## SEMESTER- I

**Credits-4** **ECO-CC-101 MICRO ECONOMIC ANALYSIS- I**

### ECO-CC- 101.1 Demand Analysis

Theories of Demand: Axiomatic Assumptions of Preference Ordering; Utility Function and its Related Concepts; Indifference Curve Analysis- Consumers Equilibrium; Marshallian and Hicksian Demand Functions; Slutsky Equation and Decomposition of Price Effect into Substitution Effect and Income Effect; Duality in Consumptions- Indirect Utility Function and Indirect Expenditure Function; Revealed Preference Hypothesis; Lancaster's Characteristics of Goods Approach; Consumer's Choice under Risk and Uncertainty. Asymmetric Information: Adverse Selection and Moral Hazard.

### ECO-CC-101.2 Theory of Production and Costs

Production Function and its related concepts; Short-run and Long-run laws of Production; Homogeneous Production Function and Returns to Scale; Producer's Equilibrium and Optimal Choice of Inputs; Constrained and Unconstrained Profit Maximisation; Production Functions- Specification and Features of Cobb-Douglas and CES Production Functions; Duality in Production- Derivation of Supply and Cost Functions from Production Function; Cost Function- Traditional and Modern Theories of Cost.

### ECO-CC-101.3 Price and Output Determination under Perfect, Monopoly and Monopolistic Market Structures

Price and Output Determination under different Market Structures: Perfect Competition- Equilibrium of the Firm and Industry (in the short run and long run); Monopoly- Short-run and Long-run Equilibrium, Monopoly Power, Control and Regulation; Discriminating Monopolist; Monopolistic Competition- Short-run and Long-run Equilibrium.

### ECO-CC-101.4 Price and Output Determination under Duopoly and Oligopoly Market

Non-price Competition; Price and Output Determination under Non-collusive and Collusive Duopoly and Oligopoly: Non-collusive Models- Cournot, Stackelberg and Kinked Demand Curve Models; Collusive Models- Cartels and Mergers, Market Share, Price Leadership Models; Game Theoretic Approach to Duopoly.

## SEMESTER- I

## Credits-4 ECO-CC-102 MACRO ECONOMIC ANALYSIS- I

### ECO-CC- 102.1 National Income Accounts and Social Welfare

Different Systems of National Income Accounting: Social Accounting, Input-output Accounting, Flow of Funds Accounting and Balance of Payments Accounting; United Nations System of National Accounts (NSA); National Income and Social Welfare, Measure of Economic Welfare (MEW).

### ECO-CC- 102.2 Consumption Function

Keynes Psychological Law of Consumption, Implication of the Law, Short-run and Long-run Consumption Function, Empirical Evidence on Consumption Function,; Income-Consumption Relationship; Absolute Income, Relative Income, Life-Cycle and Permanent Income Hypotheses.

### ECO-CC-102.3 Investment Function

Investment Multiplier, Theories of Investment and Accelerator; Super Multiplier, Influence of Policy Measures on Investment.

### ECO-CC-102.4 Determination of National Income

Determination of National Income in Two Sector Basic Model- Expenditure Approach and Investment-Saving Approach; Determination of National Income in Three Sector Model- with Government Expenditure, Lump Sum and Proportional Tax and Transfer Payment; Determination of National Income in Four Sector Model. Determination of Output and Employment: Classical & Keynesian Approach.

## SEMESTER- I

## Credits-4 ECO-CC-103 Quantitative Methods – I (Statistical Methods)

### ECO-CC-103.1Probability and Theoretical Distribution

Deterministic and Non-deterministic Experiments, Various Types of Events, Classical and Empirical definitions of Probability- Law of Addition and Multiplication, Conditional Probability and Concept of Interdependence. Bay's Theorem and its Applications, Elementary Concept of Random Variable, Probability Mass and Density Functions, Expectations, Moments and Moment Generating Functions; Properties of Binomial, Poison and Normal Distributions.

### ECO-CC-103.2 Sampling and Estimation Theory

Basic Concept of Sampling- Universe and Sample, Theory of Sampling Distribution and Standard Error. Random and Non-random Sampling, Simple Random Stratified Random and P.S.S. Sampling Point Estimation and Interval Estimation, Desirable Properties of an Estimator.

### ECO-CC-103.3 Correlation and Regression analysis

Correlation- Simple, Partial and Multiple Correlation (applications only); Multiple Regression, Partial Regression Coefficient, Estimation of Regression Coefficients in a Multiple Regression Model; Standard Error of Regression Coefficients, Goodness of Fit of a Regression Model. Linear Regression Models and their Properties- BLUE; Identification Problem; Simultaneous Equation Models- Recursive and Non- recursive; Discrete Choice Models.

### ECO-CC-103.4 A Testing of Hypothesis and Time Series Analysis

Null and Alternative, Type- 1 and Type- 2 Errors, Goodness of Fit, Confidence Intervals and Level of Significance, Hypothesis Testing based on z, t, Chi Square and F Tests Test relating Attributes.

## SEMESTER- I

**Credits-4** **ECO-CC-104 Public Economics- I**

### ECO-CC-104.1 Public Expenditure and Public Debt

Public Expenditure- Hypotheses: Wagner's Law of Increasing State Activities, Peacock-Wiseman Hypothesis, Pure Theory of Public Expenditure; Structure, Growth and Effect of Public Expenditure; Evaluation of Public Investment; Social Cost- Benefit Analysis- Project Evaluation, Estimation of Costs, Discount Rate, Public Debt- Sources, Effects, Burden and it's Management.

### ECO-CC-104.2 Fiscal Policy and Budget

Fiscal Policy- Objectives of Fiscal Policy, Neutral & Compensatory and Functional Finance, Fiscal Policy for Stabilization- Automatic and Discretionary Stabilization; Inter-dependence of Fiscal and Monetary Policies, The Public Budgets- Kinds of Budgets, Zero-base Budgeting, Different Concepts of Budget Deficit, Budgetary Deficits and its Implications, Balanced Budget Multiplier.

### ECO-CC-104.3 Theories of Public Revenue

Public Revenue- Different Approaches to the Division of Tax Burden, Incidence and Effects of Taxation, Elasticity of Buoyancy; Taxable Capacity; Benefit and Ability to Pay Approaches; Theory of Optimal Taxation.

### ECO-CC-104.4 Indian Public Finance

Indian Tax System, Trends in Revenue and Expenditure of the Central and State Government; Major Taxes in India: Base of Taxes, Direct and Indirect Taxes, Taxation of Agriculture, Expenditure Tax, Reforms in Direct and Indirect Taxes, Taxes on Services, Non-Tax Revenue of the Centre, State and Local Bodies; Analysis of the Union and State Government Budget, Trends in Public Debt, Fiscal Crisis and Fiscal Sector Reforms in India; Reports of Finance Commissions in India.

## SEMESTER-I

**Credits-4** **ECO-CC-105 Indian Economic Policy**

### ECO-CC- 105.1 Basic Economic Indicators of Indian Economy

Basic Economic Indicators – National Income of Different Sectors; Poverty, Unemployment, Migration and Inequality.

### ECO-CC- 105.2 Objectives and Priorities of Planning

Objectives and Priorities of Planning; Five Year Plans; Problems of Resource Mobilization; New Economic Policy since 1991.

### ECO-CC- 105.3 The Agricultural Sector

Agricultural Strategy– Land Relation and Land Reforms; Rural Credit; Role of Irrigation and Fertilizer; Agricultural Marketing; Prices of Agricultural Produce; Community Development; Institutional and Technological Aspects, New Agricultural Policy.

### ECO-CC- 105.4 The Industrial Sector

Strategy of Industrial Development; Problem of Location; Problems of Large and Smalls Scale Industries; New Industrial Policy and Liberalisation; Sources of Industrial Finances; Role of Foreign Capital; Public Enterprises – Organisation, Management, Control, Accountability and Price Policy.

## SEMESTER- II

**Credits-4** **ECO-CC-201 MICRO ECONOMIC ANALYSIS- II**

### ECO-CC-201.1 Managerial and Behavioural Theories of the Firm

Critical Evaluation of Marginal Analysis: Representative Model of Average Cost and Full Cost Pricing; Baumol's Theory of Sales Revenue Maximisation: Bain's Limiting Price Theory; Morris and William's Static Managerial Model of the Firm.

### ECO-CC-201.2 Neo- Classical Approach and Factor Pricing

Neo- Classical Approach- Marginal Productivity Theory; Euler's Theorem and Product Exhaustion; Factor Pricing in Perfect and Imperfect Markets.

### ECO-CC-201.3 General Equilibrium Analysis

General Equilibrium Analysis- Existence, Stability and Uniqueness of Equilibrium, Walrasian System, Efficiency of General Equilibrium in Exchange, Production and Competitive Markets.

### ECO-CC-201.4 Welfare Economics

Pigovian Welfare Economics; Pareto Optimality Conditions; Compensation Principle, Bergson-Samuelson's Social Welfare Function; Theory of Second Best; Arrow's Impossibility Theorem; The Theory of Social Choice.

## SEMESTER- II

## Credits- 4 ECO-CC-202 MACRO ECONOMIC ANALYSIS- II

### ECO-CC- 202.1 Demand for Money and Post-Keynesian Approaches

Classical Approach to Demand for Money, Quantity Theory Approach, Fisher's Equation, Cambridge Quantity Theory, Keynes' Liquidity Preference Approach; Transaction, Precautionary and Speculative Demand for Money, Aggregate Demand for Money; Neo-Classical and Keynesian views on Interest. Post- Keynesian Approaches to Demand for Money; Patinkin and the Real Balance Effect; Friedman and the Modern Quantity Theory; Monetarism and Fiscalism.

### ECO-CC-202.2 Supply of money

Components and Determinants of Money Supply; Factors Influencing Changes in Money Supply; Financial Intermediation, Growth and Role of Non-Banking Financial Intermediaries (NBFIs) and Regional Rural Banks, Distinction between Banks and NBFIs; RBI Approach to Money Supply; High Powered Money and Money Multiplier.

### ECO-CC-202.3 The IS-LM and Post- Keynesian Approaches

The IS-LM Model; Extension of IS-LM Model with Labour Market and Flexible Price; General Equilibrium of Product and Money Market. Neo- Classical and Keynesian views on Interest; Extension of IS-LM Model with Government Sector; Relative Effectiveness of Monetary and Fiscal Policies.

### ECO-CC-202.4 Theories of Business Cycles and Theory of Inflation

Business Cycles: Theories of Business Cycles- Schumpeter, Kaldor, Samuelson and Hicks; Macro-economic Equilibrium- Relative Roles of Monetary Fiscal Policies. Inflation: Theory of Inflation; Structuralist Approach to Inflation; Philips Curve Analysis, Short-run and Long-run Philips Curve, Tobin's Modified Philips Curve; Policies to Control Inflation. Rational Expectation Hypothesis and its Critique.

## SEMESTER- II

## Credits-4 ECO-CC-203 QUANTITATIVE METHODS –II (Mathematical Methods)

### ECO-CC-203.1 Functions and Derivatives in Economics

Functions and Types of Functions and their Applications in Economics; Limit and Continuity; Sequence; Series; Simple Derivative Function and Differential (both First and Second Order) and their Applications in Economics; Partial Derivatives, Total Derivative and Total Differential and their Applications in Economics; Unconstrained and Constrained Optimization of Multivariate Functions and their Applications in Simple Economic Problems.

### ECO-CC-203.2 Vectors, Matrices and Determinants

Vectors: Vectors and Types of Vectors, Geometrical Interpretation Vectors Operations; Linear Dependence and Independence of Vectors, Basis and Dimension of Vectors Space.

Matrix: Concept of Matrix and Types of Matrices, Operations on Matrices, Matrix Inversion and Rank of a Matrix, Concept of Quadratic Forms, Eigen Roots and Eigen Vectors of Matrices.

Determinants and its Properties. Simple Application of Vectors, Matrices and Determinants- Solution of Simultaneous Equations.

### ECO-CC-203.3 Integration, Differential and Difference Equations

Integration and its Geometrical Interpretation, Methods of Integration, Application of Integration- Consumer's Surplus and Producer's Surplus; Differential Equations- Solution of First Order and Second Order Difference Equations, Stability Conditions and their Simple Applications in Economics.

### ECO-CC-203.4 Elementary Operations Research and Computer Application

Linear Programming- Formulation of Linear Programming and its Graphical Method of Solution, Input-Output Analysis- Determination of Equilibrium Level of Outputs, Prices and Employment; Game Theory- Concept of Game, Solution of Game with Saddle Point and Mixed Strategies and Value of a Game.

## SEMESTER- II

**Credits-4 ECO-CC-204 PUBLIC ECONOMICS- II**

### ECO-CC-204.1 Role of Public Sector

Role of Government in Organized Society; Changing Perspectives of Government in a Mixed Economy, Public and Private Sector Cooperation and Competition, Government as an Agent for Economic Planning and Development; Government as a Tool of Operationalising the Planning Process, Private Goods, Public Goods and Merit Goods.

### ECO-CC-204.2 Preference Revelation for Public Goods

Market Failure: Imperfections Decreasing Costs, Externalities, Public Goods; Private and Public Mechanism for Allocating Resources; Problems for Allocating Resources; Problems of Preference Revelation and Aggregation of Preferences; An Economic Theory of Democracy, Role of Bureaucracy. Regulation of Market- Collusion and Consumer's Welfare.

### ECO-CC-204.3 Rationales for Public Policy

Allocation of Resources- Theory of Public Goods, Voluntary Exchange Models, Impossibility of Decentralized Provision of Public Goods; Contributions of Lindahal and Johansen; Samuelson; Demand Revealing Schemes for Public Goods- Tiebout Model, Theory of Club Goods, Stabilization Policy- Keynesian Case for Stabilization Policy. Uncertainty and Expectations, Failure of Intertemporal Markets, Liquidity Preference, Social Goals, Poverty Alleviation, Provision of Infrastructural Facilities, Removing Distributional Inequalities and Regional Imbalances.

### ECO-CC-204.4 Fiscal Federalism

Fiscal Federalism: Principles of Multi-unit Finance; Fiscal Federalism in India. Vertical and Horizontal Imbalance. Assignment of Function and Sources of Revenue, Constitutional Provisions, Finance Commission and Planning Commission, Devolution of Resources and Grants. Theory of Grants. Resource Transfer from Union to States- Criteria for Transfer of Resources; Centre- State Financial Relations in India. Problems of State's Resources and Indebtedness, Transfer of Resources from Union and States to Local Bodies.

## SEMESTER-II

### Credits-4 ECO-CC-205 RESEARCH METHODOLOGY

### ECO-CC-205.I Introduction to Social Science Research

Meaning- Objectives and Characteristics of Research, Types of Research, Positivism and Post Positivistic Approach to Research. Main Steps in Research- Selection of Research Problem- Sources, Formulation of a Research Problem. Methods of Research- Experimental, Descriptive, Historical, Qualitative and Quantitative. Meaning and Need of Research Design, Features of a Good Design, Different Research Designs for Exploratory, Descriptive, Diagnostic and Experimental Research. Review of Literature- Need and Sources; Setting up Objectives and Hypotheses; Preparation of a Research Proposal, Problems in Research.

### ECO-CC-205.II Collection of Data

Data-Primary and Secondary Data, Methods of Collection of Primary Data- Observation, Interview, Questionnaire, Schedule; Pilot Survey and Case Study Method; Advantages and Disadvantages of Primary Data, Collection of Sensitive Information; Secondary Data-Sources; Advantages and Limitations of Secondary Data; Sampling Design- Methods and Sample Size.

### ECO-CC-205.III Processing and Analysis of Data & Testing of Hypothesis

Editing, Coding and Classification; Data Presentation: Tabular and Graphical Presentation- Preparation of a Statistical Table, Requisites of a Good Table, Types of Tables, Figures and Charts; Analysis: Tools and Techniques for Qualitative and Quantitative Data; Hypothesis- Importance and Definition, Formulation- Null and Alternative Hypothesis, Types of Errors in Testing of Hypothesis, Testing of Hypothesis and Level of Significance.

### ECO-CC-205.IV Report Writing

Report Writing- Significance and Steps; Foot Note and End Note; Bibliography and References- Style (APA, MLA, Chicago and Harvard); Steps for Writing Dissertation/Thesis. Method for Writing an Article for Conference/Seminar and Publication in a Journal; Ethics and Plagiarism in Research; Application of ICT in Research.

## SEMESTER- III

**Credits-4 ECO-CC-301 INTERNATIONAL TRADE AND FINANCE -I**

### ECO-CC-301.1 Theory of International Trade- I

The Pure Theory of International Trade- Theories of Absolute Advantage, Comparative Advantage and Opportunity Costs; Empirical Testing of Classical Theory; Trade Equilibrium under Constant, Increasing and Diminishing Cost Conditions, and Imperfect Competition.

### ECO-CC-301.2 Theory of International Trade- II

Heckscher- Ohlin Theory of Trade, Leontief Paradox, Theorem of Factor Price Equalization, Stolper- Samuelson Theorem, Rybczynski Theorem, Kravis and Linder Theorem of Trade, Technological Change and International Trade.

### ECO-CC-301.3 Gains from Trade

Gains from Trade: Their Measurement and Distribution; Concept of Terms of Trade, Their Uses and Limitations; Hypothesis of Secular Deterioration of Terms of Trade, its Empirical Relevance and Policy Implications for Less Developed Countries; Terms of Trade and Income Distribution; Trade as an Engine of Economic Growth; Concept and Policy Implications of Immiserising Growth .

### ECO-CC-301.4 Interventions in Trade

Theory of Interventions: Tariffs, Quotas and Non-Tariff Barriers; Effects of Tariffs under Partial and General Equilibrium Perspectives; Tariff and Income Distribution; Optimum Tariff; Types of Regional Economic Integration; Theory of Customs Union: Viner's Partial Equilibrium Approach to Welfare Effects of Customs Union; General Equilibrium Analysis of Customs Union- Lipsey Model and Vanek Model; Empirical Findings and Dynamic Considerations of Custom Union and Free Trade Area.

## SEMESTER-III

## Credits-4 ECO-CC-302 ECONOMICS OF SOCIAL SECTOR AND ENVIRONMENT-I

### ECO-CC-302.1 Economics of Environment Policy

Environmental Externalities and Market Inefficiency- Environmental Taxes and Subsidies; Marketable Pollution Permit; Deposit Refund System; Coase's Property Rights and Bargaining Ssolution; Command and Control Approach; Comparision of Regulations and Markets- Based Instruments; Global Environmental Externalities; Climate Change and Carbon Tax; Trade and Environment.

### ECO-CC-302.2 Environmental and Natural Resource Policies in India

Mechanism for Environmental Regulation in India; Environmental Laws and their Implementation; Policy Instruments for Controlling Water and Air Pollution; Forest Policy; People's Participation in the Management of Common and Forest Lands; Joint Forest Management; Social Forestry- Rationale and Benefit.

### ECO-CC-302.3 Economics of Education

Education as an Instrument of for Economic Growth; Human Capital vs. Physical Capital; Demand for Education- Private and Social Demand; Cost of Education, Wastage and Stagnation Benefits of Education- Direct and Indirect Benefits, Private and Social Benefits.

### ECO-CC-302.4 Economics of Health

Health Dimension of Development; Determinants of Health- Poverty, Malnutrition and Environmental Issues. Economic Dimensions of Healthcare- Demand and Supply of Healthcare; The Concept of Burden of Disease; Institutional Issues in Healthcare Delivery in India.

## SEMESTER-III

## Credits-4 ECO-CC-303 COMPUTER APPLICATION IN ECONOMIC ANALYSIS

## (Marks: ES-50 and PE-30)

### ECO-CC-303.1 Introduction to Computer and Operating Systems

Computer Organisation; Central Processing Unit; Types of Memory; Input and Output Devices; Classification of Computers; Programming Languages; Operating System- DOS and Windows; Data Representation and the Number Systems: Decimal, Binary, Octal and Hexa decimal.

### ECO-CC-303.2 Computer for Office Automation

Spread Sheet- Concept and Use of Spread Sheet, Structure of a Spread Sheet, Spread in – Built Functions, Chart Feature of a Spread Sheet, Operation and Use of MS-Excel and Lotus Smart- Suite.

### ECO-CC-303.3 Statistical Data Processing Techniques-I

Statistical Package Handling and Command Description; Statistical Package for Social Science (SPSS); Basic Statistical and Econometric Functions and their Analysis- Analysis of Regression, Analysis of Correlation.

### ECO-CC-303.4 Statistical Data Processing Techniques-II

Analysis of Variance (ANOVA), Analysis of Covariance (ANCOVA), Linear Programming; Time Series Trend Analysis; Input-output Analysis, Game theory- Saddle-Point and Mixed Strategy Solutions.

## SEMESTER-III

## Credits-4 ECO-CC-304 FINANCIAL INSTITUTIONS AND MARKETS -I

### ECO-CC-304.1 Nature and Role of Financial System

Money and Finance- Money and Near-money- Financial Intermediation and Financial Intermediaries-The Structure of the Financial System- Functions of the Financial Sector- Indicator of Financial Development- Equilibrium in Financial Markets- Financial System and Economic Development- Criteria to Evaluate Assets.

Risk and Financial Assets, Types of Risk Return on Assets, Risk- Return Trade off- Valuation of Securities.

### ECO-CC-304.2 Structure of Interest Rates

Theories of Interest Rate Determination- Level of Interest Rates- Long Period and Short Period Rates- Term Structure of Interest Rates- Spread between Lending and Deposit Rates- Administered Interest Rates- Appropriate Interest Rate Policy.

### ECO-CC-304.3 The Central Bank and Monetary Policy

Functions of Central Bank- The Aims and Objectives of the Monetary Policy in Developed and Developing Countries- Instruments of Monetary Policy- Proliferation of Banking and Non- Bank Financial Intermediaries- Effectiveness of Monetary Policy- Credit Creation and its Control.

### ECO-CC-304.4 The Commercial Banks and Development Banks

Functions of Commercial Bank, Credit Creation. Profitability and Efficiency of Banks; Development Banks- Role and Functions; Investment Banking and Merchant Banking;

## SEMESTER-III

## Choice based Credit Transfer (CBCT)

***Credits-4 ECO-CC-305 INDIAN ECONOMIC PROBLEMS***

### ECO-CC- 305.1 Public Finance

Fiscal Policy; Growth of Public Expenditure; Tax Policy and Tax Reforms; Main Source of Revenue of Union and the State Governments; Fiscal Correction for Economic Growth; Public Debt Policy; External Debt; Deficit Financing.

### ECO-CC- 305.2 Money, Banking and Prices

Organisation of Indian Money and Capital Markets; Reserve Bank of India; Supply of Money; Inflation and Analysis of Price Behaviour; Monetary Policy; Interest Rate Policy; Financial Sector Reforms; Working of SEBI.

### ECO-CC- 305.3 Foreign Trade.

Structure and Direction of Foreign Trade; Foreign Trade Policies and Reforms; Balance of Payments: Trends and Issues; Exchange Rate Policy; Foreign Exchange Reserves and Growth.

### ECO-CC- 305.4 Foreign Capital and MNC

Foreign Capital and MNCs; Changing Patterns of Foreign Direct Investments; Globalisation and its Impact.

## SEMESTER-IV

## Credits-4 ECO-CC-401 INTERNATIONAL TRADE AND FINANCE- II

### ECO-CC- 401.1 Exchange Rate and Balance of Payments

Exchange Rate-Concepts and Theories; Foreign Exchange Market and Arbitrage; Meaning and Components of Balance of Payments; Equilibrium and Disequilibrium in the Balance of Payments; Devaluation and Balance of Payments Adjustment; Foreign Trade Multiplier with and without Foreign Repercussions and Determination of National Income and Output.

### ECO-CC- 401.2 Approaches for Balance of Payment Adjustments

Absorption, Payments and Monetary Approaches for Adjustment in the Balance of Payments; Expenditure-Reducing and Expenditure-Switching Policies for Balance of Payment Adjustment;

Approaches for Achieving Internal and External Equilibrium Simultaneously: The Swan Model and Mundell- Fleming Model; Relative Merits and Demerits of Fixed and Flexible Exchange Rates in the Context of Growth and Development in Developing Countries.

### ECO-CC- 401.3 International Economic Co-operation

Regionalism- EU, Rationale and Progress of SAARC/SAPTA and ASEAN Region; Problems and Prospects of forming Customs Union in Asia; Multilaterialism- UNCTAD, NIEO, GATT/WTO; Optimum Currency Areas; International Financial Institutions- IMF and World Bank; Need, Adequacy and Determinants of International Liquidity; Conditionality Clause of IMF from the point of view of India.

### ECO-CC- 401.4 Trade Policies and India

Trade Problems and Trade Policies in India during the last five decades; Recent changes in the Direction and Composition of Trade and their Implications; Rationale and Impact of Trade Reforms since 1991 on Balance of Payments, Employment and Growth; Instruments of Export Promotion; Recent Import and Export Policies, and Agenda for the Future.

## SEMESTER-IV

## Credits-4 ECO-CC-402 ECONOMICS OF SOCIAL SECTOR AND ENVIRONMENT- II

### ECO-CC-402.1 Measurement of Environmental Values

Need of Environmental Valuation; Total Economic Value – Use Values, Option Values, and Non-use Values; Valuation Methods: Methods Based on Observed Market Behaviour– Hedonic Pricing Method and Travel Cost Method (Household Production Function Models); Methods Based on Response to Hypothetical Markets – Contingent Valuation Method; Environmental Values and Cost Benefit Analysis; Choice of Discount Rate.

### ECO-CC- 402.2 Economics of Non-Renewable Natural Resources Management

Types of Natural Resources; Concern for Natural Resource Scarcity; Theory of Optimal Extraction of Non-Renewable (Exhaustible) Resources- Extraction under Perfectly Competitive and Monopolistic Markets.

### ECO-CC- 402.3 Economics of Renewable Natural Resources Management

Theory of Optimal use of Renewable Resources – Biological Growth Process, Harvesting under Private Property and Open Access Conditions; Approach for Common Property Resources.

### ECO-CC- 402.4 Environment and Development

Environment and Development Trade-off; The Environmental Kuznets Curve Hypothesis and its Limitations; Sustainable Development: Weak and Strong Sustainability; Rules and Indicators of Sustainable Development; Integrated Environmental and Economic Accounting; Measurement of Environmentally–corrected GDP

## SEMESTER- IV

## Credits-4 ECO-CC- 403 ECONOMICS OF GROWTH AND DEVELOPMENT

### ECO-CC- 403.1 Approaches to Development– I

Economic Growth versus Economic Development; Indicators of Economic Development: PQLI, HDI, SDGs; Poverty and Inequalities- Concepts and Measurement: Partial Theories of Growth and Development -- Vicious Circles of Poverty, Circular Causation; Development Theories – Classical, Marx and Schumpeter's Theories of Development; Unlimited Supply of Labour; Big Push; Balanced and Unbalanced Growth.

### ECO-CC- 403.2 Approaches to Development – II

Critical Minimum Efforts Thesis; Low-income Equilibrium Trap; Forward and Backward Linkage; Dualism – Technical, Behavioural and Social; Ranis &Fei Model; Dependency Theory of Development.

### ECO-CC- 403.3 Economic Growth

Economic Growth versus Economic Development; Exogenous Growth Models- Harrod and Domar Growth Model and its Instability in Equilibrium; Solow Model: Meade's Steady State Growth Model; Kaldor's Model; Production Function Approach to the Determinants of Growth; Technical Progress- Hicks, Harrod and Solow Neutrality; Endogenous Growth- Role of Education, Research and Knowledge in Economic Growth; Romer's Endogenous Growth Model.

### ECO-CC- 403.4 Investment Techniques

Investment Criteria and Choice of Technique- Capital Turnover Criterion, SMP Criterion, Marginal Per Capita Reinvestment Criterion, Labour versus Capital Intensive Techniques;

## SEMESTER- IV

### *Credits-4 ECO-CE-404 DISSERTATION*

Objective of this subject is to make the students know the basic concepts in research and preparation of research and project work in Economics. This paper helps the students to develop the ability to apply theoretical and practical tools, techniques to solve real life problems related to industry, research laboratory and institutions and pursue further research in future in higher studies such as M.Phil., and Ph.D. after completion of project work, the student will be able to:

1. Identify problem in a system.
2. Review literature related to a problem.
3. Evaluation of research problem.
4. Collect materials and know methods.
5. Data analysis.
6. Develop the ability to communicate effectively.

In lieu of the core elective course ECO-CC- 404 (Dissertation) the students have to undertake project work under the guidance of a guide provided to them from among the faculty members of the department. First of all they have to write a project proposal to the department. After approval of the project proposal by the department the students have to do research with the help of primary data and/or secondary data. They have to write a project report and submit it to the department with in the stipulated time.

Project is an independent investigation and own work of the student. It is a way of applying the knowledge gained through the various courses to the issues and concerns of day to day events in the economy. It is mandatory to submit a typed and bound copy of the project report. The length of the project work may be between 8000-10000 words (50-60 pages). It must be written in English.

The dissertation is of four credits. This paper has no mid-Sem. examination. The content of the dissertation has 50 marks, 30 marks for seminar presentation and 20 marks for Viva.

**Or**

## SEMESTER- IV

### *Credits-4 ECO-CE-404* AGRICULTURAL ECONOMICS

### ECO-CE- *404*.1 Agriculture and Economic Development

Nature and Scope of Agricultural and Rural Economics; Agricultural Production and Productivity; Cropping Pattern Shift, Resource Use and Efficiency; Factor Combination and Resource Substitution; Traditional Agriculture and its Modernisation; Role of Agriculture in Economic Development; Interdependence between Agriculture and Industry- some Empirical Evidence; Models of Interaction between Agriculture and the Rest of the Economy; Agricultural Development, Poverty and Environment.

### ECO-CE - *404*.2 Land Reforms and Labour Market

Rural Labour Supply; Interlocking of Factor Markets; Mobility of Labour and Segmentation in Labour Markets; Marginalisation of Rural Labour; Nature, Extent and Trends in Rural Unemployment; Agricultural Wages in India; Male-female Wage Differences; Non agricultural Rural Employment- Trends and Determinants, Principles of Land Utilisation; Land Distribution- Structure and Trends; Land Values and Rent; Land Tenures and Farming Systems- Peasant, Capitalist, Collective and State Farming; Tenancy and Crop Sharing Forms, Incidents and Effects; Land Reform Measures and Performances; Problems of Marginal and Small Farmers.

### ECO-CE - *404*.3 Rural Finance and Cooperation in India

Role of Capital and Rural Credit; Organised and Unorganised Capital Market; Rural Savings and Capital Formation; Characteristics and Sources of Rural Credit- Institutional and Non-institutional; Reorganisation of Rural Credit- Cooperatives, Commercial Banks, Regional Rural Banks, Role of NABARD, Cooperative Movement; Genesis and Growth of Cooperative Sector; Agricultural Cooperation in India; Problems and Prospects of Cooperative Institutions.

### ECO-CE - *404*.4 Agricultural Marketing and Prices

Marketing and State Policy; Agricultural Markets and Marketing Efficiency- Marketing Functions and Costs; Market Structure and Imperfections; Regulated Markets; Marketed and Marketable Surplus; Behaviour of Agricultural Process- Cobweb Model; Price and Income Stability; State Policy with respect to Agricultural Marketing; Warehousing; Prices; Taxation and Crop Insurance; Terms of Trade between Agricultural and Non-agricultural Prices; Need for State Intervention; Objectives of Agricultural Price Policy- Instruments and Evaluation; Food Security in India and Public Distribution System; WTO and Indian Agriculture.

## SEMESTER-IV

## Credits-4 ECO-CC-405 FINANCIAL INSTITUTIONS AND MARKETS - II

### ECO-CC-405.1 Non-Bank Financial Intermediaries

Definition and Types of Non-Bank Financial Intermediaries: Their Growth and Impact on India's Economic Development, Measures taken to Control their Operations.

### ECO-CC-405.2 Financial Markets

Role and Structure of Money Market and Capital Market- Call Money Market, Treasury Bill Market, Commercial Bill Market including Commercial Paper and Certificate of Deposits, Discount Market; Regulation of Capital Market.

### ECO-CC-405.3 Securities and Derivatives Markets

Government Securities Market- Markets for Derivatives: Features and Options and Other Derivatives; Types, Uses and Pricing of Derivatives- Primary and Secondary Market for Securities;

SEBI: Its Impact on the Working of Capital Market in India; IRDA and its Role in Financial Markets.

### ECO-CC-405.4 International Financial Markets

Reforms in International Monetary System for Developing Countries- Lending Operations of World Bank and its Affiliates- Working of IDA and IFC; The Growth of Regional Financial Institutions; Asian Development Bank and its Lending Activities; Asian Development Bank and India; Euro-Dollar and Euro-Currency Markets; Their Developmental Role and Regulation at the International level.

