylor G.: Urban Geography. Muthuen and Co., London.
V.K.R.V. Rao: Socio-Economic survey of Greater Delhi. Asia Publishing Bombay.
V.L.S. Prakash Rao: T Gowns of Mysore state. Statistical Publishing House, Calcutta.

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Paper code: Geo 311: Geography Practicals

Minimum Marks: 36	Bifurcation of marks	Max. Marks: 100
Written Test on Lab. Work (4 Questions)	48	4 hours
Record Work & Viva-Voce.	20+12	
Internal Assessment	20	
Total	100	

N.B. In written test there shall be 2 questions from each section. Candidates have to answer 4 questions selecting at least one question from each section. All questions carry equal marks. Examination be conducted in batches of not more than 20 candidates in any case. 12 hours of teaching practicals be provided for a batch of 20 students per week.

SYLLABUS

Section A

Methods and techniques of representation of relief: methods and techniques of depicting relief Profile, gradients and calculation of slope, Block diagrams, field sketching, hypsographic curves, altimetric frequency graphs.

Section B

Interpretation of topographical maps: a brief history of topographical maps of the world with special reference to India and their interpretation, detailed study of such topographical sheets which depict typical geomorphological and cultural landscapes, scanning and digitization of maps (Raster- Vector Image).

Section C

Calculation of scale, number of runs/strips and aerial photographs in a strip, knowledge of stereoscopic vision and use of stereoscope, Air photo interpretation and exercise on the determination of height on Air photo using Parallax Bar.

Recommended Readings:

Robinson, A.H. et al. 2004: Elements of Cartography. John Wiley & Sons, Inc., New York.
Singh, R.L. and Singh RPB 1991: Elements of Practical Geography. Kalyani Publishers, New. Delhi.
Rampal, K.K. 1993: Mapping and Conflation: Methods and Techniques. Concept Publishing Company, New Delhi.
Monkhouse, F.J. and Wilkinson, H.R. 1971: Maps and Diagrams. Methuem, London.
Sharma, J.P. 2011: Practical Geography. Rastogi Publications, Meerut.
Tiwari, R.C. 2009: Practical Geography. Prayag Pustak Bhawan, Allahabad.

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Paper Code: Geo A01: Research Methodology

Section A

Research: meaning, objectives, significance, types of research, research approaches, problems of geographical research, relevant and applied research, hypothesis and its basic concepts, testing of hypothesis, models and paradigm, formulation of research proposal and research design, types of research projects and report writing.

Section B

Sources of data, methods of data collection, processing, analysis and results, observation and interview questionnaire and field schedule, sampling theory, sample size, sampling techniques, selected techniques of spatial analysis, concentration and dispersal of economic activities, interaction theories, scaling techniques, measurements of disparities and inequalities, methods of delimitation of economic, industrial, agricultural and planning regions.

Section C

Regional population analysis, population projections, network analysis, delimiting sphere of city influence, core and marginal area, morphometric analysis, drainage basin analysis and slope analysis, biogeochemical cycles, integrated, area development planning, use of software for quantitative geographical analysis, introduction to remote sensing and geographical information system in land use analysis.

Recommended Readings:

आहूजा,राम 2010: सामाजिक अनुसंधान। रावत पब्लिकेशन्स, नई दिल्ली।

जी.डी. चौनियाल 2006: सुदूर संवेदन एवं भौगोलिक सूचना प्रणाली। शारदा पुस्तक भवन, इलाहाबाद।

Guthrie, G. 2010: Basic Research Methods-An Entry to Social Science Research. SAGE Publications, India Pvt Ltd., New Delhi.

Gupta, S.P. 1979: Statistical Methods. Sultan Chand & Sons, New Delhi.

Harvey, D. 1969: Explanation in Geography. Arnold Heinemann, London.

Har Prasad 1992: Research Methods and Techniques in Geography. Rawat Publication, Jaipur.

K.R. Sharma 2004: Research Methodology. National Publishing House, Jaipur.

Kothari, C.R. 1990: Research Methodology-Methods and Techniques. Wishwa Prakashan, New Delhi

Misra, H.N. and Singh, V.P. 1998: Research Methodology in Geography. Rawat Publication, Jaipur.

Mahmood, A. 1998: Statistical Methods in Geographical Studies. Rajesh Publication, New Delhi.

Mishra, R.P. 1989: Research Methodology. Concept Publishing Company, New Delhi.

Pal, S.K. 1998: Statistics for Geoscientists – Techniques and Applications. Concept Publishing Company, New Delhi.

Sharma, P.R. and Yadav, R.S. 2011: Research Methodology: Concepts and Studies. R.K. Books, New Delhi.

श्रीवास्तव एवं प्रसाद 2008: भूगोल की सांख्यिकी विधियाँ। पब्लिशिंग प्रकाशन, गोरखपुर।

नरेन्द्र प्रकाश शर्मा 2001: रिसर्च मैथोडोलोजी। पंचशील प्रकाशन, फिल्म कॉलोनी, चौड़ा रास्ता, जयपुर।

Dy. Registrar (Acad.)
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Paper Code: Geo A02: Political Geography

Section A

Definition, scope nature and importance of political geography: its relation with other social sciences, history and development of political geography: pre-modern phase (before 19th Century), geopolitics and German school of thought. Global strategic views: views of Mackinder, Spykman, Mehring, Hooson, De Seversky, World's geostrategic regions, types of approaches, trends of politics in the world modern phase (19th to 2000 AD).

Section B

State and nation, idea of state: elements of the state: territory, population, organization and power, concept of nation, nationalism, heart of the state: core areas, the focus: capital city, frontiers and boundaries: definitions, classification and concepts, boundaries as economic barriers, Indias, borders and their problems, buffer zones, the concept of territorial sea and maritime boundaries ,landlocked states: problem of access, growth of nations and disintegration of empires: unitary and federal states, the dying colonialism and resurgent nationalism, supernationalism: form state of blocks.

Section C

Extending dimensions of political geography, politics and transportation, geography of foreign aid & economic development, emergence of third world block, politico-geographical study of india, political geography of administration, politico-geographical implications of space research, function, methods and trends of electrol geography: voter's participation before voting prediction, conceptual model of the voting decision, operationalisation of conceptual decision, garrymendering in relation to India.

Recommended Readings:

Adhikari, S. 2004: Political Geography. Rawat Publications, Jaipur.

Alexander I.M. 1966: World Political Patterns. John Murray and Co., London.

De Blij, H.J. and Glassner, Martin 1968: Systematic Political Geography. John Willey, New York.

Deshpande, C.D. 1992: India- A Regional Interpretation. Northern Book Centre, New Delhi.

Dikshit R.D. 1982: Political Geography: A Contemporary Perspective. Tata McGraw-Hill Publishing Co., New Delhi.

East, W.G. and Spate, O.H.K. 1966: The Changing Map of Asia. Methuen, London.

Fellmann, J. Getis, A. and Getis, J. 1995: Human Geography: Landscapes of Human Settlements. WCB Brown Publishers, Dubuque.

Guha, J.L. and Chattorij, P.R.: A New Approach to Economic Geography. World Press, Kolkata.

Pounds, N.J.G. 1972: Political Geography. McGraw Hill, New York.

Short, J.R. 1982: Political Geography of the 20th Centaury A Global Analysis. New York.

सक्सेना, एच.एम.: राजनैतिक भूगोल के सिद्धान्त। रस्तोगी पब्लिकेशन्स।

Taylor, P. 1985: Political Geography. Longman, London.

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Paper Code: Geo B01: Advanced Geomorphology

Section A

Fundamental concepts of geomorphology; schools in geomorphology, recent trends in geomorphology, earth movements: epeirogenic, orogenetic types and classification of weathering, mass movement erosion. plate tetonics, seismicity, vulcanicity, orogenic structures with reference to the evolution of Himalaya, various models of landscape evolution (Davis, Penck, King, Hacks, Morisawa, Schumn, polycylic evolution of landscapes.

Section B

Geomorphic processes, dynamics of fluvial, glacial, Aeolian, marine, and karst processes and resultant landforms, polycylic landforms, various models of slope development (Wood, Davis, Penck, King, R. Savigear, Strahler, Fisher-Lehmann, Young), concept of morphogenetic region. Systems in geomorphology; Models in geomorphology, erosion surfaces-techniques of identification and correlation.

Section C

Terrain evaluation, geomorphic mapping. geomorphic hazards and mitigation measures; Digital Elevation Model (DEM) and Triangulated Irregular Network (TIN) unit, land capability and land suitability classification, hydro-geomorphology, urban geomorphology, environmental geomorphology, geomorphic hazards.

