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B.A. Economics for affiliated colleges

Course structure & Syllabus
(2011-12)

SEMESTER I

Sl. No.	Course	Main/Allied
1	Language-I	Foundation
2	Functional English I	Foundation
3	Towards Understanding Economics	Main I
4	Statistical Methods I	Main II
5	Economics of Social Sector and Environmental Issues/ Population studies	Allied I

SEMESTER II

Sl. No.	Course	Main/Allied
1	Language-II	
2	Functional English II	
3	Microeconomics I	Main
4	Mathematics for Economists I	Main
5	Environmental Economics/ Regional Economics	Allied

SEMESTER III

Sl. No.	Course	Main/Allied
1	Language III	
2	Functional English III	
3	Microeconomics II	Main
4	Macroeconomics I	Main
5	Statistical Methods II	Main

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SEMESTER IV

Sl. No.	Course	Main/Allied
1	Language IV	
2	Functional English IV	
3	Monetary Economics	Main
4	Macroeconomics II	Main
5	Mathematics for Economists II	Main

SEMESTER V

Sl. No.	Course	Main/Allied
1	International Economics I	Main
2	Public Finance I	Main
3	Elements of Econometrics	Main
4	Indian Economy I	Main
5	Development Economics / Human Resource Management	Allied

SEMESTER VI

Sl. No.	Course	Main/Allied
1	International Economics II	Main
2	Public Finance II	Main
3	Indian Economy II	Main
4	History of Economic Thought	Main
5	Indian Financial Institutions and Markets/ Marketing	Allied

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Semester I

TOWARDS UNDERSTANDING ECONOMICS

Unit 1: Exploring the Subject Matter of Economics

Why study economics? – scope of economics – the economic problem: scarcity and choice – the question of what to produce, how to produce and how to distribute output – science of economics – the basic competitive model – prices, property rights and profits: incentives and information, rationing – opportunity sets – economic systems.

Unit 2: Role of Markets, their Functioning and Welfare

Markets and competition – determinants of individual demand/supply, demand/supply schedule and demand/supply curve, market versus individual demand/supply, shifts in the demand/supply curve – demand and supply together – how prices allocate resources – elasticity and its application – controls on prices – taxes and the costs of taxation – consumer, producers and the efficiency of the markets.

Unit 3: The Households

The consumption decisions – budget constraints, consumption and income/price changes, demand for all other goods and price changes – description of preferences – the investment decision – investment alternatives for a household – desirable attributes of investments – labor supply and savings decision – choice between leisure and consumption – labour force participation – tax policy and labour supply -human capital and education – budget constraints and savings – savings and interest rate, other factors affecting savings.

Unit 4: The Firm and Perfect Market Structure

Financing, controlling and managing firms – the firm' s legal form, corporate finance – why corporations care about financial structure – takeover and the market for managers – making decisions – centralization and decentralization – the boundaries of the firm. behaviour of profit maximizing firms and the production process – short run costs and output decisions.

Unit 5: Introduction to Macroeconomics and National Income Accounting

The roots of macroeconomics – concerns over macroeconomic – the role of government in the macro economy – the components of the macro economy – the methodology of macroeconomics – concepts of national income – approaches to calculating national income – nominal and real income – issues on measurement of national income, the concept of black and green income.

Readings:

1. Karl E. Case and Ray C. Fair (2002), Principles of Economics, 6th Edition, Pearson Education Asia Low Price Edition.
2. N. Gregory Mankiw, (2002), Principles of Economics, Thomson.
3. J.E. Stiglitz, and C.E. Walsh (2002), Principles of Economics, 3rd Edition, W.W. Norton & Company, New York.
4. R. Stone and G. Stone (1962), National Income and Expenditure, Bowes and Bowes London.
5. Paul Hayne (1998), Economic Way of Thinking, Prentice Hall.

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Semester I

STATISTICAL METHODS I

Unit 1: Meaning, Classification and Tabulation of Data

Primary data and secondary data: definition, sources and method of collection – quantitative data**:** time series data, cross section data and pooled data – qualitative data – presentation of data (table) – Simple table, complex table (manifold table) – discrete frequency distribution table – continuous or grouped frequency distribution table – relative frequency distribution – cumulative frequency distribution: less than and more than – presentation of data (diagram) : line diagram, bar diagram (simple and multiple), pie diagram – presentation of data (graph): graph of time series or line graph, logarithmic graph, graph of frequency distribution (histogram, frequency polygon, frequency curve, cumulative frequency curve / ogive).

Unit 2: Measures of Central Tendency and Partition Values

Meaning of average – types of average: arithmetic mean(for raw data, ungrouped frequency distribution and grouped frequency distribution), median (for raw data, ungrouped frequency distribution and grouped frequency distribution), mode (for raw data, ungrouped frequency distribution and grouped frequency distribution), geometric mean, harmonic mean (along with formula for each type of average, respective merits, demerits, uses and properties) – quartiles (for individual series, discrete frequency distribution and frequency distribution with class interval) – deciles (for individual series, discrete frequency distribution and frequency distribution with class interval) – percentiles (for individual series, discrete frequency distribution and frequency distribution with class interval).

Unit 3: Measures of Dispersion

Meaning of dispersion – types of dispersion: range, quartile deviation, mean deviation, standard deviation and variance (along with absolute measure, the relative measure or coefficient of each type of dispersion) – coefficient of variation – combined standard deviation – Lorenz curve (application in income distribution).

Unit 4: Skewness and kurtosis

Skewness – meaning of skewness and symmetry in a distribution – symmetrical distribution – asymmetrical or skewed distribution – negatively skewed and positively skewed, measures of skewness: absolute measure – Karl Pearson's coefficient of skewness – Bowley's coefficient of skewness – definition, types and measures of kurtosis – Karl Pearson's coefficient of kurtosis.

Unit 5: Moments

Definition of central moments (both for individual series and frequency distribution) – properties of central moments – raw moments (both for individual series and frequency distribution) – moment generating function – purpose of moments.

Readings:

1. A.L. Nagar and R.K. Das (2006), Basic Statistics, Second Edition Oxford University Press, New Delhi.
2. S.P. Gupta (2000), Statistical Methods, Sultan Chand and Sons, New Delhi.

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Semester I

ECONOMICS OF SOCIAL SECTOR AND ENVIRONMENTAL ISSUES

Unit 1: Conceptual Issues

Concept of Social Sector – Significance of Social Sector – Economic Development And Social Sector Development – Equity and Social Sector – Environment of Economics – Economy – Environment Interaction- The Material Balance Principle - Entropy Law - Market Failure , Property Rights , Open Access Resources- Collective Action .

Unit 2: Educational Economics

Human Capital – Human Capital Vs. Physical Capital, Components of Human Capital: Determination of Demand for Education: Costs and Benefits of Education: Educational Planning and Economic Growth: Educational Financing: Education and Labor Market,: Economics of Education Planning In Developing Countries with special emphasis on India.

Unit 3: Health Economics

Determination of Health - Economics of Health Care: Appraisal of Health Care Financing: The concept of Human Life Value: Benefit Cost and Cost Effectiveness Approaches: Inequalities in Health and Class and Gender Perspectives: Institutional Issues in Health Care Delivery.

Unit 4: Environmental issues

Causes and effects Of Environmental Degradation – Degradation of land, Forest and Natural Resources- Pollution from Energy –effects on health, Land , water and air- valuation of Environmental Damages- direct and indirect methods- Pollution Prevention , control and abatement - direct and indirect Instruments of Pollution Control – concept and indicators of sustainable development.

Unit 5: Policy issues in India

Programmes and Policies of Educational Development – health development- Strategies, Programmes and Policies- Evolution of Environmental Policy in India – Air and Water Acts- Fiscal Incentives- Enforcement and Implementation Issues- Policies and Programmes Relating to Water Supply and Sanitation.

Readings:

1. Council for Social Development (2006), India: Social Development Report.
2. Dreze, Jean and Sen, Amartya (1995), Indian Economic Development and Social Opportunity, Oxford University press .Delhi.
3. Field B.C. (1994) Environmental economics: an Introduction New York: McGraw Hill
4. Freeman III, A.M.(1998) The Economic Approach to Environmental Policy, Chelter law, U.K. Edward Elgar,
5. Krueger A and M.Lindhal (2001), Education for Growth: why and for whom , Journal of Economic Literature , 39(4): 1101 -1136.
6. Latchanna G and Hussein J.O.(2007) Economics of education, Discovery publishing House, New Delhi.
7. Planning Commission Eleventh Five Year Plan, (2007- 12) vol II. Social Sector Services.

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Semester I

POPULATION STUDIES

Unit 1: Introduction

Population study and demography; its relation with other disciplines; Theories of Population - Malthus, Optimum theory of population, and Theory of Demographic Transition; Historical evidence of population growth in developed and developing countries

Unit 2: Sources of Demographic Data in India

Sources of Demographic data in India: Census - Civil registration system and Demographic surveys; National Family Health Survey 1 and 2 - their relative merits and demerits

Unit 3: Techniques of Analysis

Crude birth and death rates, age specific birth and death rates, standardized birth and death rates- Study of Fertility; total fertility rate, gross reproduction rate, and net reproduction rate — study of marital status — Life table; meaning of its columns and its uses - Reproductive and child health in India - Temporal and spatial variation in sex ratios

Unit 4: Population Projection

Techniques of population projection - Concept of stationary, stable and quasi-stationary population - Aging of population in India - Changes in family structure and old age security

Unit 5: Population Policy

Salient features of Population Censuses of 1971,1981,1991 and 2001; Evolution of population policy in India, shift in policy focus from population control to family welfare and to women empowerment; Demographic status and household behavior - Education women's autonomy and fertility-Population, health, poverty and environment linkage in India; Migration - Urbanisation - The New population Policy

Readings:

1. Agarwala S.N. (1985), India's Population Problem, Tata McGraw-Hill, Bombay.
2. Bhende, A. and T.R. Kanitkar (1982), Principles of Population Studies, Himalaya Publishing House, Bombay.
3. Agarwala U.D. (1999), Population Projections and Their Accuracy, B.R. Publishing Corporation, New Delhi.
4. Bogue, D. J. (1971), Principles of Demography, John Wiley, New York
5. Bose A. (1996), India's Basic Demographic Statistics, B.R. Publishing Corporation, New Delhi.
6. Census of India, Government of India, Various Reports, New Delhi.
7. Choubey, P.K. (2000), Population Policy in India, Kanishka Publications, New Delhi.
8. Misra, B.D. (1980), An Introduction to the Study of Population, South Asian Publishers, New Delhi.
9. Srinivasan, K. (Ed.) (1999), Population Policy and Reproductive Health, Hindustan Publishing Corporation, New Delhi.

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B.A. Economics for affiliated colleges

Semester II

MICROECONOMICS I

Unit 1: Introduction

Nature and scope of micro economics – importance and limitations of micro economics – micro statics – micro dynamics – comparative statics – concept of equilibrium – static, dynamic and neutral equilibrium – Partial Vs General equilibrium – role and limitations of price mechanisms in a free market economy – frontiers & microeconomics.

Unit 2: Consumer Behavior

Demand and law of demand – utility analysis and derivation of demand – ordinal approach-indifference curve – consumer equilibrium – price, income and substitution effect(Hicks and Slutskey) – derivation of demand curve analysis – comparison of cardinal and ordinal analysis – Giffin goods – compensated demand – elasticity of demand: price, income and cross – consumers surplus – Engel curve.

Unit 3: Theory of Supply and Production

Supply and law of supply – elasticity of supply – production decision – factors of production – production function – law of variable proportion – returns to scale – economies of scale – Iso quant approach and producer's equilibrium – factor substitution – elasticity of factor substitution.

Unit 4: Theory of Cost

What are costs? – production and costs – various measures of cost – cost curves and their shapes – the relationship between short run and long run average total cost – elasticity of cost.

Unit 5: Theory of Revenue and Equilibrium

What are revenues – average and marginal revenue – relation between AR and MR Curves – AR, MR and elasticity – importance of revenue curves – interactions of cost and revenues – conditions of equilibrium of a firm.

Readings:

1. A. Koutsoyannis (1979), Modern Micro Economics, MacMillan Press, London
2. H. R.Varian (1993), Intermediate Microeconomics a Modern Approach, 3rd Edition, Affiliated East West Press.
3. N.G. Mankiw (2009), Economics : Principles and Application Cengage Learning, Printed in India

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Semester II

MATHEMATICS FOR ECONOMISTS I

Unit 1: Preliminaries

Elements of logic and proof – mathematical induction – sets and set operations – ordered pairs, Cartesian products of sets – relations functions, one to one and onto functions, composite functions, the inverse function – the real numbers, natural numbers, integers, rational and irrational numbers – absolute value and intervals –inequalities.

Unit 2: Elementary Linear Algebra

Two, three and n – dimensional row and column vectors – vector addition and scalar multiplication – length of a vector, scalar products, orthogonality – Lines and planes in R^2 and R^3 – linear and convex combinations of vectors – linear independence.

Unit 3: Matrices and Matrix Operations

Addition, scalar multiplication, matrix multiplication – the transpose – the inverse of a square matrix – rank of matrix – invertibility and rank for square matrices, characteristic roots and eigen values, Cramer rule.

Unit 4: Determinants

Determinats – definition, properties, minors and cofactors – expansion by alien cofactors – singularity and invertibility –the adjoint matrix and formula for the inverse.

Unit 5: Elementary Topics in Calculus

The derivative of a function – differentiability and continuity – techniques of differentiation – sums, products and quotients of functions – composite functions and the chain rule – inverse functions – second and higher order derivatives.

Readings

1. Knut Sydsaeter and Peter J. Hammond (2002), Mathematics for Economic Analysis. Pearson Educational Asia: Delhi (reprint of 1st 1995 edition).
2. Alpha C. Chiang (1984), Fundamental Methods of Mathematical Economics. McGraw Hill (3rd edition).
3. Hadley, G. (1987), Linear Algebra, Addison-Wesley.
4. Metha B.C. and Madnani. GMK (2004), Mathematics for Economists, Sultan chand & Sons, New Delhi.

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Semester II

ENVIRONMENTAL ECONOMICS

Unit 1: Theory and Concept

Nature and significance of environmental economics – definition and scope of environmental economics – basic theory – market system and the environment – welfare and environment – the economics of externalities.

Unit 2: Environment and Economics

Environment – economy linkage – environment as a necessity and luxury – population and environment linkage – environmental use as an allocative problem – environment as a public good – valuation of environmental damages: land, water, air and forest.

Unit 3: Environmental Problems

Economic development and environmental problems – air pollution – water pollution – sound pollution – energy use and environment problem – pollution and urbanization – global warming and green house effect – health, urbanization, transport and technology – environmental degradation.

Unit 4: Pollution Control

Prevention, control and abatement of pollution – choice of policy instruments in developing countries – environmental law – sustainable development – indicators of sustainable development – environmental planning – environmental accounting.

Unit 5: Policy measures

Basic approach – design of environmental policy – Indian environment policies and performance – pollution control boards and their function.

Readings

1. M. Karpagam (1993), Environmental Economics, Sterling Publishers, New Delhi.
2. S. Sankaran(1994) Environmental Economics, Margham , Madras
3. N.Rajalakshmi and Dhulasi Birundha (1994), Environomics, Economic analysis of Enviroment, Allied publishers, Ahmedabad.
4. S.Varadarajan and S. Elangovan(1992), Environmental economics, Speed, Chennai.
5. Singh G.N (Ed.) (1991) Environmental Economics, Mittal Publications, New Delhi.
6. Garge, M.R. (Ed.) (1996), Environmental Pollution and Protection, Deep and Deep Publications, New Delhi.
7. Lodha, S.L (Ed.) (1991), Economics of Environment, Publishers, New Delhi.
8. The Hindu survey of Environment: Annual Reports.

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Semester II

REGIONAL ECONOMICS

Unit 1: Concepts

Why Regional Economics? What is a region? Different types of regions; Regional Income; Problems of estimation; Indicators of regional development.

Unit 2: Location of Firms

One market one input case; More generalized versions; Locational interdependence; Hotelling phenomena; General equilibrium; Uncertainty; Maximizing vs. satisfying.

Unit 3: Spatial Price Theory

Price equilibrium in geographically separated and interlinked markets; Market area boundaries; Reilly's law; Models of pricing under free entry; Spatial .monopoly and Price discrimination; Spatial monopolistic competition.

Unit 4: Techniques of Regional Analysis

Regional and interregional input-output analysis; Attraction model; Gravity model; Shift-share analysis; Impact studies.

Unit 5: Regional Policy

People prosperity versus Place prosperity; Formulation of interregional objectives; Consistency between national and regional objectives; Alternate regional policy measures; Historical evidence ; Agriculture, Industry, Physical infrastructure, Social Sector.

Readings:

1. Chand, M. and V.K. Puri (1983), Regional Planning in India, Allied Publishers, New Delhi.
2. Richardson, H.W. (1969), Regional Economics, Weidenfield ;M and Nicolson, London.
3. Hoover, E.M. (1974), An Introduction to Regional Economics, Alfred A.Knopf, New York.
4. Isard, W. (1960), Methods of Regional Analysis, MIT Press, Cambridge, Mass.
5. Nair, K.R.G. (1982), Regional Experience in a Developing Economy, Wiley-Eastern, New Delhi.
6. Brahmananda, P.R. and V.R.Panchmukhi (Eds.) (2001), Development Experience in the Indian Economy: Inter-State Perspectives, Bookwell, Delhi.

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Semester III

MICROECONOMICS II

Unit 1: Market Structure and Equilibrium

Market forms – perfect and imperfect forms – equilibrium of a firm under perfect competition, monopoly, monopolistic competition, duopoly and oligopoly – importance of time element in price theory – price discrimination and measure of monopoly power – control and regulation of monopoly – collusive price leadership – kinked demand curve-taxation and equilibrium of a firm-comparison of various markets.

Unit 2: Pricing Methods

Mark up pricing – break even pricing – rate of return pricing – variable cost pricing – peak load pricing – going rate pricing – controlled or administered pricing – minimum support price.

Unit 3: Factor Pricing

Market for the factors of production – marginal productivity theory of pricing of factor (distribution theory) – Euler's theorem-linkages among the factors of production – theories of wages – determination – wages and collective bargaining – wage differentials – rent – Ricardian and modern theories of rent – scarcity rent – differential rent and quasi rent – interest – classical and Keynesian theories – profit – innovation, risk and uncertainty theories – the concept of normal profit – monopoly profit.

Unit 4: Investment Analysis

Payback period – average annual rate of return, net present value, internal rate of return, price changes, risk and uncertainty – elements of social cost benefit analysis.

Unit 5: Welfare Economics

What is welfare economics – economic and general welfare problems in measuring welfare – classical welfare economics – Pigovian welfare condition – Pareto's criteria – value judgment – concept of a social welfare function-compensation principle –the Kaldor- Hicks criterion.

Readings:

1. A.Koutsoyannis,(1979), Microeconomics A Modern Approach, East West Press, New Delhi
2. H.R.Varian (1993), Intermediate Microeconomics, W.W. Norton, New York
3. J.l Ryan(1962), Price Theory, ,MacMillan Press, London
4. N.C.Ray(1998), An Introduction to Microeconomics, MacMillan Press, London
5. N.G.Mankiw(2009), Economics : Principles and Applications, Cengage Learning, Printed in India

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Semester III

MACROECONOMICS I

Unit 1: Nature and scope of macro economics

Nature and scope of macroeconomics – meaning and definition of key macroeconomic variables (output, unemployment, inflation etc.) – concepts of national income – methods of measuring national income – circular flow of income – issues in national income accounting.

Unit 2: Employment and output in a growing economy

The goal of full employment – frictional and structural unemployment – unemployment and inadequate demand – the concept of potential output – factors affecting output – production and employment with economic growth – growth of actual and potential output

Unit 3: The Classical System

The classical revolutions – say's law –quantity theory of money– wages, prices, employment, and production – rigid wages and monetary policy in the classical model.

Unit 4: The Keynesian Model

The problem of unemployment – the components of aggregate demand – equilibrium income – determination of equilibrium income – changes in equilibrium income – the role of fiscal policy and multiplier – the concept of balanced budget multiplier – exports and imports in Keynesian model.

Unit 5: Money, interest and income:

The money supply, money demand and interest rate – the relationship between bond prices and interest rates – the Keynesian theory of money demand and interest rate – the liquidity trap – the implications of increase in money supply.