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|---|---|---|---|---|
| ENG –CE 404 A | SPECIAL PAPER : TRANSLATION Vol. II | 100 | 4 | 404 B and 405 taken together |
| ENG –CE 404 B | | 100 | 4 | |
| ENG –CE 405 | DISSERTATION | 100 | 4 | |
| | | | | |

## SEMESTER ONE
## Paper I

| PAPER | PAPER CODE | TITLE | MARKS | CREDITS |
|---|---|---|---|---|
| I | ENG-CC 101 | DRAMA: TRAGEDY | 80 | 04 |
| Unit | | Topic | | |
| I | | Doctor Faustus: Marlowe | 16+4=20 | 1 |
| II | | Hamlet: William Shakespeare | 16+4=20 | 1 |
| III | | Oedipus Rex: Sophocles | 16+4=20 | 1 |
| IV | | The Duchess Of Malfi: Webster | 16+4=20 | 1 |

## PAPER- II

| PAPER | PAPER CODE | TITLE | MARKS | CREDITS |
|---|---|---|---|---|
| II | ENG-CC 102 | DRAMA: COMEDY AND ROMANCE | 80 | 04 |
| Unit | | Topic | | |
| I | | Tempest: William Shakespeare | 16+4=20 | 1 |
| II | | Volpone or The Fox : Ben Jonson | 16+4=20 | 1 |
| III | | The Way of the World : Congreve | 16+4=20 | 1 |
| IV | | Frogs : Aristophanes | 16+4=20 | 1 |

## PAPER- III

| PAPER | PAPER CODE | TITLE | MARKS | CREDITS |
|---|---|---|---|---|
| III | ENG-CC 103 | PRE-ROMANTIC POETRY | 80 | 04 |
| Unit | | Topic | | |
| I | | The General Prologue to Centerbury Tales : Chaucer | 16+4=20 | 1 |
| II | | Paradise Lost Book I & II : Milton | 16+4=20 | 1 |
| III | | Rape of the Lock : Alexander Pope | 16+4=20 | 1 |
| V | | Selected Poems : John Donne and other Metaphysical Poets<br><br>*Poems to be taught:*<br><br>DONNE: "The Sunne Rising", "The Good Morrow " , " Valediction: Forbidding Mourning " , " Batter my Heart " , and " Thou Hast Made Me"<br><br>POEMS<br>Marvel: " To His Coy Mistress"<br>Herbert: " The Gifts of God"<br>Crashaw: "Wishes for the Supposed Mistress"<br>Vaughn:"The Retreat" | 16+4=20 | 1 |

## PAPER- IV

| PAPER | PAPER CODE | TITLE | MARKS | CREDITS |
|---|---|---|---|---|
| IV | ENG-CC 104 | ROMANTIC AND VICTORIAN POETRY | 80 | 04 |
| Unit | | Topics | | |
| I | | The Prelude, Book I & II : Wordsworth | 16+4=20 | 1 |

| | | | | |
|---|---|---|---|---|
| II | | **Selected Odes of John Keats: "Ode to a Nightingale" "Ode to Psyche "Ode on a Grecian Urn", "Ode to Autumn" and "Ode on Melancholy".** | **16+4=20** | **1** |
| III | | **Adonais : Shelly** | **16+4=20** | **1** |
| IV | | Tennyson: In Memoraim* : Sections to be taught: "The Prologue", Sections I, II, B, VII, IX, XX, XXI, XV, XXVII, XXXI. XXXVII, XLI, XL, L, LVI, LV, LXXIII, XCV and "The Epilogue." | **16+4=20** | **1** |

## Paper V

| PAPER | Paper code | Title | Marks | Credits |
|---|---|---|---|---|
| V | ENG-CC 105 | LINGUISTICS | 80 | 4 |
| | | **Details** | | |
| **Unit** | | **Topic** | **Marks** | **Credits** |
| I | | Definition of Language, Language Change, Variation and Classification. | L. Q= 12 (12X1) S.Q.= 12 (4X3) | 1 |
| II | | Phonetics: ***i.*** Classification of Speech Sounds, ***ii.*** Vowels and Consonants, Problem Sounds for Indian Speakers, ***iii.*** Syllable structure, ***iv.*** Phonemes and Allophones, | L. Q= 12 (12X1) S.Q.= 12 (4X3) | 1 |

| | | | | |
|---|---|---|---|---|
| | | *v.* Supra-segmental features- | | |
| | | Stress, Rhythm, Intonation. | | |
| III | | Morphology : Morphemes, Allomorphs, Word Formation, Derivation and Inflection, Borrowing and Coinage. | L. Q= 08 (8X1) S.Q.= 08 (4X2) | 1 |
| IV | | Syntax and Semantics: Word, Phrase, Sentence. Synonymy, Antonymy, Hyponymy, Ambiguity, Compound words and meanings. | L. Q= 08 (8X1) S.Q.= 08 (4X2) | 1 |

**Semester TWO:**
**Paper VI**

| PAPER | Paper code | Title | Marks | Credits |
|---|---|---|---|---|
| VI | ENG –CC 201 | PRE-MODERN CRITICISM | 80 | 4 |
| | | Details | | |
| Unit | | Topic | Marks | Credits |
| I | | Aristotle: *Poetics* | 16+4=20 | 1 |
| II | | Johnson: *A Preface to Shakespeare* | 16+4=20 | 1 |
| III | | Wordsworth: "Preface to Lyrical Ballads" | 16+4=20 | 1 |
| IV | | Arnold: "The Study of Poetry" | 16+4=20 | 1 |

**Paper VII**

| PAPER | Paper code | Title | Marks | Credits |
|---|---|---|---|---|
| VII | ENG –CC 202 | MODERN CRITICISM AND THEORY | 80 | 4 |
| | | Details | | |
| Unit | | Topic | Marks | Credits |

| | | | | |
|---|---|---|---|---|
| I | | Eliot: Two essays: "Tradition and Individual Talent", and "Hamlet". | 16+4=20 | 1 |
| II | | Jacques Derrida: "Structure, Sign and Play in the Discourse of the Human Sciences" | 16+4=20 | 1 |
| III | | Roman Jakobson : " The Metaphoric and Metonymic Poles". | 16+4=20 | 1 |
| IV | | Roland Barthes: "Death of the Author" | 16+4=20 | 1 |

**PAPER- VIII**

| PAPER | Paper code | Title | Marks | Credits |
|---|---|---|---|---|
| **VIII** | **ENG –CC 203** | **FICTION AND NON-FICTIONAL PROSE** | **80** | **4** |
| | | **Details** | | |
| **Unit** | | **Topic** | **Marks** | **Credits** |
| I | | Dickens: *Great Expectations* | 16+4=20 | 1 |
| II | | Hardy: *Tess of the D'Urbervilles* | 16+4=20 | 1 |
| III | | Fielding: *Tom Jones* | 16+4=20 | 1 |
| IV | | **Bacon:** Selected Essays Essays Prescribed for study: 1.Of Truth, 2.Of Adversity, 3.Of Parents and Children **Bertrand Russell**:*Unpopular Essays*- 1. The Future of Mankind, 2. On Being Modern-minded **Charles Lamb**:*Essays of Elia*-1. | 16+4=20 | 1 |

| | | | | |
|---|---|---|---|---|
| | | The Praise of Chimney Sweepers,<br>2.A Bachelor's Complaint of the Behaviour of Married People | | |

**Paper IX**

| PAPER | Paper code | Title | Marks | Credits |
|---|---|---|---|---|
| IX | ENG –CC 204 | MODERN NOVEL | 80 | 4 |
| | | Details | | |
| Unit | | Topic | Marks | Credits |
| I | | Forster: *A Passage to India* | 16+4=20 | 1 |
| II | | Joyce: *A Portrait of the Artist as a Young Man* | 16+4=20 | 1 |
| III | | Lawrence: *The Rainbow* | 16+4=20 | 1 |
| IV | | William Golding: *Lord of the Flies* | 16+4=20 | 1 |

**Paper X**

| PAPER | Paper code | Title | Marks | Credits |
|---|---|---|---|---|
| X | ENG –CC 205 | ENGLISH LANGUAGE TEACHING (ELT) | 80 | 4 |
| | | Details | | |
| Unit | | Topic | Marks | Credits |
| I | | Curriculum and Syllabus:<br>***i.*** Syllabus- Diagnosis and Design. | L. Q= 12 (12X1)<br>S.Q.= 12 | 1 |

| | | | | |
|---|---|---|---|---|
| | | *ii.* Instructional Material.<br>*iii.* Method of Teaching.<br>*iv.* Evaluation. | (4X3) | |
| II | | Teaching of Skills and Text types I:<br>*i.* Listening.<br>*ii.* Speaking. | L. Q= 12 (12X1)<br>S.Q.= 12 (4X3) | 1 |
| III | | Teaching of Skills and Text types II:<br>*i.* Reading.<br>*ii.* Writing<br>Teaching – Prose, Poetry, Novels. | L. Q= 08 (8X1)<br>S.Q.= 08 (4X2) | 1 |
| IV | | Classroom Situation and Teacher Development.<br>*i.* Teaching in Difficult situations.<br>*ii.* Designing the Classroom- Learner centred, Smart classrooms.<br>*iii.* Teacher Development/ Training | L. Q= 08 (8X1)<br>S.Q.= 08 (4X2) | 1 |

3rd Sem.

## ENGLISH ENG-CC-301

| PAPER | Paper code | Title | Marks | Credits |
|---|---|---|---|---|
| XI | ENG –CC 301 | MODERN POETRY | 80 | 4 |
| **Unit** | | **Topic** | **Marks** | **Credits** |
| I | | **W.B. Yeats**: Selected Poems<br><br>The following poems are to be studied:<br><br>"The Song of Wandering Aengus", "Among School children", "Wild Swans at Coole," "A Prayer for my Daughter", "Easter 1916", "The Second Coming", "Sailing to Byzantium", "The Tower", "Byzantium" and "Leda and the Swan". | 16+4=20 | 1 |
| II | | **T.S. Eliot**: *The Waste Land* | 16+4=20 | 1 |
| III | | **Women poets of the Twentieth Century and a background study of Ferminism:**<br><br>**Eavan Boland**: Witness, My country in Darkness<br><br>**Sylvia Plath:** Family Reunion, Dialogue between Ghost and Priest,<br><br>~~**Virginia Woolf**~~ Sylvia Plath: Daddy, Kindness<br>**Sarojini Naidu:**In the Bazaars of Hyderabad, In Salutation to the Eternal Peace | 16+4=20 | 1 |
| IV | | **Tagore**: *Gitanjali* | 16+4=20 | 1 |

## ENGLISH ENG-CC-302

| PAPER | Paper code | Title | Marks | Credits |
|---|---|---|---|---|
| XII | ENG –CC 302 | MODERN DRAMA | 80 | 4 |
| | | **Details** | | |
| **Unit** | | **Topic** | **Marks** | **Credits** |
| I | | Osborne: *Look Back in Anger* | 16+4=20 | 1 |
| II | | Beckett: *Waiting for Godot* | 16+4=20 | 1 |
| III | | Shaw: *Man and Superman* | 16+4=20 | 1 |
| IV | | Anton Chekov: *The Cherry Orchard* | 16+4=20 | 1 |

## SPECIAL PAPER PROGRAMMES
## (CORE ELECTIVES)

**Each special paper programme shall be in FOUR papers, each carrying 100 marks. As specified in the consolidated chart of the courses above, Two papers shall be devoted to each special paper programme under Semester Three and the rest two in Semester Four.**

**THREE SPECIAL PAPER PROGRAMMES are available to the students: namely (i) American Literature (ii) Translation Studies and (iii) Creative Writing.**

**I: American Literature SPECIAL PAPER PROGRAMME (Total Marks: 400 / 16 Credits))**

The students will be ordinarily taught the American Literature SPECIAL PAPER PROGRAMME under which they will study FOUR theory papers each carrying 100 marks as spcified below:

### Semester III

### Paper XIII(AL)

### American Literature: SPECIAL PAPER PROGRAMME

| Paper | Paper code | Title | Marks | Credits |
|---|---|---|---|---|
| XIII(AL) | ENG-C E 303 (SP-AL) | SPECIAL PAPER AMERICAN LITERATURE I: Poetry and Philosophy | 80 | 04 |
| | | Details | | |
| Unit | | Topic | Marks | Credits |
| I | | Emerson: "The American Scholar", "Self reliance", "The Oversoul" | 16+4=20 | 1 |
| II | | Selected Poems of Robert Frost: "The Silken Tent," "Moving," "Mending Wall," "After Apple Picking," "The Road not Taken," "Birches," "Stopping by woods | 16+4=20 | 1 |

| | | | | |
|---|---|---|---|---|
| | | on a snowy Evening," "The gift Outright," "West-running Brook," | | |
| III | | Whitman: " Song of Myself " (from *Leaves of Grass*) | 16+4=20 | 1 |
| IV | | Thoreau: *Walden* | 16+4=20 | 1 |

**OR**

**Paper XIV(AL)**

| Paper | Paper code | Title | Marks | Credits |
|---|---|---|---|---|
| XIV(AL) | ENG-CE 304 (SP-AL) | SPECIAL PAPER : AMERICAN LITERATURE II: Novel | 80 | 04 |
| | | Details | | |
| Unit | | Topic | Marks | Credits |
| I | | Hawthorne: *The Scarlet Letter* | 16+4=20 | 1 |
| II | | Twain: *Huckleberry Finn* | 16+4=20 | 1 |
| III | | Hemingway: *A Farewell to Arms* | 16+4=20 | 1 |
| IV | | Melville: *Moby Dick* | 16+4=20 | 1 |

**N.B. : Paper no. XV shall be studied by the students of the**

**Department, choosing it from the Allied Elective Courses offered by other Departments.**

**Likewise, Paper no. XV shall be studied by the students of other Departments, choosing it from the two CBCT papers stated above other Departments.**

## PAPER -XV

## ENG- CE – 305 SPECIAL PAPER PAPER: TRANSLATION Vol. I

**(Total Marks: 100)**

Under this programme a student shall prepare TWO volumes of translation of certain literary work(s) of established Odia poets/dramatists/novelists/short story/autobiography writer(s) into English in a minimum of 10,000 words under the supervision of a subject expert from among the members of the faculty.

However, only candidates with proven ability shall be encouraged to opt for the Translation Studies SPECIAL PAPER PROGRAMME subject to following conditions:

a. The candidate qualifies in a rigorous selection process including a written test followed by a viva voce test conducted by the Head of the Department which should be unanimously approved by the Staff Council of the Department.

b. Even after a student qualifies in the tests conducted, a subject expert should be willing to supervise him on the texts of his choice.

c. As on the date of application for this special paper programme, the student must have published in standard literary journals with ISSN no. translation of Odia literary works into English to the tune of at least 2,000 words.

## ENG- CE- 306 SPECIAL PAPER PAPER: TRANSLATION Vol. I

Under this programme a student shall prepare TWO volumes of translation of certain literary work(s) of established Odia

poets/dramatists/novelists/short story/autobiography writer(s) into English in a minimum of 10,000 words under the supervision of a subject expert from among the members of the faculty.

However, only candidates with proven ability shall be encouraged to opt for the Translation Studies SPECIAL PAPER PROGRAMME subject to following conditions:

a. The candidate qualifies in a rigorous selection process including a written test followed by a viva voce test conducted by the Head of the Department which should be unanimously approved by the Staff Council of the Department.

b. Even after a student qualifies in the tests conducted, a subject expert should be willing to supervise him on the texts of his choice.

c. As on the date of application for this special paper programme, the student must have published in standard literary journals with ISSN no. translation of Odia literary works into English to the tune of at least 2,000 words.

**PAPERS TO BE OUTSOURCED FOR THE STUDENTS OF OTHER DEPARTMENTS UNDER CBCT SCHEME**

**This paper is meant for the students of other Departments under the Choice Based Credit Transfer Scheme**

| paper | Paper code | Title | Marks | Credits |
|---|---|---|---|---|
| ENG – CTBT 1 | ENG-AE 307 305 | READING LITERATURE | 80 | 04 |
| | | Details | | |
| | | Topic | Marks | Credits |
| I | | John Osborne: *Look Back in Anger* | 16+4=20 | 1 |
| II | | R.K.Narayan: *Guide* | 16+4=20 | 1 |
| III | | Tagore: *Gitanjali* | 16+4=20 | 1 |

| | | | | |
|---|---|---|---|---|
| IV | | Critical Appreciation of an unknown poem | 16+4=20 | 1 |

**OR**

| Paper | Paper code | Title | Marks | Credits |
|---|---|---|---|---|
| ENG – CTBT II | ENG-AE 308 | PROFESSIONAL WRITING | 80 | 04 |
| | | Details | | |
| | | Topic | Marks | Credits |
| I | | Feature Writing | 16+4=20 | 1 |
| II | | Report Writing/Proposal writing | 16+4=20 | 1 |
| III | | i. Content Writing<br>ii. Precis Writing | 16+4=20 | 1 |
| IV | | i. Noting and Drafting<br>ii. Editing | 16+4=20 | 1 |

**SEMESTER IV**

**(CORE COURSES)**

**Paper XVI**

| paper | Paper code | Title | Marks | Credits |
|---|---|---|---|---|
| XVI | ENG-CC 401 | CONTEMPORARY WORLD NOVEL | 80 | 04 |
| | | Details | | |
| | | Topic | Marks | Credits |
| I | | Arundhati Roy: *The God of Small Things* | 16+4=20 | 1 |
| II | | Chinua Achebe: *Things Fall Apart* | 16+4=20 | 1 |
| III | | Ken Kessey: *One Flew over the* | 16+4=2 | 1 |

| | | | | |
|---|---|---|---|---|
| | | *Cuckoo's Nest* | 0 | |
| IV | | Orhan Pamuk: *Snow* | 16+4=20 | 1 |

## Paper XVII

| Paper | Paper code | Title | Marks | Credits |
|---|---|---|---|---|
| **XVII** | **ENG-CC 402** | **COMMONWEALTH LITERATURE** | **80** | **04** |
| | | **Details** | | |
| | | **Topic** | **Marks** | **Credits** |
| I | | Fakir Mohan Senapati: *Six Acres and a Third* | 16+4=20 | 1 |
| II | | Bapsi Sidwa: *Ice Candy Man* | 16+4=20 | 1 |
| III | | Tehmima Anam: *The Good Muslim* | 16+4=20 | 1 |
| IV | | J.M. Coetzee: *Summertime* | 16+4=20 | 1 |

**PAPER- XVIII (A) (AL)**

| paper | Paper code | Title | Marks | Credits |
|---|---|---|---|---|
| **XVIII (A) (AL)** | **ENG-CE-403(A) (SP-AL)** | **SPECIAL PAPER : AMERICAN LITERATURE III: Drama** | **80** | **04** |
| | | **Details** | | |
| | | **Topic** | **Marks** | **Credits** |
| I | | Eugene O' Neill : *Desire Under the Elms* | 16+4=20 | 1 |
| II | | A Miller: *Death of a Salesman* | 16+4=20 | 1 |
| III | | Tennessee Williams: *A Streetcar Named Desire* | 16+4=20 | 1 |

| | | | | |
|---|---|---|---|---|
| IV | | Sam Shepard: *Curse of the Starving Class* | 16+4=20 | 1 |

**PAPER- XVIII (B) (AL)**

| paper | Paper code | Title | Marks | Credits |
|---|---|---|---|---|
| XVIII (B) (AL) | ENG-CE 404(B) (SP-AL) | SPECIAL PAPER : AMERICAN LITERATURE IV: RACE AND GENDER | 80 | 04 |
| | | Details | | |
| | | Topic | Marks | Credits |
| I | | Ellison: *The Invisible man* | 16+4=20 | 1 |
| II | | Zora Neale Hurston: *Their Eyes are Watching God* | 16+4=20 | 1 |
| III | | Toni Morrison: *Sula* | 16+4=20 | 1 |
| IV | | Alice Walker: *The Color Purple* | 16+4=20 | 1 |

## PAPER- XIX (A)

## ENG- CE – 404(A) SPECIAL PAPER PAPER: TRANSLATION Vol. II

**(Total Marks: 100)**

Under this programme a student shall prepare TWO volumes of translation of certain literary work(s) of established Odia poets/dramatists/novelists/short story/autobiography writer(s) into English in a minimum of 10,000 words under the supervision of a subject expert from among the members of the faculty.

However, only candidates with proven ability shall be encouraged to opt for the Translation Studies SPECIAL PAPER PROGRAMME subject to following conditions:

a. The candidate qualifies in a rigorous selection process including a written test followed by a viva voce test conducted by the Head of the

Department which should be unanimously approved by the Staff Council of the Department.

b. Even after a student qualifies in the tests conducted, a subject expert should be willing to supervise him on the texts of his choice.

c. As on the date of application for this special paper programme, the student must have published in standard literary journals with ISSN no. translation of Odia literary works into English to the tune of at least 2,000 words.

**PAPER- XIX (B)**

**ENG- CE- 404(B) SPECIAL PAPER PAPER: TRANSLATION Vol. II**

**(Total Marks: 100)**

Under this programme a student shall prepare TWO volumes of translation of certain literary work(s) of established Odia poets/dramatists/novelists/short story/autobiography writer(s) into English in a minimum of 10,000 words under the supervision of a subject expert from among the members of the faculty. However, only candidates with proven ability shall be encouraged to opt for the Translation Studies SPECIAL PAPER PROGRAMME subject to following conditions:

a. The candidate qualifies in a rigorous selection process including a written test followed by a viva voce test conducted by the Head of the Department which should be unanimously approved by the Staff Council of the Department.

b. Even after a student qualifies in the tests conducted, a subject expert should be willing to supervise him on the texts of his choice.

c. As on the date of application for this special paper programme, the student must have published in standard literary journals with ISSN no. translation of Odia literary works into English to the tune of at least 2,000 words.

**PAPER- XX**

| paper | Paper code | Title | Marks | Credits |
|---|---|---|---|---|
| XX | ENG- | DISSERTATION | 80 | 04 |

| | CC 405 | | | |
|---|---|---|---|---|
| | | Details | | |
| | | Topic | Marks | Credits |
| I | | DISSERTATION<br>Each students will prepare a dissertation in about 4000 words(approx.)on a topic of literary and critical interest under the supervision of a teacher [ A presentation carrying 20 marks on the same topic shall be considered towards Mid-sem Exam ] | 80 | 4 |
| II | | | | |
| III | | | | |
| IV | | | | |

---------THE END--------

# FIRST SEMESTER
## Core Course – 101
## Paper – I

## History of Ancients Societies and Civilization (World)

**Full Mark: 100 ( 80 + 20)** **Time : 3 hours**

**Unit-I**

**i) Ancient Egypt** - Geography, people, Political History, Society, Economy, Religion Cultural Development Contribution to Human Civilization. **20 Marks**

**ii) Mesopotamia** – Sumerian Civilization – Govt., Society, Economy Religion, Contribution of the Sumerians.

**iii) Babylonian Civilization**-Govt. Hamurabi's administration, Society Economy, Religion etc.

**Unit-II**

**i) Assyrian Civilization** – Government, Military Organization, Expansion of the Empire, contribution. **20 Marks**

**ii) Harappan Civilization**-Origin, Extent, Time and authors of the culture, Urban Civilization, Town Planning, Society, Religion, Economic life, decline.

**iii) China**-Geography, People, Society and Culture, Major Ruling Dynasties, Contributions.

**Unit-III**

**i) Greece** – Geography, Races, Early settlement, Athens, Sparta and other city states. Evolution of Democracy, Per clean Age, Peloponnesian War, Contributions. **20 Marks**

**ii) Rome** – Foundation of Rome, Roman Republic, class struggle, Expansion of the Republic. The punic Wars, Decline of the Republic, Julies Caesar, Contributions.

**iii) Persia** – Geography and people, Great Rulers, Culture Zoroastrianism, Mithraism, Legacy of Persian Civilization.

**Unit-IV**

**i) Hebrews**-Origin, Political History. The Hebrew Migration, Founding of Monarchy, Religious evolution, culture, Hebrew influence. **20 Marks**

**ii) Early Civilization of the American** – The Mayan and Aztec Civilization of Mexico.

**iii) The Incas of South America.**

**Internal Assessment** **20 Marks**

**Books for Reference**


1. J.E.Swain - A History of World Civilization
2. Davies - Outline History of the World.
3. Breastead - A History of the Ancient Egyptians
4. H.G.Wells - A short History of the World.
5. Dr. R. N. Chaudhury - Ancient and Medieval World
6. E.M.Burns - Western Civilization
7. S. N. Pal - Survey of World History
8. Sinnigen and Boak - A History of Rome
9. R. K. Majumdar & A. N. Srivastav - History of World Civilizations
10. N.S. Mittal - Ancient Civilization
11. H.S. Baghela - Ancient Civilization

# FIRST SEMESTER

## Core Course – 102

## Paper – II

### Practical History of Ancient Indian From 6th Century B.C. to 1206 A.D.

**Full Mark: 100 ( 80 + 20)** **Time : 3 hours**

**Unit-I**

i) Political condition of North India during 6th Century B.C. **20 Marks**
ii) Life and teachings of Vandhaman Mahavira.
iii) Life and Teachings of Gautam the Buddha.

**Unit-II**

i) Alexander's invasion of India and its effects. **20 Marks**
ii)
a) Chandragupta Maurya – Achievements.
b) Ashoka – His Kalinga war of 261 B.C., Religious policy.
iii) Downfall of the Maury Empire, Maury administration, Cultural development during the Mauryas.

**Unit-III**

i) Kaniska, Military and Cultural Achievements. **20 Marks**
ii)
Achievements of Chandragupta-I, Chandragupta-II & Samudragupta.
iii) Cultural activities during the Imperial Guptas : Society, Religion, Literature, Education, Science, Art & Architecture, Painting, Terracotta etc.

**Unit-**

i) Downfall of the Gupta Empire, Gupta administration. **20 Marks**
ii) - Contribution of South India to Art & Literature.
iii) His achievements: Military & Cultural, Administration.
iv) Invasion of Muhammod Ghori of Ghor.

**20 Marks**

**Books Recommended:**


1) An Advanced History of India – Raychoudhury Majumadar and Dutta
2) Early History of Idnia – N. N. Ghosh
3) Ancient India – Arun Bhattacharya
4) Ancient India – P. Maiti
5) Political History of Ancient India – H. C. Raychoudhury
6) Ancient India – K. L. Khurana
7) A short history of Muslim rule in India-Iswari Prasad.
8) Mediaval India – P. Maity
9) Mediaval India – V.D. Mahajan
10) Ancient India – V.D. Mahajan

# FIRST SEMESTER

## Core Course – 103

## Paper – III

## Social, Cultural and Economic History of Ancient India (From Pre-Historic Times to 1206 A.D.)

**Full Mark: 100 ( 80 + 20)** **Time : 3 hours**

**Unit-I**

i) Source of Ancient Indian History. Literary, Archaeological, Foreign Accounts, Folk Tales etc. **20 Marks**
ii) Physical Features (Geographical Divisions) and Unity in Diversity.
iii) Vedic period The Vedas, Political organization, Vedic Culture of Early and later period.

**Unit-II**

i) Social Life in Ancient India-Varma, Ashramas, Samskaras Family, Marriage, Divorce, Caste system etc. Hindu social systems, Sati, Jauhar, Purda System. Untochability and slavery etc. **20 Marks**
ii) Position of Women in Ancient Indian Society.

**Unit-III**

**i)** **20 Marks**
Economic Life in Ancient India during the historic period – Agriculture, Land Ownership Revenue, Taxation Land grants, Landed Aristocracy.
ii) Trade and commerce Internal and External, Ports, Trade Routes, Trade Centres, Maritime Activities.
iii) Coinage system during Ancient period.

**Unit-**

i) Salient features and development of Hindu Art, Architecture, sculpture, paining. **20 Marks**
ii) Development of Literature, language, education and science during the ancient period.
iii) Cultural development during the Mauryas, Arthasastra.

**20 Marks**

**Books Recommended:**


1) R.C. Majumdar (Ed.) - History and culture of the Indian people. (Bhartiya Vidya Bhavan Series Vols I, II, III)
2) N. Sengutpa - Evaluation of Hindu Marriage.
3) S.C. Ray Chaudhury - Social cultural and Economic History of India
4) B. N. Lunia - Evolution of Indian Culture
5) D. D. Kosambi - The culture and civilization of Ancient India, an Historical outline.
6) Percy Brown - Indian Architecture
7) A. L. Basham - Aspects of Ancient Indian Culture
8) R. S. Sharma - Indian Feudalism
9) A History of South India - K.A.N. Sastri
10) Indian Architecture (Islamic Period) – Percy Brown
11) Indian Scultpute - S.K.Saraswati
12) Socio-Economic History of Medieval India – K. N. Chitnis.
13) L. Prasad – India culture
14) B. Patra – New Horizon in History of Culture.
15) Manmath Padhy – Fairs, Festivals and Folk Culture of Odisha
16) Manmath Padhy – Tribal society and culture.
17) S.S. Samal – Radharanjan Gada O Dhamasalara Pratnatwika vaibhava (Odia)

# FIRST SEMESTER

## Core Course – 104

## Paper – IV

## RISE OF MODERN WEST

**Full Mark: 100 ( 80 + 20)** **Time : 3 hours**

**Unit-I** **20 Marks**

i) The English civil war and the Economic development in England.
ii) The scientific Revolutions of the 16th and 17th Century A.D.
iii) Transition from Feudalism to Capitalism.
iv) The proletariat Revolution of 1917 in Russia : Causes and effects.

**Unit-II** **20 Marks**

i) Meaning, Causes, Spread of Renaissance in Europe, Humanism, Art, Literature, New ideas etc.
ii) Geographical Discoveries and colonial expansion, causes, Course and early colonial voyages of Spain and Portugal, English colonial establishments, impact of the explorations.
iii) -Meaning of Reformation, causes, Martin Luther and protestant movement in Germany. Reformation in England under Henry VIII and Elizabeth Tudor, Reformation in France and Switzerland.

**Unit-III** **20 Marks**

i) Commercial Capitalism and mercantilism, Period of Mercantilism, Factors responsible for the birth of Mercantilism.
ii) Rise of Enlightened Despots.
Louis XIV of France
Fredrick the Great of Prussia.
iii) Peter the Great and Catharine of Russia
Maria Theresa and Joseph II of Austria.

**Unit-** **20 Marks**

i) Agrarian Revolution in England-Meaning, Factors, Effects etc.
ii) Industrial Revolution in England-Causes, Major Inventions, Effects etc.
iii) American war of Independence: Causes, Events & Effects.

**20 Marks**

**Books Recommended:**


1. C.J.H. Hayes - History of Modern Europe Vol. I & II
2. H.A.L. Fisher - A History of Europe
3. G. Barraclough - An introduction to contemporary History
4. Meenakshi Phukan - Rise of the Modern West
5. Andrews, Stuart - Sixteenth Century Europe
6. E- Lipson - Europe in the 19th& 20th Centuries
7. C.D. Hazen - Europe upto 1945
8. C.D.M. Ketelbey - A History of modern Times
9. L.C.B. Seaman - From Vienna to Versailles
10. The New Cambridge Modern History of Europe

# FIRST SEMESTER

## Core Course – 105

## Paper – V

## International Relations from - 1919 to 1939

**Full Mark: 100 ( 80 + 20)** **Time : 3 hours**

**Unit-I**

i) Cause of the World War-I **20 Marks**
ii) Paris peace conference
Treaty of Versailles – Provisions & Criticism
iii) League of Nations – Origin, Organisation, Achievements and failure

**Unit-II**

i) The Washington Conference **20 Marks**
ii) Problem of Reparation, Economic Crisis
iii)The Quest for International Security
Geneva Protocol
Locarno Agreements
The Kellogg-Briand Pact

**Unit-III**

i) Problem of Disarmament. Through the League and outside the League, conference and causes of failure. **20 Marks**
ii) Fascist Italy-Home and Foreign Policies of Benito Mussolini.
iii) Nazi Germany-Home and foreign Policies of Adolf Hitler.

**Unit-**

i) Causes of Russain Revolution – 1917 **20 Marks**
ii) Achievements of Lenin and Stalin
iii) Rise of Turkey-Mustafa Kamel Pasha-Domestic and Foreign Policies
iv) Causes of the second World War.

**20 Marks**

**Books Recommended:**


1. The World since 191-Langsam
2. International Relations-Gathorne and Hardy.
3. International Relations between two World Wars – E.H.Carr.
4. International Relations – V.D. Mahajan
5. International Relations Since World War I – Asit Kumar Sen
6. International Relations – U. Sharma
7. Adhunika Viswa Itihasa (Odia) – Dr. S. S. Samal
8. Antarjatika Ghatanavali (Odia) – Dr. S. S. Samal
9. World Since 1919 – A.C. Roy
10. International Relations – K . B. Keswani
11. International Relation – M. G. Gupta
12. The United Nations – Siddhartha Das
13. Dynamics of International Politics – Siddhartha Das

# SECOND SEMESTER

## Core Course – 201

## Paper – VI

## Political History of Mediaval India from 1206 A.D. to 1757 A.D.

**Full Mark: 100 ( 80 + 20)** **Time : 3 hours**

**Unit-I**

i) Sources of Medieval Indian History **20 Marks**
ii) Early rulers oof Delhi sultanate : The slave Dynasty
Iltutmish and Balban – Achievements
iii)
Ala-Ud-Din Khalji – Achievements and Policies:

**Unit-II**

i) **20 Marks**
Muhammad-bin-Tughuuq and Fiuz shah Tughlug: Achievements and Policies.
ii)
Babur-Conquest of India
Humayun – Achievements
iii) Sher Shah – Achievements and administration

**Unit-III**

i) Akbar-Achievements and Policies (Religious Policy and Rajput Policy) **20 Marks**
ii) Jahangir-Early career, Achievements, The role of Nurjahan in Mughal Administration.
iii) Shahjahan – Achievements and Policies.

**Unit-**

i) Aurangzeb-Achievements and policies (Religious policy, Rajput policy, Deccan policy) **20 Marks**
ii) Mughal Administration
iii) Downfall of Mughal Empire causes
iv) Shivaji Conquests and Administration

**20 Marks**

**Book For Reference:**


1. R.C. Majumdar (Ed) – History and Culture of the Indian People Vols. VI & VII.
2. R.C. Majumdar, H.C. – An Advanced History of India.
3. V. S. Smith – Oxford History of India.
4. M. Habib & K. A. Nizami – The Delhi Sultanate Vol. V K.A. Nizami – Some of aspects of Religion & Politics in India during the 13th Century.
5. K. A. Nizam – Som eof aspects of Religion & Politics in India during the 13th Century.
6. Lane Pole – Medieval India under Mohamadan Rule.
7. Jadunath Sarkar:
   - i) Studies in Mughul India
   - ii) Mughal Administration.
   - iii) History of Aurangzeb Vol – 5
   - iv) The Fall of the Mughul Empire Vols 4.
   - v) Shivaji & his Times.
8. Satish Chandra – Parties and Politics at the Mughul Court.
9. M. Alha Ali – The Mughul Nobility under Aurangzab.
10. R.C. Varma – Foreign Policy of the Great Mughuls.
11. H.N.Serwami – The Brahmins of the Deccan.
12. A. Krishna Swame – The Tamil Century under Vijayanagar.

# SECOND SEMESTER

## Core Course – 202

## Paper – VII

## Social, Cultural and Economic History of Medieval India

**Full Mark: 100 ( 80 + 20)** **Time : 3 hours**

**Unit-I**

i) Early Muslim Settlements, Rise of Islam and its impact. **20 Marks**
ii) Composition and stratification of the society, Rural urban relationship.
iii) Position of Women.

**Unit-II**

**i)** Agrarian Economy, Sources of Revenue, Nature and magnitude of taxation. **20 Marks**
ii) Cotton textiles, handicrafts, agro-based industries, metal technology and artisans.
**iii)** State policies, internal and external trade, trade centres and posts, transport and communication

**Unit-III**

i) Bhakti Movement : Cause of the rise of Bhakti Movement. Nath Panthis, Kabir, Santh tradition, Nanak, Dadu, Chaitanya, Tulsi Das, Namdev. **20 Marks**
ii) Sufism – Its origin, concept, Practices, Major Sufi orders Chisti order, Suhrawardi order etc.
iii) Impact of Bhaktism and Sufism.

**Unit-**

i) Indo – Islamic Architecture –Khalji, Tughluq, Sayyid and Lodi Period. **20 Marks**
ii) Mughal Architecture under Akbar, Jahangir, Shah Jahan, Aurangzeb and later Mughals.
iii) Painting under the Mughals, Rajput painting, Deccan Painting

**20 Marks**

**Books Reference:**


1) An advanced study in the History of Medieval India – J. L. Mehta, Vols I, II & III.
2) Social, Cultural and Economic History of India – (Earliest Times of Preset Times) S. C. Roy Choudhury.
3) History of Medieval India – Satish Chandra.
4) The Agrarian System of Mughal India – Irgan Habib
5) Some aspects of North Indian Social life – P. N. Ojha
6) A History of South India – K.A. N. Sastri
7) Indian Architecture (Islamic Period) – Percy Brown
8) Trade and civilization in the Indian Ocean – Satish Chandra
9) Social Economic History of Medieval India – K. N. Chitnis
10) Manmath Padhy – Fairs, Festivals and Folk Cuilture of Odisha
11) Manmath Padhy – Tribal society and culture : Changes and Continuity.
12) S. S. Samal – Radhnagar Gada O Dhamaslara Pratnatatwika Vaibhava
13) S.S. Samal – Antiquities of Gandhamardhan Mountain of Orissa.