Recommended Readings:

Ahmed, E. 1985. Geomorphology. Kalyani Publishers, New Delhi.
Bloom, A. L. 1998/2001: Geomorphology. Prentice Hall of India, New Delhi.
Chorley, R.J., Schumm S A and Sugden D E. 1984: Geomorphology. Methuen and Company Ltd., London
Cooke, R.U. and Doornkamp, J.C. 1974: Geomorphology in Environmental Management-A introduction. Clarendon Press, Oxford.
Chorley, R.J. 1972 Spatial Analysis in Geomorphology. Methuen, London.
Dayal, P. 1994: A Text Book of Geomorphology. Kalyani Publishers, New Delhi.
Dury, G.H. 1959: The Face of the Earth. Penguin Harmondsworth.
Fairbridge, R.W. 1986: Encyclopedia of Geomorphology. Reinhodts, New York.
Goudie, A. 1995: The Nature of the Environment. Oxford & Blackwell, London.
Garner, H.F. 1974: The origin of landscape-A Synthesis of Geomorphology. Oxford University Press, London.
Jog, S. R. (ed.) 1995: Indian Geomorphology (2 vols.). Rawat Publications, Jaipur.
Kale, V. and Gupta, A. 2001: Introduction to Geomorphology. Orient Longman, Hyderabad.
Mitchell, C.W. 1973: Terrain Evaluation. Longman, London.
Ollier, C.D. 1979: Weathering Longman. London.
Pitty, A.F. 1971: Introduction to Geomorphology. Methuen, London.
Singh, S. 2004: Geomorphology. Prayag Pustak Bhawan, Allahabad.
Stoddart, D.R. (ed) 1996: Process and Form in Geomorphology. Routledge, New York.
Sparks, B.W. 1986: Geomorphology. Longmans, London.
Thornbury, W.D. 2005: Principles of Geomorphology. John Wiley and Sons, New York.
Thornbury, W.D. 1960: Principles of Geomorphology, John Wiley, New York.

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Paper Code: Geo B02: Contemporary Issues in Human Geography

Section-A

Human Geography : Changing nature or perspectives, issues and debates, critical understanding of social theory and human geography. Conceptualizing Space and Place : Structure and dynamics of space; relational framework of space and place; social construction of space and time; ethics of space and place.

Section-B

Geography of Difference and Exclusion : Geographies of identity and difference related to class, religion, caste, gender and location: social justice and political geography of difference. Geographical Organisation of Power : Spatial meaning and definitions of power; dynamics of spatio-social interactions and power; geopolitics of power-territoriality and globalization.

Section-C

Geography of Development : Meaning, definitions and approaches; construction of development indicators; linking globalisation and new forms of development; local initiatives towards development. Geography of social action and movements : Reasons and approaches to social movements; aspects of social security; social-environmental movements in India.

Recommended Readings :

Agnew, J.A. and Corbridge, S. (1995), Mastering Space : Hegemony, Territory and International Political Economy, Routledge, London.
Benko, G. and Strohmayer, U. (1997), Space and Social Theory : Interpreting Modernity and Postmodernity, Blackwell Publishers, Oxford, London.
Bhabha, H. (1994), The Location of Culture, Routledge, London and New York.
Corbridge, S., Martin, R. and Thrift, N. (1997), Money, Power and Space, Blackwell, Oxford.
Derek, G., Martin, R., and Smith, G. (1994), Human Geography : Society, Space and Social Science, Macmillan Publishers, Cambridge.
Johnston, R.J. (1991), A Question of Place : Exploring the Practice of Human Geography, Blackwell Publishers, Cambridge.
Harvey, D. (1996), Justice, Nature and Geography of Difference, Blackwell Publishers, Cambridge.
Massey, D. (1998), Space, Place and Gender, Polity Press, Cambridge.
Massey, D., Allen, J., and Sarre, P. (1999), Human Geography Today, Blackwell Publishers, Cambridge.
Morley, D. and Robins, K. (1995), Spaces of Identity : Global Media, Electronic Landscapes and Cultural Boundaries, Routledge, London.
Redcliff, M., and Benton, T. (1994), Social Theory and Global Environment, Routledge, London and New York.
Rogers, A. and Vertovec, S. (1995), The Urban Context, Berg, Oxford.
Sack, R.D. (1997), Homo Geographicus : A Framework for Action, Awareness, and Moral Concern, The John Hopkins University Press, London.
Sibley, D. (1995), Geographies of Exclusion : Society, and Difference in the West, Routledge, London.
Werlen, B. (1993), Society, Action and Space : An Alternative Human Geography, Routledge, London

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Paper Code: Geo C01: Marketing Geography

Section-A

Marketing Geography: Definition, scope and significance. Growth and development. Approaches of study: Commodity, Spatial, Social, Economic, Behavioural. Application of Planning: Market, Urban, Agriculture.

Section-B

Markets: Classification, structure and hierarchy, Markets participants, Market Channel and Trade Area, Theoretical Framework for Study of Market Centres: Christaller and Losch Model of Market Locations; B.J. Berry's Model and Reilly's Models of interaction and trade area delimitation.

Trade, Classification and structure: Local, Regional, National, and International. Historical Development of Trade, Factors of Development of Trades.

Section-C

Indian Agricultural Marketing: Definition, Types and Structure, Formal Marketing: Regulated, Government Purchase Centres. Informal Marketing: Local, Regional, Private Traders, Processing Units. Marketing Channels, Foodgrains and Vegetables, WTO and Agricultural Marketing: Its impact on agriculture, environment, Food Security and Society.

Recommended Readings:

Acharya, S.S & Agarwal, N.L (1987) Agricultural Marketing in India, Oxford & IHB Publishing Co, New Delhi.

Berry, B.J.L. (1967) Geography of Market centers and Retail Distribution. Prentice Hall, Englewood cliffs, N.J

Davis, R.L. (1976) Marketing Geography, .Methuen, London,

Dixit, R.S. (1984) Marketing Centers and their spatial development in the Umland of Kanpur, Allahabad

Garnier, B, J and Delobez. A (1977) Geography of Marketing, Longman, London.

Khan.N (1991) Agriculture development and Marketing, H.K. Publisher, New Delhi

Losch, A (1 954) Economics of Location. Yale University press, New Heaven,

N.C.A.E.R (1983) Market towns and Spatial Development in India, NCAER, N.D.

Saxena, H.M (1984) Geography of Marketing. Concepts and Methods, New Delhi.

Saxena, P. Marketing and Sustainable Development. Rawat Publication, New Delh

Singh, G.N. (1987) Agricultural Marketing in India. Hugh Publication, Allahbad.

Rajgopal (2001) Rural Marketing. Rawat Publication, New Delhi

Dy. Registrar (Acad.)
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Paper Code: Geo C02: Social Geography

Section-A

Definition, nature and scope of social geography. Social geography in the realm of social sciences. Concepts and themes in social geography : Social space. Social segregation. Social justice. Social well-being. Ethnicity.

Section-B

Evolution of socio-cultural regions in India : Evidence from classical literature. Core and peripheral regions. Attributes of spatial distribution of : Tribes. Religion. Language. Caste.

Section-C

Social transformation and change in India : Modernization and sanskritization. Role of rural-urban interaction. Problems of social transformation. Social and ethnic diversity of India and national integration. Cultural pluralism and development.

Recommended Readings :

Ahmad, Aijazuddin : Social Geography, Rawat Publications, New Delhi, 1999.
Jones, Emrys and John Eyles : An Introduction to Social Geography, Oxford University Press, London, 1977.
Jones, Emrys (ed.) : Readings in Social Geography, Oxford University Press, London, 1975.
Khare, R.S. : Cultural Diversity and Social Discontent, Sage India, New Delhi, Sage India, 1998.
Mandelbaum, David G. : Society in India, University of California Press, Berkley, 1970.
Rao, M.S.A. : Urbanisation and Social Change, Orient Longmans, New Delhi, 1970.
Sareer, T.R. and S.R. (ed.) : Castes and Tribes of India, Anmol, New Delhi, 1993.
Singer, Milton and B.S. Cohn (ed.) : Structure and Change in Indian Society, Aldine, Chicago, 1968.
Singh, K.S. : Tribal Situation in India, Indian Institute of Advanced Studies, Shimla, 1972.
Sopher, David E. : An Exploration of India, Longman, London, 1980.
Srinivas, M.N. : Social Change in Modern India, Orient Longman, 1966.
Srinivas, M.N. (ed.) : Caste : Its Twentieth Century Avatar, Penguin India, New Delhi, 1997.
Atreya, B.L. et al. (ed.) : Indian Culture, Universal Publications, New Delhi, 1956.
Dubey, S.C. : Indian Society, National Book Trust, New Delhi, 1991.
Sen, Amartya, and Dreze Jean : Indian Development : Selected Regional Perspectives, Oxford Univers ty Press. Delhi, 1996.

Paper Code: Geo D01: Project Work

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M.A. / M.SC. GEOGRAPHY
IV Semester

S.No.	Subject Code	Course Title	Course Category	Credit	Contact Hours Per Week			EOSE Duration (Hrs.)	
					L	T	P	THY	P
1.	Geo 401	Geography of Rajasthan	CCC	4	3	1	0	3	
2.	Geo 402	Agricultural Geography	CCC	4	3	1	0	3	
3.	Geo 403	Applied Geography	CCC	4	3	1	0	3	
4.	Geo 411	Practical	CCC	6	0	0	9	4	
5.		**Elective – I**	ECC	4	3	1	0	3	
	GEO A01	Bio.Geography							
	GEO A02	Industrial Geography							
6.		**Elective – II**	ECC	4	3	1	0	3	
	GEO B01	Regional Planning and Development							
	GEO B02	Geography of Water Resources							
7.		**Elective – III**	ECC	4	3	1	0	3	
	GEO C01	Oceanography							
	GEO C02	Principles and Applications of Remote Sensing and Geographical Information System							
8.		**Elective – Practical**	ECC						
	GEO D01	Dissertation		6	0	0	9	4	
		Total Credit		36					

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IV SEMESTER

Paper Code: Geo 401: Geography of Rajasthan

Section-A

Physical aspects of rajasthan: geological structure, relief, climate, drainage, natural vegetation, environmental pollution-causes and types, drought, desertification, soils, soil erosion and conservation ,availability, problems and conservation of water resources.