Readings

1. R T Froyen (2008), Macroeconomics, Theory and policies, Prentice Hall.
2. N. Gregory Mankiw, (2002), Principles of Economics, Thomson.
3. Gardner Ackley (1978), Macroeconomics, Theory and Policy, Macmillan Library

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Semester III

STATISTICAL METHODS II

Unit 1: Correlation

Concept of correlation – types of correlation – bivariate distribution and covariance –simple correlation – Karl Pearson's product moment coefficient of correlation measure – partial correlation: definition and measure (ceteris paribus assumption) – multiple correlation: definition and measure(long run production function) – Spearman's rank correlation coefficient (when ranks are given, when ranks are not given and when equal ranks are given) – properties and uses of correlation.

Unit 2: Analysis of Time Series

Definition and components of a time series – mathematical models – additive model and multiplicative model of a time series – seasonal variations – measuring through -a) simple average method- and ratio to trend method – cyclical variations – measuring through residual method – trend and its measurement through a) method of moving averages and method of least squares(annual production, sales, profit. etc.,) – fitting a second degree trend (population growth) – growth curves, logistic curve and gompertz curve – interpolation and extrapolation.

Unit 3: Regression Analysis

Meaning of regression – types of regression – simple and multiple linear and non-linear regressions – concept and method of least squares – line of best fit – regression coefficients – line of regression of x on y (aggregate consumption function) –line of regression on y on x (accelerator) – properties of regression coefficients – utility regression analysis in economic studies – coefficient of determination.

Unit 4: Index Numbers

Definition of index number – types of index number – price index-quantity index –value index – simple index number – weighted index number – construction of index number – problems in construction – methods in construction – simple and weighted – Laspeyre's price index (cpi in india) – Paasche's price index – Fisher's ideal index – splicing of index number – deflating (finding real wages).

Unit 5: Statistical Quality Control (SQC)

Definition – causes of variation in quality – types of quality control – process control and product control – SQC methods – control charts, mean charts, fraction defective charts.

Readings:

1. A.L. Nagar and R.K. Das (2006), Basic Statistics, Second Edition Oxford University Press, New Delhi.
2. S.P. Gupta (2000), Statistical Methods, Sultan Chand and Sons, New Delhi.

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Semester IV

MONETARY ECONOMICS

Unit 1: Definition, Functions and Theories of Money

Money and its function – the concepts and definitions of money – measurement of money – advantages of money – theories of demand for money**:** Classical approach, the transactions and cash balance approach, the Keynesian analysis, Post Keynesian developments, Monetarist approach.

Unit 2: Money Supply

Financial intermediaries – nature and functions – theories of money supply – mechanistic model of money supply determination – high powered money and behavioral model of money supply determination – methods of monetary control – Interest rates in closed and open economies – theories of term structure.

Unit 3: Monetary Transmission Mechanism:

Meaning – interest rate channel, credit channel, bank lending channel, balance sheet channel, exchange rate channel, other asset price channels.

Unit 4: Monetary Policy:

Instruments, targets, indicators, lags in monetary policy and rules versus discretion debate.

Unit 5: Central Banking:

Functions of a central bank – quantitative and qualitative methods of credit control – bank rate policy, open market operations, cash reserve ratio, selective methods, role and functions of Reserve Bank of India – objectives and limitations of monetary policy with special reference to India.

Readings

1. Pierce, D G and P J Tysome (1985) Monetary economics: theories, evidence and policy, Butterworths, London.
2. Saving, R T (1967), "Monetary policy targets and indicators", Journal of Political economy,75: 446-465
3. Carl E Walsh (1998), Monetary Theory and Policy, MIT Press, Cambridge.
4. Bennett McCallum (1989), Monetary Economics: Thoery and Policy, Macmillan.
5. C Rangarajan (1999), Indian Economy: Essays in Money and Finance, UBSPD.
6. Narendra Jadhav (1994), Monetary Economics for India, Macmillan.

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Semester IV

MACROECONOMICS II

Unit 1: Microeconomic Foundations

Consumption – absolute income hypothesis, relative income hypothesis, life cycle hypothesis, permanent income hypothesis – investment (business fixed investment, residential investment and inventory investment) – neo-classical theory of investment – accelerator theory of investment – the Tobin's q theory.

Unit 2: The Closed Economy in the Short Run

The goods market and derivation of IS curve – real influences and Shift in IS schedule – the money market and derivation of LM curve – the shift in LM curve – determination of equilibrium income and interest rates – the relative efficacy of fiscal and monetary policy.

Unit 3: The Aggregate Demand and Supply

The derivation of aggregate demand and supply curves – the Keynesian aggregate demand with vertical aggregate supply curve – sources of wage rigidity and unemployment – the flexible price with fixed money wage model – labour supply and money wage – the shift in aggregate supply – Keynes vs. Classics.

Unit 4: Output, Inflation and Unemployment

Inflation: concepts and consequences- The Phillips curve – the natural rate of unemployment – factors affecting natural rate of unemployment – the adaptive expectation and long-run Phillips curve – the concept of rational expectations – policy ineffectiveness debate.

Unit 5: Open Economy Models

The Mundell-Fleming model – determining equilibrium output in a small open economy – the monetary and fiscal policy under flexible and fixed exchange rates regimes – the Mundell-Flemming model with changing price level.

Readings:

1. R T Froyen (2008), Macroeconomics, Theory and policies, Prentice Hall
2. N. Gregory Mankiw (2010). Macroeconomics (7th Edition). Worth Publishers
3. Rudiger Dornbusch, Stanley Fischer and Richard Startz (2007), Macroeconomics, McGraw Hill.
4. Jones, Charles I. (1998), Introduction to Economic Growth, W.W. Norton & Company, Chapters 1, 2, 8.

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Semester IV

MATHEMATICS FOR ECONOMISTS II

Unit 1: Functions of One Real Variable

Examples (linear functions, polynomials, etc.) – Sets of points in the plane determined by equations or inequalities.

Unit 2: Limits

Infinite sequence and series – the concepts of convergence and limits – algebraic properties of limits – the limit of f(x) as x →a – continuity – the intermediate – value theorem.

Unit 3: Advanced/Higher Calculus

The second derivative criterion – points of inflexion – differentials and linear approximation – exponential and logarithmic functions – logarithmic differentiation – partial differentiation – tangent planes to a surface – higher–order partial derivatives – partial derivatives in economics – the chain rule – first and higher order derivatives of functions defined implicitly..

Unit 4: Problem of Optimization

Homogeneous functions – elasticity of substitution –concave and convex functions – convex sets – maxima and minima – saddle points – unconstrained optimization – necessary and sufficient conditions for local optima – constrained optimization (equality constraints) – the method of Lagrange multipliers – interpretation of the necessary conditions and of the Lagrange multiplier – sufficient conditions – economic examples.

Unit 5: Applications in Economics

The role of concavity and convexity – applications, profit maximization of firms, utility maximization and cost minimization using optimization – integration and its application in economics.

Readings

1. Knut Sydsaeter and Peter J. Hammond (2002), Mathematics for Economic Analysis. Pearson Educational Asia: Delhi (reprint of 1st 1995 edition).
2. Alpha C. Chiang (1984), Fundamental Methods of Mathematical Economics. McGraw Hill (3rd edition).
3. Weber Jean, E (1982), Mathematical Analysis HarperCollins college Div:4, Sub edition.

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Semester V

INTERNATIONAL ECONOMICS I

Unit 1: Introduction to International Economics

Importance of international economics – international trade & economic growth – subject matter of international economics – purpose of international economic theories and policies – current international economic problems

Unit 2: **Theories of International Trade**

Distinguishing features of internal and international trade – the pure theory of international trade-theories of absolute advantage, comparative advantage and opportunity cost – Heckscher-Ohlin theory of trade – factor price equalization theory – empirical relevance of the H-O theory

Unit 3: **Alternative trade theories**

Vent for surplus approach – Kravis and Linders theory of trade – imitation gap and product cycle theory, role of dynamic factor in explaining the emergence of trade, trade under imperfect competition and increasing returns to scale – measurement of gains from trade and their distribution.

Unit 4: **Economic Growth and International Trade**

Introduction – effect of growth on trade – production and consumption effects of growth, combined effect – effects of growth on terms of trade, immiserizing growth – technical progress and international growth – import substitution and export promotion strategy.

Unit 5: Gains from Trade

Meaning – factors determining the gains from trade – gains from trade and income distribution – measurement of gains from trade and their distribution – the gains from trade in the case of large and small country – free trade vs no trade – restricted trade vs no trade

Readings:

1. Paul Krugman and Maurice Obstfeld (2002), International Economics: Theory and policy, Addison Wesley
2. Salvatore D (1997), International Economics,PHI,New York
3. Dana ,M.S (2000), International Economics ,Routledge Publications ,London
4. Carbough ,R.J (1999), international Economics
5. Bhagwati.j(1981), International trade,Cambridge university Press.London

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Semester V

PUBLIC FINANCE I

Unit 1: Role of Government

Nature and scope of public finance - Rationale for government intervention – Musgrave's three function of government – types of government intervention – production versus provision – regulation of markets – sources of public revenue – deficit financing.

Unit 2: Taxation

Theories of taxation– ability and benefit principles of taxation (Lindhal) – Principle of maximum social advantage – taxable capacity – shifting and incidence – types of taxes – characteristics of good tax system.

Unit 3: Public Expenditure

Theories of public expenditure – Wagner's law – Peacock hypothesis – Samuelson theory of public goods– basics of cost benefit analysis.

Unit 4: Decentralization

Rationale for decentralization – economic, administrative and political – assignment of taxes and expenditure between various tiers of a federal government – rationale and role of local governments.

Unit 5: Deficit Financing

Deficit financing – monetarist versus Keynesian views – pattern of deficit financing – public debt management and implication for growth, inflation and interest rate.

Readings:

1. Goode, R. (1986), Government Finance in Developing Countries, TMH, New Delhi
2. Jha. R. (1998), Modern Public Economics, Routledge, London.
3. Musgrave, R.A. and P.B. Musgrave (1976), Public Finance in Theory and Practice, McGraw Hill, Kogakusha, Tokyo
4. Atkinson, A.B. and J.E. Stiglitz (1980), Lectures on Public Economics, TMH, New York.
5. Herber, B.P. (1967), Modern Public Finance, Richard D. Irwin, Homewood.

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B.A. Economics for affiliated colleges

Semester V

ELEMENTS OF ECONOMETRICS

Unit 1: Nature and Scope of Econometrics

Meaning of econometrics – relationship between statistics, mathematics and economics – economic and econometric models – the aims and methodology of econometrics – historical origin of the term regression and its modern interpretation – statistical vs deterministic relationship – regression vs causation – regression vs correlation – terminology and notation – the nature and sources of data for econometric analysis.

Unit 2: Two Variable Regression Analysis

The basic two variable regression models: estimation – statistical inference and prediction – extensions of two variable regression model – regression through origin – scaling and units of measurement – functional forms of regression model –

Unit 3: Multiple Regression Analysis

Multiple Regression Analysis: The problem of estimation – notation and assumptions – meaning of partial regression coefficients the multiple coefficient of determination – R^2 and the multiple coefficient of correlation R – R^2 and adjusted R^2 – partial correlation coefficients – interpretation of multiple regression equation.

Unit 4: The Problem of Inference

The normality assumption – hypothesis testing about individual partial regression coefficients – testing the overall significance of the sample regression – testing the equality of two regression coefficients – restricted least squares – testing for structural stability of regression models – testing the functional form of regression.

Unit 5: Relaxing the Assumptions of the Classical Regression Model

Multicollinearity – heteroscedasticity and autocorrelation: nature, consequences, detection and remedial measures.

Readings

1. Gujarathi, D (2003) Basic Econometrics, 4th Edition, New York: McGraw Hill
2. Maddala, G (1992) Introduction to Econometrics, 2nd ed., New York: MacMillan.

PONDICHERRY UNIVERSITY

B.A. Economics for affiliated colleges

Semester V

INDIAN ECONOMY I

Unit 1: Indian Economy Prior to Independence

Indian economy in the pre British period – structure and organization of villages – industries and handicrafts – Indian economy and the British conquest – rule of the East Indian Company (1758-1858) – rule of the British Government (1858-1947) – commercialization and agriculture – famines during British period – industrial transition – monetary and currency developments – taxation system during the British period – economic consequences of the British rule – colonial exploitation (forms and consequences) – the theory of drains – its pros and cons.

Unit 2: Indian Economy at the Time of Independence

Backward economy – salient characteristics of India as a backward economy – obstacles to development in 1947 – planning exercises in India – National Planning Committee – people's plan – Gandhian plan - Planning Commission .

Unit 3: Structure and Resources of Indian Economy

Structure of Indian economy – national income – sectoral contribution and economic transition in India – resources of india: natural, land, forest, fisheries, and mineral resources – economic development and resource depletion – infrastructure: a short review – human resources – theory of demographic transition – population size and growth rates – consequences – sex, age, and rural urban composition – density and quality of population – occupational distribution – population policy – social infrastructure – growth of education and health.

Unit 4: Planning in India

Objectives of planning – overview of plans in India – approaches, outlays, targets and priorities, broad achievements and failures – new economic reforms – liberalization, privatization and globalization – rationale behind economic reforms – progress of privatization and globalization.

Unit 5: Indian Agriculture

Nature and significance of agriculture – trends in agriculture production and productivity – factors determining productivity – progress of agriculture under the five year plans – new agriculture strategy and green revolution – land reforms – irrigation, rural credit, marketing and warehousing – agricultural labour.

Readings:

1. Romesh chander Dutt (2000), The Economic History Of India Under Early British Rule, Routledge (reprinted), London
2. Dadabhai Naoroji (1990), Poverty and British rule in India, Low Price Publications.
3. V.K.R.V. RAO (1983), India's national income, 1950-1980: an analysis of economic growth and change, Sage Publications.
4. Reserve Bank of India (2005), Hand book of statistics on the Indian Economy (2004-05)
5. Kirit S Parikh and R.Radhakrishnan (ed) (2002), India Development Report.
6. Centre for Science and Environment(1982), The state of Indian Environment
7. Government of India, Economic surveys, Different years
8. Census of India, various issues.
9. Ruddar Datt (1997), Economic Reforms in India – a Critique, S. chand and co, New Delhi.
10. Ruddar Datt and K.P.M Sundaram (2008), Indian Economy S.chand and co, New Delhi,

PONDICHERRY UNIVERSITY

B.A. Economics for affiliated colleges

Semester V

DEVELOPMENT ECONOMICS

Unit 1: Nature and Scope of Development Economics

Emergence of development economics – reasons, subject matter, nature and significance – role of values in development economics.

Unit 2: Economic Development (Meaning and Measurement)

Meaning of economic development – distinction between growth and development – new view of economic development (Dudley Seers view) – three core values of development: sustenance, self esteem and freedom – growth and environmental degradation – economic development and human welfare – measurement of economic development – limitations of using percapita income as a measure – alternative measures: PQLI and Human Development Index.

Unit 3: Economic Growth

Modern economic growth – Kuznets six characteristics – relevance of historical growth experience to the under developed countries – contemporary UD countries – diverse structure and common characteristics.

Unit 4: Theories of Under Development and Development

Theories of under development: vicious circle of poverty, low level equilibrium trap, circular causation and backwash effect, dualism, dominance and dependence – theories of development, classical theories (Smith, Ricardo, Malthus), Marxian theory of capitalist development, Schumpeterian analysis of capitalism.

Unit 5: Strategies for development

Big push – balanced vs unbalanced growth – Mahalanobis strategies – balance between agriculture and industry – import substitution vs export orientation – neo-liberal vs interventionist policies.

Readings

1. Michael P. Todaro, (1998), Economic development Longman,
2. A.P. Thirwall (2005), Growth and Development: With Special Reference to Developing Economies, Palgrave Macmillan
3. Denis Gullet, (1971), The Cruel Choice: A New Choice in the Theory of Development, New York, antheneum.
4. Charles P. Kindleberger and Bruce Herrick (1983), Economic Development, McGraw-Hill Education
5. Adam Szirmai,(2005), The Dynamics of Economic Development: An Introduction Cambridge University Press .
6. Higgins (1968), Economic Development, WW Norton & Co.
7. G.M. Meier, (2003) Leading issues in economic development, Oxford University Press.
8. Gunnar Myrdal (1970) The Challenge of World Poverty: A World Anti-Poverty Program in Outline, Random House Trade Paperbacks.

PONDICHERRY UNIVERSITY

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Semester V

HUMAN RESOURCE MANAGEMENT

Unit 1: Human Resource Management

Nature and Scope – objectives – nature of people and organizations – Personnel policies and principles – Environment of human resource management – social systems – human resource accounting and audit.

Unit 2: Human Resouce Planning

Human resource/ manpower planning – meaning – process of HR Planning – job analysis – recruitment and selection – orientation and placement – orientation programmes

Unit 3: Employee and Reward Systems

Training personnel – job – job evaluation – job satisfaction – appraising and rewarding performance – money as means of rewarding – economic incentive systems – wage incentives – wage administartion – benefits and services – profit and production sharing

Unit 4: Motives

Human needs – theories of motivation –Maslow's Hierarchy needs – Hertzberg's two factor model – other theories – Behavioral modification – motivational patterns – expectancy model – application of motivation concepts

Unit 5 Leadership, Communication and Counseling

Nature of leadership behavior – leadershio style – employee participation – nature, scope programmes and benefits of participation – employee communication process – communication systems – employee counseling and types.

Readings:

1. Michael V. P. (1998), Human Resource Management and Human Relations – Himalaya Publishing House, New Delhi
2. M N Rudrabasavaraj (1998), Cases in Human Resouce Management – Himalaya Publishing House, New Delhi.
3. H. John Bernardin and Richard W Beauty (1984), Performance Appraisal: Assessing Human Behaviour at Work, Bosten:Kent.
4. George T Milkovich and John W Boudreu (1998), Personal Human Resource Management: A Diagnostic Approch, th Ed. Plano, TX Business Publications.

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B.A. Economics for affiliated colleges

Semester VI

INTERNATIONAL ECONOMICS II

Unit 1: Terms of Trade, Tariff and Protection

Concept of terms of trade – their uses and limitations – importance in the theory of trade – secular deterioration of terms of trade, its empirical relevance and policy implications for less developed countries – trade as a engine of growth – theories of terms of trade – views of British school, Rawl, and Singer and Prebisch– theory of intervention – economic effects of tariff on national income, terms of trade and income distribution – effects of quotas – effective rate of protection.

Unit 2: International Economic Integration

Benefits of integration – types of integration – forms of economic cooperation – the theory of custom union – its features – partial and general equilibrium approach – Vanek model – welfare gains or losses from a custom union – Lipsey model – dynamic effects of custom union.

Unit 3: Balance of Payment

Meaning structure and components of balance of payment – equilibrium and disequilibrium in the balance of payment – consequences of disequilibrium in the balance of payment – balance of payment and balance of trade – causes and methods of its correction (both monetary and non- monetary measures and their relative merits and demerits).

Unit4: Review of national income and Balance of Payment Accounting

National income accounts and Balance of Payments accounts: balance of trade, BoP on capital and current account, overall BOP, BOP accounting principles (credits & debits, double entry book keeping).

Unit 5: Balance of Payment and Policy

Automatic adjustment mechanism under Gold Standard – Balance of Payment and national income – expenditure reducing and expenditure switching policies – direct control for adjustment – policies for achieving internal and external balance.

Readings:

1. Salvatore D (1997), International Economics, John Willey & sons.
2. Paul Krugman and Maurice Obstfeld (2002), International Economics: Theory and policy, latest edition, Pearson Education low-price edition, distributed in India by Addison-Wesley Longman.
3. Amitav K. Dutt (1995), "The Open Economy" in Prabhat Patnaik (ed.), Macro-economics,OUP, Delhi.
4. T.N. Srinivasan (1998), Developing Countries and the Multilateral Trading System, OUP, Delhi, Chapters 5-8.
5. W.M. Corden (1974), Trade Policy and Welfare, Claredon Oxford, Chapters 1, 2 and 9.
6. Mannur, H.G (2000). International Economics

PONDICHERRY UNIVERSITY

B.A. Economics for affiliated colleges

Semester VI

PUBLIC FINANCE II

Unit 1: Trend and Pattern of Public Revenues

India's public revenue – taxes of union, state and local Governments – trends in tax revenue – tax/GDP – tax and distributive justice – direct versus indirect taxes – tax reforms - rate and procedure rationalization – VAT in union and state taxes.

Unit 2: Trend and Pattern of Public Expenditure

India's public expenditure – trend in union, state and local Government's public expenditure – public expenditure/GDP – change in the composition of public expenditure – developmental versus non developmental – plan versus non plan – revenue versus capital – economic and functional classification of public expenditure – implications.

Unit 3: Basics of Budgeting

Constitutional basis for budgeting – process of passing finance and appropriation bills in the parliament/assembly – CAG and PAC – FRBM – deficit, public debt and monetary management.