# SECOND SEMESTER
## Core Course : 203
## Paper – VIII

## HISTORY OF THE FREEDOM MOVEMENT IN INDIA (1885-1947)

**Full Mark -100 (80+20)** **Time : 3 hrs**

**Unit-I**

i) Emergence of Indian Nationalism
ii) Foundation of the Indian National Congress, Moderate phase, Extremist phase and Revolutionary Nationalist Activities : The Ghadar Movement
iii) Rise of Economic Nationalism : Swadeshi Movement

**Unit-II**

i) Home Rule Movement
ii) National Movement under Gandhi's Leadership : Gandhi's career & thought, Entry into politics, Experiments with Satyagarha in india. Methods of mass mobilization, Khilafat and non-co- operation movement, Role of Women
iii) Swaraj Party : Formation Work Division, Evaluation of their work

**Unit-III**

i) Civil disobedience movement, Role of women, Round Table conferences
ii) The Indian Council Act – 1909
iii) The Govt. of India Act – 1919 and 1935
iv) Muslim league and Partition of India

**Unit-**

i) Quit India Movement
ii) Subas Chandra Bose and the Indian National Army- Royal Indian Naval Revolt
iii) The Partition of India and Achievement of Independence

**Book for Reference**


1. A.R. Desai : Social Background of Indian Nationalism
2. Bipan Chandra : Nationalism and Colonialism in India
3. Bipan Chandra (Ed.): India's Struggle for Independence 1857-1947
4. Bipan Chandra : The Epic Struggle
5. Sumit Sarkar : Modern India (1885-1947)
6. B.L. Grover and S. Grover : A new look at modern Indian History
7. B.N. Pandey (Ed.) : Centenary History of Indian National Congress, 3 Vols
8. M.N. Das: Indian under Morley and Minto
9. A.R. Desai : Peasant Struggle in India
10. Bipan Chandra : Rise and Growth of Economic Nationalism in India
11. R.C. Dutt : Economic History of India 2 Vols
12. L. Prasad : India National Movement

# SECOND SEMESTER
## Core Course : 204
## Paper – IX

## HISTORY OF EUROPE FROM 1789 TO 1914

**Full Mark -100 (80+20)** **Time : 3 hrs**

**Unit-I**

i) The French Revolution causes
ii) The Estate General, National Assembly making of the constitution
Legislative Assembly
National Convention, Directory
iii) The consulate – Napoleon Bonaparte Reforms and Foreign policy
Early years of the Empire
The Empire at its height
Downfall of Napoleon : Causes

**Unit-II**

i) Congress of Vienna
ii) Era of Metternich and his system
iii) Regin of Louis XVIII

**Unit-III**

i) July Revolution – 1830 and Charles – X
ii) February Revolution – 1848 and Louis Philippe
iii)Second Republic and Founding of the Second Empire:
Napoleon III – comestic and Foreign Policy

**Unit-**

i) Crimean War-Causes and Effects
ii) Unification of Italy
iii) Unification of Germany, Domentic & Foreign Policy of Bismark
iv) Alexander – II – Reforms

**Book Recommended**

1. A History of Modern Times : C.D.M. Ketelbey
2. Europe Since Napoleon : David Thosmson
3. Europe in the 19th and 20th century – Lipson
4. History ofModern Europe – C.D. Hazen
5. History of Europe – P.Maitai
6. Modern Europe : K.L. Khurana

**Book For Reference**


1. E..H.Carr : International Relations Between Two World Wars
2. M.G.Gupta : International Relations
3. W.C. Langsham : World Since 1919
4. D.C.Gupta : The League of Nations
5. E.H.Carr : The Russian Revolution from Lenin to Stalinn
6. A.J.P. Tayalor : The Origin of the Second World War
7. H.S. Morganthau : sPolitics among Nations
8. B.William : Modern Africa
9. Harold M. Vinacke : A History of the Far East in Modern Times
10. Dr. S.S. Samal : Adhunika Viswa Itihas (Odia)
11. Dr.S.S. Samal : Antarjatika Ghatanavali (Odia)
12. Siddhartha Das : The United Nations
13. Siddhartha Das : Dynamics of International Politics
14. K.B. Keswani – International Relations in Modern World (1900-2000)

# SECOND SEMESTER

## Core Course – 205

## Paper – X

## International Affairs (1939 A.D. – 2000 A.D.)

**Full Mark -100 (80+20)** **Time : 3 hrs**

**Unit-I**

i) United Nations Organisation – Formation, Structure, Objectives
ii) Achievements and failure of the UNO
iii) Post – war Revival of Japan :
Democratic & Socio – Economic Revival from 1945 to 1951
Progress of Japan from 1951 to 1970

**Unit-II**

i) Meaning, Origin, Background Super Power Rivalry from 1945 to 1980 Progress and Redemsion
ii) Regional Security and Alliances : Military NATO, CENTO, Waresaw Pact, ASEAN, SEATO.
iii) Germany and the Cold War

**Unit-III**

i) India in the world Politics
India Foreign Policy (From 1947 to 2000) – Salient Features
India and Pakistan (Simla Agreement)
ii) India and Soviet Russia
India and United States of America
iii) Emergence of India as a Nuclear State : Comprehensive
Tent Ban Treaty (CTBT) and India's Perception about it.

**Unit-**

i) Prospects of Disarmament after the second world war
ii) Non Aligned Movement (NAM), The Summits ; India and the NAM
iii) Dawn of Democracy in Soviet Union Under Gorbachev.

# THIRD SEMESTER

## Core Course : 301,

## Paper – XI

### Political History of Modern India from 1757 to 1885 A.D.

**Full Mark -100 (80+20)** **Time : 3 hrs**

**Unit-I**

i) The Sourses
ii) The Establishment of British Rule in India
Siraj-Ud-Daula and the Battle of Plassey Causes, Course and Importnace
iii) Lord clive – Early career and achievements,
Dual system of administration in Bengal under clive.

**Unit-II**

i) Warren Hastings - Reforms
ii) Lord Cornwallis – Reforms, Perament Settlement
iii) Lord Wellesley – Achievements : The Subsidiary Alliance

**Unit-III**

i) Anglo – mysore and Anglo Maratha Relations
ii) Willam Bentinck Reforms
iii) Lord Dalhousie – Reforms, Doctrine of Lapse
iv) Revolt of 1857 – Causes and Consequences

**Unit-**

i) Administrative reorganization under the British Crown – 1858
ii) Lord Ripon – Reforms
iii) Lord Curzon – Reforms and Polices
iv) Socio- Religious Reform movement in the 19th Century : Role of Raja Rama Mohan Roy and Dayananda Saraswati.

**Internal Assessment**

**Book Reference**


1. Text Book of Modern Indian History : Sarkar & Dutta
2. History of British Rule in India : P.E. Roberts
3. New Look at Modern Indian History : B.L. Grover & S. Grover
4. Advances History of India : Ray Choudhury, Majumdar & Dutta
5. Advanced Study in the History of Modern India Vol.: I and II G.S. Chhabra
6. Modern India L. Prasad
7. Modern India : K.L. Khurana
8. Modern India : V.D. Majumdar

# THIRD SEMESTER

## Paper – XII

### Core Course - 302

### Social, Cultural and Economic History of Modern India

### (1757 A.D. to 1947 A.D.)

**Full Mark -100 (80+20)** **Time : 3 hrs**

**Unit-I**

i) Understanding Modern India – Sources **20 Marks**
Archival records, Private Pap ers, News Papers, Periodicals etc
ii) European traders in India Portuguese, Dutch, French and British. Their Settlements in India

**Unit-II**

i) Economic History during the colonial period Agrarian Policy, Land settlement, Zamidari system and Ryotwari system etc. Comercialisation of agriculture. **20 Marks**
ii) Industry Rural Industry and Urban industry, Evolution of Modern Industry, Indigo, Tea, coffee, Jute, cotton textile, sugar industry etc. Coal mining Iron and steel, cement,paper and other heavy industry, destruction or traditional artisan industry.
iii) Transport development Railway system, Water transport, Road Transport, Air Transport, Impact on Indian economy.

**Unit-III**

i) Growth of Education: Role of the Christian Missionaries and Non-Missionary British official, Macaulay's Minitue, Wood's Despatch. Hunter commission, Lord Curzon and Education system, under him, Sadler commission, Hartog Committee, Wardha scheme of Basic Education, Sargeant plan of Education. **20 Marks**

**Unit-IV**

i) Indian press under colonial rule-East India company and the Indian press; Period of Struggle between the press and govt Vernacular PressAct, 1878. Newspaper Act. 1908. Indian Press Act, 1910, and The Indian Press Act – 1931 **20 Marks**
ii) Emancipation of women : abolition of sati, Female infanticide

**Internal Assessment** **(20 Marks)**

**Books for Reference**


1. S.S. Raychowdhury – Social Culture and Economic History India
2. B.L. Grover & S. Grover : A New look at Modern Indian History
3. Sumit Sarkar : M odern India
4. Tapan Raychowdhury (zEd) – Indian Economy in 19th Century
5. J. Krishna Murty (Ed) : Indian Economy in the 19th Century
6. Iswari Prasad : Indian in the Eighteenth Century
7. K.K. Dutta – Socio –Cultural Background of Modern India
8. S. Natarajan : The press in India
9. Majumdar Dutta, Raichowdhury – An advanced History of India
10. N.K. Sinha : Modern India

CC- 303

# THIRD SEMESTER

## Allied Course – I (A.E.-I)

# Research Methodology

**Full Mark -100 (80+20)** **Time : 3 hrs**

**Unit-I**

i) Sources of Indian History – Ancient and Medieval Periods
ii) Sources of Indian Hjistory – Modern Period
iii) Sources of Odishan History

**Unit-II**

i) Preliminary Operations – What is Research
ii) Historical facts and evidences
iii) Value of allied disciplines in Historical Interpretations

**Unit-III**

i) Chronology and Dating
ii) Analylical Operations
iii) Synthetic Operations

**Unit-**

i) Concluding Operations
ii)Principles of Historical Imagination and Observation
iii) Language and style of composition Presentation
iv) A case study of Tribal museum of Koraput, the arrangement of specimens, personal contributions of public, Teachers and Students for its development.

**(20 Marks)**

**Book for Reference**


| | |
|---|---|
| 1. B. Sherk Ali | History, Its theory and Method (Madras, 1978) |
| 2. AIL, Rowse | The use of History (London, 1963) |
| 3. E.H. Carr | What is History (London, 1951) |
| 4. R.G. Collingwood | The idea of History (London, 1972) |
| 5. R.K. Majumdar & A.N. Srivastav | Historigraphy – Method of History (Delhi - 1987) |
| 6. K. Rajayan | History in theory and Method (Madurai, 1982) |
| 7. G.K. Clark | Guide for Research Students working on Historical Subject(Cambridge , 1969) |
| 8. P. Gardiner (ed.) | Theories of History (Oxford, 1959) |
| 9. H.E. Barnes | A History of Historical writing (New York, 1963) |
| 10.U. N. Ghoshal | The Beginnings of Indian Historiography and other essays(Calcutta-1944) |
| 11. B.N. Luniya | Historians of Medieval India (Agral 1969) |
| 12. R.C. Majumdar | Historiography in Modern India (Bombay 1970) |
| 13. V.S. Pathak | Ancient Historians of India (Bombay, 1989) |
| 14. Jagdish Narayan Sarkar | History of History Writing in Medieval India |

CC- 304

# THIRD SEMESTER

## Core Elective (C.E -I)

## Special Paper – I

## Political History of Odisha upto 1568 A.D

**Full Mark -100 (80+20)** **Time : 3 hrs**

**Unit-I**

i) Historical Geography of Odisha
ii) Kallnga War of 261BC.-Causes and effects.
iii) Mauryan administration in Kalinga.

**Unit-II**

i) Kharavela-Career and Achievements
ii) The Sailodbhabas : Originand the Rulers
iii) The Bhaumakaras :Origin, Genealogy, Sivakaradeva-I, Subhakaradeva-I, Sivakaradeva-II, Tribhuvana Mahadevi-IPrutviMahadevi, Gauri Mahadevi, Vakula MahadeviandDharmaMahadevi,BhaumaAdministration.

**Unit-III**

i) The Somavamsis :Achievements of Janmejaya I, YayatiI,YayatiII,andUdyotkesari, Somavamsi Administration.
ii) TheLaterGangas: Achievements of Chodaganga Deva, Ananga bhima Deva-III and Narasingha Deva-I
iii) Ganga Administration

**Unit-**

i) TheSuryavamsis :Kapilendra Deva
ii) PurustottamaDevaandPrataparudra Deva
iii) Suryavamsi Administration
iv) Downfall oftheOdisha Kingdom: Causes

**(20 Marks)**

**Books For Reference :**


1. HistoryofOrissa-Dr, K.C.Panigrahi
2. Political andCultural HistoryorOrissa-Dr. Shishir Kumar Panda
3. AstudyofHisiotry ofOrissa-Atul Chandra Pradhan
4. HistoryorOrissa-Prabodh KumarMishra
5. HistoryorOrissa- Vol.I-N.K.Sahu
6. TheGajapati KingsofOrissa-Pravat Mukharjee
7. TheRiseandFalloftheSailodbhavas-Dr. SaratChandra Behera
8. TheBhaumakaras ofOrissa-Dr. UmaKantaSubudhi
9. TheBhaumakaras, theBuddhist KingsofOrissa andtheirtimes-Biswarupa Das
10. HistoryofOrissa-N.K. Sahu,P.K. Mishra,J.K.Sahu
11. The Somavamsi KingsofOrissa-Bina Kumari Sarma
12. Some Aspecs ofHistoryandCulture ofOrissa-A.K.Rath
13. Religious History ofOrissa Ed.N.R.Patnaik
14. Economic History ofOrissa Ed.N.R.Patnaik
15. Glimpses ofOrissan Culture Ed.N.R.Patnaik
16. Antiquities ofGandharnardan MountainofOdisha-Dr. S.S.Samal
17. Gandhamardan Parvatra Pratnatatwika Vaibhava-Dr. S.S.Samal
18. Radhanagar ebam Dharmasalara Pratnatatwika Vaibhava-Dr. S.S.Samal
19. Antiquities ofRadhanagar andDharmasala Dr.S.S.Samal

CC - 305

# THIRD SEMESTER

## Core Elective – 2 (C.E.-2)

## Special Paper – II

# Political History of Odisha From 1568 A.D. to 1947 A.D.

**Time : 3 hrs**

**Full Mark -100 (80+20)**

**Unit-I**

i) Odisha under the Afgans
ii) Odisha under the Mughals
iii) Odisha under the Marathas

**Unit-II**

i) British Conquest of Odisha
ii) Early British Administration (1804-1857)
iii) Resistance Against the British in Odisha : Paik Rebellion, Ghumusar Rebellion, Sambalpur Rebellion

**Unit-III**

i) Growth of Odia Nationalism : Factors
ii) Utkala Sammilani (1903-1920)
iii) Role of Madhusudan Das and Krushna Chandra Gajapati in the making of Odisha.
iv) Contribution of Koraput in the freedom struggle.

**Unit-**

i) Creation of the province of Odisha : Language Agitation, Amalgamation of Odia speaking territories.
ii) Odisha in the nationalist movements : Non-cooperation, Civil Disobedience and Quit India.
iii) Prajamandala Movement in Odisha : Dhenkanal, Nilgiri, Talcher, Ranpur
iv)Role of Odia women in the freedom struggle

**(20 Marks)**

## Book Reference


| | | |
|---|---|---|
| 1. | B.C. Ray | i) Orissa under the Mughuls |
| | | ii) Orissa under the Marathas |
| | | iii) Foundation of British Orissa |
| 2. | L.N. Rout | Socio-Economic life in Medieval Orissa 1568-1751 |
| 3. | K.M. Patra | Orissa under the East India Company |
| 4. | J.K. Samal | i) Orissa under the British Crown |
| | | ii) History of Education in Orissa |
| | | iii) History of Modern Orissa |
| | | iv) Administrative History of Orissa |
| 5. | K.C.Jena | Ascending of British Raj in Orissa |
| 6. | P. Mukherjee | History of Orissa |
| 7. | P.K. Mishra | Political History of Orissa |
| 8. | Prasanna Kumar Mishra | Political Unrest in Orissa in the 19th Century |
| 9. | N.K. Jit | The Agrarian Life and the Economy of Orissa |

# FORTH SEMESTER

## Core Corse 401

## Paper XIII

# Historical Application in Tourism

**Full Mark -100 (80+20)** **Time : 3 hrs**

**Unit-I**

i) Understanding Tourism-Definitions, forms. Traveller and Tourist, Purpose of visit, means of transport, Tourism Accommodation.

ii) History of Tourism in India-Travel in Pre-Historic times, Travel in Middle Age, Development of Early and Morden Transportation system.

iii) Organisation of Tourism-Role of the Government, Need for organisation, Factors, The National Tourist organisation, U.N. conference Recommedndations, World Tourism organization, Pacific-Asia Travel Association.

**Unit-II**

*i) Museum* administration, Planning of Museum building, planning of museum gallery, principles of display, Ligthing, Mode and ways of Aquisition of Museum specimens. Arrangement in museum

ii) Documentation and Labels in Museum Need for Documentation Method of Documentation, safeguards of Records, Development of Computer based Documentation, Documentation of Enthrographic specimens, museum labels, Dioramas models and charts, museum photography

iii)

a) Car festival of Lord Jagannath , b) Onam ,c) Christmas ,d) Muharam

e) Nuakhai, f) Balijatra

g) Chaitra Purva in the sakti pithas of Rayagada with a special references to Maa Majjhighariani

**Unit-III**

i) Tourism and promotion of Handicraft, performing Arts of Odisha:

a) Pattachitra Painting and applique work of Pipli

b) Handloom Textile of Odisha (Sambalpuri Pata) Pattachitra of Raghurajpur, Filegree work of Cuttack

c) Handicraft made of clay, Stone, Wood, Bamboo, Silver, Ivory, Lacque etc.

d) Pala, Daskathia, Chhau, Odisi, Gotipua, Mughal Tamasa, Vaunsarani, Sambalpuri dance, Tribal dance in Rayagada

ii)

a) The Odisha State Museum Bhubaneswar

b) Khandagiri and Udaygiri

c) Ratnagiri, Lalitgiri and Pushpagiri

d) Nrusingha Nath – Dist Bargarh

e) Hari Sankar – Dist – Bolangir

f) Jaugad – Dist Ganjam

g) Gupteswar – Dist Koraput

iii) **Tourist Destinations : Historical Events**

a)Kalinga War
b)Jalianwallabag Massacre
c)Inchudi Episode
s)Iram Massacre
e) Papadahandi Massacre – Dist Navarangpur

**Unit-IV**

i) Regional monuments-Evolution and Development of Odishan temple Architecture **20 Marks**
- Khakhara, Nagara and Pidha Temples:

**Case study of some temples :**

a) Parsurameswar, b) Vaital , c) Mukteswar Lingaraj, d) Sun Temple at Konark
e) Jagannath Temple at Puri and Rayagada.
f) Nilakantheswar Siva Temple at Devagiri, Dist Rayagada.
g) Pathaleswara temple at Paikapada , Rayagada.

ii) **Guiding Aids and Skills-**

a) Guides and Escrots : Definition and Role of a Guide
b) Guiding as a technique, leadership facual knowledge, personality, Communication skill, command in language etc.

iii) Profiling Foreign and Domestic Tourist

**Internal Assessment** **(20 Marks)**

# FORTH SEMESTER

## Core Corse 402

## Paper XIV

# Historiography

**Full Mark -100 (80+20)** **Time : 3 hrs**

**Unit-I**

i) Nature and Scope of History
What is History
History as Science or Arts
ii) Value and Subject matter of History
Historical Objectivity and Subjectivity in history, Historicism
iii) Structure and from of History, Bias in History

**Unit-II**

i) Historiography or Development of Historical Writings
Ancient Historigraphy - Herodotus, Thucydides, Cato the Censor, Livy, Cornelius
ii) Medieval Historiography, Church Historiography, Agustine, Ibn Khaldun
iii) Modern Historigraphy
Positive Historiography
Gibbon, Carlyle, Toynbee, Hegel
Vico, comte, Ranke, Spengler

**Unit-III**

i) Ancient Period
Indian Tradition of Historiopraphy – Vedas, Puranas etc.
Jaina and Buddist Historiography – Bana and Kalhana
ii) Medieval Period
Alberuni, Abul Fazl, Amir Khusrau
iii) Modern Period
Colonial Historians of India
Macaulay, WW Hunter
R.G. Bhandarkar, K.P. Jayaswal, H.C. Raychaudhury, Muhammad Habib

**Unit-**

i) Odishan Historiography- A Sterling, RD Banerjee, N.K. Sahu, K.C. Panigrahi, S.N. Rajguru
ii) Themes in Indian History (I) (Economic, Labour and Peasants, Varna, Jati, Janjati, Gender, religion etc.)
iii) Themes in Indian History (II) (Art, Literature, Environment, Science etc.)

**Internal Assessment**

**Book for Reference :**


| | | |
|---|---|---|
| 1. | A.L. Basham | Cultural Heritage of India |
| 2. | Dharmaranjan & Seth | Tourism in India |
| 3. | Sunita Chopra | Tourism Today |
| 4. | Ratandeep Singh | Tourism Today |
| 5. | Sobhita Panja | The Museums of India |
| 6. | R.N. Kaul | The Dynamics of Tourism |
| 7. | Saryu Doshi | Aspects of the Performing Arts of India |
| 8. | J.C. Harley | The Art and Architecture of the Indian Sub-continent |
| 9. | Percy Brown | Indian Architecture - Vol – I the Indian Buddhist and Hindu Period |
| 10. | Percy Brown | Indian Architecture – Vol – II Islamic Period |
| 11. | Michael M. Coltman | Introduction to Travel Tourism |
| 12. | K.C. Panigrahy | Archaeological Remains of Bhubaneswar |
| 13. | VidyaDahejia | Early Stone Temples of Orissa |
| 14. | N.K. Sahu | Buddhism in Orissa |
| 15. | National Book Trust | Festivals of India |
| 16. | Utkala Pathaka Sansada | Odisara Parva Parvani (Odia) |
| 17. | Dr. S.S. Samal | Antiquities of Gandhamardhan Maountain of Odisha |
| 18. | Dr. S.S. Samal | Gandhamardhan Parvatara Pratnatawika Vaibhava |
| 19. | Dr. S.S Samal | Radhanagar ebam Dharmasalara Pratnatatwika Vaibhava |

**Book Reference**


1. What is History – E.H. Carr
2. The Nature of History – A. Marwik
3. Idea of Histor y R.G. Collingwood
4. Past and Prejudice – Romilla Thapar
5. A study of History – Arnold Toynbee
6. History : Its Theory and Method – B. Seikh Ali
7. History – Tits Theory and Research Methodology – K.L. Khurana
8. Concepts & Methods of Historiography – K.L. Khurana
9. H.E. Banerji – A History of Historical Writing

# FORTH SEMESTER

## Core Corse 403

## Paper XV

## History of Science and Technology in India

**Full Mark -100 (80+20)** **Time : 3 hrs**

**Unit-I**

**Science and Technology : The Beginninh**

i) Sources of History of Science and technology in Ancient India
ii) Orgin and development of technology in pre-historic period : Beginning of agriculture and its impact on the growth of science and technology.
iii) Science and technology during Vedic and Later Vedic times : Doctrine of five elements, Theory of Atomism

**Unit-II**

i) Developemnts in astronomy : Contribution of Aryabhata, Varahamihira and Bhaskara – I
ii) Development of Mathematices : Geometry, the Sulbha Sutra; Arithmetic and Algebra
iii) Development of Medicine and Surgery ; Ayurveda : Charaka and Sushruta Samhitas

**Unit-III**

i) Early European Scientists in Colonial India : Surveyors; Botanists, Doctors under the compay's service.
ii) Indian Response to New Scientific Knowledge.
iii) Pioneer Indian Scientists and their contributions – J.C. Bose, P.C. Ray, C.V. Raman

**Unit-**

i) Atomic Energy in India
ii) Nuclear Energy in India
iii) Space and Defense Research in India.

**Book Reference**


Arnold Devid : Science, Technology a nd Medicine in Colonial India, The New Cambridge History of India Series, OUP, Cambridge, 1999

A.K. Bag : Science and Civilization in Indi, Vol – I (Harappan Period, C-3000 B.C. – C. 1500 B.C.) Navrang Publications, New Delhi, 1985

A.K. Bag (ed.) - History of Technology in India, Vol I, INSA, New Delhi, 1997

A.K. Biswas - Science in India, Firma KL Mukhopadhyaya; Calcutta, 1967

Ahsan Jan Qaisar- The Indian Response to European Technology and Culture (A.D. 1498-1707); Oxford University Press, Delhi 1982

Ardhendu Sekhar Ray – Crafts and Technology in Ancient India; S.S. Publishers, Delhi, 1998

B.R. Nanda (ed.) : Science and Technology in India, Vikas Publishing House Pvt. Ltd. New Delhi, 1977

Debiprasad : History of Science and Technology in Ancient India, 3, Vols. Firma

Chattopadhyaya : KLM Pvt. Ltd. , Calcutta, Vol I (1989), Vol .II (1191), Vol.III(1996)

D.M. Bose et.al (ed) : A concise History of Science in India: INSA, New Delhi, 1971

Anil Kumar : Medicine and the Raj Sage, delhi 1998

Deepak Kumar : Disease and Medicine in India: A historical Overview

Macleod, Ray & Deepak Kumar (eds) : Technology and The Raj. Sage, Delhi, 1995

Deepak Kumar : Scince and The Raj, Oxford University Press, Delhi – 1995

Dharmpal : Indian Science and Technology in the Eighteeth Century – Some contemporary European Account, Impex India, Delhi 1971

Deepal Kumar (ed) : Science and Empire : Essays in Indian Context, Anamika Prakashan Delhi, 1991

H.C. Bhardwaj : Aspects of Ancient Indian Technology, Motilal Banarasi Dass, Delhi 1979

Kenneth G. Zysk : Asceticism and Healing in Ancient India, Oxford University Press

Priyavrat Sharma : History of Medicine in India, INSA, New Delhi, 1992.

# FORTH SEMESTER

## Core Elective (C.E -3)

## Special Paper – III

## Social, Cultural and Economic History of Odisha upto 1568 A.D.

**Full Mark -100 (80+20)** **Time : 3 hrs**

**Unit-I**

i) Sources of Odisha History
ii) Social and Economic condition of Odisha uptp 1568 A.D.
iii) Religious condition of Odisha upto 1568 A.D.
iv) Development of Education and literature upto 1568 A.D.

**Unit-II**

i) Saivism in Odisha
ii) Saktism and the Tantra cult in Odisha
iii) Vaishnavism in Odisha
iv) Origin and Evolution of Jagannath Cult and the cat worship at Narasingha Nath and Harinankar.

**Unit-III**

i) Salient feature of Odishan Art, Architecture, Sculpture, Painting, Rock Art, Temple Architecture etc.
ii) The Kosali and Kalingan Style of Architecture – Special Features and importance.
iii) Jainism and Jaina Movements in Odisha upto 1568 A.D. (Art & Architecture)

**Unit-**

i) Buddism and Buddhist Movements in Odisha upto 1568 A.D. (Art & Architecture)
ii) The Art Architecture of Jagannath temple (Puri), Konark Temple, Lingaraj Temple, (BBSR).
iii) Condition of Women during Ancient & Mediaval Period.

**(20 Marks)**

**Book for Reference**


1. P.K. Mishra & J.K. Samal (Ed) Comprehensive History and Culture of Orissa, Vol-II & III
2. N.K. Sahu Huddhism in Orissa
3. L.K. Panda Sharvism in Orissa
4. Collection & Selection of History of Orisssa, Vol – I
5. N.R. Pattnaik Cultural History of Orissa
6. A.K. Rath Some aspects of the History and Culture of Orissa
7. A.K. Rath Odishara Jaina Dharma Sanskruti
8. R.P. Mahapatra Jain Monuments of Odisha
9. S.K. Panda History of Odisha
10. Sahu, Mishra & Sahu History of Orissa
11. Dr. S.S.Samal Gandhamardan Parvatra Pratnatatwika Vaibhava
12. Dr. S.S.Samal Radhanagar ebam Dharmasalara Pratnatatwika Vaibhava
13. Dr. S.S.Samal Antiquities ofRadhanagar andDharmasala
14. Dr. S.S.Samal The Antiquities ofRadhanagar andDharmasala
15. K.C. Panigrahi History of Culture
16. R.L. Mitra Antiquites of Orissa Vol – 1 & 2
17. K.C. Panigrahi Archaeological Remains at Bhubaneswar
18. S.N. Rajguru History of Gangas Part – 1 & 2
19. R.P. Mahapatra Jaina Movements of Odkisha

# FORTH SEMESTER

## Core Elective (C.E - 4)

## Special Paper – IV

### Project Work & Viva Voce

**1. Paper – IV(a)**
**Project Works**
It will be based on highlighting the History of Rayagada and Koraput in Particular and History of Odisha in general.

**Paper –**
Viva Voce.....
(Questions from subject will be of 70% and From G.K. 30%).

**P. G. Dept. Of History**

## FIRST SEMESTER

### PSC-101: Western Political Thinkers: Ancient and Medieval

**Unit-I**

Plato – Ideal State, Theory of Knowledge, Theory of Justice, Communism.

Aristotle – Nature and Purpose of State, Constitution: Classifications, Revolution and Slavery.

**Unit-II**

Machiavelli – Child of Renaissance, Religion, Ethics and Politics.

Montesquieu – Liberty, Separation of Powers

**Unit-III**

Hobbes – Theory of Social Contract, Absolute Sovereignty

Locke – Individual and Community, Theory of Natural Rights, Social Contract, Political Obligation.

**Unit-IV**

Rousseau – Origin of Inequality, General Will, Civil Liberty.

**Suggested Readings:**


1. Aristotle, The Politics, Translated Ernest Barker, Oxford University Press, 1998 edn.
2. Hobbes, Thomas, The Leviathan, Amherst New York, Prometheus Books, 1988.
3. Pocock J.G.A., The Machiavellian Moment, Princeton, N.S. Princeton University Press, 1975.
4. Raphal D.D. Hobbes: Morals and Politics, Great Britain, Cambridge University Press, 1977.
5. Jones W.T., Master of Political Thought, OUP, 1975.
6. Sabine G.H. A History of Political Theory UP 1973.
7. Strans Leo and Corpscy, Joseph, History of Political Philosophy, Chicago, 1987.
8. Popper, Karl, The Open Society and Its Enemies.

## PSC 102 Modern Political

Unit-I

Political Theory : Meaning ,scope,and significance.

Approaches:Traditional,Behaviouralism,Post Behaviouralism,Liberal and Marxist

Unit-II

Basic Concepts:Law,Liberty,Equality,and Justice

Unit-III

Easton's system Analysis

Almond structural Analysis

Unit-IV

ISMS

Communism,Feminism,Nationalism,and Internatiomalism

Suggested Readings:

1.Dhal Robert,Modern Political Analysis.

2.S.P Verma,Modern Political Theory,Vikash Publication,New Delhi

3.Easton David,ASystem Analysis of political life,niversity Chicago,1979

4.Lucian Pye, aspects Of political DevelopmentBhill Academic Publisher.

5Madan Gopal Gandhi, Modern Political Theory.

6. Madan Gopal Gandhi,Modern Political Analsis,Oxford and IBH(1987)

## PSC-103: PUBLIC ADMINISTRATION: CONCEPTS AND ISSUES

**Unit – I**

Meaning, Nature, Scope and Significance of Public Administration

Approaches to the Study of Public Administration, New Public Administration

**Unit-II**

Theories of Organization: Scientific Management Theory (Frederick Winslow Taylor), Human Relations(Elton Mayo), Ecological: (Fred Riggs), System Approaches: open/closed systems.

**Unit-III**

Leadership: Types and Styles of Leadership.

Theories of Motivation: Maslow, McGregor, Herzberg.

Personnel Administration: Recruitment, Training.

**Unit-IV**

Major Issues in Administration: Public Policy, Relationship between Permanent Executive and Political Executive, Employee-Employer relationships.

**Suggested Readings:**


1. Agarwal, D.V., Human Relations and Organisation Behaviour (New Delhi, 1988).
2. Avasthi, Amareswar and Maheswari, S.R., Public Administration Agra, 1986).
3. Bhattacharya, Mohit, Public Administration (Calcutta, 1981).
4. Dimmock, M.E. and Dimmock, G.V., Public Administration (New York, 1975).
5. Goel, S.L., Advanced Public Administration (New Delhi, 1994).
6. Maheswari, S.R., Theories and Concepts in Public Administration (New Delhi, 1991).
7. Mehta, Prayag, Bureaucracy, Organisational Behaviour and Development (Sage, 1989).
8. Rao, Shankar, Public Administration and Management (New Delhi, 1991).
9. Sharma, R.D., Advanced Public Administration (New Delhi, 1990).
10. Simon, Herbert, Administrative Behaviour (London, 1976).

## PSC104 International Politics :Theories and Concepts

Unit-I

Contending theories and approaches to the study of International Relations :Idealism ,Realism,Neo Realism,Kaplans system Theory, Decision Making Theory.

Unit-II

Marxian Approach and Dependency Theory

Unit-III

i. Cold War Neo Cold war :Meaning Causes, History and End of cold war.
ii. Changes amerging Trends in post cold war.

Unit-IV

India's Foreign Policy:Features.

India's Relation with USA,chinan Pakistan

Suggested readings

1.keohane ,Robert After Hegemony,Princeton,1984.

2.Bandhopadhyay ,J, General Theory of International relations,Allied Publishers,New Delhi.

3.Baral J,K.,International Politics:Dynamicd and Dimensins,South Asian publishers,New Delhi,1987.

4.Bull Headley,The Anarchicalsociety:A study of order in world politics.

5Holsti,K.j. International Politics:A famework of Analysis,premtice Hall.

6.Kumar Mahendra,Theoritical Aspects of International politics,Shivlal Aggarwal and Co,Agra 1967

7. Vandana ,A, Theory of International Politics,Vikas Publishing House,Pvt.Ltd.1998.

## PSC-105: FEDERALISM IN INDIA

**Unit-I**

**Theoretical and Constitutional Framework:**

a. Federal in form Unitary in Spirit.

b. Genesis and Reorganization of States.

c. Constitutional status of States in Indian Political System, Politics of Secession, Autonomy and Accommodation.

**Unit- II:**

**Areas of Conflict in Centre- State relations:**

Constitutional Features, Administrative, Financial and Legislative Relations.

**Unit-III**

**New institutional mechanisms for Cooperative Federalism**

a) National Development Council

b) Financial Commission

c) Niti Ayog

**Unit- VI**

Challenges to Indian Federalism

Recommendation of Sarkaria Commission

**Suggested Readings:**


1. Arora, B. (1995) 'Adapting Federalism to India: Multi-level and Asymmetrical Innovations',
2. Arora, B. and Verney, D. (eds.) *Multiple Identities in a Single State: Indian Federalism in Comparative Perspective.* Delhi: Konark, pp. 71-104.
3. Dhavan, R. and Saxena, R. (2006) 'The Republic of India', in Le Roy, K., Saunders, C. and
4. Kincaid, J. (eds.) *A Global Dialogue on Federalism*. Montreal: Queen's University PressMarwah, V. (1995) 'Use and Abuse of Emergency Powers: The Indian Experience', in Arora,
5. B. and Verney, D. (eds.) *Multiple Identities in a Single State: Indian Federalism in*
6. *Comparative Perspective.* Delhi: Konark, pp.136-159.
7. Sinha, A. (2004) 'The Changing Political Economy of Federalism in India: A Historical
8. Institutional Approach,' in *India Review*, 3(1): pp. 25-63.
9. *The Constitution of India*, Bare Act with Short Notes (2011) New Delhi: Universal, Fifth and

## SECOND SEMESTER

### PSC-201: Modern Western Political Thinkers

**Unit-I**

J. Bentham: Jurisprudence, Principles of Morals and Legislation, Utilitarianism,

J.S. Mill: Liberty, Revision of Utilitarianism

**Unit-II**

Hegel; Dialectical Idealism and State

Karl Marx: Dialectical Materialism, Surplus Value, Class Struggle, Revolution

**Unit-III**

T.H. Green: Radical Individualism

John Rawls: Liberty, Justice and State

**Unit-IV**

Mao: Concept of Continuous Revolution: New Democracy

Gramsci: Power and Hegemony

**Suggested Readings:**


1. Avineri Shlomo, Hegel's Theory of the Modern State, Cambridge, Cambridge University Press, 1972.
2. Bluhm, W.T. Theories of Political Systems: Classics of Ancient and Modern Political Thought, Pruntice Hall, New Delhi, 1981.
3. Coker, F.W., Recent Political Thought.
4. Duner, John, Western Political Theory in the Face of the future.
5. Marx, Karl, "Economic and Philosophical Manuscripts 1844. Translated by Lloyd G. Easton and Kurt H. Guddat in Kark Selections echited by Allen W. Wood. New York, Macmillan, 1988 pp 40-79.
6. Marx, Karl , Capital Volume 1 Moscow Progress, 1977.
7. Dunning, William. A History of Political Theories Allahabad, 1996.
8. Einstin, William, Modern Political Thought Oxford and IBM, 1974.

## PSC-202: Comparative Politics

### Unit-I

Comparative Politics: Nature and Scope.

Major Approaches to the Comparative Politics: Traditional, Structural- Functional, Systems, Marxist.

### Unit-II

Constitutionalism: Development of the Concept, Types of Constitutional Systems, Functions and Capacity of Constitution.

Political Change and Nation Building.

### Unit-III

Relations between Centre and Units: Impact of Political, Cultural, Economic and Legislative Factors.

Politics of Representation and Participation, Political Parties.

### Unit-IV

Public Policy: Nature of the Policy – Making Process, Role of the Executive, Legislature and Judiciary.

### Suggested Readings


1. Almond. G.A and Powell G.B. Comparative Politics Boston, 1978.
2. Almond G.A. and Tames S. Coleman, The Politics of Developing Areas (Princeton, 1970).
3. Blondel J., Comparative Governments (London, 1969),
4. Blondel J. And Powell G.B. Comparative Politics: A development Approach.
5. Bottomore T.B., Elites and Society, Penguin, 1985.
6. S.P. Verma, Modern Political Theory, Vikas Publishing, Third Print 1996.
7. S.N. Kay, Comparative Politics.
8. Apter. Darid, Harry Eckstein (eds.) Comparative Politics, Subject Publication, 2003.