Section B

Economics aspects: irrigation, sources, types, irrigation intensity, crop wise irrigation, quality of irrigation water, problems, irrigation projects: detailed study of Indira Gandhi canal project, Chambal valley project, Mahi bajaj sagar project on physical and socio-economic aspects.

Agriculture: development under five year plans, problems of agriculture development, general land use: live-stock and dairy development, minerals, industries: textile, sugar, cement, marble and granite, fertilizer, zinc and copper smelting, power & energy: hydro-electricity, coal, petroleum, solar energy, bio-energy, transport &trade, development of tourism, desert development programme, tribal areas development programme, Aravali hill development programme.

Section C

Cultural and development aspects: population-number, growth, distribution and density, rural and urban, male and female population, literacy status, occupational structure, schedule castes and schedule tribes, population problems, study of Bhil, Meena and Garasia, settlement: types, building materials and house types and factors affecting settlements in Rajasthan.

Recommended Readings :

Bhalla L.R. 1996-97: Geography of Rajasthan. Kuldeep Publications, Ajmer.

Dhillariya, S.S. 1988: Desert Spread and Desertification. Environmentals, Jaipur.

Govt. of Rajasthan Techno-Economics Survey Of Rajasthan. Govt. of Rajasthan Publication.

Gujar, R.K 1992: Geography of Indira Gandhi Canal. Rajasthan Hindi Granth Academy.

Lodha, R. & Maheshwari, D. 2001: Geography of Rajasthan. Shahitya Bhawan Publication, Hospital Road, Agra.

Maheswari, D. 2008: Geography of Rajasthan. Shahitya Bhawan Publication, Hospital Road, Agra.

Mishra,V.C. 1967: Geography of Rajasthan. National book trust of India, New Delhi.

Sharma H.S. and M.L. Sharma 2014: Geography of Rajasthan. Pancheil Puplisher,Jaipur.

Singh, Attar 1992: Flood Prone Areas of India. Aviskar Publishers Jaipur.

Sharma B.L. 1984: Agricultural Typology of Rajasthan.

Sing, R.L. 1977: Regional Geography of India.

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University of Rajasthan
JAIPUR

Paper Code: Geo 402: Agricultural Geography (Elements & Applied)

Section A

Agriculture geography: nature and development, origin dispersal and development of agriculture, field survey and mapping in agriculture geography, geographical determinants of agricultural land use: relief and climate, soils, human determinants of agriculture.

Section B

Models in agricultural geography, diffusion of agriculture innovations, land use and land capability classification, agricultural efficiency productivity, agricultural evaluation, techniques, crop ranking intensity, crop diversification and crop combination regions.

Section C

Agricultural regionalization, agricultural typology, green revolution, agricultural scenario in India, agro-climatic zones: India and Rajasthan, agricultural policy in India.

Recommended Readings:

Ali Mohammad 1981: Situation of Agricultural Geography. Rajesh Publication, New Delhi.
Ali Mohammad : Situation of Agricultural, Food and Nutrition in Rural India. Concept Publishing Co., Delhi.
Ali Mohammad : Synamics of agriculture Development in India. Concept Publication Co., Delhi.
ICAR (1956-71): Soil and Water Conservation Research.
ICAR : Soil Conservation of India.
Kostowickie, Z. : Agricultural Typology. Polish Academy, Warsaw.
Symon Lesin 1967: Agricultural Geography. G. Gell and Sons Ltd., London.
Singh, R.L. (Ed.) : Applied Geography. BHU Press, Varanasi.
Singh P.P. Govind Raju, K.C. and others : new Seeds Adoption and Yield, Sterling Publication Pvt. Ltd., New Delhi.
Singh, Jasbir : Agricultural Atlas of India. vishal Publishers.
Singh, Jasbir : Agricultural Geography of Haryana.
Noor Mohammad : Agricultural Land use in India. Inter-India Public, Delhi.

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Paper Code: Geo 403: Applied Geography

Section A

Meaning, nature and scope, principles and approaches, application of geographical methods of survey and geospatial tools in analysis of resource base, its appraisal, micro regional planning and demographic attributes.

Section B

Delineation of resource regions, regional divisions according to variations in levels of socio-economic development, special purpose regions-river valley regions, national capital region, problem regions- hilly regions, tribal regions, regions of drought and floods.

Section C

Planning for a region's development, state capital region (Jaipur), indicators of development and their data sources, measuring levels of regional development and disparities-case study of Rajasthan, land use policy implications in India with special reference to India, review of policies related to decentralized planning formulation at national, state, district, block and grass root level.

Recommended Readings:

Bhat, L.S. et al 1976: Micro-Level planning: A Case Study of Karnal Area, Haryana, K.B. Publications, New Delhi.

Blair, J. P. and Carroll, M. C. 2009: Local Economic Development – Analysis, Practices, and Globalization. SECOND EDITION, SAGE PUBLICATIONS, INC.

Chandna, R. C. 2008: Regional Planning and Development. Kalyani Publishers, Ludhiana.

Dutta, A.K., Mishra, H.N. and Chatterjee, M. 2008 (eds.): Explorations in Applied Geography. Printice-Hall of India Private Limited, New Delhi.

Friedmann, J. 1992: Empowerment: The Politics of Alternative Development. Blackwell, Oxford.

Gosal, G.S. and Krishan, G. 1984: Regional Disparities in Levels of Socio-Economic Development in Punjab. Vishal Publications, Kurukshetra.

Gupta, P., and Sdasyuk, G. 1968: Economic Regionalization of India: Problems and Prospects. Census of India, New Delhi.

Johnson, E.A.J. 1970: The Organisation of Space in Developing Countries. Harvard University Press, Cambridge.

Kundu, A. and Raza, M. 1982: Indian Economy, The Regional Dimension. Spectrum Publishers, New Delhi.

Misra, R. P. (ed.) 1992: Regional Planning: Concepts, Techniques, Policies and Case Studies. Concept Publishing Company., New Delhi.

Nangia, S. 1976. Delhi Metropolitan Region. Rajesh Publication, Delhi.

Pacione, M. 2009 (ed.): Applied Geography: Principles and Practice. Routledge, London.

Pathak, C. R. 2003: Spatial Structure and Processes of Development in India. Regional Science Association., Kolkata.

Raza, M. 1988: Contributions to Indian Geography. Volume X, Regional Development, Heritage Publishers, New Delhi.

श्रीवास्तव, वी.के. 1997: प्रादेशिक नियोजन और सामुदायिक विकास। बसुन्धरा प्रकाशन, गोरखपुर।

Sundaram, K. V. 2004: The Trodden Path: Essays on Regional and Micro Level Planning. Anamaya Publications., New Delhi.

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45

Paper Code: Geo 411: Practical

Minimum Marks 36	Bifurcation of Marks	Max. Marks 100
Written Test (Four Hours)	32 Marks	
Record Work and Viva-Voce.	12+04	
Field Survey and Viva-Voce. 2 hours	12+04	
Camp Work and Viva-Voce.	12+04	
Internal Assessment	20	
Total	100 Marks	

N.B. In written test there shall be 2 questions from each section. Candidates have to answer 4 questions selecting at least one question from each section. All questions carry equal marks. Examination be conducted in batches of not more than 20 candidates in any case. 12 hours of teaching practicals be provided for a batch of 20 students per week.

SYLLABUS

Section A

The art of surveying, history of surveying, scope and utility, problems and classification of surveying, use of plane table survey, types of traversing, resectioning in plane table survey: two and three point problems, use of Indian pattern clinometer.

Section B

Use of dumpy level, practical contouring cross sectioning, use and application of abeny level, theodolite: its parts and their functions, use, traverse and traverse computation, independent coordinates.

Section C

Use of total station and GPS, interpretation and identification of cultural and physical features on aerial photographs, photo interpretation of land use and settlements in the field.

Camp Work: A topographical survey of about 100 hectares in a settlement for one week away from the headquarter of the institution. Survey reports of the same will be prepared with the help of computer technology (word programme & AutoCAD). The marking on the survey report will be awarded by the external examiner in consultation with the internal examiner concerned.

Recommended Reading:

B.C. Punmia 1988: Surveying and Field Work. Vol. I, Laxmi Publications, New Delhi.
Breed. C.B. and Hosmer, G.L.: The Principle of Surveying. Vol.I and II, New York.
Devis, R.E. and Foot, F.S.: Surveying theory and practice. Mc-Graw Hill Book Co., New York.
Gautam, N.C.: Urban Land use studies through Airphoto Interpretation .
Roorke Engineering College: Mannual of Surveying.
T.R.Tracy: Surveying theory and practice. John Willey and Sons, Inc., New York.
Thrilfall, H.S., A.: Text Book of surveying and Levelling. Charles Graffiin, London.
Techniques: Pink Publishing House, Mathura.