Unit 4: Centre State Financial Relationships

Role of Finance Commission in filling vertical and horizontal fiscal imbalance – plan transfers and discretionary transfers – latest finance commission report of the union and state governments.

Unit 5: Recent Fiscal Reforms

Latest commentary on India's fiscal policy – tax reforms, expenditure pruning, constitutional constraints on deficit - fiscal and monetary policy nexus.

Readings:

1. Goode, R. (1986), Government Finance in Developing Countries, TMH, New Delhi
2. Jha. R. (1998), Modern Public Economics, Routledge, London.
3. Musgrave, R.A. and P.B. Musgrave (1976), Public Finance in Theory and Practice, McGraw Hill, Kogakusha, Tokyo
4. Atkinson, A.B. and J.E. Stiglitz (1980), Lectures on Public Economics, TMH, New York.
5. Herber, B.P. (1967), Modern Public Finance, Richard D. Irwin, Homewood.

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Semester VI

INDIAN ECONOMY II

Unit 1: Indian Industries

Role of Indian industries – industrial development during the planning period – industrial policies – licensing policy – growth and problems of some large scale industries: iron and steel, cotton, jute, sugar and cement – growth and problems of small scale enterprises – role, growth and problems of public sector enterprises in India.

Unit 2: Indian Currency, Financial System and Public Finance

Indian currency systems today – sources of broad of money (m3) : factors affecting money supply in India – progress of banking in India since 1969 – role of reserve bank of India in Indian economic development – competition of India's capital and money markets – revenues and expenditure of central government – current central budget – revenue and expenditure of state government – financial relation between the centre and states.

Unit 3: Important Areas of Concern

Poverty and inequality in India – Rising unemployment, rising prices, industrial Relations – regional disparities – Environmental degradation-parallel economy.

Unit 4: Puducherry Economy

A short review of Puducherry economy as it emerged from the French rule- An overview of structure of puducherry Economy - physical and Human resources- Growth of agriculture and its present problems – Measures taken by the Government to improve agriculture production and productivity- industrial growth and Industrial Issues –Industrial policies – Infrastructure development-Energy, Transport, Education ,Health, Housing and Banking.

Unit 5: Planning, Government Finance and Development Issues of Puducherry.

Overview of planning in Puducherry- Achievements and failures of planning in puducherry- Government finance –Structure and Growth of government's Revenue-Growth and trends in Public expenditure –m Central Government t assistance to Puducherry as Union Territory – Development issues of Puducherry –Urbanization and its problems – Environmental issues _ poverty and unemployment – Inter regional disparities –Growing financial stresses of the UT Government –Demand for statehood to Puducherry and UT states to karaikal.

Readings:

1. Aluwalia, I.J. and I.M.D. Little (Eds) (1999), India's Economic Reforms and Development, Oxford University Press, New Delhi.
2. Bardhan,P.K. (1999), The Political Economy of Development in India, Oxford University Press, New Delhi.
3. Bawa, R.S. and P.S. Raikhy, (1997), Structural Changes in Indian Economy, Gurunanak Dev University Press, Amritsar.
4. Chakravarty, S. (1987), Development Planning: The Indian Experience, Oxford University Press, New Delhi.
5. Datt.R. (2001), Second Generation Economic Reforms in India, Deep and Deep Publications, New Delhi.
6. Ramadass. M. (1987), Pondicherry Economy, Priser.
7. M.Y. Khan (2008), Indian Financial System, 5th Edition, T.M.H Publishing Company.
8. Ruddar Datt and K.P.M Sundharam (2008) Indian Economy S.Chand & Company Ltd.

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B.A. Economics for affiliated colleges

Semester VI

HISTORY OF ECONOMIC THOUGHT

Unit 1: Early Period

Nature and importance of history of economic thought – ancient economic thought – Aristotle, Plato-Medieval economic thought – contribution of early Muslim scholars to economic thought: Abu Yusuf, Marwadi, Gazali, Ibn Themiah, Ibn Hazm and Ibn Khaldun, Mercantilism: Main characteristics – Physiocracy: main characteristics .

Unit 2: Classical Period

Adam Smith – David Ricardo – Thomas R. Malthus – German romantics and socialists – Sismondi, Karl Marx – economic ideas of J.B.Say – J.S.Mill – Historical School: Senior, List.

Unit 3: Marginalists

The precursors of marginalism – Cournot, Thunen, Gossen – the marginalist revolution – Jevons, Walras and Menger-Bohm-Bawerk, Wicksell and Fisher – the rate of interest – Wicksteed and Weiser – distribution-Marshall as a great synthesizer – Pigou:welfare economics – Schumpeter: role of entrepreneur and innovations.

Unit 4: J M Keynes and his Contributions

A Treatise on Money – The General Theory of Employment, Interest and Money.

Unit 5: Indian Economic Thought

Early economic ideas: Kautilya, Valluvar – Modern economic ideas: Naoroji, Ranade, R.C.Dutt, Gokhale, J.K.Metha and M.N.Roy – Economic ideas of Gandhi: Village, swadesi, place of machine and labor, cottage industries, trusteeship – Early approaches to planning – cooperation as a strategy – Contributions of Vakil, Gadgil and VKRV Rao – Economic thought of Dr.Ambedkar.

Readings:

1. Bhatia H.L (1994), History of Economic Thought, Vikas Publishing House, New Delhi.
2. Ganguli,B.N(1977), Indian Economic Thought: A Nineteenth Century Perspective, TMH, New Delhi.
3. Roll,Eric, History of Economic Thought.
4. Seshari,G.B (1997), Economic Doctrines,B.R.Publishing Corporation, New Delhi.
5. Haney(1977), Economic Thought
6. Gide and Rist Economic Thought.
7. Shanmugasundaram.V(1981), Indian Economic Thought and Policy,S.Chand, New Delhi.
8. Ghosh,B.N and R.Ghosh(1988), Concise History of Economic Thought.
9. Readings in Islamic Economic Thought Edited by Abul Hassan M. Sadeq and Aidit Ghazali, Longman, Malaysia, 1992.

PONDICHERRY UNIVERSITY

B.A. Economics for affiliated colleges

Semester VI

INDIAN FINANCIAL INSTITUTIONS AND MARKETS

Unit 1: Introduction to Money

Simple exposition to money demand and money supply – RBI and measures of money supply – commercial banks and credit creation – RBI control on money supply – time value of money and interest rates.

Unit 2: Introduction to Indian Financial System

Overview of Indian Financial System – functions of financial system – players – structure and growth – regulatory bodies.

Unit 3: Money and Capital Markets

Indian money market – instruments – institutions – functioning of Indian money market – changes in the regulatory framework – growth – stocks and bonds – primary and secondary markets – process of initial public offer – offer of Government bonds – stock market functioning – stock indices – evaluation of stocks and bonds – understanding stock market information.

Unit 4: Foreign Exchange Market

Exchange rate – types – determination of exchange rate – nature of forex market – nature of forex inflow and outflow – examples of ECBs and NREs – RBI and exchange rate management.

Unit 5: Financial Derivatives

Need for derivatives – types of derivatives – example of how stock index derivatives could be used to hedge risks in stock market investment – evaluation of financial derivatives.

Readings:

1. Bhole, L.M. (2002), Indian Financial Institutions and Markets, Tata McGraw Hill Ltd, New Delhi.
2. David S. Kidwell, David W. Blackwell, David A. Whidbee, Richard L. Peterson, (2005) Financial Institutions, Markets, and Money, 9th Edition, Wiley Publication, New York.
3. Khan M.F., (2006), Indian Financial Institutions, Tata McGraw Hill Ltd, New Delhi.
4. Pathak, Bharathi V., (2007), The Indian Financial System: Markets, Institutions and Services, 2/e, Pearson Education India, New Delhi.

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Semester VI

MARKETING

Unit 1:Introduction

Nature and scope of marketing – importance of marketing as a business function and in the economy –marketing concepts; traditional and modern, selling vs marketing – marketing mix – marketing environment.

Unit 2:Consumer Behaviour and Market Segmentation

Nature, scope and significance of consumer behavior and market segmentations – concept and importance – bases for market segmentation.

Unit 3:Product

Concept of product, consumer, and industrial goods – product planning and development – packaging role and functions – brand name and trade mark – after sale service – product life cycle concept.

Unit 4:Price Importance of Price in Marketing Mix

Factors affecting price of a product/service – Discounts and rebates.

Unit 5:Distribution Channels and Physical Distributions

Distribution Channels – concept and role – type of distribution channels – Factors affecting choice of a distribution channel – retailer and wholesaler – physical distribution of good transportation – warehousing; inventory control – order processing.

Unit 6:Promotion Methods

Promotion methods of promotion – optimum promotion mix – advertising media – their relative merits and limitations – characteristics of an effective advertisement – personal selling; selling as a career – classification of a successful sales personal – functions of a salesman.

Readings:

1. Phillip Kotler (2000)., Marketing management, Englewood cliffs, Prentice Hall NJ.
2. William M pride and O C Ferrell(2003), Marketing , Houghton- Millin , Boston.
3. Stanton W J, Etzel Micheal J and Walker bruco J.(2005), Fundementals of marketing, McGraw Hills, New delhi.
4. Lamb Charles W., Hair Joseph F., and DcDaniel Carl.(2000), Principles of marketing, South Western Publishing Cincinnati, Ohio.
5. Cravens David W. Hills Gerald E, Wooddruff Robert B.(2004),Marketing Management, Homewood ,Ilinois.
6. Kotler P and Armstron G.(2005), Principles of marketing, Englewood Cliffs Prentice Hall, NJ.

PONDICHERRY UNIVERSITY

PUDUCHERRY

B.Com

DEGREE PROGRAMME

SEMESTER PATTERN

REVISED SYLLBI

WITH EFFECT FROM

ACADEMIC YEAR 2011 - 2012

CONTENTS

PONDICHERRY UNIVERSITY

BACHELOR OF COMMERCE (B.COM) DEGREE COURSE

REGULATIONS

(WITH EFFECT FROM ACADEMIC YEAR 2011 – 2012)

AIM OF THE COURSE:

The B. Com Degree programme provides ample exposure to subjects from the fields of Commerce, Accountancy and Management. The course equips the students for entry level jobs in Industry, a key contributor to the economic development of the country.

DURATION OF THE COURSE:

The duration of the B.Com degree programme shall be for three academic years of six semesters.

ELIGIBILITY FOR ADMISSION:

Candidates for admission to the first year of the B.Com degree shall require to have passed the Higher Secondary Course examination (+2) of any board or equivalent recognized by the Pondicherry University, having commerce and / or accountancy as one of the subjects.

For lateral entry, candidates, who passed Diploma in Commerce or Diploma in Modern Office Practice (3 years course) awarded by Directorate of Technical Education of Tamil Nadu or other states shall be admitted to the second year of B.Com degree.

AGE LIMIT:

The rules are as applicable to other Under Graduate courses as prevailing in Pondicherry University.

COURSE OF STUDY

The course of study for B.Com Degree shall comprise of the following.

Part I - Language (Any one of the Part I language under the option of the candidate for first year only The syllabus and text books for the above said language papers are as prescribed by Pondicherry University from time to time.

Part II - English (for first year only)

The syllabus and text books for the above said English papers are as prescribed by Pondicherry University from time to time.

Part III - Major and Allied subjects

EXAMINATION

There shall be examinations at the end of each semester i.e. November /April. A candidate who does not pass the examination in any subject(s) shall be permitted to appear in such failed subject(s) in the subsequent semester examinations. No candidate shall be permitted to register for a subsequent examination without having registered at the first appearance. Rules and regulations prevailing in the University in respect of other courses will be followed. The results of all the examinations will be communicated to the candidates through the Principals of the College.

SCHEME OF EXAMINATION:

All the theory/practical examinations will be of three hours duration. The maximum marks for each subject shall be 100. Passing minimum for theory examinations is 40. For the Computer Application paper (maximum 50 marks for theory and 50 marks for practical), passing minimum shall be 20 marks each for theory and for practical components separately.

EVALUATION:

Theory/Practical examinations will be evaluated by Pondicherry University.

ATTENDANCE:

A candidate shall be permitted to appear for the examination in a subject of study only if

1. He/She secures not less than 75% attendance in the subject concerned.
2. He/She may be allowed to appear for the examination under condonation category not below 60% of attendance.

CLASSIFICATION OF SUCCESSFUL CANDIDATES:

1. Candidates who pass in all the examinations in all the 3 years and secures an aggregate of not less than 60% of the total marks in the University examinations shall be declared to have passed the examination for the degree in First Class.
2. Candidates who pass in all the examinations in all the 3 years and secures an aggregate of not less than 50% of the total marks in the University examinations shall be declared to have passed the examination for the degree in Second Class.
3. All other successful candidates who secure 40% to 49% shall declared to have passed the examination for the degree in Third Class.
4. For purpose of declaring a candidate to have qualified for the degree of B.Com in First Class/ Second Class / Third Class, marks obtained in Part III alone will be the criteria, provided he/she has secured the prescribed passing minimum in Part I and Part II.
5. The marks of Environmental Studies paper shall not be considered for classification under Part III.
6. There shall be no classification for Part I and Part II.

AWARD OF THE DEGREE:

The candidate should have undergone the prescribed course of study for a period of not less than 3 years and passed the prescribed examination course of study for a period not less than 3 years and passed the prescribed examinations in all the papers / years. Further a candidate will get a maximum of six years only from the year of admission to pass all the papers.

REVISION OF REGULATIONS AND CURRICULUM:

The University may from time to time revise, amend and change the Regulations and Curriculum, if found necessary.

PONDICHERRY UNIVERSITY

B.COM. DEGREE COURSE

CURRICULAM

(WITH EFFECT FROM ACADEMIC YEAR 2011 – 2012)

FIRST SEMESTER

Sl. No.	Paper		Lecture/ Practical Hrs/week	Exam Duration Hrs	Max. Marks
1	Foundation	English I	6	3	100
2	Foundation	Language I	6	3	100
3	Major I	Financial Accounting I	6	3	100
4	Major II	Business Management	6	3	100
5	Allied I	Business Economics	6	3	100

SECOND SEMESTER

Sl. No.	Paper		Lecture/ Practical Hrs/week	Exam Duration Hrs	Max. Marks
1	Foundation	English II	5	3	100
2	Foundation	Language II	5	3	100
3	Major III	Financial Accounting II	6	3	100
4	Major IV	Business Law	6	3	100
5	Allied II	Business Environment	5	3	100
6	Compulsory	Environmental Studies	3	3	100*

*Marks not considered for classification

THIRD SEMESTER

Sl. No.	Paper		Lecture/ Practical Hrs/week	Exam Duration Hrs	Max. Marks
1	Major V	Corporate Accounting I	6	3	100
2	Major VI	Company Law	6	3	100
3	Major VII	Business Statistics	6	3	100
4	Major VIII	Cost Accounting	6	3	100
5	Major IX	Entrepreneurial Development	6	3	100

FOURTH SEMESTER

Sl. No.	Paper		Lecture/ Practical Hrs/week	Exam Duration Hrs	Max. Marks
1	Major X	Corporate Accounting II	6	3	100
2	Major XI	Business Communication	6	3	100
3	Major XII	Money and Financial System	6	3	100
4	Major XIII	Auditing	6	3	100
5	Major XIV	Business Mathematics	6	3	100

FIFTH SEMESTER

Sl. No.	Paper		Lecture/ Practical Hrs/week	Exam Duration Hrs	Max. Marks
1	Major XV	Income Tax I	6	3	100
2	Major XVI	Computer Applications in Business (Theory)	3	3	50
3	Major Practical	Computer Applications in Business (Practical)	3	3	50
4	Major XVII	Management Accounting I	6	3	100
5	Major XVIII	Electives ** - Paper 1	6	3	100
6	Major XIX	Electives ** - Paper 2	6	3	100

SIXTH SEMESTER

Sl. No.	Paper		Lecture/ Practical Hrs/week	Exam Duration Hrs	Max. Marks
1	Major XX	Income Tax II	6	3	100
2	Major XXI	Management Accounting II	6	3	100
3	Major XXII	Indirect Taxes	6	3	100
4	Major XXIII	Electives ** - Paper 3	6	3	100
5	Major XXIV	Electives ** - Paper 4	6	3	100

* Not taken for aggregate marks

** List of electives and detailed syllabus enclosed

PONDICHERRY UNIVERSITY

B.COM DEGREE COURSE

QUESTION PAPER PATTERN

(WITH EFFECT FROM ACADEMIC YEAR 2011 – 2012)

FOR ACCOUNTS PAPERS

SECTION A: Answer any 5 out of 8 Questions (5 X 10 Marks = 50 Marks)
SECTION B: Answer any 2 out of 3 Questions (2 X 25 Marks = 50 marks)

FOR OTHER PAPERS

SECTION A: Answer all Questions (10 X 3 Marks = 30 Marks)
SECTION B: Answer any 5 out of 8 Questions (5 X 6 Marks = 30 Marks)
SECTION C: Answer any 2 out of 3 Questions (2 X 20 Marks = 40 Marks)

SEMESTER I

MAJOR I

FINANCIAL ACCOUNTING – I

OBJECTIVE : To impart basic accounting knowledge as applicable to business

UNIT I Meaning and Scope of Accounting: Need, development, and definition of accounting; Book-keeping and accounting; Persons interested in accounting; Disclosures; Branches of accounting; Objectives of accounting. –

UNIT II Accounting Principles: International accounting standards (only outlines); Accounting Principles; Accounting standards in India.

UNIT III Accounting Transaction: Accounting Cycle; Journal; Rules of debit and credit; Compound Journal entry; Opening entry; Relationship between journal and ledger; Rules regarding Posting; Trial balance; Sub division of journal, Sectional Balancing System: Self balancing system- Accounts of Non - Trading Institutions

UNIT IV Capital and Revenue: Classification of Income; Classification of expenditure; Classification of receipts. Accounting concept of income; accounting concepts and income measurement; expired cost And income measurement. Final accounts; manufacturing account; trading account; Profit and loss account; Balance Sheet; Adjustment entries. Rectification of errors; Classification of errors; Location of errors; Rectification of errors; Suspense account; Effect on profit .

UNIT V Depreciation Provisions, and Reserves; Concept of depreciation; Causes of depreciation; Depreciation, depletion, amortization, and dilapidation; depreciation accounting; Methods Of recording depreciation; Methods for providing depreciation; Depreciation of different assets; Depreciation of replacement cost; Depreciation policy; as per Accounting Standard; Depreciation accounting Provisions and reserves.

(Problems: 80%, Theory: 20%)

Text Book

1. Shukla M.C Grewal S and Gupta S.C., Advanced Accounting,(2010) S. Chand & Co New Delhi

Reference Books

1. Gupta, R.L. and Radhaswamy M., Financial Accounting, (2006) Sultan Chand Sons. New Delhi
2. Compendium of Statement and standards of Accounting: The Institute of Chartered Accountants, New Delhi.
3. Jawarhar Lal (2009) Advanced Accounts . Sultan Chand & Sons ,Delhi
4. T.P.Gosh (2006) Fundamentals of Accounting, Sultan Chand & Sons, Delhi
5. Maheswari, S.N & Maheshwary, S.K (2006) Fundamentals of Accounting, Viikas Publishing, New

SEMESTER I

MAJOR II

BUSINESS MANAGEMENT

OBJECTIVE: To orient the students the management principles and techniques that could achieve business Success

UNIT I Introduction: Concept, nature process, and signification of management: Management roles (Mintzberg) An overview of functional areas of management; Development of management thought; Classical and neo-classical system; Contingency approaches.

UNIT II Planning: Concept, process, and types, decision making – concept and process; Bounded Rationality; Management by objective; Corporate planning; Environment analysis and diagnosis Strategy formulation.

UNIT III Organizing Concept, nature, process, and significance; Authority and responsibility Relationship Centralization and decentralization Departmentation - Organization Structure – forms and contingency factors

UNIT IV Motivating and Leading People at Work: Motivation-concept; Theories-Maslow, Herzberg, McGregor, and Ouchi; Financial and non-financial incentives. Leadership - concept and leadership styles; leadership theories (Tannenbaum and Schmidt) Likert System Management - Communication – nature, process, networks, and barriers; Effective communication.

UNIT V Management Control: concept and process; Effective control system; Techniques of Control - traditional and modern.