## PSC-203: NEW SOCIAL AND POLITICAL MOVEMENTS IN INDIA

**Unit I**

Social and Political Movements in India: Background, History and Debate

**UNIT-II**

Political Movements: Theories and Ideologies.

Regional Movements in India: Jharkhand and Gorkha land Movements

**UNIT-III**

Peasant's Movement: Genesis and Growth

Women's Movement: Gender Justice and Empowerment

**UNIT-IV**

Tribal Movements: Issues and Dynamics

Environmental Movements: Chipko Movement, Silent Valley Movement & Narmada Bachao Andolan.

**Suggested Readings:**


1. Basu, Amrita (edited): The Challenge of Local Feminism: Women's Movements in Global Perspective, New Delhi, 1999.
2. Shah Ghanshyam : Social Movements and the State, Sage Publications, New Delhi, 2002.
3. Shah Ghanshyam : Social Movements in India: A Review of the LIterature, Sage Publications, New Delhi, 1990.
4. Mohanty Manoranjan (ed): Caste, Class and Gender, Sage Publications, New Delhi, 2004
5. Oommen, T.K., (ed): Social Movements (Vol I and Vol II) OUP, New Delhi, 2010.
6. Singh, K.S., : Tribal Movement in India
7. Gail, Omvedt: Reinventing Revolution: New Social Movements and the Socialist, 1993
8. Wilkinson Paul: Social Movements.
9. Rao, M.S.A., Social Movements in India, New Delhi, Manohar, 1981.
10. Desai, Neera (ed.), Decade of Women's Movement in India, Bombay Himalaya Publishing House, 1988.

## PSC-204: ISSUES IN INTERNATIONAL RELATIONS

**UNIT-I**

Functionalism and Neo-Functionalism
International Regime Analysis

**UNIT-II**

Cold War, End of Cold War, Uni-polarity
American Hegemony
Post Cold War World Order

**UNIT-III**

Non-alignment: Evolution and Trends
Democratic Peace Theory
United Nations: Changing Role and its Reform

**UNIT-IV**

Contemporary Global Concerns:
Environmental Issue, Human Rights, International Terrorism and
Humanitarian Interaction: Human Security

**Suggested Readings:**


1. Mitrany, David (1948) The Functional Approach to World Organisation; International Affairs, 24 (3), 350-363.
2. Mary Farrell, Bjorn Hettne and Luk Van Largenhoe, Global Politics of Regionalism: Theory and Practice, London, Pluto Press.
3. Calvocoressi, Peter, World Politics since 1945, New York, 1982.
4. Goodrich, L.M., 1974, UN in a Changing World, New York, Columbia University Press.
5. Annan, Kofi A., 2000, We the Peoples: The Role of UN in the 21st Century, New York; United Nations.
6. Blackmore, R and A. Reddish (eds), 1996 Global Environmental Issues, London; Hodder and Stoughton.
7. Crenshaw, Martha and John Pimlott (eds), 1997, International Encyclopaedia of World Terrorism, Armonk, N.Y: Sharpe Reference.
8. Pandey, Veena Puni, 1999 International Perspectives on Human Rights, New Delhi; Rohit Publications.Dunne T and N.J. Wheeler (eds) 1999, Human Rights in Global Politics, Cambridge: Cambridge Univ. Press.
9. Bajpai, U.S.(ed), Nonalignmen: Perspective and Prospects, New Delhi; 1983 E

## PSC-205 INDIAN GOVERNMENT AND POLITICS

**Unit-I**

Evolution of the Indian Constitution: Indian Nationalism, National Movements and Constitutional Development

**Unit-II**

Basic Structure of the Constitution: Constituent Assembly, Preamble, Fundamental Rights, Directive Principles of State Policy, Amendment Procedure.

**Unit-III**

Governmental Structure and Process in Centre: Executive: President and Prime Minister, Legislature: Parliament of India, Judiciary: Supreme Court, Judicial Review and Judicial Activism

**Unit-IV**

Governmental Structure and Process in States: Executive: Governor and Chief Minister, Legislature: Vidhan Sabha and Vidhan Parishad, Judiciary: High Court and Subordinate Courts.

**Suggested Reading:**


1. Austin Granville, 1972, The Indian Constitution: Cornerstone of a Nation, New Delhi, OUP
2. Austin Granville, 1999, Working a Democratic Constitution: The Indian Experience, New Delhi, OUP
3. Basu D.D., 1999, Introduction to the Constitution of India, Calcutta, Prentice Hall (latest edition)
4. Hasan Zoya, E. Shridharan and R. Sudarshan (eds.) 2002, India's Living Constitution, New Delhi, Permanent Black
5. Kapur Devesh and Pratap Bhanu Mehta (eds.), 2005, Public Institutions in India, New Delhi, OUP
6. Saez Lawrence, 2004, Federalism without a Center, New Delhi, Sage.
7. Sathe S.P., 2002, Judicial Activism, New Delhi, OUP
8. Sharma Brij Kishor, 2002, Introduction to the Constitution of India, New Delhi, Prentice Hall

## THIRD SEMESTER

### PSC-301 Modern Indian Political Thinkers

**Unit-I**

Manu

Kautilya.

**Unit-II**

Bal Gangadhar Tilak

Swami Vivekananda

Aurobindo Ghosh

**Unit-III**

Mahatma Gandhi

B.R. Ambedkar

Raja Ram Mohan Roy

**Unit-IV**

Jawaharlal Nehru

M.N. Roy

Jay Prakash Narayan

**Readings**


1. Ambedkar, B.R., Annihialation of Caste (ed.) by Mulak Raj Anand, Arneld Pub. Delhi, 1979.
2. Appadorai. A., Political Thought in India, Karma, Delhi, 2002.
3. Gandhi M.K. Hind Swaraj, Navajeevan, Ahmadabad, 1984.
4. Mehta V.R. Foundations of Indian Political Thought, Manohar Publications, Delhi, 1992.
5. Naavane V.S., Modern Thought, Orient Longman, New Delhi, 1978.
6. Panther T. and Deutsch, K.L., (ed.) Modern Indian Thought, Sage Pub. Delhi, 1986.
7. Baral J.K. Indian Political Tradition, Macmillan, 2004.
8. V.P. Verma, Modern Indian Political Thought, Lakshmi Narayan Agarwal, Agra, 1974.
9. Mohanty, Dushmanta, Indian Political Tradition, New Delhi, 1997.

## PSC-302 INDIA'S FOREIGN POLICY

**UNIT- I**

Evolution of India's Foreign Policy, Determinants, Making, Continuity and Change.

**UNIT-II**

India and Major Powers: US, China and Russia

**UNIT-III**

India and Neighbours: Pakistan, Bangladesh, Nepal and Sri Lanka.

**UNIT-IV**

India's Nuclear Policy

India's Economic Diplomacy

**Suggested Readings:**


1. Bandopadhyaya, J., 1980 Making of India's Foreign Policy, New Delhi, Allied Publications Pvt. Ltd.
2. Harsh V. Pant (ed), Indian Foreign Policy in Unipolar World, Routledge, Taylor and Francis Group, London, 2009.
3. Raja Mohan, C., Crossing the Rubicon: The Shaping of India's New Foreign Policy, Penguin Books, New Delhi, 2003.
4. Appadorai, A and Rajan M.S., 1985, India's Foreign Policy and Relations, South Asian Publishers, New Delhi, 1985.
5. Harshe, Rajan and Seethi, K.M (Eds), 2005, Engaging with the World: Critical Reflections on India's Foreign Policy, Orient Longman, New Delhi.
6. Ganguly, Sumit (Ed), 2010, India's Foreign Policy: Retrospect and Prospect, Oxford University Press, New Delhi.
7. Dutt, V.P(2000) India's Foreign Policy in a Changing World, Vikas, New Delhi, 2010.
8. Dixit, J.N. India's Foreign Policy and its Neighbours, Gyan Publishing House, New Delhi, 2001.
9. Mahanty J.N, 2004, A Study of Triangular Diplomacy: China, India and Soviet Union, Pathika Prakashan, Bhubaneswar.
10. Baral, J.K. Mohapatra J.K., and Mishra, S.P. "Rajiv Gandhi's China Diplomacy" International Studies (Sage), July-September, 1989.
11. Kapur, Ashok, 2001, Pokhran and beyond, "India's Nuclear Behaviour, New Delhi, Oxford University Press.

## PSC-303 Research Methodology in Advanced Social Sciences

### Unit-I

Introduction to Research Reference of Social Science Research, Objectivity in Social Science Research, Research Process, Ethical Issues in Research.

The Nature of Scientific Method and its use to Social Science Research.

### Unit-II

Formulating Research Problem: Research Design: Meaning, Components and Planning Research.Hypothesis: Meaning, Formulation and Functions of Hypothesis.

### Unit-III

Survey Methods: Meaning, Types, Steps and Limitations, Observations, Questionnaire and Interviewing, sampling: Meaning, Types and Selection of Sample.

### Unit-IV

Data Analysis: Content Analysis, Report writing.

Qualitative and Quantative Data Analysis

### Readings


1. Bose Pradeep Kumar 1995: Research Methodology.
2. Mukherjee P.N (eds.) 2000-Methodology ICSSK in Social Research: Dilemmas and Perspectives, New Delhi, Sage Publications.
3. Gode W.J and Paul Tyatt, 1952: Methods in Social Research, Megraiohill, New York.
4. Gerring J. 2001 Social Science Methodology, A Critical Framework Cambridge University Press, Cambridge, U.K.
5. Evera Stephen Vaw, Guide to Methods for students of Political Science, Ithaca Cornell University Press 1997.
6. Blabloc M.M. An Introduction to Social Research Englewood Cliffs N.J Preutice Hall, 1970.
7. Brymam: A Auantityt and Quality in Social Research, Unurin Mymar, London, 1988.
8. Blondel J., Thiminning Politically, Wildwood House, London, 1976.

## PSC- 304 FOREIGN POLICIES OF MAJOR POWERS

### Unit-I

Foreign Policy Meaning and Determinants
An Overview of International Relations Since 1945
Major Approaches to the Study of Foreign Policy

### Unit-II

US Foreign Policy
Major Determinants, From Isolations to Containment
US Foreign Policy during the Cold War
Post Cold War, Change and Continuity
9/11 and its impact on Foreign Policy: War on Terror

### Unit-III

Foreign Policy of Soviet Union/Russia
Disintegration of the Soviet Union and the Emerging trends in Russian Foreign Policy
Russia's Strategic Significance Military and Economic
Reassertion in Russian Foreign Policy.

### Unit-IV

China's Foreign Policy
Ideological Component, Mao's World View
Sino-Soviet Rift and Sino-American Détente
Post Cold War Period: China as a growing power and its reflection on its Foreign Policy

### Suggested Readings:


1. Roy C. Macridis (Ed) Foreign Policy in World Politics Englewood Cliffs; Prentice Hall, 1992.
2. John Spanier, American Foreign Policy since World War-II, New York, Praeger, 1975.
3. Joyce P. Kaufman (2006) A Concise History of US Foreign Policy, Oxford: Rowman and Littlefield.
4. Robert J. Art and Seyom Brown (2008), US Foreign Policy: The Search for a New Role, Michigan: Univ. Of Michigan Press.
5. Fareed Zakaria (2008) The Post American World, New Delhi, Penguin Books.
6. R.G. Sutter (1996) Shaping China's Future in World Affairs: The Role of the US, Boulder Coloradum Westview Press
7. F.S. Northedge (ed) Foreign Policies of the Powers.
8. Acharya Amitav, (2015) The End of American World Order, OUP, New Delhi.
9. Stuart Harris (2015) China's Foreign Policy
10. Jonathan Fenby (2015) Will China dominate the 21st Century?
11. Gilbert Rozma n (2012) China's Foreign Policy: Who Makes it, and How is it made? Palgrave Mac Millan, New York.
12. David Shambaugh (ed) 2015, Tangled Titans: The United States and China.
13. Kapur (1981) The Awakening Giant: China's Ascension in World Politics, Sijthoff & Noordhoff International Publishers, Maryland.

## PSC305 Indian Politics :Issues and Problems

Unit-I

Nation Building in India:Approaches,Debate,and Political Culture in India

Unit-II

Challenges to National Integration :Casteism,Communication ,terrorism

Good Governance:Issues and Challenges

Unit-III

Democracy In India :Party system,Pressure Group,Politics of Defection,coalition Politics

Unit-IV

Politics Of Regionalism in politics:Sub Regionalism,Creation Of New states,

Politics of special category status,politics of Language.

Suggested readings:

1.Bardhan Pranab,The political Economy of Development in India,Blackwell 1984.

2.Brass,Pauul,caste,Faction and part in Indian Politics,Chanakya ,Delhi.

3.Frankal ,Franchise, Transforming India:Social and political Dynamics of Democracy,OUP,2000.

4.Jalan Bimal The Indian Economy:problems and prospect,Viking,Delhi,1992.

5.Kothari Rajani,Caste in Indian politics,orient Longman.

6.Ro,A.B. Societ,Religious and politics in India.

7.Singh,G. And H.L. Sharma ,Reservation politics in India:Mandalization of Society.

## FOURTH SEMESTER

## PSC-401: POLITICAL THEORY

**Unit-I**

**Political Theory:** Nature, function, Significance, decline and resurgence.

**People-State Interface:** Political Obligation, Resistance

**Unit-II**

**Key Concepts**: Liberty, Justice, Rights,

**Unit-III**

**Contemporary Perspectives**: Liberalism, Marxism, Feminism, Neo Liberalism, Neo- Marxism.

**Unit-IV**

**Decline of Communism and Emerging World Order:** A Debate

**Suggested Readings:**


1. Berlin, Isaiah, *Four Essays on Concepts of Liberty*, Oxford, Oxford University Press, 1969.
2. Goodin, Robert E. and Philip Pettit edited, *A Companion to Contemporary Political*
3. Goodin, Robert E. and Philip Pettit edited *Contemporary Political Philosophy*. Oxford, Blackwell Publishers, 1997.
4. Gutman, Amy edited, *Multiculturalism: Examining the Politics of Recognition*, Princeton N.J, Princeton University Press. 1994.
5. Hampton, Jean, *Political Philosophy: An Introduction*, Delhi, Oxford University Press, 1998.
6. Harrison, Ross, *Democracy*, London, Routledge, 1993.
7. Miller, David and Larry Siedentop edited, *The Nature of Political Theory*, Oxford, Clarendon Press, 1983.
8. Adams Ian, 1993, *Political Ideologies Today*, Manchester, Manchester University Press
9. Graham Gordon, 1986, *Politics in its Place- A Study of Six Ideologies*, Oxford, Clarendon Press
10. Heywood Andrew, 1992, *Political Ideologies*, London, Macmillan

# PSC 402 Political Sociology

## Unit-I

Political Sociology: Definition and scope, origin and development.

Approaches to the study of Political Sociology

## Unit-II

Political Culture

Political Socialisation.

Political Participation

Political Communication.

## Unit-III

Leadership and Circulation of Elites.

Power, Authority and Legitimacy.

## Unit-IV

Social Stratification and its bases.

Political Development and Modernization.

## Suggested Readings:


1. Almond G and S. Verna. The civic culture (Prince tour, 1963).
2. Ashraf, Ali and L.M. Sharma, Political Sociology- A Nuo Grammar of Politics, Universities Press (Indian) Ltd. Hyderabad, 1998.
3. Das H.H. and B.C. Choudhury, Introduction to Political Sociology, Vikas: New Delhi, 2002.
4. Dourse, Ronert E. and Tohm A. Thughes, Political Sociology, London, 1972.
5. Mukhopadhyay A Political Sociology, K.P. Bagchi and Company, Calcutta, 1997.
6. Padhy K.S. Political Sociology, New Delhi, 1989.
7. Parry. G. Political Elites, London, 1969.
8. Pye L.W. Aspects of Political Development, Delhi, 1972.
9. Ru;sh M and P. Asthoff, An Introduction to Political Sociology, London, 1971.
10. Weiner, M and S. Mouting tow (eds)., Understanding Political Development (Boston, 1987).

## PSC-403 : INDIA AND REGIONAL ORGANISATIONS

### UNIT-I

Regionalism and Regional Organisations: Understanding the conceptual and theoretical aspects of Process of Regionalism.

Regional Organisations: Growth and Classification

Significance of Regional Organisations in India's Foreign Policy

### UNIT-II

SAARC: Genesis and Growth, Issues and Concerns, Summit Diplomacy India's Role in SAARC.

### UNIT-III

India and ASEAN

Background and Civilizational Ties; Look East Policy of India India's Priorities: Security, Energy and Trade.

### UNIT-IV

India and BRICS:

Understanding BRICS: Origin, Agenda and Influence. India – BRICS Engagement

New Development Bank and Impact of BRICS on India's overall Strategic interests

**Suggested Readings:**


1. Oliver Stuenkel (2015) The BRICS and the future of Global Order, LexingtonPress.
2. Uwe Becker, (2014), The BRICS and Emerging Economics in Comparative Perspectives: Political Economy, Liberalisation and Institutional Change, Routledge, NewYork.
3. BhabaniSen Gupta (1993) "SAARC: Asian Prospect and Problems of Intra-regional Coopeation". South Asian Publishers, NewDelhi.
4. Bhargava, K.K. and Lama M.P (2008) SAARC, 2015: Expanding Horizons and Forging Cooperation in a Resurgent Asia, New Delhi, Friedrich EbertStiflung.
5. Rama S Melkote, Regional Organisations: A Third World Perspectives, Sterling Publishers Pvt. Ltd., New Delhi,1990.
6. BaldasGhosal (ed.) 1996, India and South East Asia: Challenges and Opportunities, Konark Publishers, NewDelhi.
7. Frederic Grare and Amitabh Matoo, (ed.) 2001 India and ASEAN: The Politics of 'Look East' Policy, Manohar Publisher, NewDelhi.
8. SudhirDevare (2005) India and South East Asia – Towards Security Convergence, Institute of South East Asian Studies,Singapore.
9. Fredrik Soderbaun and Timothy M. Shaw (eds) Theories of New Regionalism: A Palgrave Render, New York, PalgraveMacmillan
10. Dash Kishore C, 2008, Origin and Evolution of SAARC: Regionalism in South Asia, Negotiating Cooperation, Institutional Structures, New York,Rutledge.
11. RumelDahiya and UdaiBhanu Singh, 2015, Realising the ASEAN-India Vision for Partnership and Prosperity, Pentagon Press,NewDelhi

## PSC-404: Human Rights: Theories and Practices

**Unit-I**

The Idea of Human Rights: Evolution, Concepts, Nature and Theoretical Foundations.

**Unit-II**

International Protection of Human Rights: Civil, Political, Social and Economic Rights

**Unit-III**

Collective Rights: Rights of Vulnerable Groups; Women, Children, Refugee and Ethnic groups

**Unit-IV**

Human Rights in India: National Human Rights Commission; Organisations and Movements, Violations and Safeguards .

**Readings**


1. Alston Philip, the United Nations and Human Rights – A Critical Appraisal, Oxford, 1995.
2. Basu, Durga Das: Human Rights in Constitutional Law, Practice Hall of India, New Delhi, 1994.
3. Bari Upendra (ed.) The Right to be human, Delhi, Lancer, 1987 Beetham, David edited, Politics and Human Rights Oxford Blackwell, 1995.
4. Desai, A.R (ed.) Violations of Democratic Rights in India, Popular Prakashan, Bombay, 1986.
5. Kothari and Sethi Harsh (eds.) Rethinking Human Rights, Delhi, Lokayan, 1991, Saksena, K.P. edited, Human Rights: Fifty Years of India's Independence, Delhi, Gyan, 1999.


## PSC-405: PROJECT WORK

## MC-CC-101 MANAGEMENT CONCEPT & ORGANISATIONAL BEHAVIOUR

**Objective:** The objective of this course is to help students understand the conceptual framework of management and Organizational Behaviour.

**UNIT-I** **Schools of Management Thoughts**: Nature & Scope of Management, Traditional theories of management, Human behaviour and social system school; Decision theory school; Systems school; Contingency theory of management; functions of a manager.

**UNIT-II** **Planning:** concept, significance, types, **Organizing:** concept, principles, Organization structure: Formal and informal organizations; Span of control, authority, responsibility, power, delegation, decentralization, **Fundamentals of Staffing**

UNIT-III **Directing:** concept, significance
**Leadership:** Concept; Leadership styles; Theories - trait theory, behavioural theory, Fielder's contingency theory; Situational theory; Likert's four systems of leadership.
**Motivation:** Process of motivation; Theories of motivation: Maslow's need hierarchy theory, McGregor's Theory X & Y, McClelland's need theory, Victor Vroom's expectancy theory, Herzberg's two factor theory, Skinner's reinforcement theory. **Basics of Controlling**

UNIT-IV **Organisational Behaviour:** concept, significance, Personality, Perception; Attitudes; Emotions
**Group Dynamics & Organizational Culture:**
Group Dynamics: Power and politics; Conflict and negotiation; Stress management
Organizational Culture: Organizational development and organizational change

References:


1. Prasad, L.M.; Principles and Practice of Management
2. Michael, V. P: Organisational Behaviour& Managerial Effectiveness, S. Chand, New Delhi.
3. Hellreigel, Don John W Slocum Jr. and Richards W. Woodman: OrganisationalBehaviour, South Western College Publishing, Ohio.
4. Hersey, Poul, Kenneth H. Blanchard and Dewey E. Johnson: Management of OrganisationalBehaviour: Utilising Human Resource, Prentice Hall, New Delhi.
5. Aswathappa, K.; OrganisationalBehaviour, Himalaya Publishing House, Mumbai.
6. Koontz, Harold, Cyril O'Donnell and Heinz Weihrich: Essentials of Management, Tata McGraw-Hill, N. Delhi
7. Luthans Fred: OrganisationalBhaviour, McGrawHill, New York.
8. Newstrom, John W. and Keith Davis: OrganisationalBehaviour: Human Behaviour at work, TMH, N. Delhi
9. Robbins, Stephen P, and Mary Coulter: Management, Pearson Education, New Delhi.
10. Steers, Richards M. and J. Stewart Balck: OrganisationalBehaviour, Harper Collins College Publishers, NY.
11. Thom hill. -Managing Change". Pearson Education. New Delhi. Green Berg -Behaviour in Organisation".
12. Hall. -Organisation Structure, Process and outcomes-.
13. T.N.Chhabra : Principles & Practise of Management
14. Drawker, Peter; Practice of Management

## MC-CC 102 BUSINESS ENVIRONMENT

**Objective:** The objective of this course is to develop the ability to understand and scan business environment, analyze opportunities and take decisions under uncertainty.

UNIT-I **An Overview of Business Environment:**
Meaning, Nature and Characteristics of Modern Business. Meaning and Significance of Business Environment, Types of Environment: Internal and External, Micro and Macro. Environmental Analysis- Process, Benefits and Limitations.

UNIT-II **Economic Environment:**
Nature of the Economy, Structure of the Economy, Economic Policies, Economic Conditions, Government Policies, Industrial Policy & Its Phases , Exim Policy, Public Sector, Private Sector, Industrial Sickness, Small Industries.

UNIT-III **Political and Legal Environment:**
Government and Business, FERA and FEMA, Consumer Protection Act, Protection of Patents, Protection of Trade Marks. Competition Act

UNIT-IV **Socio-cultural Environment:**
Business and Society, Nature and Impact of Culture on Business, Consumerism, Social Responsibilities of Business, Business Ethics, Social Audit.

References:


1. Cherunilam F., Business Environment : Texts and Cases (Himalaya)
2. Aswathappa K., Essentials of Business Environment (Himalaya)
3. Agrawal and Diwan, Business Environment (Excel)
4. Mishra &Puri, Economic Environment of Business (Himalaya)
5. Jain P.C., Government and Business Policy (Galgotia)
6. Ghosh B., Economic Environment of Business (Vikas)
7. Adhikary M., Economic Environment of Business (Sultan Chand)
8. F.Cherunilam, International Business Environment (Himalaya)

## MC-CC 103 ADVANCED STATISTICAL ANALYSIS

**Objective:** The course aims at making the students learn the application of statistical tools and techniques for decision making

UNIT-I **Statistics Basic Background**: Concepts, Variables, Descriptive and Inferential Statistics (Only Theory)

**Correlation & Regression Analysis**: Two variable Cases, Multiple Correlation & Multiple Regression.

UNIT-II **Probability Theory** – Probability – Classical, Relative and Subjective Probability, Addition and Multiplication Probability Models- Conditional Probability and Baye's Theorem.

Probability Distributions, Binomial, Poisson and Normal Distribution, Their characteristics and Application.

UNIT-III **Data types, Data Collection and Analysis:** Sampling, need, errors and methods of sampling , Probability and Non-probability Method, Sampling and Non sampling Errors, Law of Large Numbers and Central Limit Theorem, Sampling Distribution and their Characteristics.

UNIT-IV **Theory of Estimation and Testing of Hypotheses:** Significance Test of Large Sample and Small Sample Test ; t-test, z- test and F- test, Non parametric Test:- Chi-square Test, Sign Test, Rank Sum Test, One Sample Runs Test, H or Kruskal Walls Test.

References:


1. S.P. Gupta, Statistical Methods, (Sultan Chand and Sons)
2. S.C. Gupta, Fundamentals of Statistics, (Himalaya Publishing House)
3. R.P. Hooda, Statistics for Business & Economics, (Macmillan)
4. D.N. Elhance , BeenaElhance and B.M. Aggarwal Business Statistics, (KitabMohal)
5. Heinz, Kohler, Statistics for Business & Economics, (Harper Collins)

**MC-CC104** **ACCOUNTING FOR MANAGERIAL DECISIONS**

**Objective:** The objective of this course is to acquaint students with the accounting concepts, tools and techniques for managerial decisions

UNIT-I **Financial Statement Analysis:** Trend Analysis - Financial Ratio Analysis, Du-Point Analysis, Fund flow statements

UNIT – II **Marginal Costing and Break-even Analysis:** Concept of marginal cost; cost-volume-profit analysis; Break-even analysis; Decisions regarding sales-mix, make or buy decisions and discontinuation of a product line.

UNIT-III **Budgeting:** Definition of budget; Essential of budgeting; Types of Budgets-functional, master budgets, etc; Fixed and flexible budget; Budgetary control; cash budget; Zero-base budgeting; Performance budgeting.

UNIT- IV **Standard Costing and Variance Analysis:** Standard costing as a control technique; Variance analysis- meaning and importance, kinds of variance and their uses - materials, labour and overhead variance.

**Accounting for responsibility Centers:** Meaning and significance of responsibility accounting; Responsibility centers & Its types with examples: cost centre, profit centre and investment centre; Objective and determinants of responsibility centers.

References:


1. Horngran, C.T. Gary L. Sundem and William O. Stratton: Introduction to Management Accounting, Pearson Education, Delhi
2. Horngren Charles T. George Foster and Srikanta M. Dattar: Cost ,Accounting: A Managerial Emphasis, Pearson Education, Delhi.
3. Banerjee Bhabatosh : Management Accounting.
4. Anthony, Robert: Management Accounting, Tarapore-wala, Mumbai.
5. Garrison, Ray H. and Eric W. Noreen: Management Accounting, Richard D.lrwin, Chicago.
6. Jawaharlal : Adv. Management Accounting - S. Chand, New Delhi.
7. Jain &Narang, Cost Accounting, Kalyani publisher
8. Hansen, Don R. and Maryanne M. Moreen: Management Accounting, South-Western College Publishing, Cincinnati, Ohio.
9. Lall, B.M., and I.C. Jain: Cost Accounting: Principles and Practice, Prentice Hall. Delhi.
10. Pandey, I.M: Management Accounting, Kalyani publisher.
11. Manmohan&Goyal, Principles of Management Accounting, SahityaBhavan, Agra.

MC-CC 105 **FINANCIAL MANAGEMENT**

**Objective:** The objective of this course is to help students to understand the conceptual framework of financial management and its applications under various environmental constraints.

UNIT –I **Conceptual Overview of Finance:**
Meaning, nature and scope of finance, Financial goal-profit Vs. wealth maximization. Finance functions-investment, financing and dividend decisions.

**Capital Budgeting**- investment evaluation criteria- payback period, accounting rate of return, net present value, internal rate of return and profitability index, Capital rationing, Cost of Capital.

UNIT –II **Operating and Financial leverage:**
Measurement of leverage, Effects of operating and financial leverage on profit, combined financial and operating leverage.

**Capital Structure Theories:**
Net Income Approach, Net Operating Income Approach, Traditional Approach and, MM Hypothesis, Determinants of Capital Structure decision.

UNIT –III **Dividend Policies:**
Issues in dividend policies, Walter's Model, Gardon's Model (Relevance concepts) M. M. Hypothesis (Irrelevance Concept) Determinants of dividend policy, Dividend policy in practice-Forms of dividend policy.

UNIT –IV **Management of Working Capital:**
Meaning, significance and types of working capital, Need for working capital-concept of operating cycle, estimation of working capital requirements, Financing of working capital.

**Dimensions of working capital management:** Management of Inventories receivable and cash.

References:


1. Pandey, I. M., Financial Management, (Vikas)
2. Chandra, P. Financial Management: Theory and Practice, (Tata McGraw Hill)
3. Khan M.Y. & Jain P.K, Financial Management:Text& Problems.(Tata McGraw Hill)
4. Sharma R.K. and Gupta S.K. Financial Management, (Kalyani)
6. Van Horne James C., Financial Management and Policy, (Prentice Hall)
7. T.P. Ghosh, Accounting and Finance for Managers, (Taxmann)
8. D. Chandra Bose, Fundamentals of Financial Management (Prentice Hall of India)

## *SEMESTER – II*

**MC-CC201** **MANAGERIAL ECONOMICS**

**Objective:** This course aims to develop managerial perspective to economic fundamentals as an aid to decision making under given environmental constraints.

UNIT-I **Fundamental concepts and principles :**
Nature and scope of Managerial Economics, Managerial Economist's Role and Responsibilities, Objectives of Business Firm. Demand Analysis: Determinants of Demand, Theory of Consumer Choice: Cardinal Utility Approach, Indifference Curve Approach.

UNIT –II **Production Theory:** Production Function, Law of Variable Proportion; Law of Returns to Scale, Economics of Scale, Cost Concepts, Short and Long run Cost Function- their nature and shape.

UNIT –III **Price Determination:** Methods of Price Determination, price determination under Perfect Competition, Monopolistic Competition, Oligopoly and Monopoly.

UNIT –IV **Business Cycles**: Nature and Phases of a Business Cycle, Theories of Business Cycles- Monetary and Innovation.

References:.


1. Varshney R.L., and Maheswari K.L., Managerial Economics, (Sultan Chand & Sons)
2. Dean, Joel, Managerial Economics, (Prentice Hall)
3. Mote,V.L.,Paul S. &Gupta,G.S.,Managerial Economics Concepts and Cases, (TataMcgrawhill )
4. Dwivedi, D.N, Managerial Economics, (Vikas Publishing House)
5. Adhikary M. Business Economics, (Excel Books)
6. Chopra OP: Managerial Economics, (TataMc.GrawHill)
7. D.M. Mithani, Managerial Economics, (Himalaya)
8. Mishra &Puri, Economics for Management :Text and Cases, (Himalaya)
9. H.L. Ahuja, Business Economics : Micro & Macro, (S.Chand& Co. Ltd.)
10. S.A. Siddiqui&A.S.Siddiqui,Managerial Economics & Financial Analysis, (New Age)

MC-CC202 **MARKETING MANAGEMENT**

**Objective:** The objective of this course is to facilitate understanding of the conceptual framework of marketing and its applications in decision making under various environmental constraints.

UNIT-I **Marketing and its concepts:**
Concepts, evolution, elements and approaches of marketing, Marketing mix, Marketing channels, Strategic marketing planning, overview.
Market Analysis and Selection: Marketing environment, macro and micro components and their impact on marketing decision, Environmental Scanning,

UNIT–II **Consumer Behaviour and Market segmentation:**
Concepts of Consumer Behaviour, Factors influencing consumer buying decision, Consumer buying Process.
Market segmentation, Targeting and positioning.

UNIT –III **Product and Pricing Decisions:**
Product classification of Products, Major product Designs, Product line and Product Mix, Product Life Cycle, New Product Development and Consumer Adoption Process.
Pricing Decisions, Factor affecting price determination, Pricing Policies and Strategies, Discounts and Rebates.

UNIT –IV **Promotion and Distribution Decisions:**
Promotion mix-Advertising, Personal Selling, Sales Promotion, Publicity and Public Relations, Role of promotion in marketing
Nature, function and types of distribution channels, distribution channel intermediaries, Channel management decision.

References:


1. Kotler, Philip, and Gary Armstrong: Principles of Marketing, (Prentice Hall)
2. Kotler, Philip :Marketing Management: Analysis, Planning Implementation and Control, (Prentice Hall)
3. Ramaswamy, V.S. and Namkumari S.: Marketing Management, (Macmillan)
4. Srinivassan, R.: Cass Studies in Marketing : The Indian Context, (Prentice Hall)
5. Stanton, William J., and Charles Fatrell: Fundamentals of Marketing: (Mc.Graw Hill)
6. Still, Richard R, Edward W.Coundiff and Norman A.P. Govani: Sales Management: Decisions, Strategies and cases, (Prentice Hall)
7. F. Cherunilam, Industrial Marketing, (Himalaya)
8. S.A.Sherlekar, Marketing Management, (Himalaya)

**MC-CC203** **FINANCIAL INSTITUTIONS AND MARKETS**

**Objectives:** The course aims at providing students with an understanding of the structure, organization and working of financial institutions and markets in India.

UNIT-I **Introduction to financial system:**
Nature and Role of Financial System, Indian Financial System, Financial markets: Money market and capital market, Role of SEBI

UNIT-II **Commercial Banks**: functions, management and present structure, e-banking, recent developments in commercial banking; Reforms in Banking Sector.

UNIT-III **Development banks:** Concept, objectives, functions, operational and promotional activities of development banks: IFCI, ICICI, IDBI and NABARD

UNIT-IV **Foreign investment:** types, trends, implications, Regulatory framework for foreign investment in India.

References:


1. Bhole, L.M., Financial Markets and Institutions, (Tata McGrawHill)
2. Khan M.Y., Indian Financial System, (Tata Mc.GrawHill)
3. Srivastav, R.M., Management of Indian Financial Institutions, (Himalaya)
4. Avdhani, Investment and securities market in India, (Himalaya)
5. Avdhani, Investment and Securities Market in India, (Himalaya)
6. Giddy, I.H., Global Financial Markets, AITBS.
7. Gordan&Natarajan, Financial Markets & Services, (Himalaya)
8. Varshaney, P.N., Indian Financial Systems, (Sultan Chand & Sons)
9. Verma, J.C, Guide to Mutual Funds and Investment Portfolio, (Bharat Publishing)
10. M.Y. Khan, Indian Financial System, (Tata Mc.GrawHill)

MC-CC204 **COMPUTER APPLICATION IN BUSINESS**

**Objective:** To provide an understanding the theoretical aspects computer, networking and word processing.

UNIT-I **Introduction to computer:** Basic components of a Computer and their operation, Classification of software, Application software, System software.

Operating Systems: Batch processing, Multiprogramming and time sharing OS, Introduction to WINDOWS: Platform menu bottoms, boxes, Accessories, etc. Creation, Deletion and Search for files, Customizing start menu, Creation, shortcuts to Programs and Files. LINUX: Features and advantages.

UNIT-II **Word Processing**: Introduction to MS-WORD, Creation and editing of text files. Find and replace Cut, Copy, and Paste. Text formatting: line spacing, Fonts, text alignment, page layout, Page numbering, Headers & footer, Spelling check, Creation of tables, Mail merge facility.

**Presentation:** Introduction to MS-Power point, preparation and presentation of slides, Creation of graphs, tables, organization charts, Addition of new slides, changing slide layouts, slide show.

UNIT-III **Spread Sheet:** Introduction to MS-EXCEL, Worksheet, Cell, Range, Creation of Worksheet, Editing: Insertion of columns and Rows, deletion of columns and rows, use of formula, drawing different types of charts, printing of worksheet data.

**Application of MS-Excel in Finance:** NPV; IRR; Stock Returns, Average, Regression and Co-relation

UNIT-IV **Introduction to Computer Networking**: Need of networking, Types of Network-LAN, MAN, WAN, Network Topologies, Network protocol, Internet, Intranet, Extranet, uses and basic services of internet, Concept of WWW.
**Database Management System:** Concept and components of DBMS, Database models, creating and using a database.