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JAIPUR

46

Paper Code: Geo A01: Bio Geography

Section A

Definition, scope and significance nature, approaches, history, recent trends and developments, plant and animal ecology forms and functions of eco system, ecosystem with special reference to mountain and desert factors influencing distribution of flora, taxonomical and ecological classification of plant, ecological succession, ecotone and community, patterns of distribution of world vegetation.

Section B

Nature and classification of animals, dispersal and migration of animals: type and causes – case studies, geographical isolation, the zoo-geographical region, biogeography of the seas: island biogeography.

Section C

Conservation and management of forest and wild life with reference to India, process of desertification, its consequences and management principals, projecting into the future: climate change: biogeographical consequesces of global change: changing communities and biomes, effect of climate change on biological diversity, environmental hazards and problems of pollutions.

Recommended Readings:

Anjuneyulu, Y. 2002: Environmental Impact Assessment Methodologies. B.S. Publications, Hyderabad.

Anjuneyulu, Y 2004: Introduction to Environmental Science. B.S. Publications, Hyderabad

Benjkie, P. Carmon, T. and Davis, I (eds.) 2004: At Risk: Natural Hazards Peoples Vulnerability and Disasters Routtedge, London.

Clarke, J.I. Curson, P. Kayastha, S.L and Nag, P. (eds.) 1991: Population and Disaster. Basil Blackwell, U.S.A.

Cox, C.B. Moore, P.D. 2010: Biogeography- An Ecological and Evolutionary Approach. Johnwiley and Sous, U.S.A.

Huggett, R.J. 1998: Fundamental of Biogeography. Routledge, London.

Ladle, R.J. and Whittaker, R.J. 2011: Conservation Biology. Blackwell Publications Co., U.S.A.

Mathur, H.S. 1988: Essentials of Biogeography. Pointer Publishers, Jaipur.

Macdonald, Geen, 2002: Biogeography: Introduction to Space-Time and Life. John Wiley, New York.

Odum, E.P. 1975: Ecology, Rowman and Littlefield. Lanhan U.S.A.

Robinson,H. 1982:Biogeography. Eles,Mc.Donald and Evans London.

Singh, A.K., Kamra, V.K. and Singh, J. 1986: Forest Resource: Economy and Environment. Concept Publishing Company, New Delhi.

सिंह, एस. 2013: जैव भूगोल। प्रयाग पुस्तक भवन, इलाहाबाद।

Dy. Registrar (Acad.)
University of Rajasthan
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47

Paper Code: Geo A02: Industrial Geography

Section A

Evolution of industrialization (India and World), location factors of industries, theories: least cost school, transport cost school, market areas school, marginal location school and behavioural school, new trends in industrial geography, concept of entrepreneur, significance of enterprise and firm, significance of cost and price.

Section B

Formation and delineation of industrial regions, industrial complexes, industrial regionalization, industrial regions in India: Hooghly side industrial regions, Damodar valley industrial regions, Delhi-Mumbai industrial corridor, industrial policies of India, liberalization, privatization and globalization (special reference of India); special economic zones, industrial regions of World: Ruhr basin industrial region, Great lakes industrial region.

Section C

Industries: cotton, jute, textile, iron and steel, aluminium, fertilizer, paper and pulp, copper, chemical and pharmaceutical, ship building, automobile, cottage and agro-based industries, tourism industry, concept of optimum location, geographical inertia, multi-location industries, market oriented industries, foot loose industries, raw material oriented industries, manufacturing industries, processing industries.

Recommended Readings:

Lloyd and Dicken: Location in Space: A theoretical Approach to Economic Geography.

M.C Carr and Lindberg Hodder and Lee Economic Geography: A preface to Economic Geography

Smith, D.E. Cox K.P. Man: Industrial Location. A Economic, Geographical Analysis Location and Behavior-An Introduction to Human Geography.

Riley, R.C. 1973: Industrial Geography. Chalto and windus, London.

Bengston, N.A.: Fundamentals of Economic Geography. Prentice Hall, New York.

Besoh, H.: A Geography of world Economy, D. Van Noetrand.

Britton, John. N.H.: Regional Analysis and Economic Geography. G. Bell and Sons, London.

Estall, R.C. and Buchanan, R.O.: Industrial Activity and Economic Geography. Hutchinson and Co., London.

Ghose, B.C.: Industrial London.

Hoover, E.M.: The Location of Economic Activity. McGraw Hill Books Co. New York.

Saxena, Economic Geography.

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Paper Code: Geo B01: Regional Planning and Development

Section A

Conceptual and theoretical framework of regional planning, principles and determination of regional planning, multi-level planning and inter-regional stresses, regional hierarchy, role of geography in preparation of a regional plan, significance of the term integration (political, economic and spatial) for regional planning.

Section B

The process of regional development: indicators of development; levels of regional development and disparities, strategies for development. regional planning in India: concept and indicators of development; regional imbalances; type of regions and methods of regionalization, growth pole and growth centers, environmental issues in regional planning for sustainable development, demarcation and planning regions of India.

Section C

Role of remote sensing, global positioning systems (GPS) and geographic information system (GIS) in modern regional planning, case studies from selected countries: regional planning in USA (TVA), regional planning in India (DVC and NCR) regional planning in Netherlands, Principles of town and country planning.

Recommended Readings:

Dube K. N. (ed) 1990: Planning and Development in India. Asia Publishing House, New Delhi.

Govt. of India 1986: Regional Plan 2001 - National Capital Region. NCRPB, Ministry of Urban Development, New Delhi.

Bhat, L. S. 1973: Regional Planning in India. Statistical Publishing Society, Kolkata.

Blair, J. P. and Carroll, M. C. 2009: Local Economic Development - Analysis, Practices, and Globalization. SECOND EDITION, SAGE PUBLICATIONS, INC.

Chandna, R. C. 2008: Regional Planning and Development. Kalyani Publishers, Ludhiria.

Journal of Geography and Regional Planning (JGRP) is an open access.

Hufschmidt, M.M. 1969: Regional Planning: Challenges and Prospectus. Praiger and Company, New York.

Mishra, R.P. 1978: Regional Planning and National Development. Vikas Publications, New Delhi.

Mishra R.P. (ed) 1992: Regional Planning: Concepts, Techniques, Policies and Case Studies. Concept Publications, New Delhi.

श्रीवास्तव, शर्मा एवं चौहान 2008: प्रादेशिक नियोजन और संतुलित विकास। वसुन्धरा प्रकाशन, गोरखपुर।

www.academia.edu/Papers/in/Economic_Geography

www.jstor.org/stable/143805

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Paper Code: Geo B02: Geography of Water Resources

Section A

Definition and scope of water resource geography, inventory and distribution of world's water resources, water resources of India, groundwater, hydrological cycle, demand and use of water, irrigation methods.

Section B

Salinity, alkalinity, overexploitation of groundwater and arsenic problem, water pollution, river water pollution, demand and water supply in industries, flood management, drought and dry land farming.

Section C

Water conservation/participatory approach, traditional methods of water conservation in India and Rajasthan, integrated basin planning, watershed management, river water disputes, water management by remote sensing technology, environmental disasters and water crisis.

Recommended Readings:

Agarwal, Anil 2001: Drouht: Try Capturing the Rain, Briefing paper. Down to Earth. Centre for Science and Environment, New Delhi.

Agarwal, Anil and Narain Sunita, 1998, (eds.): Dying Wisdom: Rise, Fall and Potential of India's Traditional Water Harvesting System. Centre for Science and Environment, New Delhi

Black, Magie, 2005: The No-Nonsense Guide to Water. Rawat Publications, Jaipur.

Black, Magie, 2004: A Matter of Life and Health. OUP, New Delhi.

Barlow and clark Tony, 2002: Blue Gold: The Battle Against Corporate Theft of the World's Water. Earthscan, London

भारती, राधाकांत, 1998: भारत की नदियाँ। नेशनल बुक ट्रस्ट ऑफ इण्डिया, नई दिल्ली।

Climate Change, 2001: International Pannel on climate Change. Cambridge University Press.

Clarke, Robin 1991: Water: The International Crisis. Earthscan, London.

Dams and Development 2000: Report of the World Commission on Dams. November.

Das, P.K. 1996: The Monson. National book Trust, India, New Delhi.

Dhuruv Narain, V.V., Shastry, G. and Patnaik U.S. 1990: Watershed Management. ICAR, New Delhi

Dakshinamurti, C., Michael, A.M. and Mohan, S., 1972: Water Resources of India and their Utilization in Agriculture. IARI Monograph No. 3, New Delhi.

Gurjar, R.K. 1990: Geographical Perspectives on Irrigation. Rawat Publications, Jaipur.

Goudie, A., 1997: The Nature of the Environment, Blackwell, London.

Kirmenday, David, 1988: Troubled Water: River, Politics and Pollution. Hillen Shipman, London.

Mahnot, S.C. and Singh, P.C., 1993: Soil and Water Conservation. Intercooperation Coordination Office, Jaipur.

Narain, Sunita, 2004: Down to Earth, Febuary 29, 2004.

Park, C., 1997: The Environment: Principles and Application. Routledge, London.

Rao, K.L., 1975: India's Water Wealth. Orient Longman, New Delhi.

Singh, Gopal, 2004: A Geography of India. Atma Ram & Sons, New Delhi.

Shiva, Vandana, 2002: Water Wars: Privatization, Pollution and Profit. Pluto Press, London.