Text Books :

1. Koontz & Weirich (2007) Management, Tata McGrraw Hill, New Delhi

Suggested Reading

1. Drucker Peter. (1987), Practice of Management,Pan Books, London
2. Stoner and & Wankel (199)., Management Prentice Hall, New Delhi
3. Maslow Abraham., Motivation and Personality Harper & Row New York 1954.
4. Virmani, B.R(2010) The Challenges of Indian Management, Response Books, New Delhi

SEMESTER I

ALLIED I

BUSINESS ECONOMICS

OBJECTIVE: To relate economic theory with modern business practices

UNIT I Introduction: Basic Problems of an Economy; Working of Price Mechanism. - Elasticity of Demand: Concept and Measurement of Elasticity of Demand; Price, Income and Cross Elasticities; Determinants of Elasticity of Demand; Importance of Elasticity of Demand.

UNIT II Production Function: Law of Variable Proportions; Isoquants; Economic Region and Optimum Factor Combination; Expansion Path; Returns to Scale; Internal and External Economies and Diseconomies; Ridge Lines.

UNIT III Theory of Costs: Short-run and Long-run Cost Curves – Traditional and Modern Approaches – Average revenue and marginal revenue.

UNIT IV Market Structures: Characteristics of Different Market Structures, Price Determination under Perfect Competition, Monopoly, Monopolistic Competition and Oligopoly; Kinked demand curve.

UNIT V Factor Pricing: Marginal Productivity theory of Distribution; Marginal Productivity Theory of Wage; Ricardian Theory of Rent, Modern Theory of Rent; Liquidity Preference Theory of Interest, Modern Theory of Interest; Innovative Theory of Profit, Uncertainty Bearing Theory of Profit.

Text Books

1. Varshney, R.L & Maheswari, K.L (2004) Managerial Economics, Sultan Chand, New Delhi

Reference Books

1. Dholakia, R.H & Oza, A.L (2004) Micro Economics for Management, Oxford University Press, New Delhi
2. Ahuja, H.L., *Business Economics*(2008) S. Chand & Co., New Delhi.
3. Nelli & Parker(2009) *The Essence of Business Economics*, Prentice Hall, New Delhi.
4. Dwivedi, D.N (2001) Managerial economics, Vikas, New Delhi
5. Y.K.Bhusan, (2010) Indian economy, Sultan Chand & Co, New Delhi

SEMESTER II

MAJOR III

FINANCIAL ACCOUNTING – II

OBJECTIVE : To impart basic accounting knowledge as applicable to business

UNIT I Consignment Accounts: Important terms; Accounting records; Valuation of unsold stock; Conversion of consignment into branch.

UNIT II Joint Venture Accounts: Meaning of joint venture; join venture and partnership; Accounting Records. Accounting Dependent branch Debtors systems stock and debtor system Final accounts Systems Wholesale branch; independent branch; foreign branch;

UNIT III Hire – Purchase and instalment purchase system, Meaning of hire-purchase contract, legal Provision regarding hire – purchase contract; Accounting records for goods of substantial sale Value and accounting records for goods of small values, Instalment purchase system After sales service.

UNIT IV Partnership Accounts: Essential characteristics of partnership; partnership deed, Final account Adjustments after closing the accounts; Fixed and fluctuating capital, Treatment of Goodwill, Change in profit sharing Ratio.

UNIT V Reconstitution of a partnership firm – Admission of a partner; Retirement of a partner, Death of partner; Dissolution of Partnership firm - gradual realization of assets and piecemeal distribution

(Problems: 80%, Theory: 20%

Text Book

2. Shukla M.C Grewal S and Gupta S.C., Advanced Accounting,(2010) S. Chand & Co New Delhi

Reference Books

6. Gupta, R.L. and Radhaswamy M., Financial Accounting, (2006) Sultan Chand Sons. New Delhi
7. Compendium of Statement and standards of Accounting: The Institute of Chartered Accountants, New Delhi.
8. Jawarhar Lal (2009) Advanced Accounts . Sultan Chand & Sons ,Delhi
9. T.P.Gosh (2006) Fundamentals of Accounting, Sultan Chand & Sons, Delhi
10. Maheswari, S.N & Maheshwary, S.K (2006) Fundamentals of Accounting, Viikas Publishing, New Delhi

SEMESTER II

MAJOR IV

BUSINESS LAW

OBJECTIVE : To acquaint the learners with the fundamental principles of business laws.

UNIT I Law of Contract (1872): Nature of contract; classification; Offer and Acceptance; Capacities of Parties to contract; Free consents; Consideration, Legality of object; Agreement declared void. -Performance of contract; Discharge of contract; Remedies for breach of contract

UNIT II Special contracts: Indemnity and guarantee, Contract of Agency.

UNIT III Sale of Goods Act 1930: Formation of Contracts of sale - goods and their classification; price - conditions and warranties – transfer of property in goods – performance of the contract of sale - Unpaid seller and his Rights – sale by auction – hire purchase agreement.

UNIT IV Negotiable Instruments Act 1881: Definition of Negotiable Instruments – features – Promissory note; Bill of Exchange & cheque; Holder and holder in the due course; Crossing of a cheque, types of crossing; Negotiation; Dishonour and discharge of Negotiable Instrument.

UNIT V Consumers Protection Act: Salient Features – Definition of consumers – Grievance Redressal Machinery.

Text Book

1.D. Kapoor, *Business Law*, Sultan Chand & Sons, 2008.

Reference Books

1. S.S. Gulshan, *Mercantile Law*, Excel Books, 2001.
2. M.C.Kuchhal, *Mercantile Law*, Vikas Publishing Pvt. Ltd., 2009.
3. P.R.Chadha, *Business Law*, 2/e, Galgotia Publishing, 2007.
4. S.K.Aggarwal, *Business Law*, Galgotia Publishing Company, 2007.
5. S.N.Maheshwari & Maheshwari, *Business Regulatory Framework*, Himalaya Publishing House.2010

SEMESTER II

ALLIED II

BUSINESS ENVIRONMENT

OBJECTIVE : To realize the importance of micro and macro environment of business decisions

UNIT I Indian Business Environment: Concept, components, and importance- Indian economy ; Features of mixed economy - Different sectors of economy ; primary, secondary and territory – economic indicators - major problems in Indian economy

UNIT II Economic Environment: Business and economic environment – Economic Systems – Economic parameters and their impact on business – five year planning – Economic reforms – Liberalisation; Privatisation; Globalisation – Impact on LPG on different sectors, Foreign Investments – MNCs.

UNIT III Industrial and Technological Environment: Business Environment and IPRS – Industrial Licensing – Anti-social Trends and practices – Regulation Monopoly and Restrictive Trade Practices.

UNIT IV Social and Political Environment: Political Environment – Government and business relationship in India – Provision of Indian constitution pertaining to business – Social responsibility of business – Business and society – Ethical issues and value in business – corporate social policies, issues and challenges.

UNIT V International Environment: International trading environment (overview): Trends in World trade and the problems of developing countries; Foreign trade and economic growth; International economic groupings; International economic institutions – GATT, WTO, UNCTAD, World Bank IMF. GST GSTP, Counter Trade.

Text Books

1. Francis Cherunilam, Business Environment, Himalaya Publishing House, New Delhi, (2008)

Reference Books

1. Rudder Dutt and Sundaram, K.P.M (2007) Indian Economy, S.Chand & Co.,New Delhi

2. Michael. V.P, Business Policy and Environment, (2009) S. Chand & Co, New Delhi.

3. Raj Agarwal, Business Environment, Excel Books, New Delhi,(2004).

4. Mishra, S.K. & Puri, V.K, Economic Environment of Business, Himalaya Publishing House, New Delhi(2009)

SEMESTER III

MAJOR V

CORPORATE ACCOUNTING – I

OBJECTIVE : To enable the students an understanding of accounting treatments on various corporate firms in the modern day context

UNIT I Issue of shares: Par, Premium and Discount - Forfeiture - Reissue – Surrender of Shares – Right Issue – Underwriting - Redemption of Preference Shares - Debentures – Issue – Redemption

UNIT II Final Accounts of Companies - Calculation of Managerial Remuneration, Disposal of Profit.

UNIT III Valuation of Goodwill– Need – Methods of valuation of Goodwill

UNIT IV Valuation of Shares – Need – Methods of valuation of Shares

UNIT V Liquidation of Companies - Statement of Affairs - Deficiency Account

(Problems - 80% , Theory - 20%)

Text Book

1. Shukla M.C., Grewal T.S. & Gupta S.L.(2010), "Advanced Accountancy", S. Chand & Co., New Delhi

Reference Books

1. S.P. Jain & K.L. Narang, (2008)"Advanced Accounting", Kalyani Publications, New Delhi.
2. Gupta R.L. & Radhaswamy M. (2009)"Corporate Accounts ", Theory Method and Application-13th Revised Edition 2006, Sultan Chand & Co., New Delhi.
3. M.A. Arulanandam, and K.S. Raman,(2007) "Advanced Accountancy, Part-I", Himalaya Publications, New Delhi.2003.
4. Gupta R.L. & Radhaswamy M. (2009),"Corporate Accounts ", Theory Method and Application-13th Revised Edition 2006, Sultan Chand & Co., New Delhi.
5. Reddy & Murthy, (2010) "Corporate Accounting", Margham Publications, Chennai, 2006

SEMESTER III

MAJOR VI

COMPANY LAW

OBJECTIVE : To acquaint the learners with the fundamental principles of company law.

UNIT I Corporate Personality - kinds of companies - Promotion and incorporation of companies - Memorandum of Association; and Articles of Association; prospectus

UNIT II Shares; share capital; Members; share Capital,-transfer and transmission

UNIT III Capital management – borrowing powers, mortgages and shares, debentures

UNIT IV Directors – Managing Director, Whole time director; Company meetings – kinds - quorum, voting, resolutions, minutes

UNIT V Winding up – kinds and conduct

Text Book

1. Kappor N.D., (2009) Company Law – Incorporating the Provisions of the Companies Amendment Act, 2000 Sullen Chand & Sons, New Delhi

Reference Books

1. Ramaiya A.,(2005) Guide to the Companies Act; Wadhawa & Co Nagpur.

2. Singh Avatar., (2005) Company Law Easter Book Co Luchnow.

3. Kuchhal M.C., (2006) Modern India Company Law Shri Mahavir Books Nolda

4. Kappor N.D., (2009) Company Law – Incorporating the Provisions of the Companies Amendment Act, 2000 Sullen Chand & Sons, New Delhi

5. Bagrial A.K.,. (2002) Company Law; Vikas Publishing House New Delhi

SEMESTER III

MAJOR VII

BUSINESS STATISTICS

OBJECTIVE : To provide a theoretical appreciation and use of the science of statistics to make better business decisions

UNIT I Introduction – Statistics as a subject – Descriptive statistics – compared to Inferential Statistics – Types of data – Summation operation - Rule of Sigma operations.

UNIT II Construction of a frequency distribution – Measures of Central Tendency and dispersion and their measures - Measures of relation - correlation and regression

UNIT III Analysis of Time Series: Cause of variation in time series data – Components of a time series - Decomposition – Additive and multiplicative models – Determination of trend – Moving averages methods and method of least squares (including linear, second degree, Parabolic and exponential trend) – Computational of seasonal, indices by simple average, Ratio – trend, ratio –to –moving average and link relative methods.

UNIT IV Index Number – Meaning, Types and uses Methods of Construction price and quantity Indices (Simple and aggregate): Tests of adequacy; Chain – basis index number base shifting, splicing, and deflating problems in constructing index numbers; Consumer price index

UNIT V Theory of Probability and Theoretical Distribution: Definition of Probability – Importance – Calculation – Theorems – Theoretical distribution, Binomial, Poisson and Normal.

(Problems: 80%, Theory:20%)

Text Books

1. S.P.Gupta, (2008) Statistical methods, Sultan Chand & Co, New Delhi

Reference Books

1. Hooda, R.P., (2003) Statistics for Business and Economics; Macmillan, New Delhi

2. Lewin and Rubin.(2002), Statistics for Management, Prentice Hall of India New Delhi 3. Arora & Arora,(2008) Statistics for Management, S.Chand & Co, New Delhi

4. C.R.Kothari (2009) Quantitative Technique, Vikas, New Delhi

SEMESTER III

MAJOR VIII

COST ACCOUNTING

OBJECTIVE : To enable the students to take decisions using costing techniques

UNIT I Cost Accounting: Introduction – meaning of cost, costing and cost accounting – comparison between financial accounts and cost accounts – application of cost accounting – designing and installing a cost accounting system – cost concepts and classification of costs – cost unit – cost center – elements of cost – preparation of cost sheet – tenders and quotations – problems.- Reconciliation of Cost and Financial Accounts: Need for reconciliation – Reasons for difference in profits – Problems on preparation of Reconciliation statements including Memorandum Reconciliation account.

UNIT II Material Costing: Classification of materials – Material Control – Purchasing procedure – store keeping – techniques of Inventory control – Setting of stock levels – EOQ – Methods of pricing materials issues – LIFO – FIFO – Weighted Average Method – Simple Average Method – Problems.

UNIT III Labour Costing: Control of labour cost – Labour Turnover- Causes and effects of labour turnover – Meaning of Time and Motion Study, Merit Rating, Job Analysis, Time keeping and time booking – idle time, causes and treatment – overtime – methods of wage payment – Time rate and Piece Rate – Incentive Schemes – Halsey Premium Plan – Rowan Bonus Plan – Taylor's and Merrick's differential piece rate systems – Problems.

UNIT IV Overhead Costing: Definition – Classification of overheads – Procedure for accounting and control of overheads – Allocation of overheads – Appointment of overheads – Apportionment of Service department costs to production departments – Repeated Distribution method – Simultaneous equation method – absorption of OH's – Methods of Absorption – Percentage of direct material cost – Direct Labour Cost – Prime Cost, Direct Labour hour rate and Machine Hour Rate – Problems.

UNIT V Costing Methods: Introduction – Job Costing – Batch Costing – Contract Costing – Transport Costing – Process Costing – Principles – distinction between Process and Job – Preparation of Process Accounts – treatment of normal loss – abnormal loss – abnormal gain – Joint and By-products – apportionment of joint.

(Problems: 80%, Theory 20%)

Text Book

1. Jawahar Lal (2008) Cost accounting, Tata McGraw Hill,

Reference Books

1. Nigam & Jai (2000): Cost Accounting,Principles and Practices, Prentice Hall of India Publishers
2. Blocher,I., Lin, (2003) Cost Management : A Managerial Emphasis, Pearson education, Mumbay
3. S.N.Maheshwari (2008) Cost Accounting, Vikas Publishing House, New Delhi
4. Jain , S.P. and K.L. Narang, (2007)''*Cost Accounting: Principles and Methods*'',
5. Iyengar, S.P., (2010)''*Cost Accounting*'', Sultan Chand & Sons, New Delhi

SEMESTER III

MAJOR IX

ENTREPRENEURIAL DEVELOPMENT

OBJECTIVE : To offer the students a conceptual and applied knowledge about

entrepreneurship

UNIT I Concepts of Entrepreneurship - Entrepreneur and Enterprise - Meaning - Definition - Characteristics - functions - Role of Entrepreneurs in the economic development classification of Entrepreneurs - factors affection Entrepreneurial growth - Entrepreneurship development – Programs small Entrepreneurs development. Self employment schemes – Government policies on Entrepreneurial Development. - Entrepreneurial Behaviour: Innovation and entrepreneur – entrepreneurial behaviour and Psycho – Theories Social Responsibilities.

UNIT II Source of ideas - preliminary evaluation and testing of ideas - project identification – demand based industries and resource based industries - import substitution and expert oriented items - project formulation and feasibility study.

UNIT III Project appraisal - technical - Commercial appraisal - information required - demand forecasting - sources of market information - financial appraisal - capital cost of project - sources of finance - financial problems.

UNIT IV Licensing procedure - procedures to start an industrial unit - financial and other assistance SMEs.

UNIT V Incentives as subsidies of state and central governments - Aims - backward areas - Industrial estates - DIC's - role of financial institutions in the Entrepreneurial growth - project financing - sources of finance - IDBI, IFCI, ICICI and IRCI - Role of promotional and consultancy organizations of State and Central Govt.

Text Book

1. Desai, Vasant, (2009) Entreprenereuial Development, Vol. I, Himalaya Publishing House, New Delhi,

Reference Books

1. Hisrich. R.D & Peter, M.P, (2008) Entrepreneurship, Tata Mc Graw Hill, New Delhi.
2. Awasthi, D & Sebastian. (2005)J, Evaluation of Entrepreneurship Progress, Sage Publications, New Delhi.
3. Jain, G. Raj & Gupta, D. (2008), New Initiatives in Entrepreneurship Education and Training, EDII, Ahmedabad.
4. Kao, John J., *"The Entrepreneurial Orgasnisation*", Englewood Cliffs, New Jersey: Prentice-Hall, (2001)
5. Panda, Shiba Charan.,(2009) *"Entrepreneurship Development",* New Delhi, Anmol Publications. (Latest Editions

SEMESTER IV

MAJOR X

CORPORATE ACCOUNTING – II

OBJECTIVE : To enable the students an understanding of accounting treatments on various corporate firms in the modern day context

UNIT I Accounting for Mergers and Amalgamation - Absorption and External Reconstruction

UNIT II Internal Reconstruction – Capital Reduction - Holding Company Accounts - Consolidation of Balance Sheets with treatment of Mutual Owings, Contingent Liability, Unrealized Profit, Revaluation of Assets, Bonus issue and payment of dividend (Inter Company Holdings excluded).

UNIT-III Banking Company Accounts - Preparation of Profit and Loss Account and Balance Sheet (New format only) - Rebate on Bills Discounted - Classification of Advances - Classification of Investments.

UNIT-IV Insurance Company accounts: General Insurance and Life Insurance

UNIT-V Introduction of International Financial Reporting Standards (IFRS): Salient Features.

(Problems - 80%, Theory - 20%)

Text Book

2. Shukla M.C., Grewal T.S. & Gupta S.L.(2010), "Advanced Accountancy", S. Chand & Co., New Delhi

Reference Books

6. S.P. Jain & K.L. Narang, (2008)"Advanced Accounting", Kalyani Publications, New Delhi.
7. Gupta R.L. & Radhaswamy M. (2009)"Corporate Accounts ", Theory Method and Application-13th Revised Edition 2006, Sultan Chand & Co., New Delhi.
8. M.A. Arulanandam, and K.S. Raman,(2007) "Advanced Accountancy, Part-I", Himalaya Publications, New Delhi.2003.
9. Gupta R.L. & Radhaswamy M. (2009),"Corporate Accounts ", Theory Method and Application-13th Revised Edition 2006, Sultan Chand & Co., New Delhi.
10. Reddy & Murthy, (2010) "Corporate Accounting", Margham Publications, Chennai, 2006

SEMESTER IV

MAJOR XI

BUSINESS COMMUNICATION

OBJECTIVE : To develop effective business communication skills among the students

UNIT I Introduction to communication: Meaning and Definitions – Need – Objective and Principles – Communication Media – Types of Communication Process – Interpersonal and Business Communication – Characteristics – Verbal and Non Verbal Communication – Barriers to Communication.

UNIT II Business Letters: Meaning, Need, Functions and kinds of Business letters – Essentials of an effective Business Letter – Layout – Appearance – Size – Style – Form and punctuation – Routine request letters – Responses to letters – Refusal letters – Claims letters – Collection letters.

UNIT III Letters of Inquiries, Quotations and Offers: Letters of Inquiry – Opening and Closing sentences in letters of Inquiry – Quotations – Specimen – Voluntary offers and Quotations – Sentences regarding Offers and Quotations – Specimen – Placing an Order, Specimen – Cancellation, Acknowledgement, Refusal and execution of Order.

UNIT IV Circular, Sales and Bank Correspondence: Meaning of Circular letters – Objectives – Situations that need Circular letters – Specimen, Meaning of Sales letters – Objectives – Advantages – Three P's Functions, Bank Correspondence, Meaning – Correspondence with Customers, Head Office and with other Banks.

UNIT V Report writing and Spoken Communication: Meaning of a Report- Importance- Oral and Written Reports – Types of Business Reports – Characteristics of Good Report – Preparing a Report – Organization of a Report – Spoken Communication – The Telephone – the public Addressing System – Word processor – Telex, Fax, Email – Teleconferences

Text Books

Rajendra Pal Korahill, (2009)"Essentials of Business Communication", Sultan Chand & Sons, New Delhi, 2006.

Reference Books

1. Effective Business Communication – Kaul (2007) Prentice Hall, New Delhi
2. Ramesh, MS, & C. C Pattanshetti, (2007)"Business Communication", R.Chand&Co, New Delhi, 2003.
3. Rodriquez M V, "Effective Business Communication Concept" Vikas Publishing Company ,(2003)
4. Munter Mary (2002) , Effective Business Communication, PHI, New Delhi

SEMESTER IV

MAJOR XII

MONEY AND FINANCIAL SYSTEM

OBJECTIVE : To expose the students to the working of money and financial syste prevailing in India

UNIT I Money: Functions; Alternative measures to money supply in India – their different Components; Meaning and changing relative importance of each; High powered money Meaning and uses; Sources of changes in high powered money

UNIT II Finance: Role of finance in an economy; kinds of finance; Financial System; Companies Financial intermediaries; Markets and instruments, and their functions.