References:


1. The Compact Guide to Microsoft Office by Ron Mansfield. BPB Publications.
2. Fundamental of Computers by V. Rajaraman.
3. Computer for Beginners by Jaggi&. Jain, Academy.
4. Straight to the point MS Office 2000, (Firewall Media)
5. Introduction to Database Systems C.J. Date- Addison Wesley Massachusetts
6. http://office.microsoft.com/en-001/training

MC-CC205 **HUMAN RESOURCE MANAGEMENT**

**Objective:** The objective of the course is to acquaint students with the techniques and principles to manage human resource of an organization.

UNIT-I :**Introduction to Human Resource Management:** Introduction ,concept of human resources management, scope of human resource management, history of human resource management ,function of human resource management ,role of HR Executives.

**Human Resource planning:** Process of human Resource Planning, Need for Human Resource Planning, HR forecasting Techniques, Successful Human Resource Planning.

UNIT-II: **Recruitment and Selection :** Concept of Recruitment, Factors Affecting Recruitment ,Sources of Recruitment ,Recruitment Policy ,Selection ,selection Process, Application Forms ,Selection Test ,Interviews, Evaluation, Placement ,Induction.

**Training and Management Development:** Meaning of Training, Methods of Training, Concept of Management Development, Management Development Methods, Differences between Training and Development, Evaluation of Training and Management Development

UNIT-III; **Performance Appraisal:** Concept and Need for Performance, Reviews, Overview of Performance Appraisal, Types of Appraisal Method, 360 degree appraisal, Benefits.

**Compensation Management:** Wage and Salary Administration, Managing Wages, Concept of Rewards and Incentives, Managing Benefits in Organization.

UNIT-IV: **Grievance and Grievance Procedure:** Concept of Grievance Causes Of Grievance, Forms and Effects of Grievance, the Grievance Handling Procedure, Need for Grievance Redressal Procedure.

**Employee welfare and Working Conditions:** Concept of Employee Welfare, Welfare Measures, Types, Employee Welfare Responsibility, the Business Benefits of Employee Welfare Activities.

**References:**


1. L.M.Prasad, Human Resource Management, Sultan Chand & Son's
2. C.B.Gupta, Human Resource Management, Sultan Chand
3. Armstrong, M.(1995). Armstrong's handbook of human resource management practice. Koran page 147
4. Dessler , Garry ,"Human Resources Management', Prentice Hall, New Jersey,1997
5. Aswathappa K, "Human Resources Management', Fifth Edition, Tata McGraw – Hill Companies, 2008.

## *SEMESTER - III*

**MC-CC301** **BUSINESS RESEARCH & BUSINESS COMMUNICATION**

**Objective:** The objective of this course is to familiarize the students with the process and technique of scientific research and its relevance in the managerial decision making. Another objective of this course is to provide a broad view of communication skills to the students.

**UNIT-I** **Research:** Meaning and Definition, Functions of Social Science Research, Limitations of Social Science Research, Research in Functional Areas: Finance, Marketing, Production, Human Resources.

**UNIT-II** **Planning of Research:** The planning Process, Selection of a Research Problem, Sources of Research Problems, Formulation of the Research Problem, Formulation of the Hypothesis, Research Design.

**UNIT-III** **Report Writing**: Categories of Report, Planning Report Writing, Research Report Format, Principles of Writing of Footnotes and Bibliography, Oral Presentation.

**UNIT-IV** **Communication:** Interpersonal Communication: Significance; Concept of Two-way Communication; Process of Communication, Barriers to effective Communication; Types of Communication: Written and Oral Communication.

Organizational Communication: Factors influencing Organizational Communication, Informal Communication.

**.References:**


1. Krishnaswami O.R. &Ranganatham M., Methodology of Research in Social Sciences, (Himalaya)
2. Bajpai S.R.: Methods of Social Survey and Research (KitabMahal)
3. Sarvanavel P., Research Methodology (KitabMahal)
4. Kooper D.R. & Schindler P.S., Business Research Methods (Mc. Grow Hill)
5. Kothary, C.R.: "Research Methodology, Methods & Technique" (Wiley Eastern)
6. Rai&Rai, Business Communication (Himalaya)
7. Pradhan H, &Pradhan, N.S., Business Communication (Himalaya)
8. Locker &Kaezmark, Business Communication, (Tata Mc-Graw hill)

MC-CC302 **INTERNATIONAL BUSINESS**

**Objective:** The objective of this course is to provide a glimpse of global business environment and the emerging trends thereof.

UNIT-I **International Business**: Evolution, Concepts & Approaches of International Business, Stages of Internationalization, and Theories of International Business, Scope, Competitive Advantage and Problems of International Business.

UNIT-II **Modes of Entering International Business:**
International Business Analysis, Different Modes of Entry in to International Business. Globalization: Meaning and Definition, Features, Drivers, Components, Benefits and Demerits of Globalization.
**Foreign direct investment** (FDI) and Foreign portfolio investment (FPI); Types of FDI, Costs and benefits of FDI to home and host countries; Trends in FDI; India's FDI policy, **Balance of payments** (BOP): Importance and components of BOP

UNIT-III **World Trade Organisation (WTO):** Functions and objectives of WTO; Agriculture Agreement; GATS; TRIPS; TRIMS, Multi-national Corporations

**Regional Economic Integration:** Levels of Regional Economic Integration; Trade creation and diversion effects; Regional Trade Agreements: European Union (EU), ASEAN, SAARC, NAFTA

UNIT-IV **International Finance:** International Accounting, International Finance, International Financial Institutions: World Bank, IMF and ADB, UNCTAD.

Reference:


1. International Business: Text and Cases P. SubbaRao (Himalaya)
2. International Business, Cherunilam (S. Chand)
3. International Business Environment, F. Cherunilam (Himalaya)
4. International Business, V.K. Bhalla&S.Sivaramu (Anmol)
5. International Business, K. Aswathappa (Tata Mc.Graw)
6. International Marketing Management, Varshney& Bhattacharyya (Sultanchand)
7. International Finance, ManjuAgarwal, (IIF, Delhi)
8. International Trade & Export Management, F. Cherunilam (Himalaya)
9. Export & Import Management, Acharya& Jain (Himalaya).

MC-CE 303 **CORPORATE FINANCIAL ACCOUNTING**

**Objective:** The Objective of this course is to expose students to advanced accounting issues and practices

**UNIT-1** **Valuation of goodwill and share:** Need for valuation, Factors affecting value of goodwill, Methods of valuation of goodwill, Need for valuation of shares, Methods of valuation of shares.

**UNIT-II** **Accounting issues relating to amalgamation, absorption and reconstruction of companies:** Meaning and methods of external and internal reconstruction, Calculation of purchase considerations, Alteration of share capital, Reduction ofshare capital, Accounting treatments and entries.

**UNIT-III** **Accounts of Holding Companies:** Introduction and Meaning of holding company and subsidiary, Merits and demerits and consolidation of financial statements. Basic rules for constructing a consolidated balance sheet with some special adjustments.

**UNIT-IV** **Recent trends in corporate accounting:** Social Responsibility accounting, Human resource accounting.

Reference


1. Beams, F. A. : Advanced Accounting, (Prentice Hall)
2. Dearden, J, and S. K. Bhattacharya: Accounting for Management, (Vikas)
3. Engler,C.,L.A.Bernstein&K.R.Lambert, Advanced Cost Accounting, (Irwin)
4. Fischer, P.M., W.J.Taylor& J.A. Leen, Advanced Accounting, (South-Western)
5. Gupta, R. L., Advanced Financial Accounting, (S. Chand and Co.)
6. Monga, J.R, Advanced Financial Accounting, Mayoor Paperbacks
7. Narayanaswamy, R.: Financial Accounting: A Managerial Perspective, (Prentice Hall)
8. Neigs, R.F., Financial Accounting, (Tata McGraw Hill)
9. Shukla, M. C. and T. S. Grewal: Advanced Accouutancy, (Sultan Chand & Co).
10. Warren, C.S. & P.E. Fess: Principles of Financial and Managerial Accounting, (South-Western)

**MC-CE 304** **ACCOUNTING STANDARD & CORPORATE REPORTING**

**Objective:** To provide an understanding to the students regarding Accounting theories, standards and corporate reporting.

**UNIT-I :** **Accounting an Introduction:** Accounting as an Information System, Branches of Accounting, Meaning of Financial Accounting, Objective of Accounting, Users of Accounting Information.

**UNIT-II :** **Development in Accounting Theory :** Concept of Accounting Theory, Role of Accounting Theory, Classification of Accounting Theory, Methodology in Accounting Theory – Positive and negative Methodology.

**UNIT-III :** **Accounting Standards:** Defining the term standard, Benefits of Accounting Standard, Management and Standard Setting, Govt. as standard setter, Private sector as standard setter, Standard setting body, Standard setting by agency, Types of standard setting.

**Indian Accounting Standards (IND AS) and IFRS:** Its features, Importance and Challenges.

**UNIT-IV** **Corporate Reporting:** Concept of financial reporting, Qualitative Characteristics of Financial Reporting, Benefits of Financial Reporting Objective of financial reporting, General purpose and specific purpose reporting.

**Specific Reporting:** Concepts, Importance and Types, Environmental and Social Reporting, Corporate Governance Reporting, Integrated Reporting

References:

1. Accounting Theory, R.K. Lele and JawaharLal, (Himalaya )
2. Advanced Accounting : Financial Accounting, Dr. Ashok Sehgal& Dr. Deepak Sehgal, (Taxmann)
3. Studies in Accounting Theory, P.K. Ghosh, G.C. Maheswari, R.N. Goyale, (Wiley Eastern Limited)
4. Corporate Financial Reporting: Theory and Practice, Prof. Jawaharlal, (Taxmann)
5. Accounting for Management, Dr. JawaharLal, (Himalaya)

**MC-AE 305** **INVESTMENT IN STOCK MARKETS**

**Objective:** To enable the students to understand the modus of operandi of Indian Stock Market and to know the technical aspects of investment in Indian Stock Markets.

**Unit-I:** Capital Market in India: Primary Market/New Issue Market and Secondary Market/Stock Market, Functions of Primary Market, Methods of Marketing Securities in the Primary Market, Role of Primary Market, Regulation of Primary Market.

**Unit-II**: Functions of Stock Market, Listing of Securities, Stock Exchanges in India, and Regulation of secondary market.

**Unit-III:** Trading and Settlement System in Stock Exchanges, Speculation, Types of Speculators, Margin Trading and Depositories.

**Unit-IV:** Stock Market Quotations and Indices: Types of Indices, Methods of Calculation of Stock Market Indices and Usefulness of Stock Market Indices.

**Unit-V:** Stock Market Analysis- Fundamental Analysis: Economy Analysis, Industry Analysis and Company Analysis, Technical Analysis

Reference:


1. Bhalla, V.K. Investment Management, Security Analysis, S. Chand, New Delhi.
2. Kevin S: Portfolio Management, Prentice Hall, New Delhi.
3. Desai Vasant: Financial Market and Financial Market and Financial Services, Himalaya Publishing House, Giragaon, Mumbai-4.
4. Agarwala, K.N and Agarwala D: Bulls, Bears and the Mouse, Macmillian, N. Delhi.

## *SEMESTER - IV*

**MC-CC 401** **MANAGEMENT INFORMATION SYSTEM**

**Objective:** To provide an understanding to the students the basic information needs of manager for the decision making process. The supporting systems which continuously provide the information to the managers.

**UNIT – I** **Introduction to MIS:** concept of information system. Data & information, MIS and levels of management, Characteristics of MIS, importance and significance of computer based MIS, Goals of Information System.

**UNIT-II** **Planning & Controlling Information System**: : Introduction to planning, strategic information systems panning, tactical and operational planning, business a system planning, critical success factors, computer aided planning tools, acquisition of hardware, software and services, hardware evaluation factors, software evaluation factors, evaluation of vendor support, implementation MIS, problems of MIS.

**Controlling information system:** Why are controls needed? Information system controls: input controls, processing control, output controls, storage controls, procedural controls, physical facility controls, controls for end user computing, controlling information systems costs, auditing information systems.

**UNIT-III** **Decision support system :** introduction, managerial decision making, phases in decision making, process factors that shape the decision process, architecture of DSS (DBMS, MBBS, DGMS). Information support for intelligence, Design and choice phase, DSS as tool for decision making, difference between EDP, MIS and DSS.

**UNIT-IV Application of information system:**

i) Accounting information system – order processing, inventory control, accounts receivable: accounts payable etc.
ii) Financial information system – Cash and securities management, capital budgeting, financial forecasting, financial planning.
iii) Marketing information system-sales, product, management advertising and promotion, sales forecasting, market research.
iv) Manufacturing information system-process control, product control and scheduling etc.

References:


1. Computer in Business Management an Introduction by James A.O. Brien
2. Management Information Systems: Conceptual Fundamentals, Structure and Development by Gorden B. Davis Margrethe H. Olson.
3. Information Systems for Modern Management by Robert G. Mardick, & Ross. (Printice Hall)
4. Management Information System for Higher Education by Centre for Educational Research & Innovations, Canada.
5. Management Information System by W.S. Jawadekar, (Tata McGraw Hill )
6. Management Information System (Text & Applications) by Mr. C.S.V. Murthy, (Himalaya)
7. Management Information System , O'Brien Markes (Tata Mc.Graw Hill)

MC-CC 402 **E- COMMERCE**

**Objective** The Objective of this Course is to enable students gain knowledge about e-commerce and its various components.

**UNIT-I** **Introduction to E-Commerce:** Meaning and Concept; Electronic commerce versus traditional commerce; E-commerce and e-business; Channels of e-Commerce; Need-for e-commerce, special features of e-commerce.

**UNIT-II** **Business Models of E-Commerce and Infrastructure:** E-Commerce models; Supply chain management, product and service digitization, remote servicing, procurement; Online marketing and advertising; E-commerce resources and infrastructure, resources and planning for infrastructure.

**UNIT-III** **Business to Consumer E-Commerce:** Cataloguing, order planning and order generation, cost estimation and pricing, order receipt and accounting, order selection and prioritization, order billing and payment management; Post sales services.

Business to Business E-Commerce: Need and alternative models of B2B e-commerce; EDI architecture, EDI standards, VANs.

**UNIT-IV** **Security Issues in E-Commerce:** Security risks of e-commerce, types of threats, sources of threats, security tools, Corporate Digital Library.

**Electronic Payment Systems:** Special features required in payment systems for e-commerce; Types of e-payment systems; E-cash and currency servers. e-cheques, credit cards, smart cards, electronic purses and debit cards, Components of an effective electronic payment system.

References:

1. Agarwala, K,N. and DeekshaAgarwala: Business on the net: What's How's of E-Commerce: Macmillan, New Delhi
2. Janal D,S.: On-Line Marketing Hand Book, Van Mostrannd Reinhold, New York.
3. Agarwal K. N. and DeekshaAgarwala: Business on the Net: Bridge to the on line storefront: Macmillan, New Deihi
4. Cady, Glee Harrab and Mcgregor Pat: Mastering the Internet, SPS Publication, New Deihi
5. DiwanPrag and Sunil Sharma: Electronic Commerce- A Manager's Guide to E-Business, Vanity Books International Deihi
6. Janal D. S.: On-Line Marketing Hand Book, Van Nostrand Reinhold, New York.
7. Kosivr David: Understanding Electronics Commerce, Microsoft Press, Washington
8. Minoli and Minol: Web Commerce Technology Handbook, Tata McGraw Hill, New Delhi.
9. Schneider Gray P: Electronic Commerce, Course Technology, Deihi
10. Young, Margaret Levine: The Complete Reference to Internet, Tata McGraw Hill, New Delhi.
11. O'Brien J.: Management Information Systems,Tata McGraw Hill, New Deihi
12. DeewanBhusan - E Commerce - S. Chand, New Delhi
13. ParagDiwan and Sunil Sharma, E- Commerce- A managers guide to E- Business; Excel Books, New Deihi
14. BhusanDeewan : E-Commerce, Sultan Chand, New Deihi.

**MC-CE 403** **SPECIALISED ACCOUNTS**

**Objective:** To provide opportunity understanding the peculiarities of each such special Accounts like H R Accounts, Environmental Accounts, Inflation Accounts and Government Accounts.

**UNIT-I** **Human Resources Accounting :** Meaning, Objectives and Significance of HRA Assumptions Underlying HRA, Important Factors in Developing HRA in an Organization Major Aspects of HRA, Use of HRA.

**UNIT-II** **Environmental Accounting:** Advantages of EA, Key issues in EA Constituents of EA, Major Accounting issues in EA.

**UNIT-III** **Inflation Accounting :** Introduction , Limitation of historical Cost Accounting , Methods of accounting for inflation , Current purchase power (CPP) Accounting , Current Cost Accounting, Holding gain/loss, Depreciation Adjustment, Cost of sales Adjustment (COSA), Monetary Working Capital Adjustment (MWCA), Gearing adjustment.

**UNIT- IV** **Accounts of Indian Government:** Introduction, Central of Government Finances, Recording of Financial Transactions of Government. Treasury System, Structure of Government Accounts, Capital and Revenue Expenditure/Receipts, Comptroller and Auditor General of India, Public Accounts Committee- Consolidation of funds-Compilation of Accounts.

References:


1. Jain S.P. and Naranga K.L. : Advanced Accounting, Kalyani Publisher, Ludhiana.
2. Arulanandam M.A. and Raman K.S. : Advanced Accountancy, Himalaya Publishing House, Mumbai.
3. Sehgal Ashok and Sehgal Deepak : Advanced Accounting, Taxman's Publication, New Delhi.
4. Saxena V. K. : Advanced Accounting, Sultan Chand and Sons, New Delhi.
5. Xavier Grancis G.: Fundamental and Advanced Accounting, Tata MC Graw Hill Publishing Company Ltd., New Delhi.

**MC-CE 404** **COST AND MANAGEMENT AUDIT**

**Objective:** To help the students to understand the meaning and importance of Auditing in costing, Management Accounting and Government Sector.

**Unit-I** **Introduction :** Meaning necessity and type of audit: Generally accepted auditing principles and techniques : standard auditing practices.

**Unit-II** **Cost audit :** Characteristics, scope and function of cost audit : Benefits and limitations : Provision of cost audit in companies Act :Cost audit rules. Cost audit Procedure: cost audit reports.

**Unit-III** **Management Audit:** Management audit Vis-a-Vis financial audit and cost audit. Audit of various operations and management functions.

**Unit-IV** **Government and Tax Audit:** audit of government departments and public sector undertaking : Tax audit under Income Tax Act.

Reference:


1. Maheswari, S. N. : Advance Cost Accounting, Sultan Chand & Sons, Kishore, Ravi M. : Advance Management Accounting, Taxmann Publications, New Delhi.
2. Batra, G. S. : Auditing and Contemporary Accounting : New Horizons, Deep and Deep Publications, New Delhi.
3. Arun Kumar and Rachna Sharma : Auditing Theory and Practice, Atlantic Publisher, New Delhi

**MC-CC 405** **DISSERTATIONS**

I. Sixty percentage weightage for dissertation papers and forty percentage weightage for presentation.
II. Dissertation is to be prepared under the guidance of a faculty of the department during the semester period covering the areas of commerce & management.

**GUIDELINES FOR DISSERTATION**

*The objective of the project course is to help the student develop ability to apply multidisciplinary concepts, tools and techniques to solve organizational problems. The project may be from any one of your areas preferably of specialization area: Comprehensive case study (covering single organization/multifunctional area, problem formulation, analysis and recommendations). Inter-organizational study aimed at inter-organizational comparison/validation of theory/survey of management practices, field study (empirical study).*

## SYNOPSIS

The Proposal of the proposed Project should essentially have the following:
I. Introduction, brief background and relevance of the topic chosen for the project.
II. Statement of the problem.
III. Objectives (clearly stated in behavioural terms).
IV. Research Methodology:
Research Design
Nature and source of data/information to be collected.
Sample and sampling technique.
Rationale of chosen organisation and the sample.
Tools and Techniques to be used for data collection - details of the tools/questionnaire to be used and its relevance with the objectives of the project.
Method/s to be used for data collection.
V. Data handling and analysis- organisation and analysis of data. Statistical tools to be used for analysis. Relevance of statistical tools with the objectives of the project.
VI. Findings and conclusions.
VII. Limitation of the proposed project, if any.
VIII. Scope for further research (optional).
IX. Any other relevant detail which will help better appreciation and understanding of the project proposal.

## PROJECT REPORT

**The Project Report must have the following:**

I. Cover Page – must have the name and roll no. of the student and the name & designation of the guide along with the title of the Project. Acknowledgement, declaration, Certificate of originality signed by the guide with date.
II. Detailed tables & figures of contents with page nos. Index of Chapters
III. All pages of the Project Report must be numbered as reflected in Index of Chapters

Chapter-I: Introduction & Review of literatures,
Chapter-II: Research Methodology,
Chapter-III: Conceptual & Theoretical Descriptions,
Chapter-IV: Analysis & Interpretations,
Chapter-V: Testing of Hypotheses,
Chapter-VI: Conclusion, suggestions & Scope for further research.
References, Annexure, etc.

## Research Methodology:

I. Research Design
II. Nature and Source of data/information
III. Sample and Sampling method with rationale
IV. Details of the tools:
V. The Questionnaire and other methods used and their purpose
VI. Reliability and Validity of the tools used
VII. Administration of tools and techniques
VIII. Data collection
IX. Data Handling, Statistical tools used for Data Analysis
X. Data Interpretation and Findings
XI. Recommendations
XII. Summary and Conclusion
XIII. Limitations of the Project
XIV. Direction for further research
XV. Reference/Bibliography
XVI. Annexure/Appendices (Questionnaire used etc.)

## SEMESTER-I

## Basic Organic Chemistry-I

### Paper-CHE-101

**Unit-I: Basic Concepts**

Application of Inductive effect, Resonance and Hyper conjugation, Aromaticity in benzenoid and nonbenzenoid compounds, Huckel's rule , Addition Compounds: Crown ether complexes and cryptands, Inclusion complexes, Cyclodextrins, Catenanes and Rotaxanes.

Reaction intermediates: Classification, Structure, Stability, Generation and Fate of carbenes and free radicals.

**Unit-II: Structure and reactivity**

Types of reaction mechanisms, Thermodynamic and Kinetic requirements, Kinetic and thermodynamic control, Hammond's postulate, Curtin-Hammett principle, Potential energy diagram, Methods of determining mechanism, Isotope effect, Hard-soft concept of acid base, HSAB principle, Hammett equation, substituent and reaction constants, Taft equation.

**Unit-III: Stereochemistry**

Conformation of cycloalkanes and decalins. Effect of conformation on reactivity. Optical activity in absence of chiral carbon (biphenyls, allenes and spirans), Chirality due to helical shape, Asymmetric synthesis (Sharpless epoxidation, Noyeri reduction), Racemic modification, Resolution of racemic modification, Absolute and relative configuration, R-S nomenclature, Optical purity, E-Z-notation.

**Unit-IV: Aliphatic nucleophilic substitutions**

$SN_2$ and $SN_1$ mechanisms , Ion pairs in $SN_1$- mechanisms , Mixed $SN_2$ and $SN_1$ -mechanisms, SET mechanism, $SN_i$- mechanism, Nucleophilic substitution in allylic, vinylic and aliphatic trigonal carbon, Neighbouring group participation mechanism, Non-classical carbocation, Effect of structure of the substrate, attacking nucleophile, solvent and leaving group on reactivity of nucleophilic substitution.

**Books recommended**


1. Advanced Organic Chemistry: Reactions, Mechanism and Structure (McGraw-Hill) J. March. John Wiley and Sons.
2. Advanced organic chemistry by F.A.Carey and R.J.Saundberg, Plenum.
3. Organic reaction mechanism- Sunakar Panda
4. A guide book to mechanism in Organic chemistry (Orient-Longmens)- Peter Sykes
5. Organic reaction mechanism (Benjamin) R. Breslow
6. Mechanism and structure in Organic chemistry (Holt Reinh.) B. S. Gould.
7. Reaction mechanism in organic chemistry- S. M. Mukharji and S. P. Singh.
8. Stereochemistry of organic compounds) D. Nasipuri.
9. Organic chemistry by J. Clayden, N. Greeves, S. Warren and P. Wothers, Oxford University Press.

# Basic Inorganic Chemistry

## Paper-CHE-202

### Unit-I: Covalent Bond

Qualitative discussion on valence bond theory-formation of hydrogen molecule, Qualitative discussion on molecular orbital theory, bonding and antibonding orbitals, energy distribution and stability, MO energy level diagrams of simple diatomic molecules like $N_2$, $O_2$, $F_2$, CO and NO, Hybridisation and wave mechanical description for sp, $sp^2$ and $sp^3$ orbitals, qualitative idea about $dsp^2$, $dsp^3$ and $d^2sp^3$ orbitals, VSEPR theory, shapes of simple molecules and ions, Linnet's double quartet theory and spectra of simple molecules.

### Unit-II: Bonding in Co-ordination Compounds

Valence bond theory-strength and short coming, Crystal field theory-effect spin types, CFSE, Evidence for crystal stabilization energy in octahedral, tetrahedral, tetragonal, square pyramidal and square planner fields, Applications of Crystal Field Splitting, Molecular orbital theory (qualitative), MO energy level diagrams, Sigma–pi bonding and their importance in co-ordination compounds

### Unit-III: Spectral and Magnetic Properties of Transition Metal Complexes

Spectroscopic ground states, Correlation and Orgel diagrams for transition metal complexes ($d^1$-$d^9$ states), Charge transfer spectra, Elementary idea about magneto chemistry of metal complexes, Diamagnetism, Para magnetism, Temperature independent paramagnetism, Magnetic susceptibility and its measurement, Paramagnetism applied to metal complexes, Ferromagnetism Ferrimagnetism and Anti-ferromagnetism.

### Unit-IV: Nuclear Chemistry

Radioactive decay and equilibrium, Artificial radioactivity, Disintegration by α-particle and neutron, Types of nuclear reaction: fission and fusion. Applications radio isotopes to physic chemical problems, Uses of radio isotopes for dating, medicine agriculture and industry.

### Books recommended


1. *Advanced Inorganic Chemistry*: F. A. Cotton and G. Wilkinson, John Wiley.
2. *Inorganic Chemistry*: J. E. Huheey, E. A. Keiter. R. L. Keiter, Pearson Education.
3. *Inorganic Chemistry*: Missler and Tarr, Prentice Hall
4. *Inorganic Electronic Spectroscopy*: A. B. P. Lever, Elsevier.
5. *Magnetochemistry*: R. L. Carlin, Springer Verlag.
6. *Essential of Nuclear Chemistry*: H. J. Arnikar, ACS.

## Basic Physical Chemistry-I

**Paper-CHE-103**

**Unit-I: Symmetry and group theory**

Group, Subgroup and Classes, Symmetry elements and Symmetry operations, Relationship between orders of a finite group and its subgroup, Conjugancy relation and classes, symmetry Point group, Matrix representation of point groups and matrix representation for the E, $C_n$, $\sigma_v$, $S_n$), Nomenclature and symmetry classification of molecules, Irreducible representation and Orthogonality theorem, Standard reduction, Character table ($C_{2v}$, $C_{3v}$, $C_{4v}$, $C_{2h}$, $D_2$, $D_{2d}$), Direct product.

**Unit-II: Application of group Theory**

Transformation properties of atomic orbitals, Hybridization scheme for σ-bonding ($C_{3v}$, $C_{4V}$, $D_{3h}$, $T_d$) projection operator, Symmetry adopted LCO, Hybrid orbital as linear combination of atomic orbitals, MO treatment of coordination compounds, σ-bonding in octahedral complexes, Formation of LCO, Formation of MO, Construction of MO diagram.

**Unit-III: Quantum chemistry**

Principle of superimposition, Angular momentum, Particle in one and three dimensional boxes, Hydrogen atom, Transformation of co-ordinate, Separation of variables, φ-equation, θ-equation, The radial equation, Shapes of s, p and d orbitals.

Postulates of quantum mechanics, Simple harmonic oscillator, Rigid rotator, The variation theorem, Linear variation theorem, Linear variation principle, Perturbation theory (first order and nondegenerate), Application of various methods and perturbation theory to Helium atom, Huckel theory of conjugated systems.

**Unit-IV: Computer for chemists**

Computer programming in C: Elements of computer language, Constant and Variables, Operation and symbols, Expressions, Arithmetic assignment, Input and output, Conditional statement, Loops, Logical variables. C Programming in chemistry: Development of small computer codes involving simple formulae in chemistry such as vander Waal's equation, Radioactive decay constant, Rate constant.

**Books recommended**


1. K. Veera Reddy, *Symmetry and Spectroscopy of Molecules*, New Age International, Delhi
2. I.N. Levine, *Quantum Chemistry*, 5th edition (2000), Pearson Educ. Inc., New Delhi.
3. A.K. Chandra, *Introductory Quantum Chemistry*, 4th edition, Tata McGraw Hill, New Delhi.
4. L. Pauling and E. B. Wilson, *Introduction to Quantum Mechanics with Applications to Chemistry* (1935), McGraw Hill, New York.
5. R. K.Prasad," *Quantum Chemistry*", Wiley.
6. F.A. Cotton, *Chemical Applications of Group Theory*, Wiley
7. Ramesh Kumari, *Computers and their Applications to Chemistry*, Narosa, New Delhi

# Physical Spectroscopy

## Paper-CHE-104

### Unit-I:Electronic Spectroscopy

Atomic spectroscopy- Energies of atomic orbital, Spectra of hydrogen atom alkali metal atom. Molecular spectroscopy-Energy levels, Vibrational progression and geometry of excited state, Frank-Condon principle. Electronic spectra of poly atomic molecule

### UNIT-II: Vibrational Spectroscopy

Infra –red spectroscopy: Vibrational energy of diatomic molecules, zero point energy, force constant and bond strength, Morse potential energy diagram, vibrational-rotational spectroscopy, P,Q,R branches, break – down of Oppenheimer approximation, vibration of polyatomic molecules, Selection rules, Hot bands.

Raman Spectroscopy: Classical and quantum theories of Raman effect, Pure rotational, vibrational and rotational Raman spectra Selection rule, Mutual exclusion principle , Coherent anti Stoke's-Raman spectroscopy.

### Unit-III

**Microwave spectroscopy**: Classification of molecules, Rigid rotator model, Intensities of spectral lines, Effect of isotopic substitution on transition frequencies, Non- rigid rotator, Stark effect, applications.

**Photo electron spectroscopy**: Basic principles, Photoelectric effect, Ionisation process, Koopmans's thermo photoelectron spectra of simple molecules. ESCA, Chemical information from ESCA, Auger electron spectroscopy.

### Unit-IV

**Electron spin resonance spectroscopy**: Basic principles, Zero- field splitting and Kramer's degeneracy, Factors affecting the g value , Isotopic and anisotropic hyperfine coupling constant, Measurement techniques, Application.

**Mossbauer spectroscopy**: Basic principles, Spectral parameters and spectral display, Application of the techniques to study the bonding and structure of $Fe^{2+}$ and $Fe^{3+}$ compounds (structure of $Fe_3(CO)_{12}$, Iron-sulfur proteins).

### Books recommended


1. Fundamentals of molecular spectroscopy by C. N. Banwell, Tata McGraw Hill.
2. Physical chemistry by P. W. Atkins. ELBS. 1986
3. Introduction to molecular spectroscopy by G. M. Barrow.
4. Molecular spectroscopy by I. N. Levins, Wiley interscience.
5. Nuclear magnetic Resonance by J. D. Roberts, Mcgrew Hill.
6. Electron Spin Resonance, Elemenatry theory and practical applications by J. E.Wetz and J. R. Boulton, McGrew Hill.

## General Organic Practical
## PAPER-CHE-105

1. Identification of organic compounds having at least two functional group. Submission of derivatives.
2. Synthesis of organic compounds:
    I. Preparation of p- Nitroacetanilide.
    II. Preparation of p- Nitroaniline.
    III. Preparation of Ethylbenzoate.
    IV. Preparation of m-Dinitrobenzene.
3. Estimation of
    I. Acetyl group
    II. Phenolic group
    III. Keto group

**Book recommended**

Quantitative and Qualitative analysis By A.I. Vogel

# SEMESTER -II

## Organic Chemistry-II

## Paper-CHE-201

**Unit-I:**

**Aliphatic electrophilic substitutions:** $SE_1$, $SE_2$ and $SE_i$ – mechanisms, Distinction in between $SE_2$ and $SE_i$,. Electrophilic substitutions at allylic substrate. Effect of substrate structure, leaving group and solvent on reactivity.

**Aromatic electrophilic substitutions:** Arenium ion mechanism, Pi – complex mechanism, Orientation and reactivity, Ortho –para ratio, Ipso attack, Orientation of benzene with more than one substituent, Vilsmeir- Hack reaction. Gattermann – Koch reaction, Reimer- Tiemann reaction.

**Unit-II:**

**Aromatic nucleophilic substitutions:** ArSN (Addition-Elimination) mechanism, Benzyne (Elimination-Addition) mechanism, $SRN_1$– mechanism, Reactivity effect of substrate structure, leaving group, attacking nucleophile; Von-Richter rearrangement, Sommelet –Hauser rearrangement, Smiles rearrangement.

**Free radical substitutions:** Free radical reactions, Mechanism of free radical substitutions, Neighbouring group assistance in free radical reactions, Free radical substitutions at bridge head. Allylic halogenations, Coupling of alkynes, Arylation of aromatic compounds by diazonium salt, Hunsdiecker reaction, Kochi reaction, NBS, AIBN.

**Unit –III:**

**Addition reaction:** Electrophilic addition mechanism (syn and anti), Nucleophilic addition mechanism, Free radical addition mechanism, Addition to conjugated system, Orientation and reactivity, Hydroboration, Epoxidation, Sharpless asymmetric epoxidation, Michael addition.

**Elimination reaction:** $E_2$, $E_1$ and $E_1cb$ mechanism, Comparison in between $E_2$, $E_1$ and $E_1cb$, Reactivity effect of substrate structure, Attacking reagent, Leaving group and Reaction medium. Pyrolytic elimination, Peterson elimination reaction, hydroalkoxy elimination.

**Unit –IV:**

**Oxidation**: Different oxidative processes, Oxidation of hydrocarbon, alkanes, aromatic ring, alcohol, α, β- diol, allylic and benzylic alcohols, aldehydes ketones, carboxylic acids, amines.

Oxidation with $RuO_4$, Idobenzene diacetate, $Tl(NO_3)_3$, PCC, PDC, $SeO_2$.

**Reduction**: Different reductive processes, Reduction of alkenes, alkynes, aromatic rings, cycloalkanes, carbonyl compounds, aldehydes, ketones, acids and their derivatives, Hydrogenolysis.

**Books recommended**

1. Advanced organic chemistry (McGraw-Hill) J. March.
2. Advanced organic chemistry by F.A.carey and R.M.Saundberg
3. Organic reaction mechanism- Sunakar Panda

4. A guide book to mechanism in Organic chemistry (Orient-Longmens)- Peter Sykes
5. Organic reaction mechanism (Benjamin) R. Breslow
6. Mechanism and structure in Organic chemistry (Holt Reinh.)B. S. Gould.

## Advance Inorganic Chemistry

**Paper-CHE-202**

**Unit-I: Metal II-Complexes**

Chemistry of metal carbonyls, Constitution of metal carbonyls: mononuclear, poly nuclear clusters with terminal and bridge carbon monoxide ligand units, Carbonylate anions, Carbonyl hydrides and Carbonyl halides. Metal nitrosyl and other types of metal nitric oxide complexes, Cyanonitrosyl complexes of metals, Brown ring compounds, dinitrogen complexes. Complexes of cyclohexadienyl molecules.

**Unit-II: Rings, Cages and Metal Clusters**

Inorganic catenation and hetero catenation, Inorganic ring: borazine, phosphorazine and their derivatives, Inorganic cages: borides and carbides, higher boranes, carboranes, metallaboranes and metallacarboranes, compounds with metal-metal multiple bonds

**Unit-III: Metal-Ligand Equilibria in Solution**

Stepwise and overall formation constants and their interaction, Trends in stepwise constants, Inert and labile complexes, Kinetic application of valence bond and crystal field theories, Kinetics of octahedral substitution, Factors affecting stability of metal complexes with reference to the nature of metal ion and ligand, Chelate effect and its thermodynamic origin, Determination of binary formation constants by potentiometric and spectrophotometric methods.