Sam Water Resources Plan, 1998: Volume, I, II, III : Tahal consulting Engineer. Ltd. Tel Aviv, Israel.

Sidhartha, K., 1990: Flood in India: A Model for Generating Factors. Condor Patna.

Sidhartha, K., 1989: Drought in India: Spatio Temporal Variations. H.T. Patna.

Singh, R.L., 1971: India: A Regional Geography. NAGI, New Delhi.

World, C., 1997: Reflected in Water: A Crisis of Social Responsibility. Cassed London.

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Paper Code: Geo C01: Oceanography

Section - A

Oceanography – nature, scope and development, distribution of land and water, Ocean bottom topography, bottom relief of Pacific, Atlantic and Indian Ocean.

Section - B

Characteristics of Ocean water: temperature – distribution, salinity – composition, source and distribution, density of sea level. Movement of ocean water: currents - causes and character, currents of Atlantic, Indian and Pacific Ocean, Waves, tides and theories of origin.

Section - C

Ocean deposits and coral reefs: sources, types and distribution of ocean deposits, coral reefs –formation, condition of growth, type and theories of origin.

Recommended Readings:

Davis, R.J.A. 1986. Oceanography – An Introduction of the Marine Environment, Win C. Brown, Iowa.

King, C.A., Oceanography for Geographers, Edward Arnold Pub.

Murray, S.J., 1913, Ocean, A General account of the Science of the sea, Thorton Butter Worth, London.

Siddhartha, K. 1999, Oceanography, A Brief Introduction, Kisalaya Pub. Pvt. Ltd., New Delhi..

Singh, S. 2002, Physical Geography, Prayag Pub., Allahabad.

Stahler, A. N. Stahler A.M., 1997, Geography and man's Environment, John Wiley and Sons, New York.

Thurnman, H.V., 1978, Introduction to oceanography, Charles E. Merrill Pub. Co., London.

Weyl, P.K. 1970, Oceanography an Introduction of the Marine Environment, John Wiley and Sons Ltd., London.

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Paper Code: Geo C02: Principles and Applications of Remote Sensing and Geographical Information System

Section A

Remote sensing: definition and scope of remote sensing, elements of remote sensing: electro-magnetic radiation and interaction with earth surface features, data products and users, atmospheric windows, remote sensing systems: platforms, sensors, resolution and radiometric characteristics, elements of image interpretation and keys, types of aerial photographs, aerial cameras types of mosaics, relief displacement and parallax, Satellites: landsat- Mss & Tm, Spot, Noaa-Avhrr, Irs, Modis, Radarsat, Ikonos, Quickbird & Cartosat.

Section B

Digital image processing and classification: pre-processing and image enhancement techniques- rectification and restoration, contrast manipulation, density slicing, spatial filtering and band ratio, classification- supervised and unsupervised, post-classification analysis and accuracy assessment, microwave remote sensing, advantages over optical, unique capabilities of microwave, SAR & SLAR.

Section C

RS applications: mapping and monitoring of land use and land cover, forestry and desertification, soil and water resources, remote sensing and hazard mapping and environmental monitoring, introduction to GIS, fundamentals of GIS- geospatial databases data structure and formats, projections and coordinate system, raster and vector data infrastructure and analysis, integration of remote sensing and GIS.

Recommended Readings:

American society of Photogrammetry1983: Manual of Remote sensing. ASP, Falls Church,V.a..

Barrett E.C. and L.F. Curtis, 1992: Fundamentals of Remote sensing and Air photo Interpretation. Mcmillan, New York.

Compbell J. 1989: Introduction to Remote Sensing. Guilford, New York.

Curran, paul J. 1985: Principles of Remote Sensing. Longman, London.

चुनियाल, जी.सी. 2004: सुदूरसंवेदन तथा भौगोलिक सूचना प्रणाली। शारदा पुस्तक प्रकाशन, इलाहाबाद।

Hord R.M. 1989: Digital Image Processing of Remotely Sensed Data. Academic, New York.

Lilsand, T., Kiefer, R.W. and Chipman. J. 2007: Remote Sensing and Image Interpretation. John wiley & Sons, New York.

Jalan, Seema 2010: Image Processing. Sahityagar, Jaipur.

Luder D. 1959: Aerial photography Interpretation: Principles and Application. McGraw Hill, New York.

Pratt W.K. 1978: Digital Image Processing. John Wiley & Sons, New York.

Rao D.P.(ed.) 1988: Remote Sensing for Earth Resources. Association of Exploration Geophysicist, Hyderabad.

Thomas M. Lillesand and Ralph W. Kefer 1994: Remote Sensing and Image interpretation. John wiley & Sons, New York.

Paper Code: Geo D01: Dissertation

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SYLLABUS

Bachelor of Business Adminstration

Annual Scheme

BBA Part-I Examination 2021
BBA Part-II Examination 2021
BBA Part-III Examination 2021

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SCHEME OF EXAMINATION

BACHELOR OF BUSINESS ADMINISTRATION (BBA PART-I)

(10+2+3 Pattern)

Eligibility:-Candidates must have passed Senior Secondary Examination or equivalent with 48% marks.

Medium of instruction and examination will be English/Hindi.

For pass at each examination, a candidate shall be required to obtain a minimum of 36% marks in each paper and 48% marks in the aggregate.

Successful candidate will be qualified as under :

(a)	48% and above but less than 60% marks	II Division
(b)	60% and above but less than 75% marks	I Division
(c)	75% marks and above	I Division with distinction

The number of papers and practicals, wherever prescribed, the duration of examination, maximum marks and minimum pass marks are shown separately against each paper.

A student will be required to pass BBA Course within five years from the date of his/her admission.

Distribution of Marks

S.No.	Name of the Subject/Paper	No. of papers to be offered	Duration	Max. Marks	Min. Marks
1.	Paper-I: Business & Management	One	3 hrs.	100	36
2.	Paper-II: Business Communication	One	3 hrs.	100	36
3.	Paper-III: Legal Aspects of Indian Business	One	3 hrs.	100	36
4.	Paper-IV: Business Economics	One	3 hrs.	100	36
5.	Paper-V: Financial Accounting	One	3 hrs.	100	36
6.	Paper-VI : Computer Fundamentals Theory Practicals	One	 2 hrs. 2 hrs.	 40 60	 14 22

50% Papers (i.e. Three papers) can be carried forward from BBA Part-I examination to BBA Part-II examination and from BBA Part-II examination to Part-III examination. Further for BBA Part-III Examination, 50% of the papers (i.e., three papers) carried forward as due papers may be either from BBA Part-I or BBA Part-II or a mix from both years (BBA-I & BBA Part II)

The Pattern of question papers shall be as under :-

There will be five questions in all. The candidate will be required to attempt all the questions selecting one question from each Unit with an internal choice (either/or).

Raj Jain

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BACHELOR OF BUSINESS ADMINTRATION

PART-1

Paper-1 Business and Managemant — 3 Hours duration

Scheme: Maximum Marks: 100

Minimum Pass Marks: 36

Unit-I

Business & Management: Features and scope of Business. Elementry knowledge of Trade, Industry and Commerce, Types of Industries, Forms of ownership- Sole trading, Partnership, Company, Cooperatives, Joint sector, Public Enterprises.

Unit-II

Concept of management, Nature and scope of management. Management Functions, Functional areas of Management (elementary knowledge only), Principles of Management, Schools of Management Thought.

Unit-III

Planning: Nature and components of planning. Types of plans, Process of planning, Effective planning, MBO.

Decision-making: Process and Techniques of decision-making.

Unit-IV

Organisation: Definition, Principles of organisation, Forms of structure, Formal and informal Organisation, Delegation of authority.

Leadership: Function and Theories of Leadership, Leadership Styles.

Coordination: Principles and Techniques of coordination, Effective coordination

Unit-V

Motivation: Human needs, Techniques of motivation, Sound motivation system, Theories of motivation (suggested by Maslow, Herzberg, McGregor, Victor Vroom)

Control: Nature and process of control, Techniques of control elementary knowledge only. Effective control system

Books recommended:

1 Koontz and weihrich—Essentials of Management (Tata McGraw Hill Co.)
2 Newman, Warren & McGill—The process of management (Prentice-Hill of India Pvt, Ltd,)
3 Terry and Franklin--Principles of Management (All India Travellers Booksellers)
4 Toseph L. Massie—Essenntials of management (Prentice Hall of India)
5 Stoner, Freeman and Gilbert—Management (Prentic Hall of India)
6 Robert N. Lussier-M, Lussier—Management Fundamentals (South-Western college Publishing)
7 Dr B.S. Mathur—Principles of Management (National publishing House, Chaura Rasta, Jaipur)
8 M.J. Mathew-Business Management (Sheelsons, Jaipur)
9 G.S. Sudha--Business Management (RBSA, Jaipur)

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Paper-II: Business Communication

Scheme: Maximum Marks: 100 3 Hours duration

Minimum Pass Marks: 36

Unit-I

Concept and objectives of Communication, Effevtive Communication, Communication Process, Types of Communication-Upward and Downward Horizontal. Grapevine

Unit-II

Media of Commmunication: Written, oral, face-to-face, visual, audio-visual, modern media telex, fax teleconferencing, E-mail, media of non verbal communication, kivesies effects.