UNIT III Indian Banking System: Definition of bank; Commercial banks-importance and functions; Structure of commercial banking-importance and Meaning and importance of main liabilities And assets; Regional rural banks; Co-operative banking in India.

UNIT IV Process of Credit Creation By Bank: Credit creation process; Determination of money supply and total bank credit; Interest Rates: Various rates in India (viz., bond rate, bill rate, deposit rates etc,) – impact of inflation and inflationary expectations.

UNIT V The Reserve Bank of India Functions Instruments of monetary and credit control; Main features of monetary policy since independence.-Development Bank and Other Non-Banking Financial Institutions: Their main features; Unregulated credit markets in India – main feature.

Text Books

Gupta S.B. (2008) Monetary Planning of India S.Chand, New Delhi.

Reference books

1. Khan M.Y (2009) India Financial System – Theory and Practice; Tata McGraw Hill New Delhi.
2. Modern Money & Banking, (1999) Roger Miller, McGraw Hill New Delhi
3. Banking Commission: Reports(s)
4. Reserve Bank of India Bulletins

SEMESTER IV

MAJOR XIII

AUDITING

OBJECTIVE : To impart knowledge about the principles and methods of auditing and their applications

UNIT I Introduction Meaning and objectives of auditing Types of audit Internal audit - Internal Check Systems Internal Control

UNIT II Audit Process: Audit Programme; Audit and books; working papers and evidences, Consideration of commencing and audit; routine checking and test checking.

UNIT III Audit Procedure: Vouching Verification of assets and liabilities

UNIT IV Audit to limited Companies:

- Company auditor-Appointment, powers, duties, and liabilities.
- Divisible profits and dividend
- Auditor's report-standard reports and qualified report.
- Special audit of banking companies.
- Audit of insurance companies

UNIT V Investigations; Audit of non profit companies,

ii. Where fraud is suspected, and
iii. When a running a business is proposed

Text books

Tandon B.N., (2009) Principles of Auditing S. Chand & Co., New Delhi

Reference Books

1. Gupta Kamal.,(2005) Contemporary Auditing; Tata McGraw-Hill New Delhi
2. Pagare Dinkar., (2010) Principles and Practice of Auditing; Sultan Chand New Delhi.
3. Sharma T.R.(2008) Auditing Principles and Problem; Sahitya Bhawan, Agra.

SEMESTER IV

MAJOR XIV

BUSINESS MATHEMATICS

OBJECTIVE : To enable students to gain understanding of mathematical applications to business activities

UNIT I Ratio, Proportion and Percentage: Ratio: Definition – Continued Ratio – inverse Ratio. Proportion – Continued Proportion – Direct Proportion – Inverse Proportion – Variation – Inverse Variation – Joint Variation – Percentage: Meaning and computation of percentage.

UNIT II Profit and Loss: Terms and Formulae – Trade Discount – Cash Discount – Production involving cost price, selling price, trade discount and cash discount. Introduction to commission and brokerage – Problems on commission and brokerage

UNIT III Interest: Simple interest – compound interest (reducing balance and flat interest rate of interest) – equated monthly instalments (EMI) – Problems. -Shares and Dividends: Concept of shares – Stock Exchange – Face Value – Market Value – Dividend – Equity shares- Bonus Shares – Examples

UNIT IV Matrices and Determinates (up-to order 3 only): Multivariable data - Definition of a Matrix; Types of matrices; Algebra of matrices; Determinates – Ad-joint of a matrix – Inverse of a matrix via ad-joint matrix – homogeneous system – Solution of non-homogeneous system of linear equations (not more than three variables) – Condition for existence and uniqueness of solution – Solution using inverse of the coefficient matrix – Problems..

UNIT V Functions: (To identify and define the relationships that exist among business variables) Introduction – Definition of function, constants, variables, continuous real variable, domain or interval – Types of functions – one valued function – Explicit function – algebraic functions – polynomial functions – absolute value function – inverse function – rational and irrational function – monotone function – even and odd function – supply/demand function – cost function – total revenue function – a profit function – production function – utility function – consumption function.

Text Books

1. Kappor, V.K, (2007) Business Mathematics, Sultan Chand & Sons, New Delhi

Reference Books

1. B.M. Agarwal (2008) Basic Mathematics & Statistics, Sultan Chand & Sons, New Delhi
2. Business mathematics (2009) S Rajagopalan,R Sattanathan, McGraw-Hill New Delhi
3. Bari, (2008) Business Mathematics, New Literature Publishing Company, Mumbai.

SEMESTER V

MAJOR XV

INCOME TAX – I

OBJECTIVE : To enable the students in familiarizing the income tax provisions and to compute tax liability.

UNIT I Basic concepts: Income, agricultural income, casual income, assessment year, previous year, Gross total income, person: Tax evasion, Avoidances and tax planning. - Bases of Charge: Scope of total income residential status and tax liability, income which does not form part of total income.

UNIT II Income from Salaries – Definition- features – composition of salary income – treatment of P.F – Allowances – perquisites – rent free accommodation – treatment of other items in salary – deductions – tax rebate -

UNIT III Income from house Property – computation of annual value – deductions from house property – comprehensive problems ; self occupied houses –house deemed to be let out – house let out and self occupied – letout house property.

UNIT IV Profits and gains of business including provision relating to specific business – computation of business income from adjustment – computation of business income from profit and losses - computation of income from legal, medical and accounting profession

UNIT V Capital gains – computation of all kinds of capital gains – exemption of tax on capital gains - Income chargeable under the head Incime from other Sources

(Problems: 60%, Theory: 40%)

Text book

Singhanai V.K., Students' Guide to Income Tax; Taxmann, Delhi.*

Reference Books

1. Prasad, Bhagwathi., Income Tax Law & Practice; Wiley Publication New Delhi.
2. Mehrotra H.C., Income Tax Law & Accounts, Sahitya Bhawan, Agra.
3. Dinker Pagare., Income Tax Law and Practice; Sultan Chand & Sons, New Delhi.
4. Girish Ahuja and Ravi Gupta., Systematic approach to income Tax; Sahitya Bhawan Publications, New Delhi.
5. Chandra Mahesh and Shukla D.C., Income Tax Law and practice; Pragati Publications, New Delhi.

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- Since Finance Act is passed every year, the latest books are to be followed

SEMESTER V

MAJOR XVI

COMPUTER APPLICATIONS IN BUSINESS

OBJECTIVE : The paper will primarily provide an exposure to the use of office automation software and accounting package software in making business decisions.

UNIT I Introduction to Computer Concepts – Elements of computer – Characteristics of a Computer – Classification of Computers – Basic Computer Architecture – Input-output Devices - Software Concepts: Types of software – Software: its nature and qualities - Windows Operating System Functions.

UNIT II Applications of MS Office- Applications of MS Word in Business Correspondence: letters, tables, mail merge, labels.

UNIT III Applications of MS Excel: Graphs and Charts – Calculation of various financial functions - Ms Access: Tables and Queries.

UNIT IV Applications of MS Power Point: Introduction – Toolbar, their Icons and Commands – Navigating in Power point - Creation of slides, animation, and templates - Designing Presentations – Slide show controls.

UNIT V Applications of Accounting Software Tally (Ver. 7.2): Characteristics of the Software – Creation of a Company – Accounts Information – Creation of Ledgers – Vouchers –P & L a/c – Balance Sheet – Inventory Handling – Creation of Stock Groups – Creation of Stock Categories – Creation of Stock Items – Accounts of Banking and Departmental Accounting.

(Theory – 50% and Practical – 50%)

Text Book

1. Rajagopalan, SP. (2010) *Computer Application in Business,* Vikas Publishing House, New Delhi.

Reference Books

1. Deepak Bharihoke. (2008)*Fundamentals of IT,* Excel Books, New Delhi.
2. Dhiraj Sharma, (2008) *Foundation of IT,* Excel Books, New Delhi.
3. Bhatnagar. S.C, and K.V. Ramani,(2007) *Computers and Information Management,* Prentice Hall of India, New Delhi.
4. Martin. (2010) *Principles of Data Base Management,* Prentice Hall of India, New Delhi.
5. Sulochana, M, Kameswara Rao, K and R. Kishore Kumar, (2009)*Accounting Systems,* Kalyani Publishers, Hyderabad.
6. Parameswaran, R. (2010)*Computer Application in Business,* S.Chand & Co, New Delhi.

Note: Minimum Pass Marks for each Theory and Practical is 20 Marks separately.

SEMESTER V

MAJOR XVI – PRACTICAL

COMPUTER APPLICATIONS IN BUSINESS

LIST OF PRACTICALS

Windows OS
- Practice in Settings and search options

MS-Word
- Formatting – Text Documents
- Table Manipulation
- Sorting – Table of contents
- Developing a letter and a resume
- Practice of mail-merge option

MS-Excel
- Formatting – Features
- Functions
- Chart features

MS-Access
- Creation of tables
- Manipulating queries

MS-Power Point
- Organizational structure using slides
- Graphical representation

Tally Programs
- Voucher & Invoice
- Stock summary
- Final Accounts

SEMESTER V

MAJOR XVII

MANAGEMENT ACCOUNTING – I

OBJECTIVE : To analyze and interpret financial statements from the point of view of managers and outsiders.

UNIT I Management Accounting: Meaning, nature, scope, and functions, of management accounting, Role of management accounting in decision making; management accounting Vs financial Accounting, Tools and techniques of management accounting.

UNIT II Financial Statement: Meaning and types of financial statement; Limitations of financial Statements analysis; Comparative Statement Analysis.

UNIT III Ratio analysis; Classification of ratios – Profitability ratios, turnover ratios, Advantages of ratio analysis, Limitations of accounting ratios

UNIT IV Funds Flow Statement as per Indian Accounting Standard 3- need - objectives – sources and utility of funds – preparation of fund flow statement

UNIT V Cash flow statement. - - need - objectives – classification – calculation of cashflow.

(Problems: 80%, Theory: 20%)

Text Book

. 1. Lal, Jawahar., (2009) *"Advanced Management Accounting Text and Cases",* S. Chand & Co., New Delhi

Reference Books

1. Horngreen, Charles T., Gary L. Sundem,(2005) *"Introduction to Management Accounting",* Prentice Hall., Delhi

2.. Garrison H., Ray and Eric W. Noreen , (2004) *"Managerial Accounting"* McGraw Hill., Delhi.

3... Khan, M.Y., and P.K. Jain, (2009) *"Management Accounting",* Tata McGraw Hill,Publishing Co., New Delhiew Delhi.

SEMESTER VI

MAJOR XX

INCOME TAX – II

OBJECTIVE : To enable the students in familiarizing the income tax provisions and to compute tax liability

UNIT I Computation of Tax Liability: Computation of total income and tax liability of an individual, H.U.F and firm.

UNIT II Aggregation of income; Set-off and carry forward of losses; Deduction from Gross total income

UNIT III Tax Management: Tax deduction at source; Advance payment of tax; Assessment Procedure; Tax planning for individuals.

UNIT IV Income Tax Authorities: Powers and Functions of Income Tax Officer, Central Board of Direct Taxes, Commissioner of Income Tax – Types of Assessments and Rectification of Mistakes – Recovery of Tax and Refunds.

UNIT V Appeals and revision – procedure in appeal – powers of commissioner (Appeal) – appeal to Appellate Tribunal – reference to high court- appeal to supreme court – revision of best judgement assessment – revision by commissioner – penalties and prosecution – procedure and time limit for imposing penalty – offences and prosecution,

(Problems: 60%, Theory: 40%)

Text book

Singhanai V.K., Students' Guide to Income Tax; Taxmann, Delhi.*

Reference Books

1. Prasad, Bhagwathi., Income Tax Law & Practice; Wiley Publication New Delhi.

2. Mehrotra H.C., Income Tax Law & Accounts, Sahitya Bhawan, Agra.

3. Dinker Pagare., Income Tax Law and Practice; Sultan Chand & Sons, New Delhi.

4. Girish Ahuja and Ravi Gupta., Systematic approach to income Tax; Sahitya Bhawan Publications, New Delhi.

5. Chandra Mahesh and Shukla D.C., Income Tax Law and practice; Pragati Publications, New Delhi.

- Since Finance Act is passed every year, the latest copies of [publication are to be followed

SEMESTER VI

MAJOR XXI

MANAGEMENT ACCOUNTING – II

OBJECTIVE : To analyze and interpret financial statements from the point of view of managers and outsiders.

UNIT I Absorption and Marginal Costing: Marginal and differential costing as a tool for decision – make or buy Change of product mix;

UNIT II Pricing - Break-even analysis; Exploring new markets; Shutdown decisions.

UNIT III Budgeting for Profit Planning and Control: Meaning of Budget and budgetary control - Objective; Merits and limitations; Types of budgets; Fixed and flexible budgeting; Control ratios;

UNIT IV Standard Costing and Variance Analysis; Meaning of standard cost and standard costing Advantages and application; Variance analysis – material; Labour and overhead (two-way Analysis); Variances

UNIT V Zero base budgeting Responsibility accounting; Performance budgeting.

(Problems: 80%, Theroy:20%)

Text Book

. 1. Lal, Jawahar., (2009)*"Advanced Management Accounting Text and Cases",* S. Chand & Co., New Delhi

Reference Books

1. Horngreen, Charles T., Gary L. Sundem,(2005) *"Introduction to Management Accounting",* Prentice Hall., Delhi

2.. Garrison H., Ray and Eric W. Noreen , (2004)*"Managerial Accounting"* McGraw Hill., Delhi.

3... Khan, M.Y., and P.K. Jain, (2009)*"Management Accounting",* Tata McGraw Hill,Publishing Co., New Delhiew Delhi.

SEMESTER VI

MAJOR XXII

INDIRECT TAXES

OBJECTIVE : This course aims at imparting basic knowledge about major indirect taxes

UNIT I Indian Tax System – Direct and Indirect Taxes – Principles of Taxation – Taxable capacity – Scope and functioning - Shifting and incidence of indirect taxes

UNIT II Central Exercise: Nature and scope of central excise – important terms and definitions under the central excise Act – General procedure of central excise – clearance and excisable goods – concession to small scale industry under central excise Act, CENVAT.

UNIT III Customs: Role of customs in international trade important terms and definitions under the Customs Act 1962 – Assessable value Baggage – Bill of entry Dutiable goods Duty Exporter – Foreign going vessel – Aircraft goods – import – import Manifest – Importer – Prohibited goods – Shipping bill – Store – Bill of lading – export manifest – Letter of Credit – Kinds of duties – Basics auxiliary, additional or countervailing- Basics of levy – Advalorem – Specific duties – Prohibition of export and import of goods and provisions regarding notifies and specified goods – Import of goods - Free import and restricted import – Type of import – import of cargo, import of personal baggage, import of stores.

UNIT IV Central Sales Tax: Important terms and definition under the Central Sales Tax Act 1956 – Dealer, declared goods place of business, sale price, turnover, year appropriate authority – Nature and scope of Central Sales Tax Act – Provisions relating to inter-state sales – Sales inside a State – Sales/purchase in the course of imports and exports our of India – Registration of dealers and procedure thereof – Rate of tax – Exemption of subsequent sales – Determination of turnover – principles for determining levy of central sales tax – concept of sale or purchase of goods in the course of Central/state trading – when does sales or purchase of goods take place inside the state – when dose the sale or purchase of goods take place in the course of imports or exports – Registration of dealer and procedures thereof – Rate of tax – Sale against ‘C’ and ‘D’ forms – Exemptions of subsequent sales – Branch and consignment transfer – Determination of turnover – Deduction from turnover.

UNIT V Introduction to VAT, goods and dealers – Categories of sales – Assessment and Audit-Dealer

Text Books

Ahuja Girish and Gupta Ravi , Practical Approach to Income Tax, Wealth Tax and Central Sales Tax (Problems and solutions with multiple choice questions) Bharat Law House Pvt. Ltd, New Delhi.* (the publications of current year are to be referred)

Reference Books

1. Bare Act of Central Excise Act. (latest)

2. Bare Act of Customs Act. (latest)

3. Bare Act of Central Sales Tax Act (latest)

B.COM DEGREE COURSE

ELECTIVES*:

1. **FINANCE**
   - Paper 1. Financial Management
   - Paper 2. Financial Market Operations
   - Paper 3. Financial Statement Analysis
   - Paper 4. Merchant Banking and Financial Services
2. **MARKETING**
   - Paper 1. Principles of Marketing
   - Paper 2. Consumer Behaviour
   - Paper 3. International Marketing
   - Paper 4. Advertising and Sales Promotion
3. **BANKING AND INSURANCE**
   - Paper 1. Indian Banking System
   - Paper 2. Fundamentals of Insurance
   - Paper 3. Insurance Management
   - Paper 4. Bank Management
4. **E-COMMERCE**
   - Paper 1. Essentials of E-Commerce
   - Paper 2. Internet and Word Wide Web (www)
   - Paper 3. Financial Accounting with Accounting Packages
   - Paper 4. Management Accounting with computer
5. **HUMAN RESOURCES MANAGEMENT**
   - Paper 1. Human Resources Management
   - Paper 2. Organisational Behaviour
   - Paper 3. Industrial Relations and Labour Welfare
   - Paper 4. Human Resources Accounting

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* Colleges are expected to offer these electives during 5^{th} and 6^{th} semesters by choosing any one stream based on the availability of faculty, resources and the students interest in general B.Com degree programme.

Elective I : FINANCE

PAPER 1 : FINANCIAL MANAGEMENT

OBJECTIVE : To help students understand the conceptual framework of financial management

UNIT I Financial Management: Financial goals; Profit vs wealth maximization, Financial functions – Investment, financing, and divided decisions; financial planning.

UNIT II Cost of Capital: Significance of cost of capital; Calculating cost of debit; Preference share, equity capital and retained earning; combined (weighted) cost of capital. Operating and Financial Leverage: Their measure; Effects on profit, analyzing alternate financial plans, combined financial and operating leverage. - Capital Structure: Theories and determinates.

UNIT III Capital Budgeting: Nature of investment, decisions, investment evaluation criteria, payback period accounting rate of return, net present value, internal rate of return profitability index NPV and IRR Comparison.

UNIT IV Management of Working Capital: Nature of working capital, significance of working capital, Operation cycle and factors determining of working capital requirements Management of Working capital – cash, receivables, and inventories.

UNIT V Dividend Policies: Issues in dividend policies; Welter's model; Gordon's model M.M. Hypothesis, forms of dividends and stability in dividends, deterninates.

(Problems-40% & Theory 60%)

Text Book

Pandey I.M. (2004) Financial Management, Vikas Publishing House, New Delhi.

Referance Books

1. Van Home J.C (2002), Financial Management and policy; Prentice Hall of India, New Delhi.
2. Khan, M.Y. and Jain P.K (2006) Financial Management, Text and Problems; Tata McGraw Hill New Delhi.
3. Prasanna Chandra., (2006) Management Theory and practice; Tata McGraw Hill, New Delhi.
4. Bhalla V.K., Modern working Capital Management (2005) Anmol Publishers, Delhi.

Paper 2: FINANCIAL MARKET OPERATIONS

OBJECTIVE : To enable the students to know the operations og financial markets

UNIT I An overview of financial markets in India. Money Market: Indian money market's composition and structure; (a) Acceptance house, (b) Discount house, and (c) Call money market; Recent trends in Indian money market:

UNIT II Capital Market: Security market – (a) New issue market, (b) Secondary markets; Functions and role stock exchange; Listing procedure and legal requirements; Public issue – Pricing and Marketing Stock exchange – National Stock Exchange and over – the – counter.

UNIT III Securities Contract and Regulations Act: Main provisions. - Investors Protection: Grievances concerning stock exchange dealing and their removal; Grievance cells in stock exchanges; SEBI; Company Law Board; Press; Remedy through courts.

UNIT IV Functionaries on Stock Exchange: Brokers, sub brokers, market, jobbers, portfolio consultants, institutional investors, and NRIs.

UNIT V Financial Services: Merchant Banking – Functions and roles; SEBI guidelines; Credit rating – Concept, functions, and types.

Text Book

Bhole L.M., (2005) Financial Markets and institutions; Tata McGraw – Hill New Delhi.

Referance Books.