**Unit-IV: Reaction Mechanism of Transition Metal Complexes**

Acid hydrolysis, Factors affecting acid hydrolysis, Base hydrolysis, Conjugate base mechanism, Direct and indirect evidences in favour of conjugate mechanism, Anation reactions, Reactions without metal ligand bond cleavage, Substitution reactions in square planar complexes, Trans effect, Mechanism of one electron reactions, Outer-sphere type reactions, Cross reactions and Marcus-Hush theory, Inner sphere type reactions.

**Books recommended**

1. *Chemistry of the Elements*: N. N. B. Greenwood and A. Earnshow, Pergamon.
2. *Mechanism of Inorganic Reactions*: F. Basalo and R. G. Pearson, Wiley Eastern publication 1967.
3. *Advanced Inorganic Chemistry*: F. A. Cotton and G. Wilkinson, Wiley Estern 1988.
4. *Inorganic Chemistry*: J. E. Huheey, E. A. Keiter, R. L. Keiter, Pearson Education.
5. *Advanced Inorganic Chemistry*: F. A. Cotton and G. Wilkinson, John Wiley

## Physical Chemistry-II

### Paper-CHE-203

**Unit-I: Classical thermodynamics** Brief resume of the concept of enthalpy, entropy, free energy and laws of thermodynamics, Partial molar properties, Chemical potential, Effect of temperature and pressure, Determination of partial molar properties by: (i) Direct Method, (ii) Apparent method, (iii) Method of intercept.

Concept of fugacity and its determination by (i) Graphical method, (ii) From equation of state (iii) Approximation method, Nernst heat theorem and its application to solid, Third law of thermodynamics, Experimental determination of entropy by third law.

**Unit-II: Statistical thermodynamics**

Thermodynamic probability and entropy, Maxwell-Boltzmann statistics, Partition function (translational, vibrational, rotational and electronic) for diatomic molecules, relationship between partition and thermodynamic function (internal energy, enthalpy, entropy and free energy), Calculation of equilibrium constant, Fermi-Dirac statistics, Bose-Einstein statistics, Distribution law and its application to metal.

**Unit-III: Non-equilibrium thermodynamics**

Thermodynamic criteria for non-equilibrium states, Entropy production and entropy flow, Transformation of the generalized fluxes and forces, Non-equilibrium stationary state, Microscopic reversibility, Onsager's reciprocity relation, Electrokinetic phenomena, Diffusion, Electric conduction.

**Unit-IV: Chemical Dynamics**

Collision theory of reaction rate, Activated complex theory, Arrhenius equation, Ionic reaction, Kinetic salt effect, Steady state kinetics, Photochemical reaction (Hydrogen-Bromine and Hydrogen-Chlorine reactions), Oscillatory reactions (Belousov-Zhabotinsky reaction), Homogeneous catalysis, General features of fast reaction, Study of fast reaction by flow method and relaxation method. Dynamics of Unimolecular reactions (Lindemann-Hinshelwood and Rice-Ramsperger-Kassel-Marcus theories)

**Books recommended:**


1. K.L. Kapoor, *Text book on Physical Chemistry*, Volume 2, Macmillan India Ltd. Delhi
2. P. W. Atkins, *Physical Chemistry*, 7th Edition, (2002) Oxford University Press, New York.
3. Andrew Maczek, *Statistical Thermodynamics*, (1998) Oxford University Press Inc., New York.
4. F.W. Billmayer, Jr., *Text Book of Polymer Science*, 3rd Edition (1984), Wiley-Interscience, New York.
5. K. J. Laidler, *Chemical Kinetics*, Third Edition (1987), Harper & Row, New York.
6. P. W. Atkins, *Physical Chemistry*, Seventh Edition (2002), Oxford University Press, New York.
7. I.N. Levine, *Physical Chemistry*, 5th Edition (2002), Tata McGraw Hill Pub. Co. Ltd., New Delhi.
8. J. Raja Ram and J.C. Kuriacose, Kinetics *and Mechanism of Chemical Transformations* (1993), MacMillan Indian Ltd., New Delhi.

# Applications of Spectroscopy

## Paper-CHE-204

**Unit-1: 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 and conjugated dienes, Ultraviolet spectra of aromatic and heterocyclic compounds, Steric effect in biphenyls, Woodword rule ($\lambda$max).

**Unit –II: Infra-red spectroscopy**

Infra-red spectroscopy :Instrumentation, Characteristics vibrational frequencies of simple organic molecules like alkene, alkyne, aromatic compounds, alcohols, phenol, amines, aldehydes, ketones, acids and acid derivatives, Effect of hydrogen bonding and Solvent effect on IR –spectra, Overtones and combination bands, Fermi resonance, FT-IR.

**Unit-III**

**Nuclear Magnetic Resonance Spectroscopy**

Basic principle, Chemical shift, Spin-spin interaction, Shielding mechanism, Chemical shift values and correlation to protons bonded to carbon and other nuclei, Chemical exchange, Effect of deuteration, Complex spin-spin interaction between two, three, four and five nuclei, Hindered rotation, Shift reagent , Nuclearoverhauser effect, AX,AB, $AX_2$ systems.

**Carbon-13 NMR spectroscopy**: General consideration, Chemical shift (aliphatic, olefinic, alkyne, aromatic, heteroaromatic, and carbonyl carbon), Coupling constant, Two dimension NMR spectroscopy: COSY, DEPT, INDEQUATE, HMBC, HMQC techniques.

**Unit-IV: Mass Spectroscopy**

Introduction , EI, ESI, CI, FD, MALDI and FAB, Factors affecting fragmentation, Ion analysis, Ion abundance fragmentation of organic compounds with common functional groups, Molecular ion peak, Metastable ions, Mc-Lafferty rearrangement, Nitrogen rule, High resolution mass spectrometry, Examples of mass spectra fragmentation for the determination of structure of simple organic molecules.

**Books recommended**


1. Instrumental Methods of analysis- Willard, Merrit, Dean and Settle.
2. Spectroscopic identification of organic compounds- R.M. Silverstein and G.C. Bassler
3. Spectroscopic methods in organic chemistry- D.H. Williams and I. Fleming
4. Absorption spectroscopy of organic molecules- V.M. Parikh
5. Applications of spectroscopic techniques in Organic chemistry- P.S. Kalsi

## Inorganic Practical

### Paper CHE-CC-410

1. Qualitative analysis of mixtures containing not less than six radicals (organic radicals should be excluded). Anyone of the following rare metal ions may be included.

a) V b) Mo c) W d) Ti

2. A) Volumetric analysis involving EDTA as reagent.

i) Determination of $Ca^{2+}$ and $Mg^{2+}$ in Dolomite.

ii) Determination of Nickel in Stainless steel.

OR

B) Complete analysis of:

i) Brass ii) Cement iii) chromo iron ore.

OR

C) Preparation of Hexamine Cobalt (III) chloride.

**Book recommended**

Quantitative and Qualitative analysis By A.I. Vogel

## SEMESTER-III

## Advanced Organic chemistry

### Paper-CHE-301

**Unit-I: Pericyclic Reactions**

Molecular orbital symmetry, Frontier orbital of ethene, 1,3- Butadiene,1,3,5-Hexatriene,Allyl system, Classification of pericyclic reaction, Woodward-Hoffmann method, Frontier molecular orbital theory approach.

Electrocyclic reactions: Dis and Con rotation, 4n ,4n+2 and allylic system, Explanation through correlation diagram and Huckel-Mobius approach, Cycloaddition reaction : 2+2 and 4+2 cycloaddition, 1,3-Dipolar cycloaddition, Cheletropic reactions, Sigmatropic rearrangements, Claisen Rearrangement,Cope rearrangement, 1,5-hydrogen shift, 1,7-hydrogen shift.

**Unit-III: Organic Photochemistry**

Electronic excitation, Fate of excited molecules (Jablonski diagram), Fluorescence, Phosphorescence, Photodissociation reactions: Norrish Type-I &II cleavage, Photo isomerisation,Photo-Fries rearrrangment,Paterno-Buchi reaction, Barton reaction, Di-Pi methane rearrangement, Photochemistry of aromatic compounds, Photo-Oxditation of alkenes, Photochemistry of vision.

**Unit-IV: Name reaction and molecular rearrangement**

Chichibabin reaction, Clasien-Schmidth reaction, Bayer villager reaction, Hoffman reaction, Shapiro reaction, Stobbe condensation, Wittig reaction.

Beckmann rearrangement, Benzillic acid rearrangement, Pinacol-Pinacolone rearrangement, Wagner-Meerwein rearrangement, Dienone-Phenol rearrangement, Favorskii rearrangement, Lossen rearrangement, Neber rearrangement, Steven rearrangement, Benzidine rearrangement .

**Unit-IV: Applications of Organometallic compounds**

Metal atom functionality in Organometallic reactions: Carbocationic behaviour, Carbanionic behaviour, Free radical behaviour. Synthetic applications of organozinc, organocadmium, organolithium, organomercury and organocopper compounds

**Books for Organic Chemistry**


1. Organic reaction and mechanism- Sunakar Panda
2. A guide book to mechanism in Organic chemistry (Orient-Longmens)- Peter Sykes
2. Organic reaction mechanism (Benjamin) R. Breslow
3. Mechanism and structure in Organic chemistry (Holt Reinh.)B. S. Gould.
4. Organic chemistry (McGraw-Hill)Hendrikson, Cram and Hammond.
5. Basic principles of Organic chemistry (Benjamin) J. D.Roberts and M. C.
7. Stereochemistry of Carbon compounds. (McGraw-Hill) E.L.Eliel
8. Organic Stereochemistry (McGraw-Hill) by Hallas.
9. Organic reaction mechanism (McGraw-Hill) R. K. Bansal.
10. Organic chemistry- R. T. Morrison and R. N. Boyd, (Prentice Hall.)

11. Modern organic reactions(Benjumin) H. O. House.
12. Principle of organic synthesis- R.O.C. Norman and J. M. Coxon.(ELBS)
13. Reaction mechanism in organic chemistry- S. M. Mukharji and S. P. Singh.
14. Advanced organic chemistry (McGraw-Hill) J. March.

## Organic synthesis

**Paper-CHE-302**

Unit-I **Disconnection approach**

Disconnection approach An introduction to Synthons and synthetic equivalents, disconnection approach, functional group interconversions. One group C-X and two group disconnections in 1,2,1,3 -,1,4-& 1,5- bifunctional compounds, Chemoselectivity, reversal of polarity,cyclisation reaction, amine synthesis.

Protecting Groups: Principle of protection of alcohol, amine, carbonyl and carboxyl groups.

Unit-II **Retrosynthesis**

Retro- synthesis of Alkene ,acetylenes and aliphatic nitro Alcohols and carbonyl compounds, amines, the importance of the order of events in organic synthesis, chemoselectivity, regioselectivity. Diels Alder reaction, Michael addition and Robinson annulation. Retro-synthesis of aromatic Heterocycles and 3, 4, 5 and 6 membered carbocyclic and heterocyclic rings.

Unit-III **Synthesis of Heterocyclic Compounds**

Three membered and four membered Heterocycles- synthesis and reactions of aziridines, oxiranes, thiranes, azetidines, oxitanes and thietanes.

Synthesis and reactions of benzopyrroles, benzofurans and benzothiophenes.

Synthesis and reactions of pyrilium salts and pyrones and their comparison pyridinium and thiopyrylium salts and pyridones. Synthesis and reactions of coumarins, chromones.

Unit –IV **Synthetic reagents**

Complex metal hydrides, lithium dialkyl cuprate, lithium diisopropylamide (LDA) Dicyclohexylcarbodiimide (DCC), Trimethyl silyl iodide, tributyltin hydride, peracids, lead tetra acetate, PPA, Diazomethane, ozone phase transfer catalyst, woodward-prevost hydroxylation, Barton and Shapiro reaction Hoffmann – Loffler-Freytag. Miyamura, Stille, Negishi, Kamada Peterson synthesis

**Book recommended**

1. S.Warren: Designing of organic synthesis
2. J. Fuhrhop & G. Penzlin.: Organic synthesis (2nd ed.)
3. Carruthres: some modern methods of organic synthesis.
4. H.O.House: modern synthetic reaction.
5. Fieser & Fieser : Reagent in organic synthesis
6. R.O.C.Norman: principle of organic synthesis
7. CAREY & Sundharg: Advanced organic Chemistry

8. P.E.REALAND: Organic synthesis
9. Bartan and Ollis : comprehensive organic Chemistry
10. Weber & Gokel : phase transfer catalyst in organic synthesis.
11. J. Roberton (OX): Protecting group chemistry

## Chemistry and society

**Paper-CHE-303**

**Unit-I Chemicals in food:**

a) Carbohydrates: Classification, sugar and non-sugar, Glucose, fructose, starch and cellulose. Importance of carbohydrates.

b) Amino acids: Classification, essential and nonessential amino acids, Zwitter ion structure, polypeptides, proteins (classification and function).

c) Lipids: Classification, oils and fats, metabolism of lipids.

d) Vitamins: Classification, Nomenclature and disease caused by the deficiency of vitamins.

**Unit-II Chemicals in Medicines:**

Development of new drugs, different types of drugs, analgesics, antipyretics, antiseptics and antibiotics, broad spectrum antibiotics. Metals in medicines: Metal deficiency and disease, toxic effect of metals.

**Unit-III Chemicals in Agriculture:**

Fixatation of Nitrogen, fertilisers, classification of fertilisers: nitrogenous, phosphorous and potassium fertiliser. Pesticides classification, insecticides, fungicides and rodenticides. Detrimental effects of pesticides (DDT, BHC, Parathion).

**Unit-I V Chemicals in daily life:**

General idea about soap, synthetic detergents and shampoo, preparation of soap and synthetic detergents. Advantage and disadvantage of synthetic detergent, cosmetics and perfumes. Plastic and its determintral effects on environment.

## Chemistry and Environment

**Paper-CHE-304**

**Unit-I Environmental Processes**

Environment and its classification, Factors influencing environment, Components of Environment; Environmental degradation, Biogeochemical cycles; Hydrological cycle, Gaseous cycles (Oxygen cycle, $CO_2$ cycle, Nitrogen cycle), Sedimentary cycles (Sulfur cycle, Phosphorous cycle)

**Unit-II Natural Resources**

Introduction on classification of resources; land resources, formation of soil, soil erosion, Water resources, Sources of fresh water, Uses of water. causes for the depletion of water resources ;mineral resources, Forest resources, Deforestation, consequences of deforestation; affords to control

deforestation, Renewable and nonrenewable resources, Conventional and nonconventional energy resources

**Unit-III Environmental pollution**

Introduction, Pollutants, Types of pollutants, Classification of pollution, effects of pollution, Radiation pollution: sources, effect and control of radiation pollution, Thermal pollution: sources, effects and its control, Industrial pollution, Sewage and sewage treatment.

**Unit-IV Air Pollution and its control**

Atmosphere; structure and composition of atmosphere, Classification of air pollutants, Consequences of air pollution (Ozone layer depletion, Green house effect, Smog, Acid rain), Control of air pollution, air quality and standards.

**Book recommended**


1. Environment and Ecology By Dr. Sunakar Panda
2. Environmental Chemistry By A.K. De
3. Air Pollution by Wark & Werner
4. Environmental Pollution Control in Process Industries By S.P. Mahajan
5. Environmental Chemistry By B.K. Sharma & H.Kaur
6. Introduction to Air Pollution By P.K. Trivedi
7. Environmental Pollution Analysis By S.M. Khopkar
8. A Text Book of Environmental Pollution By D.D. Tyagi, M. Mehre
9. Environmental Pollution Engineering and Control By C.S. Rao


## Physical Chemistry Practical

**Paper-CHE-305**

6 Hrs duration F.M.-100

1. Determination of surface excess of amyl alcohol
2. Determine the critical Micelle Concentration (CMC) of surfactant from the measurement of surface tension.
3. To determine the Molecular weight of a polymer from viscosity measurements.
4. To determine the Isoelectric point of gelatine and to find out the Intrinsic Viscosity at isoelectric point.
5. Determination of critical solution temperature (CST) of phenol-water system
6. A study of phase diagram of three-component liquid (ternary) system at room temperature: (Benzene-acetic acid-water system)
7. To determine the strength of HCL and acetic acid (AcOH) from the mixture of acids by strong alkali (NaOH) conductometrically.
8. Potentiometric titration of a weak acid (acetic acid) with caustic soda solution and determination of the dissociation constant of the acid using quinhydrone electrode at room temperature
9. To determine the energy of activation from the Kinetic measurement of hydrolysis of ester
10. Determination of rate constant of inversion of sucrose by polarimeter and also verification of the effect of catalyst on the rate constant.

11. First order rate kinetics for acid catalyzed hydrolysis of methyl acetate.
12. Second order rate kinetics for base catalyzed hydrolysis of ethyl acetate.

**Book recommended**

1. Physical Chemistry Practical by Saroj Kr Maity and Naba Kr Ghosh
2. Experimental Physical Chemistry by R.C. Das and B. Behera
3. Text book of Quantitative Inorganic Analysis by A.I. Vogel,ELBS(1978)
4. Experimental Physical chemistry by J B Yadav, Goel Pub. House,(1981)
5. Senior Practical Physical Chemistry by B. C. Kosla, Simla Printers New Delhi (1987).
6. Experimental Physical Chemistry by Daniel et al., McGraw Hill, New York (1962).
7. Practical Physical Chemistry by A.M James and P. E. Pritchard, Longman's Group Ltd (1968)

## SEMESTER IV

### Physical Chemistry-III

### Paper-CHE- 01

**Unit-I Electrochemistry-I**

Electrochemistry of sol- ...tion: Ion-solvent interactions, B ...rn Model, Ion-ion interactions: Debye-Huckel (ion-cloud) ... Bjerrum Model, Thermodynami... of electrified interface equations; Ion transport in sol... ...on: Debye Huckel-Onsager equatio..., I erivation of Butler-Volmer equation, Tafel plot.

Activity ... activity coefficient, Ionic strength, ...ebye-Huckel lin iting law and its verification, Degree o... dissociation and its determination, Dete mination of activit coefficient by freezing point, Vapo... dissociation and its determination, Dete mination of activit coefficient by freezing point, d... ...ssociatio ... onstant of electrolyte.

**Unit-II F ...lectrochemistry-II**

Semicor ductor interfaces, Theory of double layer at semic onductor, Electrolytic solution interfaces, Structure of double layer interfaces, Effect of light at sen iconductor solution interface, Fuel cell, Corrosion: Homogeneous theory forms of corrosion, corrosion monitoring and prevention.

Electromotive force, Measurement of EMF, Relationship between EMF and thermodynamics parameters (free energy change, enthalpy change and entropy change), Thermodynamics of reversible cells, Electrode potential in terms of osmotic pressure and solution pressure. Nernst equation relating electrode potential and concentration.

**Unit-III Surface Chemistry**

Adsorption, Surface tension, Capillary action, Pressure difference across curved surface (Laplace equation), Vapour pressure of droplets (Kelvin equation), Gibb's adsorption isotherm, Estimation of surface area (BET equation), Surface films on liquids (electrokinetic phenomenon), Catalytic activity at surfaces.

Micelles: Surface active agents, Classification, Micellization, Hydrophobic interaction, Critical micellar concentration (CMC), Factors affecting CMC of surfactants, Counter ion Binding to micelles. Thermodynamics of micellization, Phase separation and mass action models, Solubulisation, Microemulsion, Reverse micelles.

**Unit-IV Solid state**

Crystal systems and lattices, Miller planes, Crystal packing, Crystal defects; Bragg's Law, Ionic crystals, Band theory, Metals and semiconductors, Types of solid state reactions.

**Books recommended**

1. J.O'M. Bockris and A.K.N. Reddy, *Modern Electrochemistry*, Vol. 1 & 2A and 2 B, (1998) Plenum Press, New York.

2. Y. Moroi, *Micelles : Theoretical and Applied Aspects*, (1992) Plenum Press, New York.

3. F.W. Billmayer, Jr., *Text Book of Polymer Science*, 3rd Edition (1984), Wiley-Interscience, New York.

4. A.R. West, *Solid State Chemistry and its Applications*, (1984) John Wiley & Sons, Singapore.
5. C.N R. Rao and J. Gopalkrishnan, *New Directions in Solid State Chemistry*, (1997) Cambridge Univ. Press.
6. S. Glasstone, " *Introduction to Electrochemistry*" Affilisated East West

## Analytical Chemistry

**Paper-CHE-402**

**Unit- Thermal methods of analysis**

Thermo analytical methods: TGA, DTGA and DTA, Instrument, Instrumental and application to physical studies (reaction kinetics and information for the constitution of phase diagram), Analytical applications.

**Unit-II Electrical methods of analysis**

Voltametry and polarography: Dropping mercury electrode, Ilkovic equation, Current-potential curves, Reversible reactions, The residual current, Current maxima, Analytical applications, Amperometric titration using rotating platinum electrode, Cyclic voltammetry.

**Unit-III Analysis of Food and Soil**

Analysis of food: Moisture, ash, crude protein, fats and carbohydrates. Food adulteration-common adulterants in food, contamination of food stuffs. Microscopic examination of foods for adulterants. Pesticide analysis in food products, Thin layer chromatography for identification of chlorinated pesticides in food. Separation of pesticides by HPLC.

Analysis of soil: Moisture, pH, total nitrogen phosphorous, silica, lime, magnesia, manganese, sulphur and alkali salts.

**Unit-IV**

**Analysis of Fuel and Drugs**

Fuel analysis: Solid, liquid and gas. Liquid fuels-flash point, Aniline point, octane number and carbon residue. Gaseous fuels-producer gas and water gas-calorific value.

Drug analysis: Narcotics and dangerous drugs. Classification of drugs. Screening by gas and thin layer chromatography.

**Analysis of data**: Types of errors, determinate error, indeterminate error, minimisation of error, Accuracy and precession. Mean (Average Deviation), Standard deviation, Median, Methods of repeating analytical data, statistical evaluation of data, statistical analysis. Problems.

## Bio-inorganic and Supramolecular Chemistry

**Paper-CHE-403**

**Unit-I: Bioinorganic Chemistry of Alkali and Alkaline Earth Metals**

Essential and trace elements in biological systems, structure and functions of biological membranes; mechanism of ion transport across membranes; sodium pump; ionophores: valinomycin and crown ether complexes of Na+ and K+; ATP and ADP; photosynthesis: chlorophyll a, PS I and PS II; role of calcium in muscle contraction, blood clotting mechanism and biological calcification.

**Unit- II: Metalloproteins**

Heme proteins and oxygen uptake, Structure and functions of haemoglobin, myoglobin, hemocyanin and hemerythrin, Iron-sulphur proteins: rubredoxin and ferredoxins, Nitrogenase, Bio-inorganic aspects of nitrogen fixation.

**Unit- III: Metalloenzymes**

Zinc enzymes – carboxypeptidase and carbonic anhydrase, Iron Enzymes – catalase peroxidise and cytochrome p-450, Copper enzymes – superoxide dismutase, Mg enzymes – vitamin $B_{12}$.

**Unit IV: Supra molecular Chemistry**

Molecular recognition: Spherical recognition, Recognition of anionic Substrate, Tetrahedral recognition, Co receptor molecules and multiple recognition, Binding and recognition of neutral molecules.

Supra molecular reactivity and catalysis.

Molecular assembly in supra molecular chemistry.

Supra molecular devices: Suitable binding, photochemical and electrochemical sensor wires.

**Books Recommended:**

1. *Priciple of Biochemistry (Lehninger)*: D. L. Nelson and M. M. Cox, W. H. Freeman and company, New York.
2. *Fundamentals of Biochemistry*: D. Voet, J. G. Voet and C. W. Pratt; John wiley and sons.
3. *Bioinorganic Chemistry*: Bertini, Gray, Lippard, Valentine, Viva Books Private Limited.
4. *Supramolecular Chemistry*: J. M. Lehn; VCH

## Project and Seminar

**Paper-CHE-404**

Each student has to work for at least 200 hours in a reputed research laboratory or industry on a specific project under the guidance of a Professor/Reader/lecturer or a Scientist. The research work will be submitted in the form of a dissertation within 15 days of last theory examination. The student has to present his work before an External examiner and an Internal examiner for evaluation.

## Analytical Chemistry Practical

**Paper-CHE-405**

3 Hrs duration F.M.-100

1. To find out the dissociation constant of the given tribasic acid, i.e. phosphoric acid by treating it against NaOH using a pH Meter
2. Determination of hydrolytic constant (Kh) of ammonium chloride solution pH-metrically.
3. To estimate the iron content in the given ferrous ammonium sulphate solution by Colorimetry

4. To determine the composition and stability constant of Fe(III) –salicylic acid complex colorimetrically by Job's method of continuous variation.
5. To determine the $\Lambda^{o}$ and $K_a$ of weak electrolyte at a definite temperature by Debye Huckel Onsagar equation.
6. To determine the stoichoimetric ratio in the complexometric titration of $HgCl_2$ against potassium iodide conductometrically.
7. To determine the total cation concentration in natural water.
8. To estimate the amount of $Na^{+}$ ion in a given sample using ionisation resin column.
9. Potentiometric estimation of Mohr salt solution with standard potassium dichromate solution and also determination of formal potential (reduction) of ferric-ferrous system.
10. Determination of activity solubility product of silver chloride by emf measurement

**Book recommended**


1. Physical Chemistry Practical by Saroj Kr Maity and Naba Kr Ghosh
2. Experimental Physical Chemistry by R.C. Das and B. Behera
3. Text book of Quantitative Inorganic Analysis by A.I. Vogel,ELBS(1978)
4. Experimental Physical chemistry by J B Yadav, Goel Pub. House,(1981)
5. Senior Practical Physical Chemistry by B. C. Kosla, Simla Printers New Delhi (1987).
6. Experimental Physical Chemistry by Daniel et al., McGraw Hill, New York (1962).
7. Practical Physical Chemistry by A.M James and P. E. Pritchard, Longman's Group Ltd (1968)

## SEMESTER-I

## PAPER-CC-101

## BIOPHYSICS, BIOMOLECULES AND BIOCHEMISTRY

Time: 3 Hours

Full Marks: 100 (20 + 80)

### UNIT – I: BIOPHYSICS

Intermolecular forces: Dipoles, dielectric constants, Ionic bond, Hydrogen bonds & Vander Wall's force. Colloidal system, properties of colloids, Ultra-filtration, Emulsion, Suspension &Adsorption. Structure and Ionization of water, Acid and bases. Relationship of pH and pK in a Buffer system.

### UNIT – II: BIOMOLECULES

Structure of amino acids and proteins (primary, secondary, tertiary and quaternary structures) Domain structure of protein,Ramachandran plot.
Nature, Properties and Classification of Enzymes and Co-enzymes. Mechanism of Enzyme action. Kinetics, Regulation of enzyme activity: Constitutive and regulatory enzymes.
Membrane Composition, Membrane transport, Diffusion, Active transport.

### UNIT - III: BIOCHEMISTRY

Gluconeogenesis, Hexose Monophosphate shunt.
Fatty acid biosynthesis, General reactions of amino acid metabolism.
Structure of polysaccharides, structure and significance of glycolipids, glycoproteins and peptido-glycans. An outline classification of lipids.

### UNIT - IV: THERMODYNAMICS

Laws of Thermodynamics in relation to living organisms. Concept of steady state. Gibb's Free energy, enthalpy, entropy and energy changes.
Electron transport in mitochondria and chloroplast. Oxidative phosphorylation & Photo-phosphorylation, proton pump. ATP Synthesis, Chemi-osmotic mechanism (Mitchell's hypothesis, ATPase & Fo-$F_1$ –The tiniest Motor concept)

## SEMESTER-I
## PAPER-CC-102
## CELL BIOLOGY AND MICROBIOLOGY

Time: 3 Hours Full Marks: 100 (20 + 80)

### UNIT – I: CELL BIOLOGY

Ultra structure of Cell, Structure and function of Mitochondria, Chloroplast, ER, Golgi body, Centrosome and Lysosome.
Molecular organization, structure, functions of ribosomes.
Cell – Cell interaction, adhesion, Cell signaling.
Cytoskeleton: Micro tubule, Micro filaments, Intermediate filaments.

### UNIT – II: CELL CYCLE

Mitosis, meiosis, DNA synthesis in Cell cycle,
Cell surface receptors G-protein coupled receptors.
Signal transduction pathway.
Secondary messengers.
Regulation of signaling pathway.

### UNIT – III: MICROBIOLOGY

Virus: Status, nature and classification, Reproduction in Virus: lysogenic and lytic cycle.
Bacteria– Molecular organization, growth, nutrition, and reproduction in bacteria, Genetic Recombination: transformation, Conjugation & transduction.
Bacteriophage Genome, genetic recombination in other phages.

### UNIT – IV: MICROBES IN INDUSTRY

A brief outline survey of other Microbes such as Protozoa, Mycoplasma, Slime molds, Actinomycetes, Yeasts and Cynobacteria and their use in industry (fermentation, alcohol, antibiotics, vitamins, food production, organic acids, enzymes, steroid transformation, food preservation) and agriculture.

**SEMESTER-I**

**PAPER- CC-103**

**GENETICS AND EVOLUTION**

Time: 3 Hours Full Marks: 100 (20 + 80)

UNIT – I: **GENETICS**

Mendelism; Probability and pedigree analysis; Incomplete dominance and Co-dominance; Multiple alleles, lethal genes, Epistasis, Pleiotropy.
Recessive and Dominant traits, Penetrance and Expressivity, Polygenic inheritance;
Numericals;Neo-Mendelism
Linkage, Crossing over and Recombination.

**UNIT-II: CYTOGENETICS**

Structural chromosomal aberrations; Duplication, deletion, inversion, and translocation.
Numerical chromosomal aberration; Aneuploids (trisomics and monosomics)
Euploids(autopolyploids and allopolyploids) role of polyploids in speciation with reference to Triticum, Brassica.

**UNIT – III: EXTRA CHROMOSOMAL INHERITANCE;**

Chloroplast mutation: Variegation in Four-o'clock plant;
Mitochondrial mutations in yeast;maternal effects-shellcoiling in snail;
Infective heredity- Kappa particles in *Paramecium.*

**UNIT –IV:EVOLUTION AND POPULATION GENETICS**

Fossils, Fossilisation and dating of fossils and some Indian fossils.
Patterns of evolution – Sequential evolution, convergent and Divergent evolution, Micro, Macro and Mega evolution.
Theory of Natural selection;
Molecular evolution, Synthetic theory of evolution.
Continental drift and Species distribution, Speciation.
Principles of population genetics and Hardy-Weinberg's Law.

## SEMESTER-I
## PAPER-CC-104 (PRACTICAL)
## CELL BIOLOGY AND MICROBIOLOGY

Time : 6 Hours

**Full Marks: 100**

### CELL BIOLOGY

Study of stages of mitosis and meiosis by squashing technique
Karyotype Analysis
Micrometry and measurement of Cell size

### MICROBIOLOGY

Sterilization of glass ware
Preparation of culture media (LB)
Gram stain of bacteria
Streak plate culture of bacteria

## SEMESTER-I
## PAPER- CC-105 (PRACTICAL)
## (GENETICS AND EVOLUTION)

Time: 6 Hours

**Full Marks: 100**

### GENETICS

**Three point test cross**
**Study of Gene interaction (Concept Map and Problems)**
**Epistatic gene interactions (Complementory, Supplementary and Dominant-Recessive)**
**(9:7; 9:3:4, 9:7 & 15:1- To be elucidated and confirmed with help of coloured seeds)**

### EVOLUTION

Model/Photographs/Slides of Fossils and Missing Links
Study of Evolutionary Trends of selected species

**SEMESTER-II**

**PAPER- CC-201**

ECOLOGY AND BIOSTATISTICS

Time: 3 Hours

Full Marks: 100 (20 + 80)

**UNIT – I ECOLOGY:**

Concept of Ecosystem (Emergent Properties, Biological levels of Organization, Structure, Classification of Ecosystems, Ecological energetics, Gaia hypothesis and Cybernetics).

Leibig's Law of Minimum and concept of limiting factors, Law of Tolerance.

**UNIT – II POPULATION ECOLOGY:**

Population characteristics, structure and dynamics.

Community Structure, Community dynamics, Ecological niche.

**UNIT – III ENVIRONMENTAL CONCERNS:**

Environmental Pollution: sources & control (Air Pollution, Water Pollution, Land Pollution, Noise pollution)

Green house effect, Ozone depletion, Global warming, climate change, Waste Management & Bioremediation,

Environmental Management and Auditing, EIA, Environmental Education and awareness.

Biodiversity: Types/Levels, Conservation strategies.

**UNIT – IV BIOSTATISTICS:**

Probability distribution (Normal, Binomial & Poisson).

Students 't' test

Analysis of variance ratio test (Two-way & Three-way).

Correlation and Regression analysis.

Goodness of fit and association analysis by chi-square test.

## SEMESTER-II

## PAPER- CC-202

(MOLECULAR BIOLOGY, BIOTECHNIQUES)

Time: 2 Hours

Full Marks: 100 (20 + 80)

**UNIT - I: MOLECULAR BIOLOGY-I**

Nucleic acids: Components of DNA & RNA, Molecular models of DNA, Types of DNA, Types, Structure and functions of RNA.

Replication of dsDNA; [Prokaroytic: Rolling Circle and Θ model and Eukaryotic]

Transcription and Reverse transcription

Gene as recon, muton and cistron, split gene, jumping gene, and over-lapping gene concepts.

History, elucidation and properties of Genetic Code

Regulation of gene expression; Operon Concept, Negative and Positive regulations

**UNIT – II: MOLECULAR BIOLOGY-II**

Constitution of Eukaryotic genome, C-Value paradox, sequence components i.e., repetitive and non repetitive DNA sequence.

In vitro synthesis of DNA.

Methods of DNA hybridization and its application.

Sequencing of nucleic acids and proteins.

**UNIT – III: BIOTECHNIQUES-I**

Microscopy –Principles and types : Phase contrast Microscopy, Electron & Scanning Electron Microscopy and Fluorescence Microscopy.

Chromatography –Principles and types of Chromatography (Paper, Thin layer and Gas)

**UNIT-IV: BIOTECHNIQUES-II**

Centrifugation–General Principles and types of centrifugation

Spectrophotometry– Principle & Instrumentation for colorimetry, Spectrophotometry

Electrophoresis–Principles and types (Paper, SDS-PAGE, immuno electrophoresis).

## SEMESTER-II
## PAPER-CC-203
## BIOTECHNOLOGY

Time: 3 Hours **Full Marks: 100 (20 + 80)**

### UNIT - I: BIOTECHNOLOGY: CONCEPT AND HISTORY

Biotechnology: Old and Modern concepts, Interdisciplinary nature, Public perception of Biotechnology, Biotechnology and the Developing world.

Basic Tools of new Biotechnology:

1) Enzymes; Restriction enzymes; types and functions,
2) Extraction, Isolation and purification of RNA and genomic, organellar and plasmid DNA,
3) Amplification of DNA; PCR and Blotting techniques (Southern, Northern, Western, Dot and Slot)

### UNIT - II: BIOTECHNOLOGY: TISSUE CULTURE

Plant micro and macro nutrients, vitamions and PGR (plant growth regulators)

Media for plant tissue culture.

Cell, tissue, organ, protoplast culture techniques.

### UNIT – III: CLONING VECTORS AND STRATEGIES

Cloning Vectors: Types. Plasmid. Cosmid. Phagmid.

Vector construction – $P_{BR}$ 322, Model Cloning experiments:

cDNA synthesis, Molecular Probes,

Recombinant DNA (Genetic Engineering) technology

Gene transfer technologies: Direct and Agro-bacterium mediated.

### UNIT – IV: APPLICATION OF BIOTECHNOLGY

Fermentation; Bioreactors, Antibiotics and enzyme technology

Hybridoma technology- Monoclonal antibodies.