Unit-III

Barriers to communication: Wrong choice of medium, Physical barriers, Semantic burles, Different comprehension of reality, Socio-psychologigical burgers.

Unit-IV

Aids to correct writing: Tenses, Models, Conditional Infinitives, gerunds and participles, Active and Passive voice, Subject-verb agreement, Common errors.

Unit-V

Practical aspects of business communication: Report writing, Public speaking, Seminar Present on, Interview, group descussion Effictive listning

Writing Skills: types of business letters and letters writing.

Books recommended:

1 Rajendra Pal and J.S. Korlahalli- Essentials of Business Communication (Sultan Chand & Sons)
2 C.S. Rayed—Communication (Mumbai: Himalaya Publishing House)
3 C.B. Gupta—Business Communication & Customer Relations(Sultan Chand & Sons)
4 Parag Diwan—Communication Management (Deep & Deep publication Pvt. Ltd.)
5 Ronald E. Dulek and john S. Fieden—Principles of Business Communication (Macmillan Publishing Co.)
6 Karl Erik Rosengern—Communication—An Introduction (Sage Publications)
7 Websters Guide to Effective Letter Writing – Harper & Rom.
8 Krishna Mohan and Meera Banerji—Developing Communication Skill (Macmillan India Ltd)

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Paper-III: Legal Aspects of Indian Business

Scheme: Maximum Marks: 100 3 hours duration

Minimum Pass Marks: 36

Unit-I

Law of contract: Nature of contract, Classifications, Offer and Acceptance, Capacity to contract, Free Consent, Consideration, Legality of object, Agreement declared void, Performance of Contract, Discharge of Contract, Remedies for brach of contract.

Unit-II

Special Contract: Indemnity, Guarantee, Agency.

Unit-III

Sale of Goods Act: Formation of Conrtact of sale, Goods and their classification, price conditions & warranties, Passing of property in goods, Performance of contract of sale, Unpaid seller, sale by auction.

Unit-IV

Negotiable Instruments Act: Definition of Negotiable Instruments, Features, Promissory note, Bill of Exchange & cheque, Holder & Holder in due course, Crossing of cheque, Types of crossing, Dishonours of cheque.

Unit-V

Indian Companies Act: Meaning & Nature of company, Lifting of Corporate veil: Functions, Duties, Lianilities and Right of Promoters: Procedure of Registration: Contents and alteration of Memorandum and Articles of Association, Propectus, Statement in lieu of Propectus.

Directors: Power and Duties, Appoinment and Removal of Directors, Appoinment and Role of company secretary.

Books recommended:

1 Avtar Singh—Company Law (Estern Books Co. Lucknow)
2 Gulshan and Kapoor—Business Law.
3 Avtar Singh--- Mercantile Law (Estern Books Co. Lucknow)
4 M.J Matthew--- Commercial Law (RBSA, Jaipur)
5 M>J Matthew—Company Law (RBSA, Jaipur)
6 Majumdar and Kapoor—Company Law and Practice (Taxman New Delhi)

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Paper- IV: Business Economics
Scheme: Maximum marks: 100 3 Hours duration
Minimum pass marks: 36

Unit-I

Meaning and scope of Economics: Micro vs Macro Economics Methodology of Economics.

Utility Analysis: Law of Diminishing Marginal Uitlity, Equimarginal utility, Consumer's surplus,

Unit-II

Indifference Curve Analysis Law of Demand. Demand Forcasting.

Laws of Returns: Production Function in Short-Run and Long-Run

Unit-III

Market Cost and Revenue analysis: Pricing under perfect Competition Monopoly, Monipolistic Competition, Oligopoly.

Unit-IV

Theory of Factor Pricing: Marginal Productivity Theory of Distribution.Rent, Wages, Interest, Profit

Unit-V

National Income Analysis: Various concept, Measurement and Economic Welfare.

Keynes and classicism: Brief study of keynesian Theory of Employment. Business Cycles.

Growth vs Development: Theories OF Economic Growth.

Books recommended:

1 M.L Seth --- Principles of Economics, Laxmi Agarwal, Agra
2 M.L. Jhingan--- Princiles of Economics, Vikas, New Delhi
3 Paul A. Samuelson – Economices, McGraw Hill International New York
4 D.N Dwivedi--- Managerial Economics, Vikas, New Delhi.
5 N.D Mathur—Business Economics, Shivam Books House(P) Ltd. Jaipur
6 D.M Mithani--- Fundamental of Business and Managerial Economics, Himalays Publishing
7 U.L Mote, Samule Pual and G.S Gupta--- Managerial Economics Tata Mcgraw Hill Mumbai

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BBA part I Exam
Paper-V Financial Accounting

Scheme: Maximum Marks: 100 3 Hours Duration
Minimum Pass Marks: 36

Unit-I

Generally Accepted Accounting Principles: Concepts and Conventions, Accounting Equation, Books of Original Record, Journal and Subsidiary Books, Ledger, Trial Balance.

Unit-II

Depreciation, Provision and Reserves, Rectification of Errors, Preparation of Final Account with Adjustments.

Unit-III

Bank Reconciliation Statement.
Accounting of Non-Profit Organisations and Professional People.
Insurance claims for loss of stock and loss of profit.

Unit-IV

Issue and Forfeiture of Equity Shares, Issue and Redemption of Preference Shares and Debentures.

Unit-V

Financial Statements of Companies including Managerial Remuneration.
Disposal of Profits and Issue of Bonus Shares.

Books Recommended:

1. Shukla & Grewal- Advanced Accounts.
2. S.N Maheshwari-Advanced Accountancy, Vol I & II
3. Sharma & Bhardwaj-Book-keeping & Accountancy.
4. Sharma, Shah & Agarwal-Financial Accounting.
5. Monga, Sehal, Ahuja-Advanced Accounts, Vol I & II
6. R. L. Gupta & M. Radhaswamy- Advanced Accountancy, Vol I & II

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Paper VI: Computer Fundamentals

Maximum Marks:	Theory	40
	Practical	60
Minimum Pass Marks:	Theory	14
	Practical	22
Time allowed:	Theory	2 Hours
	Practical	2 hours

Unit-I

1 Introduction to computers and related Terminology (Basic Information only)

(a) Hardware CPU—(Motherboard, Microprocessor,(The intel) Pentium III AMD and Cyrix), MMX Technology, System Clock, Address Bus, Data Bus (PCI & EISA) eache Memory Processing Speed,Espansion Slots (Video Cintroller, Sound cards, SCSI, Network card), Memory—(Unit RAM, ROM, EDO RAM, SD RAM), Input and output Devices—Keybord (The Standard Keyboard layout) Mouse Printers (DOt-Matrix, Ink-jet, Laser Jet) Microphone, Speakers, Modem, Scanner, Digital Cameras) Stroage Devices Diskette Drive (Types, Demsity, Formatting Boot Record FAT Folder Directory) Hard Disk Drive CD ROM Drive, (C.D /rom Speeds) CD-R Drive, DVD Rom Drive, Tape Drive

(b) Software—Introduction to Programming Languages, systems software (Operating system and utilities) Application Software (Word Processors Spreadsheet, DBMS. Presentation Graphics, Browsers Personls Information Managers) Introduction to Multilingual word processors.

(c) Communications and Connectivity—Data Communication system. Data transmission (Serial Parallel, bandwidth, protocols) E-Mail FAX Voice and video messaging, video conferencing, Online services user connection (types) Networking of Computers (NOne, Client server LAN, WAN) Using the network, The Internet and the web.

Unit-II

2 Operating System (Working Knowledge at Common Users Level Only)

Overwiew of improtant DOS commands, windows 98: Installation scandisk, COntrol Panel, Taskbar Toolbars, Disply setting (Background Wallpaper Svreensaver, Desktop thems) Files and Folder management, Windows Explorer,Finding Files and Folders, Formatting Disks and Copying files, Printer Settings.

Modem Installation Mouse Installation Adding and Removing Programmes, Active Desktop Concepts, Winzip and its applications Norton Antivirus and its use. Use of calculators, Paintbrush, Winmap MPEG player and Window help.

Unit-III

3 Application Softword (Working Knowledge at common users Level only)

(a) Word Processing Software—MS Word

Entering, Editing and formatting text document formats page size and orientaion, Headers and Footers, COlumns and sections page layout) Spelling and Grammer checkers. Thesaurus Find and Replace Cut and Paste. TAbles and formatiing tables Mails Merge Style and Templates.

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Unit-IV

(b) Spreadsheet Programme- MS Excel

Entering Data, labels Values Dates Formulas Cell reference Formats Functions Templates Charts and Maps Analysising data in a spreadsheet.

© DBMS--- Microsoft Sccess

Database, Entering data into the database Creating Databse tables editing data, Viewing Record, Shorting record, Querying a database, generating reports.

Unit-V

4 Computer Programming: Algorithm devolopment—step in programme development problem indentification task analysis, Data anatysis GIGO Outputs and Inputs Pseudo cods Algorithms, Flow Charting Programme coding testing and debugging.

Programming (Using C Language) Data Types, Variables and constants, Expressions, Operators and assignments statement control statement console I/O Arrays functions Dynamics data structure in C-pointers, Structures and Uniouns and user defined varibles. File Handling. The C-preprocessor C-standard Library and Header files.Simple Programming ecercise

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BACHELOR OF BUSINESS ADMINISTRATION

Part-II

Medium of instruction and examination will be English/Hindi.