1. Gupta Suraj B (2008) Monetary economics, S Chand and Co New Delhi.
2. Hooda R.P., (2007) Indian Securities Market – investors view point; Excell Books, New Delhi.
3. R.B.I Report on Currency and Finance.
4. R.B.I Report on the Committee to Review the Working of the Monetary System: Chakravarty Committee.
5. R.B.I Report of the Committee on the Financial System, Narsimham Committee.
6. Economic Survey, Government of India, Ministry of Finance, Latest issues.
7. Machiraju H.R(2004), Indian Financial System Vikas, Delhi.
8. Khan M.Y., Indian Financial System: (2007)Tata Mcgraw Hill, New Delhi.
9. Sengupta A.K., and Agarwal M.K., (2008) Money Market Operations in India, Skylark Publications, New Delhi

Paper 3 : FINANCIAL STATEMENT ANALYSIS

OBJECTIVE : To provide students the have analytical skill on financial statements and to apply the accounting techniques for management

UNIT I Financial Statement Analysis: Meaning Significance, types, and limitations of financial statement; Accounting policies, regulations of financial accounting, and accounting choices/practices; Window dressing – meaning and ways and means to check window dressing.

UNIT II Techniques of Financial Analysis: Ratio analysis; Fund flow and cash flow analysis; Common – size and comparative statement analysis Inter-firm and intra-firm comparison.

UNIT III Reporting and Measurement: Income concepts for financial reporting; Measurement and Reporting of revenue and expenses, and gains and losses; Measurement of assets and Liabilities.

UNIT IV Other Developments in Reporting: Disclosure in financial reporting Human resource measurement Interim financial reporting: Periodic reporting and segment reporting; Social reporting Accounting and reporting of the effects of changing pieces.

UNIT V Accounting Standards: An overview of national and international accounting standards, (excluding study of individual standards) ; Harmonization of accounting reports accounting for currency transaction; Financial reporting by banks, NMBFCs, and insurance companies.

(Problems-60% & Theory 40%)

Text Books

Foster G: (2005) Financial Statement Analysis; Prentice Hall, New Delhi.

Reference Books

1. Institute of Chartered Accounts of India journal Publications.
2. International accounting Standards Committee; Various Publications.
3. Pandey I.M. (2004) Essentials of Management Accounting, Vikas Publication House Pvt Ltd.
4. Porwal, L.S. () 2004) Accounting Theory: An Introduction, Tata McGraw Hill New Delhi.

Paper 4 : MERCHANT BANKING FINANCIAL SERVICES

OBJECTIVE : To give exposure to students to the essentials of merchant banking and financial services

UNIT I Merchant Banking: Functional Scope, Merchant banking in India, SEBI guidelines for Merchant bankers. Role of Merchant Bankers in Fund Raising: Managing Public issue programme; Alternative to public issue; Private placement, Rising Public deposits.

UNIT II Credit Rating: Introduce Instruments; Benefits; Rating Methodology, Cautions Types of rating.

UNIT III Lease Financing and Decision: Concept; Types of lease Leasing decisions Evaluation of leases. - Mutual Funds; Introduction; Classification; Mutual funds in India

UNIT IV Venture Capital: Introduce scope, steps, to provide venture capital mode of funding - Factoring and for fating.

UNIT V Depository and Custodial Services: Depository – introductions, concept, constitution of depository system Functioning of Depository systems Depository System in India Custodial services – meaning Registration; Obligations and responsibilities of custodians code of conduct.

Text Books

1. Machiraju H.R.(2008) Merchant Banking Principles and Practices, New Age International New Delhi

Reference Books

1. Khan M.Y.& Jain P.K (2007), Financial Management Text and Problems, Tata McGraw Hill, New Delhi.
2. Pandey I.M.,(2004) Financial Management, Vikas Pub House New Delhi.
3. Verma J.C.A.,(2004) Manual of Merchant Banking, Bharat Law House, New Delhi.
4. Pahwa H.P.S., (2003)Project Finance, Bharat Law House New Delhi.
5. Khan M.Y. (2008) Financial Service; Tata McGraw Hill New Delhi.
6. Pezzuffo Mary Ann.,(2006) Marketing Financial Services, Macmillan, New Delhi.

ELECTIVE II : MARKETING

Paper 1 : PRINCIPLES OF MARKETING

OBJECTIVE : To facilitate students to understand the conceptual framework of marketing and process of decision making under various environmental constraints

UNIT I Introduction: Nature and scope of marketing Importance of Marketing as a business functions and in the economy; Marketing concepts - traditional and modern; selling vs. marketing - Marketing mix; Marketing environment. - Consumer Behavior and Market Segmentation; Nature, Scope, and significance of consumer behaviour and market segmentations - concept and importance Bases for market segmentation

UNIT II Product: Concept of Product, Consumer, and industrial goods, Product Planning and development Packaging role and functions; Brand name and trade mark; After sale service; product life cycle concept.

UNIT III Price Importance of price in the marketing mix; Factors affecting price of a products/service; Discounts and rebates.

UNIT IV Distributions Channels and Physical Distribution: Distribution Channels – Concept and Role type of distributions channels Factors affecting choice of a distribution channel; Retailer and wholesaler; Physical distribution of good Transportation; Warehousing; inventory control Order Processing.

UNIT V Promotion Methods of Promotion Optimum promotion mix Advertising media –their Relative merits and limitations, Characteristics of an effective advertisement, Personal Selling: selling as a career, Classification of a successful sales personal Functions of salesman.

Text Book

1. Phillip Kotler. (2005) Marketing Management, Englewood cliffs, Prentice Hall, NJ

Reference Books

1. Richard M. S Wilson, Colin gilligam, Strategic Marketing Management, Viva BooksPvt. Ltd.,2003.
2. Walker – Boyd, Larreche , Marketing Strategies – Planning Implementations, TataMacgraw Hill.2004.
3. Neelamegam,S.(2007) Marketing in India : Cases and Readings, Vikas, New Delhi

Elective: Marketing **B.Com Electives Syllabus**

Paper 2 : CONSUMER BEHAVIOUR

OBJECTIVE : To make students to understand the behavioural aspects of consumers as a basis for marketing promotion

UNIT I Consumer Behaviour theory and its applications to Marketing strategy- Consumer buying process Extensive, limited and routine problem solving behaviours

UNIT II Internal Determinants of Consumer Behaviour: Needs, Motivation and involvement, Information Processing and consumer perception, learning, attitudes and attitude change, personality, Psychographs, values and life cycle.

UNIT III External determinants of Buying Behaviour: Family and household influences; reference groups Social class; influence of culture; sub-cultural aspects of consumer behaviour.

UNIT IV Opinion Leadership and Innovation Diffusion: Opinion leadership – process, measurement, Profile, Opinion leadership and firm's promotional strategy, Innovation, diffusion and adoption Process, innovator as opinion leader.

UNIT V Models of Consumer Buying Behaviour: Concept of Economic Man, passive man, cognitive Man and emotional man, Models of consumer decision making

Text Book

1. M.S. Ragu, Domnique Xardel, (2007) Consumer Behaviour, Vikas, Delhi

Referance Books

1. Bennett P.D and HH kassrijion.,(2003) Consumer behaviour, Prentice Hill, New Delhi.
2. Howard J a and Sheth J N. (2005) The theory of Buyer Behaviour, John Wiley, New York.
3. Leon G. Schiffman leslic kanuk, Consumer behaviour, Prentice Hall, New Delhi
4. Solomon, (2006) Consumer Behaviour, Pearson Eeducatio, Mumbay.

Elective: Marketing **B.Com Electives Syllabus**

Paper 3 : INTERNATIONAL MARKETING

OBJECTIVE : To give exposure to students to the conceptual framework of international marketing management

UNTI I International Marketing: Nature, definition, and scope of international marketing; Domestic marketing vs. international Marketing, International marketing environment – external and internal - Identifying and Selecting Foreign Market: Foreign market entry mode decisions.

UNIT II Product Planning for International Market: Product designing Standardization Vs adaptation; Branding and packaging; Labeling and quality issues after sales service.

UNIT III International Pricing: Factors influencing international price; Pricing process – process and methods; International price quotation and payment terms.

UNIT IV Promotion, of product / Service Abroad; Methods of international promotion; Direct mail and sales literature; Advertising, personal Selling; Trade fairs and exhibitions

UNIT V International Distribution: Distribution channels and logistics decisions; Selection and appointment of foreign sales agents. - Export Policy and Practices in India Exim policy – an overview; Trends in India's foreign trade; Steps in starting an export business; Product selection; Market selection Export pricing; Export finance; Documentation; export procedures; Export assistance and incentives.

Text Book

1. Bhattacharya R.L. and Varshney B (2009), International Marketing Management, Sultan Chand, New Delhi

Reference Books.

1. Bhattacharya B.,(2005)Export Marketing Strategies for Success, Global press, New Delhi.
2. Keegan. (2003) International Marketing Management, Prentice Hall New Delhi.
3. Kotler Phillip., (2007) Principles of Marketing, Prentice Hall NJ.
4. Paliwala, Stanley J. (2006) The Essence of International Marketing, Prentice Hall New Delhi.

Elective: Marketing **B.Com Electives Syllabus**

Paper 4 : ADVERTISING AND SALES PROMOTION

OBJECTIVE : To enable the students to learn the fundamentals of advertisements and steps involved in selling process

UNIT I Communication Process: Basic Communication process, role of source; Encoding and decoding of message, media, audience, feedback, and noise.

UNIT II Advertising and Communication mix: Different advertising functions; Types of advertising; objectives and budget. - Creative Aspects of Advertising: Advertising appeals, copy writing, headlines, illustration, message, copy types; Campaign Planning.

UNIT III Advertising Media Different types of media; Media Planning and scheduling.

UNIT IV Impact of Advertising: Advertising agency roles, relationship with clients, advertising department; Measuring advertising effectiveness; Legal and ethical aspects of advertising.

UNIT V Sales Promotion: Meaning, nature, and functions; Limitation of sales promotion;; Types of sales promotion schemes; Consumer and trade, sales promotion – Sales Promotion Schemes: Sampling, Coupon; Price off; Premium Plan; consumer contests and sweeps takes; POP displays; Demonstration; Trade fairs and exhibitions; Sales Promotion techniques and sales force.

Text Book

1. Asker Daind A, Batra., Rajeev, Myers G., (2007) Advertising Management, Prentice Hall of India New Delhi
2. Coundiff Still and Gopvani., (2003)Sales Management, Prentice Hall, New Delhi.

Reference Books

1. Aaker, David and Myers John (2008)., Advertising Management, Prentice Hall of India New Delhi.
2. Oglvy D Ogiv (2009), On Advertising, Longman Publication..
3. Sengupta Subroto.(20040Brand Positioning Strategies for Competitive Advantage, Tata McGraw Hill New Delhi..

ELECTIVE III : BANKING AND INSURANCE

Paper 1 : INDIAN BANKING SYSTEM

OBJECTIVE : To to enable the students to know the working of the Indian banking system

UNIT I Indian Banking System: Structure and organization of banks; Reserve Bank of India Apex banking institutions; Commercial bank Regional rural banks, Co-Operative bank Development banks.

UNIT II State Bank of India Brief History; Objectives; Functions; Structure of Organizations Working and progress

UNIT III Banking Regulation Act, 1949 History Social control Banking Regulation Act as applicable to banking companies and public sector banks, Banking Regulation Act as applicable to co-operative bank.

UNIT IV Regional Rural and Co-operative Bank in India Functions Role of Regional rural and cooperative bank in rural India Progress and performance

UNIT V Reserve Bank of India Objective; Organization Functions and Working monetary policy Credit control measure and their effectiveness.

Text Book

1. Tennan M.L., Banking Law and Practice in India, India Law House New Delhi.
2. Shekhar and Shekhar., Banking Theory and Practice, Vikas Publishing House, New Delhi.

Reference Books

1. Basu A.K. (2004)Fundamentals of banking – Theory and practice; A. Mukherjee and Co., Calcutta
2. Sayers R.S., (2003)Modern Banking Oxford University Press.
3. Panandikar S.G., and Mithani D.M.(2006) Banking in India, Orient Longman,.
4. Khubchandani B.S (2005) Practice Law of Banking, Macmillan, New Delhi.

Paper 2 : FUNDAMENTAL OF INSURANCE

OBJECTIVE : to enable the students to know the fundamentals of insurance

UNIT I Introduction of Insurance: Purpose and need of insurance, Insurance as a social security tool, Insurance and economic development. - Fundamentals of Agency Law: Definition of an agent Agents regulation; Insurance intermediaries; Agents Compensation.

UNIT II Procedure for Becoming and Agent; Pre requisite for obtaining a license Duration of license; Cancellation of license; Revocation of suspension/termination of agent Appointment; Code of conduct; unfair practices.

UNIT III Functions of the Agent Proposal form and other forms for grant of cover Financial and medical underwriting; Material information; Nomination and assignment; Procedure regarding settlement of policy claims.

UNIT IV Company Profile: Organizational set-up of the company Promotion strategy Market share; Import activities; Structure Product; Actual profession; Product pricing-actuarial aspects; Distribution channels.

UNIT V Fundamentals/Principles of Life Insurance/Marine/Fire/Medical/General Insurance: Constricts of Various kinds; Insurable Interest.

Text Book

1. Mishra M.N (2009), insurance Principles and practice, S. Chand and Co, New Delhi.

Reference Books

1. Insurance Regulatory Development Act, 1999.
2. Life Insurance Corporation Act, 1956.
3. Gupta OS. (2008) Life Insurance Frank Borthers, New Delhi.
4. Vinayakam N. Radhaswamy and Vasidevam SV (2005).,Insurance – Practice, S. Chand and Co New Delhi.

Paper 3 : INSURANCE MANAGEMENT

OBJECTIVE : To provide the students to acquaint the students with the basics of financial and tax planning in the area of insurance

UNIT I Introduction: Saving and investment schemes like shares, units, capital, markets, mutual funds, etc. vis-a-vis insurance; Tax benefits under insurance policies; Life cycle needs – Including solutions, matching of the customers needs and requirements to available products; Comparison between different products offered vis–a–vis chargeable premium, and coverage.

UNIT II Computation of Premiums/Bonuses: Premium calculation – including rebates, mode rebate, large-sum assured polices rebate Extra premium under premiums; Computation of benefits Surrender Value, paid – up value.

UNIT III Insurance Documents: Insurance documents including proposal forms and Group policies; With – profit and without procfit polices; Different types of insurance products-whole life products, interest sensitive products, term-assurance annuities; Endowment; Assurance.

UNIT IV Life Insurance Products: Traditional Unit Linked Policies; Individual and Group Policies; With-profit and without profit polices; Different types of insurance products – Whole life products, interest sensitive products, term-assurance annuities; Endowment; Assurance.

UNIT V Group Insurance and Pension Plans - Health Related Insurance

Text Book

2. Mishra M.N (2009), insurance Principles and practice, S. Chand and Co, New Delhi.

Reference Books

5. Insurance Regulatory Development Act, 1999.
6. Life Insurance Corporation Act, 1956.
7. Gupta OS. (2008) Life Insurance Frank Borthers, New Delhi.
8. Vinayakam N. Radhaswamy and Vasidevam SV (2005).,Insurance – Practice, S. Chand and Co New Delhi.

Paper 4 : BANK MANAGEMENT

OBJECTIVE : This course aims at to acquaint the students with the basics of commercial bank management

UNIT I Principles of Banking: Definition of bank Creation of money Present Structure of commercial banking system in India; Brief history; Functions; Working during 1947 1990 and thereafter.

UNIT II Management Principles in Banks: Managerial functions in banks Hierarchy, individual and group behavior; Management of personnel-Functions of manager, inspector, local advisory committee, Recruitment; selection; Training Promotion Control of staff.

UNIT III Management of Deposits and Advances: Deposit Mobilization; Classification and nature of deposit accounts; Advanced; Lending practice; Types of advances; principles of sound bank lending Preparation of reports Credit plans; Planning customers; Limits of credit; Security.

UNIT IV Investment Management Nature of bank investment; Liquidity and Profitability; Preparation of cheque; Bills Endorsement; Government Securities; Documents of title to goods railway receipt; Bill of lading; Book debts; Securities – Government and commercial.

UNIT V Management of Finance Bank accounts; Records; Reports; Statement of advances; Evaluation of loan applications; Profit and loss account; Balance sheet and statutory reports regarding cash revenue.

Text Book

1. Tannan ML., Banking – Law and Practice in India, Law House, New Delhi.

Reference Books

1. Radhaswami M. and Basudevan A. (2005)Textbook of banking, S Chand & Co., New Delhi.
2. Panikar K.K. (2008)Banking Theory & System S. Chand & Co., New Delhi.
3. Vinayakan N., (2006) Banking by 2000 A.D., Kanishka Publishers, Delhi..

B.Com Electives Syllabus

ELECTIVE IV: E-COMMERCE

PAPER-1: ESSENTIALS OF E-COMMERCE

OBJECTIVE : To enable the students gain knowledge about e-commerce and its various components

UNIT I Internet and Commerce: Business operations; E-Commerce practices vs. traditional business practices; Concept b2b c2c, g2g, g2c, Benefits of e-commerce to organization, consumers, and society; and society; Limitation of e-commerce; Management issues relation to e-commerce. - Operations of E-Commerce: Credit card transaction; Secure Hypertext Transfer Protocol (SHTP) Electronic payment systems; secure electronic transaction (SET) SET's encryption; Process; Cybercast; Smart cards India payment mode.

UNIT II Applications in B2C: Consumers' shopping procedure on the internet; Impact on disintermediation and re-intermediation; Global market; Strategy of traditional department stores; Products in b2c model; Success factor of e-brokers Broker- based services online; Online travel tourism service Benefits and impact of E-Commerce on travel industry; Real estate market Online stock trading and its benefits; Online banking and its benefits; Online financial services and their future; E-auctions-benefits, implementation, and impact.

UNIT III Application in B2B Applications of b2b Key technologies for b2b Architectural models of b2b Characteristics of the supplier-oriented marketplace, buyer-oriented marketplace, and intermediary – ordinate marketplace; Benefits of b2b on procurement reengineering, Just in Time delivery in 2b2 Internet – based EDI from traditional EDI; integrating EC with back-end information systems; Marketing issues in 2b2.

UNIT IV Applications in Governance: EDI in governance; E-government; E-governance-applications of the internet; Concept of government-to-business, business-to-government and citizen to-governance; E-governance models; Private sector interface in e-governance.

UNIT V Emerging Business Models: Retail model; Media model; advisory model, made-to-order manufacturing model; Do-it-yourself model; information service model; information service model; Emerging hybrid models; Emerging models in India.

(Practicals-50% & Theory 50%)

Text Book

1. Parag Diwan and Sunil Sharma: E-Commerce A Managers Guide to E-Business, Excel Book New Delhi

Reference Books

1. Agarwala Kamles.N. and Agarwala Deeksha, (2008)Bridge to Online Store front, Macmillan India New Delhi.
2. Agarwala Kamles.N. and Agarwala Deeksha: (2008) Business on the Net-Introduction to the E-Commerce; Macmillan Indian New Delhi.
3. Agarwala Kamlesh .N. and Agarwala Deeksha: (2008) Bulls Bears and the Mouse: An Introduction to the Online stock Market Trading; Macmillan India New Delhi.
4. Tiwari Dr, Muri D.,(2009) Education and E-Governance; Macmillan India New Delhi.

Paper – 2: INTERNET AND WORLD WIDE WEB (WWW)

OBJECTIVE : This course aims at familiarizing the students with the basics concepts and ground rule of internet and various services it offers.

UNIT I The Mechanism of the Internet: Distributed computing; Client-server computing Internet Protocol suite; Protocol Stack; Open System Interconnection Reference Model (OSIRM) based on the international Organization for Standardization (ISO) (Application layer presentation layer session, Layer, Transport layer network layer data link layer, and physical layer) TCP/IP protocol suite model; Mechanism of transmitting the message across the network and function of each layer; Processing of data at the destination; Mechanism to log onto the network Mechanism of sending and receiving email.

UNIT II Internet Enabled Services: Electronic main (E-Mail); Usenet & Newsgroup; File transfer protocol (FRP) Telnet; Finger; Internet chat (IRC) Frequently asked questions (FAQ); The World Wide Web Consortium, (W3c) – origin and evolution; Standardizing the Web; W3C recommendations; Browsing and searching; Browsing and information retrieval; Exploring the World Wide Web; Architecture of World Wide Web; Hyperlink; Hypertext Markup Language (HTML) Hypertext Transfer Protocol (HTTP) Address – URL.

UNIT III Designing Wed Site/Web page: WW operation, Web standards, HTML – Concept and version; Naming scheme for HTML documents; HTML editor; Explanation of the structure of the homepage; elements in HTML documents; XHTML, CSS Extensible Style sheet Language (SXL) Tips of designing wed Pages.