Transgenic Plants and Animals

Forensic applications: DNA finger printing

Waste water and Sewage treatment, Bioremediation

Bio-safety, Bioethics

## SEMESTER-II
## PAPER-CC-204 (PRACTICAL)
## (ECOLOGY AND BIOSTATISTICS)

Time: 6 Hours

**Full Marks: 100**

**ECOLOGY:**

1. Species - Area curve
2. Frequency, Density and Abundance - Community study
3. Ecological anatomy (Selected Hydropytes and xerophytes; models/photographs of selected plant species)

**BIOSTATISTICS:**

1. Central Tendency - Measurement of mean, mode& median.
2. Measurement of dispersion
3. Students t-test
4. $Chi^2$ test

## SEMESTER-II
## PAPER-CC205 (PRACTICAL)
## BIOTECHNIQUES,MOL. BIOLOGY & BIOTECHNOLOGY

Time: 6 Hours

**Full Marks: 100**

**INSTRUMENTAL TECHNIQUES:**

1. Spectrocolorimeter/Photo meter - Instrumentation and working principle
2. Centrifugation - Instrumentation and working principle
3. $pH$ Meter - Instrumentation and working principle

**MOL. BIOLOGY & BIOTECHNOLOGY :**

1. Extraction and estimation of DNA & RNA
2. Estimation of protien content
3. Agarose Gel electrophoresis
4. Chromatography (Paper/TLC)

## SEMESTER-III

## PAPER-CC-301 (PLANT SCIENCES)

## PLANT MORPHOLOGY AND TAXONOMY

Time: 3 Hours Full Marks: 100 (20 + 80)

### UNIT – I: SALIENT FEATURES OF THALLOPHYTES

An outline classification of cryptogams up to order. Algae-Range of thallus structure and reproduction in Cyanophyta, Chlorophyta, Phaeophyta and Rhodophyta.

Fungi: Organisation of thallus structure and reproduction. Economic importance of Phycomycetes, Ascomycetes and Basidiomycetes.Degeneration of sexuality in Fungi.

Bryophytes - Evolution of gametophyte and sporophyte in Marchantiales. Evolution of sex organs in Bryophyta. Degeneration of Sporogenous tissues in Bryophyta.

### UNIT – II: SALIENT FEATURES OF PTERIDOPHYTES

Pteridophyta-Origin of land plants, evolution of vascular tissues, Origin of Heterospory and its significance. Fillicales as the most advanced group of Pteridophyta.

### UNIT – III: SALIENT FEATURES OF GYMNOSPERMS

Gymnosperms - Origin and outline classification upto order and Characteristic features, Cycadofillicales as intermediate group between Bryophytes and Pteridophytes, Cycadalas as relic of ancient Gymnosperms, Phylogenetic position of Ginkgoales. Angiospermic characters of Gnetales. Palaeobotany-Geological era, process of fossilization. Fossil Gymnosperms of India.

### UNIT – IV:SALIENT FEATURES AND TAXONOMY OF ANGIOSPERMS

Angiosperms - Origin and evolution of angiosperms. Different systems of classification upto order. International code of Nomenclature (ICN). Range of floral structure, affinities and phylogeny of Monocot and Dicots with special reference to Glumiflorae, Liliflorae, Scitaminae, Microspermae, Rannales, Malvales, Tubiflorae and Umbelliferae.

## SEMESTER-III
## PAPER-CC-302 (PLANT SCIENCES)
## PLANT PHYSIOLOGY

Time: 3 Hours

Full Marks: 100 (20 + 80)

### UNIT - I: WATER RELATIONS

Water relations in plants: Concepts of water and solute potential;
Principles of Absorption of water, Ascent of sap
Transpiration: Stomatal movement mechanism, Mineral nutrition; Essential elements, hydroponics, aeroponics, absorption of elements, passive and active transport, Role of essential elements and deficiency symptoms
Translocation of organic materials in phloem

### UNIT – II: SIGNAL TRANSDUCTION & SENSORS

Phytochromes and their Photo and Biochemical properties
Photophysiology of light induced responses
Signal transduction: overview, receptors
Mechanism, Sensor & regulatory systems

### UNIT - III: PHOTOSYNTHESIS

Photosynthesis- Principles of light absorption in chloroplast, Organisation of light absorbing systems, mechanism of electron flow,
$C_3$, $C_4$ and CAM pathway for carbon reduction
Photorespiration.

### UNIT-IV: STRESS PHYSIOLOGY

Plant response and mechanism to biotic and abiotic stress.
Water deficit and drought resistance
Salinity stress, metal toxicity, freezing and heat stress
Oxidative stress (ROS), antioxidants, antioxidant enzymes; catalase, peroxidase, super oxide dismutase, glutathione transferase and reductase.

**SEMESTER-III**
**PAPER-CC-303 (PLANT SCIENCES)**
**PLANT METABOLISM**

Time: 3 Hours

Full Marks: 100 (20 + 80)

**UNIT - I: LIPID METABOLISM**

Lipid metabolism: fatty acid biosynthesis, catabolism of lipids.
Oxidation of fatty acids.
Sulphur metabolism; uptake, transports & assimilation.

**UNIT – II: NITROGEN METABOLISM:**

Nitrogen metabolism - Bio-chemical metabolism of Nitrogen fixation in free living and Symbiotic associations, nitrogen cycle.
Mycorhiza; Endo & Ectomycorhyzal association.

**UNIT - III: RESPIRATION:**

Respiration - Aerobic and Anaerobic respiration, Respiratory quotient,
Energetics of respiration; Electron Transport System, Action un-couplers, Cyanide resistant pathway, HMP pathway.

**UNIT - IV: BIOMOLECULE METABOLISM:**

Biosynthesis of starch and sucrose, Synthesis of cell wall polysaccharides
Protein biosynthesis: components/factors of protein synthesis

## SEMESTER-III
## PAPER-PS-CC-304 (PRACTICAL)
## (PLANT MORPHOLOGY, TAXONOMY)

Time :6 Hours

**Full Marks: 100**

**MORPHOLOGY**

1. Some Algal mixture separation.
2. Study and identification of some important Fungi.
3. Anatomical studies of Bryophyta
4. Anatomical studies of pterodophyta
5. Anatomical studies of Gymnosperm

[Slides/material /W.M. Stages of life cycle of species from item 1 to 5 above]

**TAXONOMY**

Floral characters & Identification of families :

1. Graminae, Cyperaceae, Ranunculaceae.
2. Umbelliferae, Malvaceae, Apocynaceae

## SEMESTER-III
## PAPER-PS-CC-305 (PRACTICAL)
## (PLANT PHYSIOLOGY & METABOLISM)

Time : 6 Hours

**Full Marks: 100**

**PHYSIOLOGY:**

1. Osmotic potential - calculation using potato tuber & Rhoeo-discolor leaf.
2. Estimation of chlorophyll pigment in various leaf samples
3. Comparision of chlorophll and carotenoid content.
4. Stomatal Index / Stomatal frequency.

**METABOLISM**

Measuring Rate of Photosynthesis under different conditions by Wilmutt's Bubbler

1. Under different wavelengths of light (Blue, Red and Green)
2. Different concentrations of $CO_2$
3. Different Temperature
4. R.Q and ATP energy balance sheet; (only problems)

## SEMESTER-III
## PAPER-CC301 (ANIMAL SCIENCE)
## BIOLOGY OF NON-CHORDATA

Time: 3 Hours | Full Marks: 100 (20 + 80)

**Unit – I: Nonchordata**

1. Locomotion in protozoa.
2. Reproduction in protozoa.
3. Parasitism in protozoa.
4. Reproduction in Porifera.
5. Polymorphism in Coelentrata.
6. Structure and affinities of Ctenophora.
7. Structure and affinities of Archiannelida.

**Unit – II :Nonchordata**

1. Helminth Parasites with special reference to man.
2. Metamerism in Annelida.
3. Vision in insects.
4. Larval forms in crustacea.
5. Respiration in Arthropoda.
6. Structure and affinities of peripetus.
7. Respiration in Mollusca.

**Unit – III :Nonchordata**

1. Larval forms in Echinodermata.
2. Water vascular system in Echinodermata.
3. Structure and affinities of Hemichordata.
4. Structure and affinities of Lobophorates.
5. Structure and affinities of brochiopods.
6. Structure and affinities of Gastrotricha.

**Unit – IV : Economic Zoology**

1. Apiculture
2. Sericulture
3. Lac culture
4. Pearl culture

## SEMESTER-III
## PAPER-CC302 (ANIMAL SCIENCE)
## BIOLOGY OF CHORDATA

Time: 3 Hours

Full Marks: 100 (20 + 80)

**Unit – I:**

1. Origin of Chordata.
2. Inter relationship of Cephalochordata and Urochordata.
3. Structure and affinities of Cyclostomata.
4. Distribution, structure and affinity of Dipnoi.
5. Origin of Tetrapoda.

**Unit – II:**

1. Structure & General account of Gymnophiona
2. Parental care in fishes
3. Parental care in amphibia
4. Structure & affinities of sphenodon

**Unit – III:**

1. Flight adaptations and perching mechanism in birds.
2. Dentition in mammals.
3. Comparative anatomy of Integument and Jaw-suspensorium in Vertebrates

**Unit – IV:**

1. Mammal like reptiles
2. General account of prototheria
3. General account of metatheria
4. Adaptive radiation in mammals.

## SEMESTER-III
## PAPER-CC-303 (ANIMAL SCIENCE)
## ETHOLOGY AND DEVELOPMENT BIOLOGY

Time: 3 Hours | Full Marks: 100 (20 + 80)

### Unit – I: ETHOLOGY

1. Instinct, Learning, types of learning, Neural mechanism of learning and learning in Vertebrates.
2. Biochemical approach to problem of memory.
3. Orientation and navigation in animals.
4. Migration behaviour in fishes and birds.
5. Reproductive behaviour in vertebrates (Courtship and Mating).
6. Biological clocks.
7. Social behaviour in insects and primates.

### Unit – II: DEVELOPMENTAL BIOLGOY

1. Molecular events during fertilization.
2. Cleavage.
3. Morphogenic movements and mechanism of gastrulation.
4. Differentiation and differential gene activity.
5. Concept of organizer and embryonic induction.
6. Regeneration.

### Unit – III: DEVELOPMENTAL BIOLGOY

1. Foetal membranes and their development..
2. Placentation
3. Development of notochord and Heart in chick.
4. Oestrous and Menustrual cycle
5. Birth control

### Unit – IV: DEVELOPMENTAL BIOLGOY

1. Totipotency and tissue culture in animals.
2. Apoptosis: Mechanism of PCD, genetic control.
3. Cytological & Morphological abnormalities of cancer cell.
4. Infertility and Artificial insemination.
5. Invitro fertilisation

## SEMESTER-III
## PAPER-CC-304 (PRACTICAL-AS)
## (NON-CHORDATA & CHORDATA)

Time: 6 Hours

**Full Marks: 100**

**Non-Chordata:**

1. Nervous system of Pila
2. Nervous system of Sepia
3. Nervous system of Prawn

**Chordata:**

1. Arterial system of Calotes
2. Venous system of Calotes
3. Brain of Toad

## SEMESTER-III
## PAPER-CC-305 (PRACTICAL-AS)
## (DEVELOPMENT BIOLOGYAND ANIMAL PHYSIOLOGY)

Time: 6 Hours

**Full Marks: 100**

**Development Biology:**

1. Study of Blastula, gastrula of Frog
2. Tadpole larva of Frog
3. Study of 18hrs, 20hrs, 24hrs, 33hrs, 36hrs, 42hrs, and 48hrschickembryo

**Animal Physiology:**

1. Test for carbohydrate
2. Test for Protein
3. Test for Fat
4. Action of salivary amylase on starch

**SEMESTER-IV**

**PAPER-CC401 (PLANT SCIENCE)**

**(PLANT ANATOMY AND DEVELOPMENTAL BOTANY)**

Time: 3 Hours Full Marks: 100 (20 + 80)

**UNIT – I: SECONDARY GROWTH**

Secondary growth in Monoct and Dicot plants, Adaptive and Non-adaptive anomalous secondary growth in Monocts and Dicot (Stem & Roots); principles of arrangement of mechanical tissues.

**UNIT – II:PHYTOGEOGRAPHY**

Phyto-Geographical distribution of plants, isolation and isolating mechanisms, sympatric and allopathic populations.

**UNIT – III: DEVELOPMENTAL BIOLOGY**

Micro-sporogenesis, Mega-sporogenesis, types of Embryo Sacs,Fertilisation; Concept of Double Fertilisation& Triple Fusion; Endosporm, Types and development, Apomixis, Development of Dicot and Monocot embryos.Polyembryony,

**UNIT – IV: GROWTH REGULATORS**

Seed Germination, physiology of flowering photoperiodism, Senescene, Regulation of plant growth and Development – phytohormones, molecular mechanism of responses of plants to Auxins, Gibberellins, Cytokinins, ABA and Ethylene.

## SEMESTER-IV
## PAPER-CC-402 (PLANT SCIENCES) PRACTICAL
## (PLANT ANATOMY, DEVELOPMENTAL BOTANY)

Time: 6 Hours

**Full Marks: 100**

### PLANT ANATOMY

1. Study abnormal secondary growth in-adaptive and Non-adaptive type Dicot Stem& Root (Slides)
2. Microscopic Preparations for the above groups
3. Study of abnormal secondary growth in-adaptive and non-adaptive types in Monocot stem and roots
4. Microscopic Preparations for the above groups

### DEVELOPMENTAL BOTANY

1. Embryological slides
2. Anatomy of Anther of different stages of microsporegensis
3. Pollen germination by hanging drop method
4. Pollen wall morphology

## SEMESTER-IV

## PAPER-CC-401 (ANIMAL SCIENCE)

## (ANIMAL PHYSIOLOGY, IMMUNOLOGY AND TAXONAMY)

Time: 3 Hours Full Marks: 100 (20 + 80)

**Unit – I: Animal Physiology**

1. Digestion and absorption of food.
2. Cardiac cycle and its regulation.
3. Breathing and gaseous exchange; Transportation of gases.
4. Muscle contraction.
5. Mechanism of Nerve impulse conduction, synaptic transmission.
6. Physiology of excretion.

**Unit – II : Immunology**

1. Types of Immunity: Innate, acquired, passive, active, Humeral and Cell mediated immunity, specificity and memory
2. Lymphoid Organs: Origin, development and function
3. Immunoglobulins: Structure, distribution and function
4. Major Histocompatibility Complexes and their role in Antigen-Antibody recognition
5. Some common Human Immune-deficiency diseases

**Unit – III : Taxonomy**

1. History of Taxonomy.
2. Principles of classification and procedures in Taxonomy.
3. Species concept.
4. Concepts of chemotaxonomy, cytotaxonomy and Numerical Taxonomy.

**Unit – IV : Taxonomy**

1. Preservation and Identification of animals.
2. Ecology and physiology in taxonomy.
3. General Classification of Animal Kingdom.
4. Zoological nomenclature and its rules.

## SEMESTER-IV
## PAPER-CC-402 (ANIMAL SCIENCE) PRACTICAL
## (ANIMAL PHYSIOLOGY IMMUNOLOGY AND TAXONOMY)

Time: 6 Hours

**Full Marks: 100**

**Animal Physiology**

1. Estimation of Hb%
2. RBC count of man/any vertebrate
3. WBC count of man
4. Preparation of Haemin crystals
5. Determination of blood type (Blood group)
6. Caesin content of milk
7. $O_2$ uptake by insect.
8. Determination of Haematocrit value of blood.

**Immunology and Taxonomy**

1. Blood grouping by Immunotechniques.
2. Percepitin test
3. Single immune diffusion test
4. Taxonomical features & phylogenetic study of some selected species.

**SEMESTER-IV**
**(SPECIAL PAPER)**
**PAPER-CC-403**
**(A) ENVIRONMENTAL BIOLOGY**

Time: 3 Hours Full Marks: 100 (20 + 80)

**Unit – I: ENVIRONMENTAL POLLUTION**

1. Water, air and soil pollution ( causes ,effects and control)
2. Pollution – Oil Pollution and pollution due to agricultural activity and Eutrophication.
3. Pollution in Indian Rivers.
4. Ionising radiation, Types and sources of Ionising radiation in environment, effects and radiation standards

**UNIT – II: ECOLOGICAL PRODUCTIVITY**

1. Primary Production and methods of measurement.
2. Secondary Production and Yield to man.
3. Ecological efficiencies and production in different regions of the world.

**UNIT – III: CONSERVATION ECOLOGY**

1. Natural habitat conservation in Orissa with special reference to Chilika, BhitarKanika, Similipal, Mahendragiri.
2. Afforestrations and forest management.
3. Wild life conservation.
4. Soil conservation.

**UNIT – IV: ENVIRONMENTAL MANAGEMENT**

1. Environmental monitoring and management.
2. Environment protection laws.
3. Environmental education and awareness.
4. Biological control of pests.
5. Sewage and solid waste management.
6. Treatment of effluents in distilleries and paper and pulp industries.

**SEMESTER-IV**
**(SPECIAL PAPER)**
**PAPER-CC-403**
**(B) BIOTECHNOLOGY**

Time: 3 Hours

Full Marks: 100 (20 + 80)

**UNIT – I : PRINCIPLES AND TOOLS BIOTECHNOLOGY:**

Genetics, Molecular Biology and Modern Biotechnology-an interdisciplinary study, Techniques and tools: Restriction enzymes: Types and functions, Cloning Vectors for recombinant DNA (Plasmids, Phages, Cosmids),gene Library (BAC,YAC and MAC), Gene Cloning: Strategies , cloning in bacteria and eukaryotes; Basic PCR, anchored PCR and asymmetric PCR; DNA Polymorphism (RAPD, RFLP, AFLP, SSR), isolation of genes; sequencing of gene or a DNA segment: Maxim & Gilbert's, Sanger's method; gene synthesis mechanism, General Idea about OMICs (Genomics, Transcriptomics, Proteomics and Metabolomics)

**UNIT – II: APPLIED BIOTECHNOLOGY:**

Scope of animal cell culture, advantages and disadvantages, the gas phase for tissue culture, culture media for animal cells and tissues, culture procedures, maintenance of cultures - cell lines; cloning of cell lines; Gene transfection; targeted gene transfer; transgenic animals; Stem Cells: Culture and applications
Culture media and plant cell culture : Culture media and their constituents (MS, B5 and White's media, cell culture, propogation; soma clonal variation, production of haploids: anther culture, ovule culture, protoplasts isolation protoplast culture.

**UNIT – III: INDUSTIRAL BIOTECHNOLOGY:**
Engineering of macro molecules-basic outline of protein engineering, drug designing, Isolation and culturing of micro-organisms; production of organic compounds by microbial fermentation: Bioreactors

**UNIT – IV: ENVIRONMENTAL BIOTECHNOLOGY:**
Biotechnology in paper industry, pollution Control: Cleaner technologies, reducing environmental impact of industrial effluents, biosensors; Renewable sources of energy, Green energy and Bio-fuel, use of biotech tools for biodiversity conservation.

**SEMESTER-IV**
**(SPECIAL PAPER)**
**PAPER-CC-403**
**(C) BIOCHEMISTRY: MACROMOLECULAR STRUCTURE AND METABOLISM**

Time: 3 Hours Full Marks: 100 (20 + 80)

**Unit – I:**

Physical properties, chemical structure, isolation and purification of proteins, molecular and biological heterogeneity of proteins, (with special reference to hormones and iso-enzymes, structural collagen) and contractlle protein.Classification and intracellular distribution of enzyme & proteins, metabolism of individual essential aminoacids.

The mechanism of enzymatic analysis catalyzed reaction and the plausible models for reaction mechanism, substrate and product inhibition of enzyme action feedback modulation of the activity of kinetics of action. Regulation of enzyme synthesis in microbial organisation and critical estimation of the regular operon model control enzyme synthesis in higher organisms.

**Unit – II**

Chemical structure and biological significance of polysaccharides. starch, glycogen, inulin, dextrin, cellulose,hemicellulose, lignin, mucopolysaccharides and glycoprotins)

A general account of plant alkaloids and pigments, photosynthetic pigments anthocyanins and anthoxanthine biosynthesis and metabolism of auxins in plant structure) and classification of vitamins and hormones in animals and their roles in metabolism.

**Unit –III :**

path of carbon in photosynthesis, glyocogen metabolism, glyoxalic shunt, uronic acid pathway, gluconeogenisis, fixation of carbon dioxide (in darkness) in plants, photorespiration in plants. Chemical structure and biological signigications for phospholipids & glycolipids, lipoprotein and steroid metabolism (biosynthesis and degradation of phospolipids, sphingolipids and cholesterol).

The concept of free energy, high energy bonds and the key position of ATP, phosphorylation, mitochondria as a biological transducer mechanism of electron transport and oxidative phosphorylation; evolution of energy transforming mechanism, energy transduction in cell, characteristic features and types of transducer role of ATP in active transport

**Unit – IV:**

Thermodynamic equilibrium and metabolic control regulation of glycolysis and TCA cycle, basterut and krahtress effects, regulation of glycogen metabolism control of lipid metabolism in a cell and in the body (animal) regulation of nucleic acid merabolism inborn errors of metabolism, antibody and interferon, their synthesis. Molecular mechanism of hormone action with reference to epinephrine, insulin, thyroxine and plant auxins, biochemistry of senescence.

**SEMESTER-IV**
**PAPER-CC-404**
**(PRACTICAL)**

Time: 6 Hours Full Marks: 100

**BIOTECHNOLOGY**

**SEMESTER-IV**
**PAPER-CC-405**
**(SEMINAR PRESENTATION AND PROJECT REPORT)**

**Full Marks: 100**

**A) SEMINAR PRESENTATION** (15 MIN) (40)

1. Students are required to participate in weekly seminar activities and present papers under guidance of a teacher.
2. The best presentation of each student will be evaluated by an external examiner on the date of exam.
3. Marks will be awarded on the basis of total performance in the whole semester by both External and Internal examiner.

**B) PROJECT REPORT / FIELD STUDY REPORT** (60)

1. Each student is required to take up a small research project under the guidance of a teacher, to be completed within a period of 4 weeks and the report be submitted at the timeof examination.

Or

The student prepare a scientific review of any current topic in biotechnology/ molecular biology/Environmental issues. under the guidance of a teacher and the report be submitted for evaluation.

Or

The student prepare a field study report on distribution of plants/ animal or vegetation of floristic aspects of a locality visited and report be submitted for evaluation.

- Foam – Takes 50 years to degrade.
- Styrofoam – Takes 80 years to degrade.
- Aluminum – Takes 200 years to degrade.
- Plastic packaging – Takes 400 years to degrade.
- Glass – It takes so long to degrade that we don't know the exact time.

# DANGERS (HEALTH)

Virtually all types of water pollution are harmful to the health of humans and animals. Water pollution may not damage our health immediately but can be harmful after long term exposure. Different forms of pollutants affect the health of animals in different ways:

- Heavy metals from industrial processes can accumulate in nearby lakes and rivers. These are toxic to marine life such as fish and shellfish, and subsequently to the humans who eat them. Heavy metals can slow development; result in birth defects and some are carcinogenic.
- Industrial waste often contains many toxic compounds that damage the health of aquatic animals and those who eat them. Some of the toxins in industrial waste may only have a mild effect whereas other can be fatal. They can cause immune suppression, reproductive failure or acute poisoning.
- Microbial pollutants from sewage often result in infectious diseases that infect aquatic life and terrestrial life through drinking water. Microbial water pollution is a major problem in the developing world, with diseases such as cholera and typhoid fever being the primary cause of infant mortality.
- Organic matter and nutrients causes an increase in aerobic algae and depletes oxygen from the water column. This causes the suffocation of fish and other aquatic organisms.
- Sulfate particles from acid rain can cause harm the health of marine life in the rivers and lakes it contaminates, and can result in mortality.
- Suspended particles in freshwater reduces the quality of drinking water for humans and the aquatic environment for marine life. Suspended particles can often reduce the amount of sunlight penetrating the water, disrupting the growth of photosynthetic plants and micro-organisms

# Detailed Syllabus

## First Semester

### Paper – CC 101

### Partial Differential Equations and its Applications marks(100=80+20)

| | |
|---|---|
| Unit 1 | Basic Concepts and Classifications of Second Order equation. |
| Unit 2 | The Cauchy Problem, The Method of Separation of Variables |
| Unit 3 | Eigenvalue Problems, Boundary Value Problems |
| Unit 4 | Fourier Transforms and Laplace Transforms |

**Books Prescribed:**

Linear Partial Differential Equations for Scientists and Engineers. Tyn Myint, U & Lokenath Debnath (Birkhauser Pub) 4th Edition. Chapters: 1(1.2-1.6) , 4, 5(5.1-5.7), 7,8,9,12(12.1-12.6, 12.8-12.11).

### Paper – CC 102

### Topology marks (100=80+20)

| | |
|---|---|
| Unit 1 | Open Sets and Limit Points, Closed Sets and Closure, Bases and relative topologies |
| Unit 2 | Connected Sets and Components, Compact and Countably Compact spaces, Continuous functions, Homeomorphism |
| Unit 3 | $T_0$and $T_1$ Spaces and sequences, Axioms of countability, $T_2$ Spaces , Regular and Normal Spaces, Completely Regular Spaces |
| Unit 4 | Urysohn's Metrization Theorem, Finite products, product invariant properties, metric products, product topology. |

**Books Prescribed:**

W.J Pervin, Foundations of General Topology, Academic press. Chapters: 3(3.1,3.2 and 3.4), 4( 4.1 to 4.4), 5(5.1 to 5.3, 5.5 to 5.6), 8 ( 8.1 to 8.4) , 10(10.1 only)

### Paper – CC 103

### Algebra- I marks (100=80+20)

| | |
|---|---|
| Unit 1 | Automorphisms, Cayley's Theorem, Permutation Groups, Another Counting Principle |
| Unit 2 | Sylow's Theorems, More Ideals and Quotient Rings, The Field of Quotients of an integral domain. Euclidean Rings. A Particular Euclidean Ring. |
| Unit 3 | Polynomial Rings, Polynomial Rings over the Rational field, Elementary Basic Concepts of Vector Spaces, Linear independence and Bases |
| Unit 4 | Extension Fields, The transcendence of e, Roots of Polynomials, Construction with Straightedge and Compass, More about roots |

**Books Prescribed: Dummit Foote**

**Books reference:**

I.N. Herstein , Topics in Algebra. John Wiley and Sons, (2nd Edition) Chapters: 2(2.8 to 2.12), 3( 3.5 to 3.10) , 4 ( 4.1, 4.2) 5(5.1 to 5.5)

## Paper – CC 104

## ELEMENTARY COMPLEX ANALYSIS-1 marks (100=80+20)

| | |
|---|---|
| Unit 1 | Complex Numbers |
| Unit 2 | Complex Functions |
| Unit 3 | Conformality and linear transformations |
| Unit 4 | Complex Integration: Fundamental theorems, Cauchy's Integral formula, local properties of analytic functions, complex integration continued: general form of Cauchy's theorem. |

**Books Prescribed:** Brown and chorchill, complex variable and application.

Serge lang, complex analysis

Books for reference:-

Lars V. Ahifors, Complex Analysis, Third Edition, Mc Graw Hill ,Chapter 1,2,3(3.1-3.4) ,4 ( Sections 1,2,3 & 4).

## Paper – CC 105

## Numerical Analysis and its Applications marks (100=80+20)

| | |
|---|---|
| Unit 1 | Interpolation & Approximation : Introduction, Lagrange and Newton interpolation, Finite difference operators, Interpolating Polynomials using finite differences, Hermite Interpolation, Piecewise and Spline Interpolation |
| Unit 2 | Interpolation & Approximation Continued: Bivariate Interpolation, Approximation, Least Square Aprroximation, Uniform Approximation, Rational Approximation, Choice of Method |
| Unit 3 | Differentiation and Integration: Introduction, Numerical differentiation, Optimum Choice of step Length, Extrapolation Method, Partial Differentiation, Numerical integration, Methods based on interpolation, Methods based on undetermined coefficients, Composite Integration Methods , Romberg Integration, Double Integration. |
| Unit 4 | Ordinary Differential Equation, Initial Value Problem : Introduction, Difference Equation, Ordinary Differential Equations, Numerical Methods, Single step methods, Stability Analysis of single step methods, Multi Step methods. |

**Books Prescribed:** S.S .sastry

**Books reference**

M.K. Jain, S.R.K. Iyengar and R.K. Jain: Numerical Methods for Science and Engineering Computations

(Fourth Edition) Chapters: 4,5 & 6.

**SECOND SEMESTER**

## Paper – CC 201

## Abstract Measure, marks (100=80+20)

| | |
|---|---|
| Unit 1 | Introduction, Outer Measure, Measurable Sets and Lebesgue Measure, A non Measurable Set,. |
| Unit 2 | Lebesgue Measurable Functions |
| Unit 3 | The Lebesgue Integral |
| Unit 4 | Differentiation and Integration |

**Books Prescribed:G. Debarra, wiley Eastern,**

**Books reference**

Real Analysis : H.L.Royden 4th edition ( Macmillan) Chapter: 2,3,4,5,6.

## Paper – CC 202

## Advanced Complex Analysis, marks (100=80+20)

| | |
|---|---|
| Unit 1 | Complex Integration and Calculus of Residues |
| Unit 2 | Series and Product Development : Power Series Expansion , Partial Fraction and Factorisation |
| Unit 3 | Entire Function, Riemann Zeta Function |
| Unit 4 | Elliptic Functions: Simple Periodic Functions and Double Periodic functions, Elliptic Function, Weirstrass Theorem. |

**Books Prescribed: serge lang**

**Books reference:**

Lars V. Ahifors, Complex Analysis, Third Edition, Mc Graw Hill , Chapter: 4( Section 5), 5(Section 1 & 2), 6( Section 3&4) , 7( Section 1,2 &3).

## Paper – CC 203

## Algebra – II, marks (100=80+20)

| | |
|---|---|
| Unit 1 | Dual Spaces, Inner Product Spaces, The Elements of Galois Theory, Solvability of Radicals |
| Unit 2 | The Algebra of Linear Transformation, Characteristic Roots, Matrices |
| Unit 3 | Canonical Forms and Triangular Forms, Nilpotent Transformations, Jordan Forms. |
| Unit 4 | Trace and Transpose, Determinants, Hermitian, Unitary and Normal Transformation |

**Books Prescribed: Dummit Foote**

**Books reference:**

I.N. Herstein : Topics in Algebra, John Wiley and Sons( 2nd Edition) 2002, Chapters : 4(4.3 to 4.4), 5(5.6 to 5.8), 6 (6.1 to 6.10).

## Paper - CC 204

## Mathematical Statistics, marks(100=80+20)

| | |
|---|---|
| Unit 1 | Elements of theory of Probability: Classical definition of Probability, Theorem on union of events, Conditional Probability: Theorem of Compound Probability, Independence of events, The Bayes Theorem, Statistical and Empirical definition of Probability, Geometric Probability, Axiomatic definition of probability , Conditional Probability ( Axiomatic Definition) |
| Unit 2 | Probability distribution on R : Random Variables, Probability distribution of a R. V . , Discrete and continuous R. V. Independent Random Variables, Lebesgue-Stieltjes Integrals, Integration of a Random Variable. |
| Unit 3 | Some Characteristics of Probability Distribution: Expectation, Moments, Some inequalities Concerning Moments, Different Measures of central Tendency, Measures of Dispersion, Measures of Skewness and Kurtosis. Some probability Inequalities |
| Unit 4 | Generating Functions: Probability Generating Function, Moment Generating Function, Factorial Generating Function, Cummulant Generating Function, Characteristic Function, Some discrete Distributions on R, : Discrete Uniform Distribution, The Bernoulli Distribution, The Binomial Distribution, The Hypergeometric Distribution, The Poisson Distribution, The Geometric Distribution, The negative Binomial Distribution. The power series Distribution. |

**Books Prescribed:**

Parimal Mukhopadhyay, Mathematical Statistics, Chapter: 1,2,3,4& 5.

## Paper - CC 205

## C Programming Language (40 term end +10 midterm + 50 – practical)

| | |
|---|---|
| Unit 1 | Arrays, Character Arrays and strings |
| Unit 2 | User Defined function |
| Unit 3 | Structure and Unions |
| Unit 4 | Pointer, Dynamic Memory Allocation |

**Books Prescribed:**

Programming in ANSI-C , E.Balaguruswamy (3rd Edition), Tata Mac Graw Hill, Chapter : 7,8(8.1-8.5) ,9,10,11.

## THIRD SEMESTER

### PAPER-CC 301

### .Functional Analysis

| | |
|---|---|
| Unit 1 | Normed Spaces, continuity of Linear Maps |
| Unit 2 | Hahn- Banach Theorems, Banach Spaces |
| Unit 3 | Uniform Boundedness Principle, Closed Graph And Open Mapping Theorems, Bounded Inverse Theorem. |
| Unit 4 | Spectrum of Bounded Operator, Duals and Transposes. |

**Books Prescribed: Erwin Kreyzig**

**Books reference:**

Functional Analysis : B.V. Limayee , New Age Publishser, 2nd Edition, Chapter: 5,6,7( Except Banach Limits),8, 9 ( Except Divergence of Fourier Series of Continous Functions and Matrix Transformations and Summability Methods), 10, 11, 12( Upto Theorem 12.6) And 13( upto theorem 13.5).

### Paper – CC 302

### Number Theory

| | |
|---|---|
| Unit 1 | Congruences, solutions of Congruences, Congruences of degree I, the function phi, Congruences of higher degree, prime power moduli, prime modulus, Congruences of degree two, prime modulus, power residues |
| Unit 2 | Number theory from Algebraic viewpoint, multiplicative Groups, rings, and fields, Quadratic residues, Quadratic reciprocity, the Jacobi symbol. |
| Unit 3 | Greatest integer function, Arithmetic functions, the Moebius inversion formula, the Multiplication of Arithmetic functions, Recurrence functions. |
| Unit 4 | Diophantine equations, the equation, positive solution, other linear equations, the equations, sums of four and five squares, Warings problem, sum of fourth powers, sums of two squares, the equation binary quadratic forms, equivalence of quadratic Forms. |

**Books Prescribed:**

An introduction to the theory of numbers by Ivan Niven, Herbert S Zuckerman : Chapter 2, 3, 4,5.

### Paper – CE 303

### Ordinary Differential Equations

| | |
|---|---|
| Unit 1 | Basic Concepts and Linear Equations of the First order |
| Unit 2 | Linear Differential Equations of Higher Order |
| Unit 3 | System of Linear Differential Equations; Systems of First order equations, Existence, Linear System with periodic co-efficients, and Uniqueness Theorem. Fundamental Matrix Non Homogeneous Linear Systems, Systems of Linear Differential Equations, Linear Systems with Constant co-efficients. |
| Unit 4 | Equations with Deviating Arguments, Existence and Uniqueness of Solutions. |

**Books Prescribed: G.F.Simmone**

**Books reference**

Ordinary Differential Equations (2nd Edition), S.G. Deo, V. Lakshmikantam , V. Raghavendra, Tata MC Graw Hill Publishing, Chapters: 1,2 ( Except 2.10),4,5,11.

PAPER-CE 304

## OPTIMIZATION TECHNIQUES-1

| | |
|---|---|
| Unit 1 | Integer Programming: Gomory's Algorithm for pure integer linear programs, Gomory's mixed integer- continuous variable algorithm, Branch and Bound methods |
| Unit 2 | Kuhn- Tucker optimality conditions: some theorems , Kuhn Tucker first order necessary optimality conditions, Second Order optimality Condition. |
| Unit 3 | Convex Programming Problem, Sufficiency of Kuhn-Tucker Conditions, Lagranges Method |
| Unit 4 | Game Theory: Game Theory Problem, Two Person Zero sum Game, Finite Matrix game, Graphical Method for 2xN and Mx2 Matrix games. Some theorems, Dominance Principles. |

Books Prescribed: S.D.Sharma and Hira Gupta

Books reference

Mathematical Programming by N.S. Kambo. Chapters : 6 (6.4 to 6.6), 7 (7.1 and 7.4) , 8, 10.

## Paper - AE 305

## -INTEGRAL EQUATIONS

| | |
|---|---|
| Unit 1 | Classification, integral equations with separable kernels, method of successive approximations, resolvent kernel and its properties, classical Fredholm theory, symmetric kernels, Hilbert-Schmidt theory. |
| Unit 2 | Rayleigh-Ritz method, singular integral equation, Abel and Cauchy type and Hilbert kernel,<br>Integral transform methods (Laplace, Fourier and Hilbert). |
| Unit 3 | Application to Ordinary differential equations, Initial value problems and boundary value problems, Greens functions, Decomposition methods. |
| Unit 4 | Non linear Fredholm integral equations and Volterra integral equations, existence and uniqueness of solutions. |

Books references:


1. Ram P Kanval, Linear Integral Equations, Theory and Techniques.
2. Courant and Hilbert, Methods of Mathematical Physics, Vol.I
3. S.G.Mikhilin, Integral Equations.
4. I.G.Petrovsky, Lectures on the theory of integral equations.
5. K.Yoshida, Lectures of Differential and Integral Equations.