For pass at each examination, a candidate shall be required to obtain a minimum of 36% marks in each paper and 48% marks in the aggregate.

Successful candidate will be qualified as under-

(a)	48% and above but less than 60% marks	II Division
(b)	60% and above but less than 75% marks	I Division
(c)	75% marks and above	I Division with distinction

The number of papers and practicals, wherever prescribed, the duration of examination, maximum marks and minimum pass marks are shown separately against each paper.

A student will be required to pass BBA Course within five years from the date of his/her admission.

Distribution of Marks

S.No	*Name of subject/Paper*	*No.of papers to be offered*	*Duration*	*Max. Marks*	*Min. Pass Marks*
1.	Paper-I Strategic Management	One	3 hrs	100	36
2.	Paper-II Marketing Management	One	3 hrs	100	36
3.	Paper-III Human Resource Management	One	3 hrs	100	36
4.	Paper-IV Business Finance	One	3 hrs	100	36
5.	Paper-V Quantitative Techniques	One	3 hrs	100	36
6.	Paper-VI Management Information System	One	3 hrs	100	36

50% Papers (i.e. Three papers) can be carried forward from BBA Part-I examination to BBA Part-II examination and from BBA Part-II examination to Part- III examination. Further for BBA Part-III Examination, 50% of the papers (i.e., three papers) carried forward as due papers may be either from BBA Part-I or BBA Part-II or a mix from both years(BBA-I & BBA Part- II)

The Pattern of question papers shall be as under :-

There will be five questions in all. The candidate will be required to attempt all the questions selecting one question from each Unit with an internal choice (either/or)

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Paper-I Strategic Management

Scheme : Maximum Marks : 100
Minimum Pass Marks : 36

3 Hours duration

UNIT I

Introduction : Meaning of Strategic Management, Role of Strategic Management, Process of SM, Limitations of SM, Organizational Mission, Vision, Objectives and Goals

UNIT II

Environmental Scanning: Appraisal of External Environment, Dynamics of Internal Environment, Organizational Capabilities and Appraisal, Core Competence.

UNIT III

Strategy Formulation: Corporate Level Strategy, Business Level Strategy, Functional Level Strategy.

UNIT IV

Strategy Implementation: Aspects of Strategy Implementation, Procedural Implementation, Resource Allocation, Organizational Design and Change, Corporate Culture.

UNIT V

Strategic Evaluation and Control: Meaning of Strategic Evaluation and Control, Criteria and Techniques of Strategic Evaluation and Control.

Books Recommended :

1. David, F.R. (1997),Cases in Strategic Management, New Jersey : Prentice Hall.
2. Prased, L,M. (1995), Business Policy & Strartegy, New Delhi : Sultan Chand & Sons.
3. Jauch, L.R. & Glueck, W.F. Business Policy and Strategic Management, Mc Graw- Hill.
4. Ramaswamy, V.S. & Namakumari, S., Strategic Planning Formulation of Corporate Strategy, Delhi : Macmillan India.
5. Azhar Kazmi :Strategic Management

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Paper- II MARKETING MANAGEMENT

Scheme : Maximum Marks : 100
Minimum Pass Marks : 36

3 Hours duration

Unit-I

Introduction: Nature and scope of Marketing, Importance of marketing in liberalized Economy, Marketing concept, Product Differentiation, Brand and Trade Marks, Packaging, Labeling, Product life cycle.

Unit-II

Marketing Research: Meaning of Market Research, Nature and importance of Marketing Research, Areas and Techniques of Marketing Research, selection of the Channels of Distribution.

Unit –III

Pricing Strategy: Factors to be considered in pricing, pricing objectives and strategies, Break even analysis, Uses of sales forecast, Methods of sales forecast, Market segmentation.

Unit-IV

Determining the sales promotion programme, personal selling, selling process – qualities of a salesman. Advertising (Media choice, Good copy, Budgeting,). Sales Promotion methods, Public Relations (Methods).

Unit-V

Control of Marketing Operations: Need for control, phase of Control, Techniques of controlling (Budgeting, Sales analysis Distribution cost accounting and analysis), Marketing audit.

Books Recommended :

1. Kotler, Philip, Marketing Management (New Delhi : Prentice-Hill of India Pvt , Ltd. The Millinnium edition).
2. Saxena, Rajan, Marketing Management (New Delhi : Tata Mc Graw-hill Publishing Co. Ltd.)
3. Ramaswamy, V.S. and Namakumari,S. Marking Management Planning Implementation and Control The Indian context (Delhi: Macmillan India Ltd.)
4. Varshney R.L. and Gupta, S.L. Marketing Management (The Indian Perspective) - Text and Cases (New Delhi : Sultan Chand & Sons)
5. Kotler, Philip, Armstrong, Gary, Principles of Marketing (New Delhi, Prentice Hall of India Pvt., Ltd.)
6. Sherleker,S. Marketing Management (Mumbai: Himalaya Publishing House)
7. Gandhi, J. C. Marketing Management : An Introduction (New Delhi : Tata McGraw Hill Publishing Co. Ltd.)

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Paper -III : Human Resource Management

Scheme : Maximum Marks : 100
Minimum Pass Marks : 36

3 Hours duration

Unit-I

Introduction : Scope, Importance and functions of HR Management. Role of HR Department, HR Environment in India

Unit-II

Procuring Human Resources: HR Planning, Recruitment and Selection, Induction and Placement

Unit-III

Human Resource Development: Career Planning and Development, Training.

Unit-IV

Performance and Potential Appraisal, Merit Rating, Executive Development

Unit – V

Motivation and Morale, Leadership.

Books Recommended:

1. Saiyadain, Mirza S.: Human Resource Management, Dhanpat Rai and Co. Pvt. Ltd., New Delhi, 1999.
2. Chhabra, T.N.: Human Resource Management, Dhanpat Rai and Co. Pvt. Ltd., New Delhi, 1999
3. Flippo, Edwin B.: Principles of Personnel Management, McGraw Hill, New York.
4. Dessler, Garry : Human Resource Management, Prentice Hall of India,
5. Gupta, C.B. : Human Resource Management, Sultan and Sons, New Delhi

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Paper - IV BUSINESS FINANCE

Scheme : Maximum Marks : 100
Minimum Pass Marks : 36

3 Hours duration

Unit –I

Environment of Business Finance :
Finance: Concept, Finance & other discipline, Business Financing, Corporate Finacing. Financial Forecasting ,Fundamentals of Stock market.

Unit –II

Perspectiveof Finance :
Financial Management-meaning , objectives, scope and functions, functional areas of Financial management, Financial Decisions, Role of CFO.

Unit –III

Financial Planninmg & Forecasting.
Financial Planning : meaning, characterstics, Captialisation : under capitalisation and over capitalisation. Financial forecassting : meaning, tools of Financial forecasting ,Cost of Capital,Capital Budgeting.

Unit –IV

Working Capital Management:Theory of working capital management, Management of cash and marketable securities,Receivables Management, Inventory Management

Unit –V

Techniques of Financial Analysis: Analysis of financial Statements:
Statement of change in Financial position Funds Flow Analysis Cash Flow Analysis, Cash Volume Profit Analysis, Financial Analysis through leverages.

Books Recommended :

1. Khan, M.Y. & Jain P.K., Financial Management : Text & Problems, New Delhi : Tata McGraw-Hill
2. Chandra, Prasanna Financial Managment-Theory & Practice Management Tata McGraw-Hill
3. Kulkarni P.V.& Satyaprasad, B.G. Financial Management-A Conceptual Approach Mumbai : Himalaya Publishing House
4. Pandey, I.M. , Financial Management, New Delhi : Vikas Publishing House
5. Vanhorne, James C., Financial Management & Policy New Delhi : Prentice Hall of India
6. Kishore, Ravi M., Financial Management with Problems & Solutioins, New Delhi, Taxmann
7. Block & Hert, Foundation of Financial Management

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Paper-V : Quantitative Techniques For Management

Scheme : Maximum Marks : 100
Minimum Pass Marks : 36

3 Hours duration

Unit –I

Quantitative Teciniques : An Introduction, Statistical and operations Research techniques, Scope and application of quantitative techniques, Scientific approach in decision making. Limitation of these techniques. **Probability and probability distributions :** Laws of probability, Baye's theorem, Methematical Expectation, Binomial, poisson and normal probability distribution.

Unit –II

Decision Theory : Decision making under certainty, uncertainty and Risk, Decision tree analysis. **Linear Programming** : Graphical and Simplex Solutions of LPP. Primal and its duel.

Unit –III

Transport and Assignment Problems : Network Analysis - Programme Evaluation and Review Technique (PERT) and Critical Path Method (CPM), Cost Analysis and Crashing the Network.

Unit –IV

Theory of Games and Queuing Models : Two persons Zero sum games, pure and mixed strategy. **Queuing mode Single channel queuing theory** Application of queuing theory in business decision making.

Unit –V

Replacement Theory: Replacing of items that deteriorate with time, Time value of money concept and replacement,**Simulation:** Advantages, Limitations, Monte Carlo Method.

Books Recommended :

1. Kothari, CR, Quantitative Techniques, New Delhi : Vikas Publishing
2. Kapoor, V.K., Operations Research, New Delhi : Sultan Chand & Sons.
3. Khandelwal, M.C. and Gupta Quantitative Techniques.