UNIT IV Security of Data/Information: Security; Network security; PINA factor – privacy, integrity, non-repudiation, authentication; SSL; Encryption; Digital signature; Digital certificate; Server security; Firewall; password; Biometrics; Payment security; Virus protection; Hacking.

UNIT V Web Browsing: Browsers; Basic functions of web browsers; Browsers with advanced facility; Internet explorer; Netscape navigator; Netscape communicator. - Search Engine/Directories: Directory; General features of the search engines, Approaches to website selection; Major search engines; Specialized search engines; popular search engines/directories; Guidelines for effective searching ; A general approach to searching.

Text Book

2. Parag Diwan and Sunil Sharma: E-Commerce A Managers Guide to E-Business, Excel Book New Delhi

Reference Books

5. Agarwala Kamles.N. and Agarwala Deeksha, (2008)Bridge to Online Store front, Macmillan India New Delhi.
6. Agarwala Kamles.N. and Agarwala Deeksha: (2008) Business on the Net-Introduction to the E-Commerce; Macmillan Indian New Delhi.
7. Agarwala Kamlesh .N. and Agarwala Deeksha: (2008) Bulls Bears and the Mouse: An Introduction to the Online stock Market Trading; Macmill an India New Delhi.
8. Tiwari Dr, Muri D.,(2009) Education and E-Governance; Macmillan India New Delhi

Elective: E-Commerce **B.Com Electives Syllabus**

Paper – 3: FINANCIAL ACCOUNTING WITH ACCOUNTING PACKAGES

OBJECTIVE : This course aims at familiarizing the students with the basics concepts and ground rule of accounting software packages and its applications in business

UNIT I Financial accounting System: Financial transactions: Books of Original entry – Ledger,

UNIT II Trail balance, Financial Statements – Profit & Loss accounts and Balance sheet. Practical knowledge on Wings Accounting/Wings Trade/ Tally (Softwares)

UNIT III Use of Software Packages of various types and obtain financial accounting Output for the following:

1. Day Books
2. Journals
3. General Ledger
4. Subsidiary Ledger
5. Trial Balance
6. Balance Sheet
7. Profit & Loss account
8. Other statements

UNIT IV Cost Accounting System: Elements of cost: Classification – Cost Sheet, Cost Accounting Methods and Techniques.

UNIT V Use of Software Packages of various types and obtain the following cost accounting output:

1. Analysis of cost – Cost centre wise.
2. Analysis of Cost – Cost elements wise.
3. Allocation of Overheads
4. apportionment of Overheads
5. Preparation of Cost Sheet
6. Variable and Fixed Costs – BEP, P/V Analysis
7. Standard Cost and variance Analysis
8. Differential cost

(Practical – 50% & Theory -50%)

Text Book

1. Software Mannuals of Accounting Packages: Tally, Miracle, Tata EXE, etc.

Reference Books

1. Kishore Ravi M.(2009) Cost Accounting, Taxamann Pub, New Delhi.
2. Iyenger SP.(20080 Cost Accounting – Principles and Practice, Sultan Chand & Sons
3. Gupta RL and Radhaswamy, M.,(2008) Advanced accountancy, Sultan & Chand, New Delhi

Elective: E-Commerce **B.Com Electives Syllabus**

Paper – 4: MANAGEMENT ACCOUNTING WITH COMPUTERS

OBJECTIVE : This course aims at familiarizing the students with the basics concepts and ground rule of accounting software packages and its applications in business decisions

UNIT I Management Accounting: Concept, Organisation and Functions

UNIT II Management Information Systems, Accounting techniques and Reports

UNIT III Use of various Software packages to obtain different management accounting outputs for the following:

1. Funds Flow Statement
2. Ratio Analysis
3. Budget and Budget Variances

UNIT IV Use of various Software packages to obtain different management accounting outputs for the following:

1. Analysis of Account Payable, Account receivable and States
2. Inventory Control
3. Projected Financial Statements
4. Cash ForecastinG

UNIT-V Use of various Software packages to obtain different management accounting outputs for the following

4. Standard Costing
5. Marginal Costing

Text Book

1. Software manuals for Accounting Packages like Tally, Miracle, Tata EXE, etc

Reference Books

1. Maheswari SN.,(2008) Management Accounting and Financial Control, Sultan Chand & Sons, New Delhi
2. Nigam and Sharma (2007) Cost Accounting – Theory, Problems and Solutions, Himalaya, Mumbai

Note: (all the 4 papers in this elective will have Computer Practical Examination with 50% marks and remaining 50% marks for theory end-semester examination). Controller of Examination will appoint an external examiner to supervise the Practical exam.

B.Com Electives Syllabus

ELECTIVE V: HUMAN RESOURCE MANAGEMENT

Paper I : PRINCIPLES OF HUMAN RESOURCE MANAGEMENT

OBJECTIVE : To provide the students to understand the functions, process and task of human resource management

UNIT I Human Resource Management – Nature and Scope – Objectives – Nature of people and organizations – Personnel Policies and Principles – Environment of Human Resource Management – Social Systems – Human Resource accounting and audit.

UNIT II Human Resource Planning – Human resource / manpower planning – meaning – process of HR Planning – Job analysis – Recruitment and selection – Orientation and Placement – Orientation Programmes.

UNIT III Employee and reward systems – Training personnel – Job – Job evaluation – Job satisfaction – Appraising and rewarding performance – money as means of rewarding – economic incentives systems – Wage incentives – Wage administration – Benefits and services – Profit and production sharing.

UNIT IV Motivation – Human needs – Theories of motivation – Maslow's Hierarchy needs – Hertzberg's two factor model – Other theories – Behavioral modification – Motivational Patterns – Expectancy model – Application of motivation concepts.

UNIT V Leadership, Communication and counseling – Nature of leadership behavior – Leadership Style – Employee Participation – Nature, Scope, Programs and benefits of Participation – Employee Communication Process – Communication Systems – employee counseling and types

Text Book

1. Michael V.P.: Human Resource Management and Human Relations – Himalalya Publishing House – New Delhi, 1998.

Reference Books

1. M.N. Rudrabasavaraj: Cases in Human Resource Management – Himalaya Publishing House – New Delhi, 1998
2. H. John Bernardin and Richard W. Beatty: Performance Appraisal: Human Behavior at work – Boston: Kent, 1984
3. George T. Milkovich and John W. Boudream: Personnel / Human Resources Management: A Diagnostic Approach, 5th Edn. Plano, TX: Business Publications, 1998.

Paper 2 : ORGANISATIONAL BEHAVIOUR

OBJECTIVE : To make the students to understand the behavioural pattern of people in the organistaion to manage manpower

UNIT I Organizational Behaviour: Focus and Purpose Organization – Meaning, Need and Importance of Organization – Classification – Organization Goals, Prospects of Formal Organization – Organizational Behaviour (OB) – Nature and Scope – Contributions – OB models - Features of Modern OB model.

UNIT II Individual Behaviour, Personality, Learning and Attitudes – Personality – Definition – Biological, Cultural, Family, Social and Situational; Factors Theories of personality – Meaning of learning – Learning Process – Learning Theory and OB – Organizational Behaviour Modification – Meaning, steps, Process and practice, Attitudes – Characteristics – Components – Formation – measurement of Attitude.

UNIT III Group Behaviour and Group Dynamics: Group Dynamics – Meaning – Types – Groups in an organization – Group size and Status – Influences – Emergence of informal Leaders – Role – Relationship and Group Behaviour – Characteristics – Behaviour Problems – Group Behaviour – Characteristics – Behaviour Problems – Group Norms – Cohesiveness – Features – Effects – Group thinking – Symptom, Consequences and Remedy – Group Decision Techniques.

UNIT IV Dynamics of organizational; behavior; Organizational changes and Development Organizational Change – Meaning – Nature of Work – Change – Stability Vs Change – Proactive Vs reactive change – Pressure of change – changes in managerial personnel – changes process – organizational resistance to change – Management of change process.

UNIT V Organizational Development – Definitions – Characteristics Objectives – Team Building – Survey Feed Back – Four System Management

Text Book

1. R.S Dwivedi, Human Relations and Organizational Behaviour, 5th edition, Macmillian Indian Limited

Reference Books

1. Gangadhara Rao, M., V.P.S. Rao, P.S. Narayana (2008): Organizational Behaviour Text & Cases.
2. Fred Luthans: Organizational Behaviour 11th Edition, Tata McGraw Hill
3. Robinson, Organisational Behaviour, International Edition 11, Prentice Hill

Paper 3 : INDUSTRIAL RELATIONS AND LABOUR WELFARE

OBJECTIVE : This course is to provide knowledge to the students to understand various legislations providing labour welfares and controlling industrial relations

UNIT I Industrial Relations – An Introduction: Concepts, to the study of Industrial Relations – Importance of Industrial. Relations-Industrial Relations and Human Relations - Industrial Relations Programme

UNIT II Evolution in industrial relations and industrial conflicts: Input of Industrial System-Industrial Conflicts-Disputes-Definition-Essentials of a Disputes-Classification of Grievance. Impact of Industrial Disputes -Causation factors-Government Machinery-Industrial Peace-Techniques of Strikes-Prevention of Strikes

UNIT III Conciliation, Arbitration and Adjudication: Mediation and conciliation-Functions and Process of Mediation-Kinds, Essentials, Conciliation Machinery-Conciliation Practice in India – Adjudication-Importance-Types-Labour Court and Industrial Tribunal-Central Industrial Relations Machinery in India.

UNIT IV Labour Welfare, Concept, Objectives & Scope: Concept and Definition of Labour Welfare Objectives, Need and principles of Labour Welfare-Inspectorate Service-Statutory Welfare Provisions-Voluntary Welfare Measures. Labour Welfare Funds, Industrial Housing and Safety; labour Welfare Funds-State-wise and Central-wise-Housing Finance-Housing schemes of the government of India.

UNIT V Industrial Safety - trends and causes of Accidents Prevention - Safety provisions - Nature Safety, Council - Industrial Health, Hygiene and Education: Industrial Health-Statutory Provisions-Ancillary Health Services-Occupational Hazards Provisions – Education Scheme-Training Programmes - Evaluation-Social Work Practice Counseling Service.

Text Book

1. Bagri (2009) Law of Industrial Disputes, Kamal Law House, Delhi.
2. Khan and Khan (2010) Labour Law, Asia Law House, Hyderabad.

Reference Books

1. Srivastav(2007) Law of Trade Unions., Eastern Book Company.

2 Dr. V.G.Goswami, (2007)Labour and Industrial Law, Central Law Agency, Allahabad.

2. S.N.Mishra, (2009)Labour and Industrial Law, Central Law Agency, Allahabad.

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Paper 4: HUMAN RESOURCE ACCOUNTING

OBJECTIVE : This course provides exposure to students to understand the basic concept for organizational effectiveness through the technique of applying human resource accounting methods

UNIT I Human resource Planning – meaning and definition – Importance of natural resources and human resources - In vestment in Human Resources – How Investment in Personnel are made – Quality of Work Force Vs Performance - Human Capital – Human Capital Investment – Expenditure Vs Productivity – Education and Training – Human Capital Discrimination

UNIT II Human Resource Accounting – Converting Human Data in Money Value – Objectives of Human Resource Accounting – Limitations of Human Resource Accounting – Approaches to Human Resource Accounting.

UNIT III Investment Approach – Investment in Human Resources – Recruiting and Training Costs – Depreciation – Rates of Return – Organizational behaviour Vs Turnover – Waste of Human Resources and Prevention.

UNIT IV Organizational Climate Approach – Improvement and Deterioration Of Organizational Climate – Determination Of Changes In Human Resource Variables – Increased Costs, Cost Reduction and Future Performance.

UNIT V Responsibility Accounting And Management Control – Responsibility Accounting – Management Control Structure And Process Classification Of Costs – In Responsibility Accounting – Behavioural Aspects Of Management Control – Social Control.

Text Book

1. Human Resource Accounting: M. Saeed, DK Kulshrestha, Anmol Publications, 2000.

Reference Books

1. Accounting for Human Resources: Rakesh Chandra Katiyar, UK Publishing House.. 2003
2. Human Resource Accounting: D Prabakara Rao, Intern India Publications.. 2006
3. K. Aswathappa, (2008) Human Resource Management Tata McGrawHill

B.COM DEGREE PROGRAMME

SPECILISATION STREAM

SEMESTER WISE COURSE STRUCTURE FROM THE ACADEMIC YEAR 2011-2012

COURSE STRUCTURE

I Semester

1. Language I *
2. English I *
3. Financial Accounting I *
4. Business Management *
5. Business Economics (Allied)*

II Semester

6. Language II *
7. English II *
8. Financial Accounting II *
9. Business Law *
10. Business Environment (Allied)*

Environmental Studies (Compulsory) @

III Semester

11. Company Law *
12. Cost Accounting *
13. **Specialisation Paper 1 #**
14. **Specialisation Paper 2 #**

15. Business Statistics *

IV Semester

16. Entrepreneurial Development *

17. Money and Financial System *

18. Specialisation Paper 3 #

19. Specialisation Paper 4 #

20. Business Communication *

V Semester

21. Income Tax I *

22. Management Accounting I *

23. Specialisation Paper 5 #

24. Specialisation Paper 6 #

25. Specialisation Paper 7 #

VI Semester

26. Income Tax II *

27. Management Accounting II *

28. Specialisation Paper 8 #

29. Specialisation Paper 9 #

30. Specialisation Paper 10 #

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*** Common Syllabus for General B.Com and Specialization B.Com Programmes**

 # Syllabus is enclosed for the Ten Specialization Papers only.

@ Not taken for aggregate of marks.

PONDICHERRY UNIVERSITY
PONDICHERRY

Revised Syllabus

for

B.Sc. (CHEMISTRY)

(SEMESTER PATTERN)

Effective from 2004-2005(Batch onwards)

2004

PREAMBLE

PONDICHERRY UNIVERSITY
B.Sc. DEGREE COURSE

REVISED REGULATION & SYLLABUS FOR B.Sc. (CHEMISTRY) DEGREE COURSE

The revised syllabus shall come into effect from the academic year 2004-2005 onwards

DURATION OF THE COURSE:

The duration of the B.Sc. (Chemistry) degree shall be for three academic years with total of six semesters.

ELIGIBILITY FOR ADMISSION:

The candidates for admission to the first year of the B.Sc. (Chemistry) degree shall have passed the higher secondary examination (+2) with Chemistry, Physics and Mathematics or Biology of any board recognized equivalent by the Pondicherry University.

AGE LIMIT:

The rules as applicable to other Under Graduate courses as prevailing in Pondicherry University.

COURSE OF STUDY:

The course of study for B.Sc. (Chemistry) degree shall comprise of the following

Part-I- Language -Tamil / French / Hindi / Telugu / Malayalam
(Under B.Sc. Pattern for four semesters - I year and II year only)
Any one of the Part-I languages under the option of the candidate for first year and second year only.

Part-II - English
(Under B.Sc. Pattern for four semesters i.e., I year and II year only)

The syllabus and textbooks for the above Part-I and Part-II are as prescribed by the Pondicherry University.

Part-III - Chemistry main with Physics and Mathematics or Zoology or Botany as Allied subjects (Theory and Practical).

EXAMINATIONS:

There shall be theory examinations at the end of each semester and practical examinations at the end of even semesters.

Candidates who do not pass the examination in any subject (s) shall be permitted to appear in such failed subjects in the subsequent semester examinations. No candidate shall be permitted to register for a subsequent examination without having registered at the first appearance. Rules and regulations prevailing in the University in respect of other undergraduate courses will be followed. The results of all the examinations will be communicated to the candidates through the Principals of the College.

SCHEME OF EXAMINATION:

All the theory examinations shall be of three hours duration with maximum of 100 marks each. The passing minimum will be 40%. For practical of the main subject it will be 75+150+275 (total 500). In each practical examination the passing minimum is 40%. For allied subjects maximum marks shall be 50 marks and passing minimum shall be 20 marks.

EVALUATION:

Theory examinations will be evaluated by Pondicherry University. Practical examination will be evaluated by a team of two examiners one-an external expert in the subject from other academic institution selected by Pondicherry University and the other-an internal examiner from the college.

ATTENDENCE:

A candidate shall be permitted to appear for the examination in a subject of study only if

1. He / She secures not less than 80% attendance in the subject concerned.
2. He / She may be allowed to appear for the examination under permission from the Chairman of the Academic Council if the attendance is below 80% and above 60%. In any case the candidates having attendance below 60% will not be permitted to appear for examination in that course.

CLASSIFICATION OF SUCCESSFUL CANDIDATE:

1. Candidates who pass in all the examinations in all the 3 years and secures an aggregate of not less than 60% of the total marks in the University examinations shall be declared to have passed the examination for the degree in First Class.

2. Candidates who pass in all the examinations in all the 3 years and secures an aggregate of not less than. 50% of the total marks in the University

examinations shall be declared to have passed the examination for the degree in Secondary Class.

3. All other successful candidates who secure 40% to 49% shall declared to have passed the examination for the degree in Third Class.

4. For purpose of declaring a candidate to have qualified for the degree of B.Sc. (chemistry) in First Class / Second Class / Third Class, marks obtained in Part-III alone will be the criteria, provided he / she has secured the prescribed passing minimum in Part I and Part II.

5. There shall be no classification for Part I and Part II.

6. Any other rules stipulated by the University will also apply.

AWARD OF THE DEGREE:

The candidate should have undergone the prescribed course of study for a period of not less than 3 years and passed the prescribed examinations in all the papers in theory and practical.

REVISION OF REGULATIONS AND CURRICULUM:

The university may from time to time revise, amend and change the Regulations and Curriculum, if found necessary.

PONDICHERRY UNIVERSITY

B.Sc. CHEMSITRY-I YEAR
I SEMESTER

INORGANIC CHEMISTRY-I
(PAPER CODE: CH 101)
60 HOURS (4HRS/WEEK)

UNIT-I: ATOMIC STRUCTURE& PERIODIC PROPERTIES:

Idea of de Broglie matter waves, Heisenberg uncertainty principle, Atomic orbitals, Schrödinger wave equation , Significance of ψ and ψ^2 , Quantum numbers , Radial and angular wave functions and probability distribution curves, Shapes of s, p, d orbitals Aufbau and Pauli exclusion principles, Hund's multiplicity rule, Electronic configuration of the elements , Effective nuclear charge. Atomic and Ionic radii, Ionization energy, Electron affinity and Electro negativity – definition, Methods of determination or evaluation, Trends in periodic table and applications in predicting and explaining the chemical behaviour.

(12 Hrs)

UNIT-II: CHEMICAL BONDING:

Ionic solids – Ionic structures, Radius ratio effect and Co-ordination number, Limitations of Radius ratio rule, Lattice energy and Born-Haber cycle, Solvation energy and Solubility of ionic solids, Polarizing power and Polarizability of ions – Fajan's rules. Valence bond theory and its limitations; directional characterstics of covalent bonds, Various types of hybridization and shapes of simple inorganic molecules and ions. Valence shell electron pair repulsion (VSEPR) theory to **NH_3, H_3O^+, SF_4, ClF_3, ICl_2^- and H_2O.**

(12 Hrs)

UNIT-III:

(A) CHEMISTRY OF NOBLE GASES:

Position in the periodic table. Occurrence - Isolation and Separation of Noble gases from atmosphere. Physical properties of Noble gases. Fluorides – Oxyfluorides and Oxides of Xenon (Preparation, Properties and Structure). Applications of Noble gases.

(B) S–BLOCK ELEMENTS:

Comparative study, Diagonal relationships, Salient features of hydrides, Solvation and Complexation tendencies including their function in Bio-systems. An introduction to alkyls and aryls of Li, Na and Mg.

(12 Hrs)

UNIT-IV: P – BLOCK ELEMENTS-13th GROUP ELEMENTS:

General characteristics of Boron group elements, detailed study of Hydrides Halides, and Oxides, Diagonal relationship between Boron and Silicon, Hydrides of Boron-Diborane and higher Boranes. Boron nitride, Borazine, Sodium boro hydride and Lithium aluminium hydride.

(12 Hrs)

UNIT-V: P – BLOCK ELEMENTS-14th GROUP ELEMENTS:

General characteristics of Carbon group elements. Allotropy of Carbon – Structure of Diamond and Graphite. Catenation, Comparative study of Hydrides and Halides of Carbon group elements. Study of Carbides, Fullerenes, Fluorocarbons and Silicates. Comparative study of Germanium, Tin and Lead.