# Fourth Semester

## Paper - CC 401

## Graph Theory

| | |
|---|---|
| Unit 1 | Introduction to Graphs |
| Unit 2 | Trees and Connectivity |
| Unit 3 | Application of trees and connectivity |
| Unit 4 | Euler Tours and Hamiltonian Cycles, Planar Graphs |

**Books Prescribed: Diestel graph theory**

**Books reference**

John Clark and D.A.Holton A First Look at Graph Theory, World Scientific and Allied Publisher, Chapter: 1,2(2.1 to 2.6),3( 3.1 to 3.4), 5(5.1 to 5.3)

## Paper - CC 402

## Number Theoritic Cryptography - I

| | |
|---|---|
| Unit 1 | Time Estimates for Doing Arithmetic, Divisibility and Euclidean Algorithm, Congruences. Some Applications to factoring. |
| Unit 2 | Finite Fields, Quadratic residues and reciprocity. |
| Unit 3 | Some simple Cryptosystems, Enciphering Matrices. |
| Unit 4 | The idea of public key cryptography, RSA |

**Books Prescribed:**

Neal koblitz, A Course on Number theoretic Cryptography. Springer , Chapter: 1,2,3,4(4.1 and 4.2)

## Paper - CE 403

## Fluid Dynamics

| | |
|---|---|
| Unit 1 | Fluid, viscosity, stress at a point, stress quadric, thermal conductivity, fundamental equations of the flow of viscous fluids. vorticity and circulation in a viscous incompressible fluid motion. |
| Unit 2 | Dynamical similarity and inspection and dimensional analysis, physical importance of non-dimensional parameters, important non-dimensional co-efficients in the dynamics of viscous fluids. |
| Unit 3 | Exact solutions of the Navier-Stokes equations, steady incompressible flow with constant fluid properties. Hagen-Poiseuille flow, Couette Flow, Jeffery-Hamel Flow, Homann flow, Hiemenz flow. |
| Unit 4 | Steady incompressible flow with variable viscosity, Unsteady incompressible flow with constant fluid properties, Steady compressible flow, steady incompressible flow with fluid injection on the boundaries. |

**Books Prescribed:**

Viscous Fluid Dynamics by J.L.Bansal , Oxford Publishing, Chapter: 1, 2, 3(excluding 3.5 to3.7), 4.

## Paper – CE 404

## Discrete Mathematical Structure

| | |
|---|---|
| Unit 1 | Grammars and Language Discussion on Grammar, formulae and definition of a language, notations of syntax analysis, Partial Ordering, Partial Ordered set: Representation and associated Terminology, Recursive Functions, Sets and Predicates |
| Unit 2 | Lattices as Partially ordered sets, Definition and Examples, Some properties of Lattices. Lattices as Algebraic systems. Sub Lattices, Direct Product and Homomorphism, Some special Lattices, Boolean Algebra, Definition and Examples, Sub- Algebra, Direct Product, Homomorphism |
| Unit 3 | Boolean Functions, Boolean forms, free Boolean algebra, Value of Boolean Expression and Boolean Functions, Representation and Minimization of Boolean functions, finite state machines, introductory sequential circuits, Equivalence of finite state Machines. |
| Unit 4 | Basic Concept of Graph Theory, Basic Definition, Paths, Reachability and Connectedness, Matrix Representation of Graphs, Trees |

### Books Prescribed:

Discrete Mathematical Structures with applications to Computer science by J. P. Tremblay, R. Manohar ( Mc Graw Hill ). Chapter 2 ( 2.3.8,2.3.9 , 2.6.1 to 2.6.2), 3(3.3.1 to 3.3.1), 4(4.1.1 to 4.1.5,
4.2.1,4.2.2,4.3.1,4.3.2,4.4.1,4.4.2,4.6.1,4.6.2) 5(5.1.1 to 5.1.4)

## Paper - CC 405

### Dissertation, Seminar and Viva Voce

Thesis: 50 Marks

Seminar: 30 Marks

Viva Voce: 20 Marks

Topic selected as per the direction of guide.

*Guidelines:*

The objective is to help the student to develop the ability to apply theoretical and practical tools and techniques to solve real life problems related to industry, research laboratory and institutions. After Completion of the dissertation the student should be able to :

1. Identify the problem in a system.
2. Review the literature relating to the problem.
3. Evaluation of Research Problem.
4. Collecting Materials and Methods
5. Data Collection and Analysis,
6. Develop the ability to communicate effectively.

General rules:

- ☐ Each student has to take up project work individually and one teacher can supervise maximum of 3 students.
- ☐ After identification of the topic and supervisor the students have to prepare a project proposal and submit it before the HOD for approval.
- ☐ After Completion of the project the student shall provide 3 copies of the project work along with soft copy in pdf format to the HOD before the commencement of the end semester examinations.
- ☐ The project report should contain the following chapters:
  - Introduction
  - Review of literature
  - Scope of Research Problem
  - Materials and methods
  - Result Discussion
  - Conclusion and suggestion
  - Bibliography
- ☐ Along with the project report the student should submit the approved project proposal and the originality certificate duly signed by the student and the supervisor.
- ☐ Certificate of originality : This is to certify that the project titled : _____is an original work of the student and is being submitter in partial fulfilment for the award of M.Sc degree of Rayagada Autonomous College, Rayagada. This report has not been submitted earlier either to this college or any other institution for the fulfilment of the requirements of the course of study

K. B. Achar

## Courses in Detail

## 1st Semester

**Course No. PHY-101:** **Mathematical Methods in Physics** Total Marks: 100

End Sem: Theory – 80 marks, Mid-Sem: Theory- 20 marks

### Unit-1

**Complex Variables:**

Analytic functions, Contour integrals, Laurent's series, the residue Theorem, evaluation of single and multivalued functions, branch points and branch cuts ,Contour integratio involving branch point.

### Unit-2

**Tensors:**

Introduction, Types of tensor, Invariant tensor, epsilon tensor, Pseudo tensor, The Algebra of tensor, Quotient law , Covariant derivative of tensor, Fundamental Tensor, Cartesian tensor, Christoffel symbol.

### Unit-3

**Group theory:**

Definitions of groups, subgroups and classes, Cayley's theorem, Group representations, characters, irreducible representations of SU(2) and O(3) groups.

### Unit-4

**Special Function:**

Legendere Polynomials, generating functions, Recurrence formulae, orthogonality properties of legendre's polynomial of 1st kind, Bessel generating function, Recurrence formulae, orthogonality properties of Bessel's polynomials, Fourier and Laplace transform.

**Text books:**

1. Mathematical Methods of Physics by Mathews and Walker (W. A. Benjamin Inc.)
2. Elements of Group Theory by A. W. Joshi (New Age International Publisher)
3. Matrices and Tensors in physics by A. W. Joshi (New Age International Publisher)
4. Mathematical Methods for Physicist by G. Arfken and H. Weber, Academic Press (Elsevier)

**Reference Books:**

1. Mathematical Physics by B. D. Gupta ( Vikas Publishing House)
2. Mathematical Physics by P. K. Chattopadhyaya (New Age International)

**Course No. PHY-102** **Classical mechanics** Total Marks: 100

End Sem: Theory – 80 marks, Mid-Sem: Theory- 20 marks

**Unit-1**

**Kinematics of rigid body motion:**

Independent co-ordinates of a rigid body, Orthogonal transformations, Eulerian angles, infinitesimal rotations, rate of change of vector, Coriolis force, angular momentum and kinetic energy of motion about a point, inertial tensor and the moment of inertia, Eigen values of Inertial tensor and the principal axis transformation, methods of solving rigid body problems and Euler's equations of motion, torque free motion of a rigid body. Heavy symmetrical top with one point fixed.

**Unit-2**

**Hamiltonian formulation:**

Calculus of Variations and Euler-Lagrange's Equation, Brachistochrone Problem, Hamilton's Principle, Extension of Hamilton's Principle to Nonholonomic Systems, Legendre Transformation and the Hamilton Equations of Motion, Physical Significance of Hamiltonian, Derivation of Hamilton's Equations of Motion from a Variational Principle, Routh's Procedure, Principle of Least Action

**Unit-3**

**Canonical Transformations:**

Canonical Transformation, Types of Generating Function, conditions for canonical transformation, Integral Invariance of Poincare, Poisson Bracket, Poisson's Theorem, Lagrange Bracket, Poisson and Lagrange Brackets as Canonical Invariant, Infinitesimal Canonical transformation and Conservation Theorems, Liouville's Theorem

Hamilton Jacobi Theory:

Hamilton-Jacobi Equation for Hamilton's Principal Function, Harmonic Oscillator and Kepler problem by Hamilton-Jacobi Method, Action-Angle Variables for completely Separable System, Kepler Problem in Action-Angle Variables

**Unit-4**

**Small Oscillation:**

Problem of Small Oscillations, Example of Two coupled Oscillator, General Theory of Small Oscillations, Normal Coordinates and Normal Modes of Vibration,

**Text book:**

1. Classical Mechanics- by H. Goldstein (Addison-Wesley)

**Reference books:**

1. Classical Mechanics by S. N. Biswas, Books and allied Publisher Ltd.
2. Classical Mechanics by J.C. Upadhya, Himalaya Publishing House.
3. Classical Mechanics by Landau and Liftshitz (Butter Worth)

**Course No. PHY-103 Computer Programming and Numerical Analysis** Total Marks: 100

End Sem: Theory – 80 marks, Mid-Sem: Theory- 20 marks

**Unit-1**

**FORTRAN 77:** Data types, expressions, statements, input and output commands, conditional and interactive constructs, character and data managements, array manipulations, subprogram, subroutine.

**Unit-2**

Fortran programs for problems like numerical integrations by trapezoidal and Simpson method, finding the root of an equation by Newton-Raphson method, finding prime numbers, Runga-Kutta method, interpolation sorting and similar other problems .

**Unit-3**

**Numerical Analysis-1:**

Solution of simultaneous linear equations, Gaussian elimination, Pivoting, Iterative Method, Matrix Inversion, Root of a transcendental equation by Newton- Rapson Method, Least square fitting.

**Unit-4**

**Numerical Analysis-2:** Eigen values and eigenvectors of matrices, power and Jacobi method, Finite Differences, Interpolation with equally Spaced and unevenly spaced points (Newton's and Lagrange's method), Forward and Backward Interpolation, Extrapolation, Numerical Integration by trapezoid and Simpson's rule, Solution of first and second order differential equation using Runge-Kutta method.

**Text books:**

1. Fundamentals of Computers by V. Rajaraman, Prentice Hall of India Ltd Publishers
2. Numerical Mathematical Analyses by J. B. Scarborough, Oxford and IBH Publishing Company.

**Reference Books:**

1. Numerical methods for engineering and scientific computation by M K Jain (Wiley Eastern)
2. Computer programming in Fortran-77 by V. Rajaraman, Prentice Hall of India Ltd Publishers.

**Course No. PHY-104** **Quantum Mechanics-I** Total Marks: 100

End Sem: Theory – 80 marks, Mid-Sem: Theory- 20 marks

**Unit-1**

**General principles of Quantum Mechanics:**

Linear vector space, Ket and Bra vectors, Scalar product of vectors and their properties, Dirac delta function, linear operators, Adjoint operators, Unitary Operators, Expectation values of dynamical variables and physical interpretation of Hermitian operators, Eigen values and eigen vectors, orthonormality of eigen vectors, probability interpretation, Degeneracy, Schmidt method of orthogonalisation,

Expansion theorem, Completeness and closure properties of the basis set, Coordinate and momentum representations, compatible an Incompatible observables, Commutator algebra, uncertainty relation as a consequence of non- commutability, minimum uncertainty wave packet, Representations of Ket and Bra vectors and operators in matrix form, Unitary transformation of basis vectors and operators.

**Unit-2**

**Quantum Dynamics:**

Time evolution of quantum states, Time evolution operator and its properties, Schrödinger, Heisenberg and Interaction picture, Equations of motion, Operator method solution of Harmonic oscillator problem, Matrix representation and time evolution of creation and annihilation operators

**Unit-3**

**Rotation and Orbital Angular Momentum:**

Orbital angular momentum operators as generators of rotation, $L_x$, $L_y$, $L_z$ and $L^2$ and their Commutation relations, Raising and Lowering operators ($L_+$ and $L_-$), $L_x$, $L_y$, $L_z$ and $L^2$ in spherical Polar coordinates, Eigen values and Eigen functions of $L_z$ and $L^2$ (operator method), Matrix representation of $L_x$, $L_y$, $L_z$ and $L^2$

**Unit-4**

**Spin angular momentum:**

Spin ½ particles, Pauli spin matrices and their properties, Eigen values and Eigen functions, Spin and rotations.

Total angular momentum: Total angular momentum J, Eigen value problem of $J_z$ and $J^2$, Angular momentum matrices, Addition of angular momentum and C. G. coefficients for the states with ( i) $j_1 = ½$ and $j_2 = ½$ ( ii ) $j_1 = 1$ and $j_2 = ½$.

**Text book**:

1. Quantum Mechanics concepts and Applications by Nouredine Zettili, John Wiley and sons,

**Reference books**:

1. Quantum Mechanics by L. I. Schiff, International Student edition.
2. Quantum Mechanics by D. Griffith, Pearson Publishers.
3. Quantum Mechanics by S. Gasiorowicz, John Wiley edition.
4. Quantum Mechanics by Eugene Merzbacher, Wiley International Edition

**Course No. PHY-105** **Computer Programming in Physics** Total Marks: 100

**(Laboratory work)**

End Sem: Practical– 100 marks

1. Numerical integration by trapezoidal method
2. Numerical integration by Simpson method
3. Solution of first and second order differential equation by Runga Kutta Method
4. Matrix addition, subtraction, multiplication and manipulation
5. Matrix inversion
6. Finding the roots of an equation by Newton-Rapson method
7. Least square fitting of linear parameters
8. Determination of prime numbers.
9. To arrange a set of numbers in increasing or decreasing order
10. Sum of A.P and G.P series, Sine and Cosine series
11. Factorial of a number
12. Evaluation of log and exponentials by summing of series
13. Any other suitable experiments.

Any other experiments that may be set up from time to time

# 2nd Semester

**Course No. PHY-201** **Classical Electrodynamics** Total Marks: 100

End Sem: Theory – 80 marks, Mid-Sem: Theory- 20 marks

**Unit-1**

Wave equations for potentials, solution by Fourier analysis, Radiation field, Radiation energy, Hertz potential, Computation of radiation fields by Hertz method, electric dipole radiation, multi pole radiation

**Unit-2**

Field of a uniformly moving electron, Lienard-Wiechart potential, Fields of a charge in uniform motion, Direct solution of the wave equation, Convection potential, Virtual photon concept, Wave guides, Propagation of electromagnetic waves in rectangular wave guides

**Unit-3**

Radiation from an accelerated charge, Fields of an accelerated charge radiation at low velocity, Case of velocity parallel to acceleration, radiation from circular orbits, Radiation with no restrictions on the acceleration or velocity, Classical cross section for bremsstrahlung in a Coulomb field, Cherenkov radiation.

**Unit-4**

Radiation, scattering and dispersion, radiative damping of a charged harmonic oscillator, forced vibrations, scattering by an individual free electron, scattering by a bound electron, absorption of radiation by an oscillator, equilibrium between an oscillator and a radiation field, effect of a volume distribution of scatters, scattering from a volume distribution, Rayleigh scattering, the dispersion relation.

**Text book**:

1. Classical Electricity and Magnetism by W. K. H. Panofsky and M. Phillips (Addition-Wesley)

**Reference books:**

1. Classical Electrodynamics- J.D. Jackson, John Wiley and Sons.
2. Introduction to electrodynamics- D.J. Griffiths, Pearsons Publishers.

**Course No. PHY-202** **Basic Nuclear Physics** Total Marks: 100

End Sem: Theory – 80 marks, Mid-Sem: Theory- 20 marks

**Unit-1**

A. Brief Discussion of Nuclear Properties: Nuclear Radius, Nuclear Mass and Binding Energy, Angular Momentum, Parity and Symmetry, Magnetic Dipole Moment and Electric Quadruple Moment.

B. Two Nucleons Bound State Problem: Central and non central force, the deuteron, tensor forces, magnetic moment and quadruple moment of deuteron.

**Unit-2**

Nucleon Scattering Problem: n-p scattering at low energy, scattering cross section and scattering length, effective range theory.

Nuclear force: Meson theory of nuclear force, Yukawa interaction

**Unit-3**

Nuclear Reactions and nuclear energy: Nuclear reaction and resonances, Breit-Wigner formula for s-waves, compound nucleus. Liquid drop model, Bohr-Wheeler theory of fission, nuclear fusion

**Unit-4**

Nuclear Models: Single particle model of nucleus, magic numbers, spin-orbit coupling, angular moment and parities of nuclear ground states, magnetic moments and Schmidt lines, Collective model of Bohr and Mottelson.

**Text Book:**

1. Nuclear Physics by R.R. Roy and B.P. Nigam (John Wiley)

**Reference Books:**

1. Physics of the nucleus by M.A. Preston (Addison Wesley)
2. Nuclear Physics by S.S.M. Wong (Prentice Hall)
3. Introduction to Nuclear Physics by H. A. Enge (Addison Wesley)

**Course No. PHY-203** **Basic Solid state physics** Total Marks: 100

End Sem: Theory – 80 marks, Mid-Sem: Theory- 20 marks

**Unit-1**

**Crystal Binding:**

Crystals of inert gases, Ionic crystals, covalent crystals, Metals Lattice Dynamics-Vibrations of a mono atomic linear chain, Vibration of a diatomic linear chain, Dispersion relations, Acoustic and Optic modes, Long-wavelength limits

**Unit-2**

**Specific heat of insulators:**

Phonon heat Capacity, Debye model for density of states, Debye $T^3$ law, Einstein's theory of the specific heat Free Electron Fermi gas-Energy levels in one-dimension, Effect of temperature on the Fermi-Dirac distribution function, Free electron gas in three dimension, Heat Capacity of the electron gas, Electrical conductivity and Ohm's law, Motion in magnetic fields, Static magneto-conductivity tensor, Hall effect, Thermal conductivity of metals, Wiedemann- Franz law

**Unit-3**

**Energy bands:**

Nearly free electron model, origin of the energy gap, Bloch functions, Kronig-Penney model, Wave equation of electron in a periodic potential, restatement of Bloch theorem, solution of the central equation, approximate solution near a zone boundary, number of orbitals in a band, metals and insulators

**Unit-4**

**Semiconductor crystals:**

Band gap, Holes, effective mass, intrinsic carrier concentration, intrinsic mobility, impurity conductivity, donor states, acceptor states, thermal ionization of donors and acceptors. Defects -Classification of defects, Point defects- Schottky and Frenkel defects, Diffusion and ionic conductivity. Dielectrics-local electric field at an atom, Lorentz field, field of dipoles inside cavity, dielectric constant and polarisability-Claussius-Mossotti relation, Mechanisms of electronic ionic and orientational polarisability.

**Text book**:

1. Introduction to Solid State Physics by C. Kittel, 7th edition, (John-Wiley, 1996)

**Reference books:**

1. Introduction to the theory of Solid State Physics by J. D. Patterson (Addison- Wesley,1971)
2. Solid State Physics by N. W. Ashcroft and N. D. Mermin , (Harcourt Asia PTE Ltd.)
3. Physics of Condensed Matter by Prasanta K.Misra (Academic Press, 2010) 13

**Course No. PHY-204** **Quantum Mechanics-II** Total Marks: 100

End Sem: Theory – 80 marks, Mid-Sem: Theory- 20 marks

**Unit-1**

**Motion in a spherically symmetric field**: Separation of variable in Schrödinger equation, radial equation, Reduction to equivalent one body , Application to Hydrogen atom, Energy eigen values and eigen functions, Degeneracy, Radial probability distribution, Application to free-particle problem, Expression of plane waves in terms of spherical waves

**Unit-2**

**Approximate methods:** Time independent perturbation theory, non-degenerate perturbation- $1^{st}$ & $2^{nd}$ order correction to energy and wave function, An harmonic oscillator- Degenerate perturbation theory, SStark effect and Normal Zeeman effect.

**Variational method:** Raleigh-Ritz criteria, Ground state of He atom.

**Unit-3**

**W. K. B. method:** connection formulas, Bound states in potential well, Bohr-Sommerfeld quantization rule, Harmonic oscillator and cold emission.

**Time-dependent perturbation theory:** $1^{st}$ order perturbation, Harmonic perturbation, Fermi-Golden rule transition to continuation.

**Unit-4**

**Scattering** -Scattering amplitude and scattering cross section and their relation, Partial wave analysis for scattering, Scattering from central potential, optical theorem, resonant scattering from a square well potential, Resonance scattering , scattering from a hard sphere, Born approximation, Scattering from screened Coulomb potentials, validity of Born approximation.

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**Text book**:

1. Quantum Mechanics concepts and Applications by Nouredine Zettili, John Wiley and sons, Publications

**Reference books**:

1. Quantum Mechanics by L. I. Schiff, International Student edition
2. Quantum Mechanics by D. Griffith, Pearson Publishers
3. Quantum Mechanics by S. Gasiorowicz, John Wiley edition
4. Quantum Mechanics by Eugene Merzbacher, Wiley International Edition

**Course No. PHY-205** **Optics (Laboratory work)** Total Marks: 100

End Sem: Practical– 100 marks

1. Experiments with optical bench :
   Biprism
   Straight edge and narrow wire
2. Experiments with spectrometer:
   Single and Double split
3. Experiments with Michelson interferometer :
   Determination of A and α
   Thickness of mica sheet
4. Fabry Perot interferometer
5. Polarization Experiments
   Babinet compensator
   Edsar-Butlerbands
   Quarter wave plate
   Mallus Law
   Study of elliptical polarized light
6. Constant Deviation Spectrography
   Calibration
   Zeeman effect
7. Babinet Quartz Spectrography
8. Any other suitable experiments
   Any other experiments that may be set up from time to time

# 3rd Semester

Course No. PHY-**301**: **Relativistic Quantum Mechanics and Field theory** Total Marks: 100

End-Sem: Theory – 80 marks, Mid-Sem: Theory- 20 marks

**Relativistic quantum mechanics:**

**Unit-1**

Brief introduction to Relativistic quantum mechanics, Notations, Klein-Gordon equation , Plane wave solution, Charge and current densities, equation of continuity, Interpretation of K-G equation, Drawbacks of K-G- equation, Dirac's relativistic equation, Dirac matrices and their properties, Dirac wave function/ Dirac spinors, Probability density and equation of continuity, Covarient form of Dirac equation, Proof of covariancy, Properties of $\Upsilon$-matrix.

**Unit-2**

Plain wave solutions of Dirac Equation, Normalization of the wave functions, negative energy state and Hole theory, Spin of Dirac particles, Dirac's equation in E-M field, Magnetic moment of electrons, Spin – orbit coupling, Dirac's eqution of central potential, Hydrogen atom, series solution of Radial equation, Energy Eigen values.

**Field Theory:**

**Unit-3**

Concept of fields, , Classical field equation ad Lagrangian density, Classical field equation in Hamiltonian form, Quantisation of Schrodinger's field for spin less Bosons,Commutation relations, Momentum Representation, Number Operators, Creation and annihilation operator, Quantisationof Schrodinger's field for Fermions, Noether's theorem and conservation laws, Gauge invariance and charge conservation .

**Unit-I**

Field Quantization: (a) neutral scalar meson field (b) charged scalar meson field (c) Dirac field,

**Text Book**:

1. Relativistic quantum field theory by J.D. Bjorken and S.D. Drell , Mc Graw-Hill Book Company

**Reference Books:**

1. Lectures on Quantum Field Theory, Ashok Das, (World Scientific Publishing Co. Pvt. Ltd).
2. Introduction to quantum field theory by P. Roman
3. Quantum Mechanics and Field Theory by B.K. Agarwal, Asia Publishing House.

**Course No. PHY-302** **Electronics** Total Marks: 100

End Sem: Theory – 80 marks, Mid-Sem: Theory- 20 marks

**Unit-1**

**AMPLIFIERS:**

Transisters, Two-port network analysis, transconductance model, Frequency response of linear amplifiers, RC and Transformer coupled amplifiers, gain bandwidth product, feedback amplifiers, effects of negative feedback, FET, MOSFET, Boot-strapping the FET

**Unit-2**

**OSCILLATOR CIRCITS:**

Feedback criteria for oscillation, Nyquist criterion, Phase shift, Wien-Bridge oscillator, Crystal controlled oscillator.

**Unit-3**

**OPERATIONALAMPLIFIERS:**

The differential amplifier, DC and AC signal analysis, integral amplifier, rejection of common mode signals, CMMR, The operational amplifier, input and output impedances, Application of operational Amplifiers, unit gain buffer, summing, integrating amplifier, Comparator, Operational amplifier as a differentiator

**Unit-4**

**DIGITAL CIRCUITS:**

Logic fundamentals, Booleantheorem, logicgates: AND, OR, NOT, NOR, NAND XOR, and EXNOR. - RTL, DTL and TTL logic, Flip-flop, RS-and JK-Flip flop, thevenins theorem, A/D and D/A Convertors.

**Text Book:**

1. Electronic fundamental and application by J.D. Ryder, PHI, Learning Pvt Ltd.

**References:**

1. Foundation of electronics – Chattopadhyay, Rakshit, Saha and Purkait , New age International publisher
2. Electronics principles-Albert Malvino, Tata Mc Graw-Hill Edition
3. Modern Digital Electronics-R.P Jain, Tata Mc Graw-Hill Edition

**Course No. PHY-303** **Condensed Matter and Materials Physics-1** Total Marks: 100

**(Elective, Special Paper-1)**

End Sem: Theory: 80 marks, Mid-Sem: Theory- 20 marks

**Unit-1**

**Quantisation of lattice vibration:**

Phonons, normal coordinate transformation, creation and annihilation operators methods of band calculation-tight binding method, OPW and pseudo-potential methods. Fermi surface-de Haas-van Alphen effect Transport theory-Boltzman equation, relaxation time approximation, electrical conductivity and thermal conductivity.

**Unit-2**

**Electron-electron interaction:**

Hartree approximation, Hartree-Fock approximation, Hartree-Fock theory for jellium Density functional theory-general formulation, Local Density approximation

**Unit-3**

**Superconductivity:**

Occurrence of superconductivity, Meissner effects, Type- I and II superconductors, energy gap, Isotope effect, Theoretical survey: Thermodynamics of superconducting transition, London Equations, coherence length, Qualitative ideas about the BCS theory, Single particle tunneling, Josephson Effect

**Unit-4**

**Advanced Superconductivity**:

Electron-phonon interaction, Microscopic theory of superconductivity, Quasi lectrons, Cooper pairs, BCS theory, Ground State of superconducting electron gas, elementary ideas of high $T_c$ superconductors.

**Text book**:

1. Physics of Condensed Matter By Prasanta K.Misra (Academic Press, 2010)
2. Quantum Theory of Solid State by J.Callaway, Academic Press

**Reference books**:

1. Principles of the theory of solids, J.M.Ziman, Cambridge, University press
2. Solid State Physics By C. Kittel, John Wiley and sons, Ins Singapore.

**Course No. PHY-304** **ATOMIC AND MOLECULAR SPECTRA** Total Marks: 100

## (Allied Course)

End Sem: Theory: 80 marks, Mid-Sem: Theory- 20 marks

### UNIT-1

**Atomic structure and Atomic spectra:**

Revision of Hydrogen atom; Bohr-Summerfield Theory, quantum theory of hydrogen atom, wave functions, orbital and spin angular momentum, magnetic dipole moment, spin orbit interaction, fine structure, spectroscopic term and notation. Hydrogen fine structure. Spectrum of Helium

### UNIT-2

**Multi-electron atom:**

Hartrees' Central field approximation, atomic orbital and Hund's rule. L.S Coupling ,Lande Interval Rule, Normal and Inverted Multipletes, Spectral terms and selection rules for multi-atoms in L-S Coupling , J.J Coupling, Selection rules

### UNIT-3

**Zeeman Effect:**

Normal AND Anomallus Zeeman effect, Explanations of Zeeman Effect in some transitions. Paschen-Bach Effect, Stark-Effect: Weak field and strong field Stark effect in hydrogen. Hyperfine structure and isotope effect, Nuclear spin and hyperfine structure.

### UNIT-4

**Molecular Spectra:**

Types of molecular spectra, Electronic spectra, Vibrational-Rotational spectra, molecule as a harmonic and non-harmonic oscillator, Pure Rotational Spectra, molecule as a rigid and non-rigid rotator .The Rama spectra and molecular structure

**Text Book**:

1. Introduction to atomic spectra by H. E. White

2. Atomic and Molecular spectra : Laser by Raj Kumar

**Course No. PHY-305** **Modern Physics (Laboratory Work)** Total Marks: 100

End-Sem: Practical– 100 marks

1. Determination of e/m by
I) Braun tube method
II) Magnetron Valve method
3. Determination of Planck's constant ( h ) by
Photo-electric effect methods
4. Measurement of velocity of light by Lecher wire
5. GM counter experiments:
I) Characteristics of the Geiger tube
II) Inverse Square Law.
III) Absorption coefficient of the Aluminium foil.
6. Characteristics of Diode and Zener diode.
7. Study of logic gates AND, OR, NOT, NAND, NOR, EXOR .
8. Making AND, OR, NOT Gates using NAND Gates.
9. Verification of Boolean Algebra.
10. Verification of Dual nature.
11. Characteristics of FET (Field Effect Transistor).
Any other experiments that may be set up from time to time 22

## 4th Semester

**Course No. PHY-401** **Statistical Mechanics** Total Marks: 100

End Sem: Theory – 80 marks, Mid-Sem: Theory- 20 marks

**Unit-1**

**Classical Statistical Mechanics:**

Postulates of classical statistical mechanics, Liouville's theorem micro-canonical ensemble, derivation of thermodynamics, Equipartition theorem, Classical ideal gas, Gibb's paradox, canonical ensemble, energy fluctuation in canonical ensemble, Grand canonical ensemble, density fluctuation in grand canonical ensemble, equivalence of canonical and grand canonical ensemble.

**Unit-2**

**Quantum Statistical Mechanics:**

Postulates of quantum statistical mechanics, density matrix, Liouville's theorem, ensembles in quantum statistical mechanics, third law of thermodynamics, Ideal gases in micro-canonical and grand canonical ensembles. Particle in a box, Maxwell-Boltzman, Boltzman-Einstein and Fermi-Dirac distributions.

**Unit-3**

**Fermi gas:**

Equation of state of ideal Fermi gas, Theory of white dwarf stars, Pauli paramagnetism

**Unit-4**

Bose gas:

Ideal Bose gas, Photon, Planck's law, Bose-Einstein condensation.

Phase transition:

1st order and 2nd order phase transitions, Ising model (one dimensional)

**Text Book:**

1. Statistical Mechanics – K. Huang, Wiley India

**Reference books:**

1. Statistical Mechanics – Landau and Lifshitz, ButterWorth
2. Statistical Mechanics- R. K. Patheria, P.D. Beale 3rd Ed, ButterWorth
3. Fundamental statistical and thermal Physics- F. Reif, Tata Mc Graw-Hill Edition
4. Elementary statistical mechanics, C. Kittel, Dover Publications.

**Course No. PHY-402** **Elementary particle physics** Total Marks: 100

End Sem: Theory: 80 marks, Mid-Sem: Theory- 20 marks

**Unit-1**

Historical introduction to the Elementary Particles, Classification of elementary particles and their interactions: Photons, Leptons, Quarks, Mesons, Baryons. Lepton number, Baryon number, color quantum number, Strangeness quantum number

**Unit-2**

Charge independence of nuclear forces, Isospin, Test for isospin conservation , Associated Production of Strange particles, Gell-Mann Nishijima scheme, conservation laws in relation to particle reactions and decays.

**Unit-3**

**Discrete Symmetry:**

Parity (P) : Parity in quantum mechanics and Field theories, Test of Parity. Time reversal (T) : Time reversal in quantum mechanics and Field theories , Test of Time reversal Charge conjugation (C) : Additive quantum number, Charge conjugation in field theories, Test of Charge conjugation . CPT theorem and its consequences.

**Unit-4**

**Unitary Symmetry:** SU(2), SU(3), Concept of I-Spin, U-Spin, V-Spin, SU(3) Quark model, The Eight-fold way, Mesons and Baryons in the Octet representation. The Baryon Decouplets, Evidence of color, Baryon-meson coupling.

**Text Book**:

1. Introduction to Elementary Particles by D.Griffiths. Prentice Hall

**Reference books**:

2. Elementary particle physics by Gasiorwicz
3. Modern Elementary Particle Physics by G.Kane, Addison-Wesley Publishing Company
4. Quarks and Leptons by F.Halzen and A.D.Martin, World Scientific Singapore

**Course No. PHY-403 Condensed Matter and Materials Physics-2** Total Marks: 100

**(Elective-Special Paper-2)**

End-Sem: Theory: 80 marks, Mid-Sem: Theory- 20 marks

**Unit-1**

**Optical properties:**

Absorption, intraband and inter band transition, Absorption spectra of materials, Luminiscence, Fluorescence, phosphorescence, Colour centres, Optical fibres (elementary ideas). Basic principles of Electron Spin Resonance, NMR and Lasers-principles, Induced absorption, Spontaneous Emission and stimulated Emission, Einstein A and B Coefficients, the Ruby laser, Helium-Neon Laser and Semiconducting Laser

**Unit-2**

**Magnetism:**

Langevin Diamagnetism and Van Vleck Paramagnetism, Paramagnet: Derivations of Curie law, Pauli paramagnetic susceptibility, Ferromagnetism: Curie point and the exchange interaction, Curie-Weiss law, Ferrimagnetic order, Curie temperature and susceptibility of ferrimagnets, Antiferromagnetic order, susceptibility below the Neel temperature

**Unit-3**

**Advanced magnetism and materials:**

Landau's theory of diamagnetic susceptibility, Spin waves and magnon specific heat, NMR Knight shift, Diluted magnetic and ferromagnetic semiconductors Spintronics-giant magneto Resistance (GMR), Mott's theory of spin-dependent scattering of electrons

**Unit-4**

**Novel Materials:**

Metallic nano clusters: Nano science and nano clusters, liquid drop model, size and surface volume ratio. Graphene: Graphene lattice, tight binding approximation, Dirac Fermions Elementary ideas about polymers, Charecterisation of materials: Experimental diffraction methods, Bragg law, Laue conditions, Geometrical Structure factor and Atomic form factor, Non-crystalline materials-diffraction pattern, amorphous semiconductors, low energy excitations, heat capacity, thermal conductivity. Basic principles of Raman Effect in crystals and Mossbauer techniques

**Text Book**:

1. Physics of Condensed Matter-By Prasanta K.Misra (Academic Press, 2010)

**References**

2. C.Kittel-Introduction to Solid State Physics by C. Kittel, John Wiley and Sons, Inc. Singapore.
3. Solid state Physics by Aschcroft and Mermin, Harcourt Asia PTE. Ltd. (A Harcourt publishers International company)

**Course No. PHY-404** **Condensed Matter and Materials Physics** Total Marks: 100

**(Elective-Special Paper) (Laboratory work)**

End Sem: Practical– 100 marks

1. Determination of energy gap of a given semiconductor by four probe method
2. Determination of Hall constant of a sample and its identification
3. Determination of energy gap by p-n junction method
4. Study of dispersion relation of an electric analog of mono atomic linear chain
5. Study of dispersion relation of an electric analog of diatomic linear chain
6. Determination of specific heat of a given sample using a thermocouple
7. Determination of dielectric constant of a given sample by lecher wire method
8. Determination of B-H curve of a given ferromagnet

Any other experiments that may be set up from time to time

**Course No. PHY-405** **Project and Seminar** Total Marks: 100

Project: 50 Marks Seminar: 50 Marks

Students will be assigned topics for project and seminar under the supervision of teachers of the department.

27/8/19