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Paper-VI : MANAGEMENT INFORMATION SYSTEM

Scheme : Maximum Marks : 100
Minimum Pass Marks : 36

3 Hours duration

Unit –I

Introduction to MIS: Concept of MIS, role of MIS, objectives of MIS, emergence of MIS, MIS and computers, Impact of MIS, systems approach to MIS, Advantages, and disadvantages of computer based MIS.

Unit –II

Information : Classification of information, levels of information, Methods of data and Information collection, value of Information

Unit –III

Information system for decision making : Decision- making and MIS, decision making concepts organisational decision-making, MIS and decision making concepts. MIS as technique for programme decisions, Decision support system.MIS and role of DSS.

Unit –IV

Data base Management systems: Data base Management systems: Data base concepts, data base models data base design, RDEMS MIS and RDEMS, Introduction of oracle, Network topology, LAN and WAN, Data communication.

Unit –V

MIS in operations : MIS for Finance, MIS for Marketing MIS for production, MIS for Human resource Management, MIS for marketing.

Books Recommended :

1. Javedkar, W.S.-Management Information Systems (Tata McGraw-Hill Publishing Company Ltd., New Delhi)
2. Mardic R.G., Ross J.E.& clagget J.R. - Information System for Modern Management (Prentice Hall of India)
3. James A.O. Brien Management Information Systems, (Galgota Publications)
4. Locus, Analysis, Design and Implementation of Information System (McGraw-Hill Book Co.)
5. Anderson, Lavid L. Post, Gerald V., Management Information System (Tata-McGraw Hill Publishing Co.)

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BBA Part-III

Paper I- Organizational Behaviour

Paper II- Indian Management Thought and Business Leaders

Paper III- International Business

Paper IV- Cost and Management Accounting

Paper V- E-Commerce

Paper VI- Comprehensive Viva Voce

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Paper- I

Organizational Behaviour

Unit I :

Meaning and Concept of Organization Behaviour, Role of OB in Today's Business organization, Challenges and Opportunities, Theories of Organization Behaviour, Social Systems and Organizational Culture.

Unit II :

Perception, Nature, Importance, Difference between Sensation and Perception; Personality: Meaning, Determinants of Personality, Personality Traits and Types, Values attitudes and Job Satisfaction.

Unit III :

Interpersonal Behaviour, Group Dynamics- Meaning, Norms and Role, Theories of Group, Cohesiveness, Dynamics of Informal Group, Team and Team building.

Unit IV :

Definitions of Conflict, Process, Negotiations Process, Individual differences in negotiation effectiveness, Causes of Stress and its effects, Stress and Conflict Management.

Unit V :

Meaning, Nature and factors of Organizational Change, Planned Change, Resistance to Change, Change Agent, Concept of Organizational Development, Organizational Development Interventions.

Books Recommended :

1. Prasad, L.M., Organizational Behaviour, S. Chand, New Delhi
2. Robbins, Stephen P., Organizational Behaviour: Concept, Controveries, Applications, Prentice Hall of India, Pvt. Ltd. New Delhi
3. Luthans Fred, Organizational Behaviour, McGraw-Hill
4. Dr. P. S. S. Kumar, Dr. Anukriti Sharma and K. S. Krishna, Organizational Behaviour, Jahanvi Publications.
5. Prof. Anil Mehta, Organizational Behaviour, RBD, Jaipur
6. Organizational Behaviour, Thakur Publication, Jaipur

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Paper- II

Indian Management Thought and Business Leaders

Unit- I

Spirituality and Management- Concept of Spirituality, Indian Ethos and Values, Role of Values in Management, Western Values vis a vis Indian Values, Applications of Yoga in Management- Personality Development, Meditation and Management of stress.

Unit- II

Indian Epics and Management- Dimensions of Vedic Management, Bhagwad Gita, Ramayan, Kautilaya's Arthshastra.

Unit- III

Indian Thinkers- Swami Vivekanand, Mahatama Gandhi, S.K. Chakraborty, C.K. Prahlad.

Unit- IV

Indian Business Leaders: JRD Tata, Ram Krishan Bajaj, G D Birla, Dhirubhai Ambani.

Unit- V

Indian Business Leaders: Narayana Murthy, Azim Premji, Lakshmi Mittal, Sunil Bharti Mittal.

Books Recommended

1. Chakraborty, S.K. and Bhattachary.., Pradip: Human Values, New Age International (P) Limited Publishers.
2. Saneev, Rinku and Khanna, Parul: Ethics and Values in Business Management, Anc Books Pvt. Ltd.
3. Khanna, S. : Vedic Management, Taxman Publications (P) Ltd.
4. Bhawad Gita as Viewed by Swami Vivekananda: Vedanta Press & Bookshop.
5. Rajgopalachari, C. : Ramayan, Bhartiya Vidya Bhawan.
6. Gita Piramal: Business Legends.

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Paper III

International Business

Unit I

Meaning of International Business, Domestic Business V/s International Business,Importance of International business,Major participants of IB, Scope of International Business.

Unit II

Understanding the International Business Environment:Cultural Environment, Economic Environment, Political Environment, Legal & financial Environment.

Unit III

International Business organisations,Forms of International organisations, World Trade Organisation (WTO).

Unit IV

International Financial Management, International Monetary Fund (IMF), World Bank.

Unit V

GlobalOperations and Supply Chain Management, International Human Resource Management, International Trade Procedure and Documentation, Global E-business, Ethics and Social Responsibility.

Books Recommended

1.Joshi,R.M.:International Business,Oxford University Press,New Delhi.

2.Aswathappa, K.: International Business, Tata McGraw-Hill Publishing Company Limited,New Delhi.

3.Cherunilam,Francis: International Business Environment,Himalaya Publishing House,New Delhi.

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Paper IV

Cost and Management Accounting

Unit I-

Introduction to Cost Accounting: Meaning and definition, scope and use of cost accounting, cost centre, cost centre, cost accounting and financial accounting, cost concepts, classification of costs.

Elements of Cost: Material, labour and expenses, direct Material cost-Meaning, Purchase and stores routine, methods of Princing Material issues, wastage, scrap spoilage and defectives, Inventory Control techniques, direct labour cost-Meaning, Remuneraion methods, labour-turnover, treatments of idle time, overtime premimum, Employees welfare costs and fringe benefits.

Unit II-

Overheads: Introduction, direct expenses, steps in accounting of overheads, classification of overheads, techniques for separation of fixed and variable costs, allocation and inproportion of overheads, absorption of overheads-methods of overheads, absorption, over absorption and underabsorption of overheads.

Costing methods: Output costing.

Unit III-

(a)Management Accounting: Meaning, Nature, Scope of Management Accounting, Tools and Techniques of Managemenet Accounting, Functions of Management Accountant, Installation of Management Accounting System, Limitations of Management Accounting.

(b)Application of Marginal Costing in Decission Making. Fixation of Selling Price, Make or Buy Decision. Dropping a line or product, Retain or Replace, own or lease, Selling in Foreign Market.

Unit IV-

Cost Control Techniques:

(a)Budgeting: Introduction, Comprehessive/Master Budget, Fixed and Flexible Budget. Cash Budget, Functional Budgets.

(b)Standard Costing: Introduction, Cost Variance Analysis: Material Variance and Labour Variance.

Unit V-

(a)Responsibility Accounting.

(b)Activity Based Costing.

Books Recommended:

1. M.N. Arora: Cost Accounting-Principles and Practices.
2. S.P. Jain and K.L. Narang: Cost Accounting.
3. M.Y. Khan and P.K. Jain: Management Accounting.
4. I.M. Pandey: Management Accounting.
5. P.C. Tulsian: Practical Accounting.
6. Robert Anthony, Rececetal. Principles of Management Accounting.

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Paper V

E-Commerce

Unit I :

Meaning, Characteristics, Origin, Process, Key Drivers of E-Commerce, Elements, Traditional Commerce Vs E-Commerce, Benefits, Standards, Technologies, E-Commerce Models, Mobile Commerce, Barriers to E-Commerce.

Unit II :

Internet and E-Commerce, Networking-LAN, WAN, Business Uses of Internet, www, Protocols, Intranet and Internet, Multimedia Application, Hardware and Software.

Unit III :

Electronic Payment Systems- Methods, Security Issues, Electronic Banking, Electronic Stock Trading.

Unit IV :

Data Warehousing, Client-Server Computing, Data Mining, Website Management – Steps.

Unit V :

ERP – Meaning, Functions, SAP Applications, Business Intelligences, Ethics, Security and E-Governance.

Books Recommended:

1. E-Commerce and E-Business : Dr. C.S. Rayudu, Himalaya Publishing House.
2. Information Technology : E-Commerce & E-Business : V.D. Dudeja, Commonwealth Publisher, New Delhi
3. Electronic Consumer Framework- Technologies and Applications: B. Bhasker, Tata McGraw-Hill
4. Electronic Commerce : A Managers Guide to E-Business: Parag Dawan and Sunil Sharma, Vanity Books International, New Delhi

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Paper VI

Paper VI- Book Review Presentation and viva-voce
Presentation of Review of a Reference book on Management- 50 Marks
Comprehansive viva-voce based on papers of BBA Course- 50 Marks

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