(12 Hrs)

B.Sc. CHEMSITRY-I YEAR
I SEMESTER

ORGANIC CHEMISTRY-I
(PAPER CODE: CH 121)
60 HOURS (4HRS/WEEK)

UNIT-I:

Classification and IUPAC nomenclature of Organic Compounds, Structure and bonding**.** Hybridization, Bond lengh and Bond angles, Bond energy, Localized and Delocalized, chemical bond, Van der Waals interaction, Resonace, Hyperconjugation, Aromaticity, Inductive and Field effects.

(10 Hrs)

UNIT-II: MECHANISM OF ORGANIC REACTIONS:

Curved arrow notation, Drawing electron movements with arrows, Half-headed and Double headed arrows, Homolytic and Heterolytic bond breaking, Types of reagents - Electrophiles and Nucleophiles. Types of Organic reactions. Energy considerations. Reactive intermediates- Carbocations, Carbanions, Free radicals, Carbenes, Arynes and Nitrenes (with examples). Assigning formal changes on intermediates and other ionic species.

(10 Hrs)

UNIT-III: STEREOCHEMISTRY OF ORGANIC COMPOUNDS:

Concept of Isomerism. Types of Isomerism, Optical Isomerism - Elements of Symmetry, Molecular chirality, Enantiomers, Optical activity, Properties of Enantiomers, Diasteromers, Meso compounds, Resolution of Enantiomers, Inversion, Retension, and Racemization. Relative and Absolute configuration, Sequence rules **D&L** and **R&S** system of nomenclature. Geometric Isomerism-determination of configuration of Geomentric Isomerism- determination of configuration of Geometric isomers **E&Z** system of nomenclature, Geomentric Isomerism in Oximes and Alicyclic compounds.

Conformational Isomerism -Conformational analysis of Ethane and n-Butane, conformations of Cyclohexane derivatives, Newman projection and Sawhorse formulae. Fischer and Flying wedge formulae. Difference between Configuration and Conformation.

(15 Hrs)

UNIT-IV: ALKANES AND CYCLOALKANES:

Nomenclature-Isomerism in Alkanes, Sources and methods of formation with special reference to Wurtz reaction, Kolbe reaction, Corey-House reaction and decarboxylation of carboxylic acids, physical properties and chemical reactions of Alkanes. Mechanism of free radical Halogenation of Alkanes: Orienatation, Reactivity and Selectivity.

Cyclo alkanes; nomenclature, methods of formation, chemical reactions, Bayer's strain theory and its limitations. Ring strain in small rings (Cyclo propane and Cyclo butane), theory of strain less rings.

(10 Hrs)

UNIT-V: ALKENES,DIENS AND ALKYNES:

Nomenclature of Alkenes, methods of formation, mechanism of Dehydration of Alcohols and Dehydro-halogenation of Alkyl halides, Regioselectivity in Alcohol dehydration. The Saytzeff rule, Hofmann elimination, physical properties and relative stabilities of alkenes. Chemical reactions of Alkenes. Mechanisms involved in Hydrogenation, Electrophilic and Free radical additions. Markownikoff's rule, Hydroboration-Oxidation, Oxymercuration- Reduction. Epoxidation, Ozonolysis , Hydration , Hydroxylation and Oxidation with $KMnO_4$, Polymerization of Alkenes. Substitution at the Allylic and Vinylic positions of Alkenes. Industrial applications of Ethylene and Propene.

DIENES:

Nomenclature and classification of Dienes: Isolated, Conjugated and Cumulated dienes. Structure of Allenes and Butadiene, methods of formation, Polymerisation. Chemical reactions-1, 2 and 1, 4-additions -Diels-Alder reaction.

ALKYNES:

Nomenclature, Structure and Bonding in Alkynes. Methods of formation. Chemical reactions of Alkynes, Acidity of Alkynes. Mechanism of electrophilic and nucleiphilic addition reactions, Hydroboration-Oxidation, Metal-Ammonia reductions, Oxidation and Polymerization.

(15 Hrs)

B.Sc.CHEMISTRY-I YEAR
I SEMESTER LABORATORY COURSE

ANALYTICAL TECHNIQUES
(Course Code: CH – P 01)

PRACTICAL EXAMINATION- I

DURATION: 3 HOURS **MARKS: 50**

1. **Calibration of Glass wares and Fractional weights:**
   - (i) Standard flasks
   - (ii) Burette and Pipette
   - (iii) Weights.

2. **Determination of Melting point:**
   Naphthalene, Benzoic acid, Urea, Succinic acid, Cinnamic acid, Salicylic acid, Acetanilide and m-Dinitro benzene.

3. **Determination of Boiling point:**
   Ethanol, Cyclohexane, Toluene, Benzene

4. **Separation and Purification techniques:**
   a. Separation of Naphthalene and Benzoic acid
   b. Separation of Naphthalene and Glucose
   c. Separation of Phenylalanine and Glycine by paper chromatography
   d. Separation of Alanine and Aspartic acid by paper chromatography.
   e. Separation and determination of R_f value for 2,4-dinitro phenylhydrazone of carbonyl compounds by TLC

5. **Purification by Crystallization:**
   (a) Aromatic acids from hot water
   (b) Naphthalene from ethanol;
   (c) Acetanilide from boiling water.

B.SC. CHEMISTRY-I YEAR
II SEMESTER

PHYSCIAL CHEMISTRY-I
(PAPER CODE: CH 142)
60 HOURS (4HRS/WEEK)

UNIT-I: MATHEMATICAL CONCEPTS:

Logarithmic relations, Curve sketching, Linear graphs and Calculation of slopes, Differentiation of functions like $\mathbf{K_x}$, $\mathbf{e^x}$, $\mathbf{x^n}$, **sin x**, **log x**, **maxima** and **minima**. Partial differentiation and Integration of some useful / relevant functions.

(8Hrs)

UNIT-II: GASEOUS STATE – I:

Postulates of Kinetic theory of gases, Derivation from Ideal behaviour, Van der Waals -equation of state. Critical phenomena : PV isotherms of real gases, continuity of states, The isotherms of Van der Waals equation, Relationship between Critical constants and Van der Waals constants, The law of corresponding states, Reduced equation of state.

(10 Hrs)

UNIT-III: GASEOUS STATE – II:

Molecular velocities: Root mean square, Average and Most probable velocities. Qualitative discussion of the Maxwell's distribution of molecular velocities, Collision number, Collision diameter, Collision frequency, Mean free path, Transport phenomena in gases. The degrees of freedom of gaseous molecules, Liquifaction of gases (based on Joule – Thomson effect).

(10 Hrs)

UNIT-IV:

(A) THERMODYNAMICS – I:

Definition of Thermodynamic terms – System – Surroundings etc, Types of Systems, Intensive and Extensive properties, State and path functions and their differentials. Thermodynamic processes, Concept of Heat and Work.

First law of Thermodynamics:

Statement, Definition of Internal energy and Enthalpy. Heat capacity, Heat capacities at constant Volume and Pressure and their relationship. Joule's law – Joule-Thomson coefficient and Inversion temperature. Calculation of **w, q, dU & dH** for the expansion of ideal gases under isothermal and adiabatic conditions for reversible process.

(9 Hrs)

(B) THERMOCHEMISTRY:

Standard state, Standard enthalpy of formation – Hess's law of heat summation and its applications. Heat of reaction at constant pressure and at constant volume. Enthalpy of neutralization, Bond dissociation energy and its calculation from Thermo – chemical data. Temperature dependence of enthalpy, Kirchhoff's equation.

(9 Hrs)

UNIT-V:

(A) LIQUID STATE:

Inter molecular forces structure of liquids (a qualitative description), Structural differences between Solids, Liquids and Gases.

Liquid crystals:

Difference between liquid crystal, Solid and liquid. Classification, Structure of nematic and cholestric phases. Uses of liquid crystals. Thermography and seven segment cell.

(7 Hrs)

(B) LIQUID STATE – PHYSICAL PROPERTIES OF LIQUIDS:

Vapour pressure – Measurement – Heat of vaporization – Troutan's rule. Surface Tension – Effects – Measurement by Stalagmometer method. The Parachor –and Chemical constitution. Surface active agents – detergent action. Viscosity – Determination by Ostwald Visco meter method. Refractive Index- Measurement by Abbe's refractometer. Specific and Molar refraction – definitions.

(7 Hrs)

B.SC. CHEMISTRY-I YEAR
II SEMESTER

INORGANIC CHEMISTRY PAPER- II
(PAPER CODE: CH 102)
60 HOURS (4HRS/WEEK)

UNIT-I: NUCLEAR CHEMISTRY:

Nuclear forces – Atomic mass unit - Packing fraction - Mass defect and Binding energy of the nucleus. Stability of nuclei. Nuclear models – The liquid drop model. Nuclear reactions - Nuclear fission – Fission of Uranium. - Nuclear Reactors - Types - Importance of Thorium in India's Nuclear energy production. Nuclear fusion.
Radio activity – Natural radio activity – Rate of radio activity disintegration – Half life Period – Transmutation of elements – Group displacement law – Radio active decay series. Isotopes – Separation of isotopes. Applications of Isotopes in Analytical chemistry, Medicine, Animal studies and in Reaction mechanism. Carbon dating, Neutron Activation analysis.

(12 Hrs)

UNIT-II:

(A) P – BLOCK ELEMENTS-15th GROUP ELEMENTS:

General characteristics of Nitrogen group elements. Allotropy of Phosphorus. Comparative study of Hydrides, Halides, Oxides and Oxyhalides of Nitrogen group elements. Oxyacids of Nitrogen and Phosphorus, Preparation, Properties, Structure and Uses of Hydrazine, Hydrazoic acid, Hydroxylamine.

(B) P – BLOCK ELEMENTS-16th GROUP ELEMENTS:

General Characteristics of Oxygen group elements. Allotropy of Sulphur – Oxides, Halides, Oxyhalides of Sulphur – Nitrides of Sulphur – Tetra sulphur tetra nitride and Disulphur dinitride. Oxyacids of Sulphur. Persulphuric acids, Dithionic and Thiosulphuric acid – (structure, Preparation and Properties).

(12 Hrs)

UNIT-III: CHEMISTRY OF ELEMENTS OF FIRST TRANSITION SERIES:

General Characteristics of d- block elements – Properties of the elements of the first transition series. Relative stabilities of their oxidation states. Metallurgy of **Fe, Co, Ni, and Cu.**

(12 Hrs)

UNIT-IV: OXIDATION AND REDUCTION & NON-AQUEOUS SOLVENTS:

Use of Redox potential data – Analysis of Redox cycle, Redox stability in water – **Frost, Latimer** and **Pourbaix** diagrams. Principles involved in the extraction of the elements. Physical properties of a Solvent, Types of Solvents and their general characteristics, Reactions in Non-aqueous solvents with reference to liquid **NH3** and liquid **SO_2**.

(12 Hrs)

UNIT-V: CHEMISTRY OF ELEMENTS OF SECOND & THIRD TRANSITION SERIES:

General characteristics –Comparative treatment with their **3d** analogues in respect of Ionic radii, Oxidation states, Magnetic behaviour, Metallurgy of **silver, gold, platinum and palladium.**

(12 Hrs)

B.Sc.CHEMISTRY-I YEAR
II SEMESTER LABORATORY COURSE

INORGANIC QUALITATIVE ANALYSIS
(Course Code: CH – P 02)

PRACTICAL EXAMINATION- II

DURATION: 3 HOURS **MARKS: 50**

Semi-micro Analysis of a Mixture containing two Cations and two Anions ofwhich one Anion being an interfering radical.

Cations:
Lead, Antimony, Arsenic, Tin, Bismuth, Cadmium, Copper, Aluminium, Chromium, Iron, Manganese, Zinc, Nickel, Cobalt, Calcium, Strontium, Barium, Magnesium, Potassium and Ammonium

Anions:
Carbonate, Sulphide, Chloride, Bromide, Iodide, Sulphate, Nitrate, Phosphate, Borate, Oxalate, Fluoride, Arsenite and Chromate.

B.Sc. CHEMISTRY –II YEAR
III SEMESTER

ORGANIC CHEMISTRY-II
(PAPER CODE: CH 221)
60 HOURS (4HRS/WEEK)

UNIT-I: ARENS AND AROMATICITY:

Nomenclature of Benzene derivatives. The Arly group. Aromatic nucleus and side chain. Structure of Benzene, Molecular formula and Kekule structure. Stability and Carbon-Carbon bond lengths of benzene, Resonance structure and M.O picture. Aromaticity; The Huckel rule, Aromatic ions. Aromatic electrophilic substitution**:** General pattern of the mechanism-Role of sigma and pi complexes. Mechanism of Nitration, Halogenation, Sulphonation, Mercuration and Friedal crafts reactions. Energy profile diagrams. Activating and deactivating substituents. Orientation and Ortho / Para ratio. Side chain reactions of Benzene derivatives. Birch reduction. Methods of formation and chemical reactions of Alkylbenzenes and Biphenyl.

(12Hrs)

UNIT-II: ALKYL AND ARYL HALIDES:

(A) ALKYL HALIDES:

Nomenclature and classes of Alkyl halides, methods of formation, chemical reactions.

(B) ARYL HALIDES:

Methods of formation of Aryl halides-nuclear and side chain reactions. The Addition –Elimination and the Elimination-Addition mechanisms of Nucleophilic Aromatic substitution reactions.

(8Hrs)

UNIT-III: ALDEHYDES & KETONES:

Structure of the Carbonyl group. Synthesis of Aldehydes and Ketones. Mechanism of Nucleophilic additions to Carbonyl group with particular emphasis on Benzoin, Aldol, Perkin and Knoevenagel condensations. Condensation with Ammonia and its derivatives. Wittig reaction, Mannich reaction, Cannizzaro reaction, MPV, Clemensen, Wolf-Kishner, $LiAlH_4$, $NaBH_4$ reduction.

Carboxylic acids and its derivatives: - Nomenclature, Properties, Acidity of Carboxylic acid, Effect of substituents on acid strength. Reactions of Carboxylic acids. H.V.Z.reaction, Acid chloride, Esters, Amides & Acid anhydrides. Interconversion, Mechanism of Esterification (BAc) & hydrolysis(acidic basic)

(16Hrs)

UNIT-IV: ORGANIC COMPOUNDS OF NITROGEN :

Preparation of Nitroalkanes and Nitroarenes, Chemical reactions of Nitro benzene with special reference to reduction to various compounds. Amines, Classification, Separation of 1^0, 2^0&3^0 Amines.

(12Hrs)

UNIT-V: ALCOHOLS & PHENOLS:

(A)ALCOHOLS:

Classification and Nomenclature. Monohydric Alcohols- Nomenclature, methods of formation by reduction of Aldehydes, Ketones, Carboxylic acids and Esters. Hydrogen bonding, Acidic nature, Reactions of Alcohols. Dihydric alcohols- Nomenclature, methods of formation, chemical reactions of vicinal glycols, Oxidative cleavage by $Pb(OAc)_4$ and HIO_4. Glycerol preparation and reactions.

(B) PHENOLS:

Preparation and acidic character of phenol, comparative strengths of Alcohol & Phenol. Properties of phenols.

(12Hrs)

B.Sc. CHEMISTRY –II YEAR
III SEMESTER

ANALYTICAL CHEMISTRY – I
(PAPER CODE: CH 261)
60 HOURS (4HRS/WEEK)

UNIT-I: STATISTICAL EVALUATION OF ANALYTICAL DATA:

Accuracy and Precision – Ways of expressing Accuracy and Precision. Errors - types - Determinate, Indeterminate and Gross errors – Minimization of Errors. Methods of reporting data – Significant figures. Statistical treatment of Indeterminate errors – Confidence limits – Criteria for rejection of outliers Q-test. Graphing –The least squares method for deriving Calibration plots.

(12 Hrs)

UNIT-II:

(A) ANALYTICAL BALANCE:

a) Principles of Analytical balance - rules for handling the balance, Errors in weighing and Calibration of Weights.
b) Single pan balance – Principle, Operation and Advantages.

(B)*STOICHIOMETRY AND CONCENTRATION SYSTEMS:*

Stoichiometry - Mole and Equivalent concepts –Stoichiometric calculations. Concentration systems–Molarity, Normality, P-functions, Percent Concentration ppm and ppb –Calculations involving various types of Concentration systems.

(12 Hrs)

UNIT-III: (A) REVIEW OF CHEMICAL EQUILIBRIUM:

Auto protolysis of Water –Acids and Bases . Ionization of weak Acids and Bases – equilibrium constant expressions. Hydrogen ion concentration –**pH**-scale –calculation of **pH** of weak acids and bases. Buffer solutions –**pH** of a buffer solution –Henderson-Hasselbalch equation

(B) SOLUBILITY EQUILIBRIA:

Principles of Solubility –Solubility product –factors affecting Solubility–Temperature, Solvent, Common ion effect, Effect of Complex formation, Separation of metal ions based on solubility differences –Sulphide separations. Applications of Solubility product principle in Qualitative and Quantitative analysis. Calculation of Problems involving Solubility equilibria .

(12 Hrs)

UNIT-IV: PRINCIPLES OF TITRIMETRIC (VOLUMETRIC) ANALYSIS:

(A) Definition of terms –Primary Standard –Secondary standard solutions – Equivalence point and End point of titrations –Types of titrations –Calculations involving Volumetric titrations.

(B) ACID - BASE TITRATIONS: Derivation of titration curves for strong acid Vs strong base and weak acid Vs strong base titrations. Theory of acid–base indicators.

(C) REDOX TITRATIONS: Nernst equation . Theory of Redox indicators . Types of Redox indicators . Applications of Redox titrations .

(D) COMPLEX FORMATION TITRATIONS: Chelating agents –EDTA. Theory of Metallochromic indicators. Titrations involving EDTA –Types of EDTA titrations - Applications.

(E) PRECIPITATION TITRATIONS: Argentometric titrations - Indicators for titrations involving Silver nitrate.

(12 Hrs)

UNIT-V: PRINCIPLES OF THERMOGRAVIMETRY:

Thermometric methods – Principles of **TGA, DTA** and Thermometric titrations – application in **$CaC_2O_4.H_2O$, $(CH_3COO)_2Ca.\ H_2O$** and **HCl Vs NaOH** Thermometric titrations.

(12 Hrs)

B.Sc. CHEMISTRY-II YEAR
III SEMESTER LABORATORY COURSE

VOLUMETRIC ANALYSIS
(Course Code: CH – P 03)

PRACTICAL EXAMINATION- III

DURATION: 3 HOURS **MARKS: 75**

1. Determination of Sodium carbonate and Sodium hydroxide in a mixture.
2. Determination of Fe (II) and Fe (III) in the mixture using Potassium permanganate.
3. Determination of Fe (II) and Fe (III) in the mixture using Potassium dichromate.
4. Determination of Potassium dichromate by Iodometric method.
5. Determination of Copper by Iodometric method.
6. Determination of Magnesium using EDTA.
7. Determination of Zinc using EDTA.
8. Determination of Hardness of water.
9. Determination of Calcium and Magnesium in a mixture.

B.Sc. CHEMISTRY –II YEAR
IV SEMESTER

PHYSICAL CHEMISTRY-II
(PAPER CODE: CHEM 242)
60 HOURS (4HRS/WEEK)

UNIT-I:
(A) SOLID STATE – I:
Definition of Space lattice, Unit cell, Laws of Crystallography –
(i) Law of Constancy of interfacial angles.
(ii) Law of Rationality of Indices.
(iii) Law of Symmetry, Symmetry elements in Crystals.

(B) SOLID STATE–II:
X–ray diffraction by crystals, Derivation of Bragg equation, Determination of Crystal structure of **NaCl, KCl, CsCl** (Laue's method & Powder method).

(16 Hrs)

UNIT-II: COLLOIDAL STATE:
Definition of Colloids, Classification of Colloids. Solids in liquids (sols) – Properties – Kinetic, Optical and Electrical, Stability of Colloids, Protective action, Hardy – Schulze law, Gold number. Liquid in liquids (emulsions) – Types of emulsions, Preparation, Emulsifier. Liquid in solids (gels) – Classification, Preparation and Properties, Inhibition, General applications of Colloids.

(8 Hrs)

UNIT-III:
(A) THERMODYNAMICS–II:
Second law of Thermodynamics: Need for the Law, Different statements of the Law, Carnot cycle and its efficiency, Carnot theorem, Thermodynamic scale of temperature. Concept of Entropy: Entropy as a state function, Entropy as a function of **V** & **T** , Entropy as a function of **P** & **T,** Entropy change in physical change , Clausius inequality, Entropy as a criteria of Spontaneity and equilibrium. Entropy change in ideal gases and mixing of gases.

(B) THERMODYNAMICS–III:
Gibbs & Helmholtz functions: Gibbs function (**G**) and Helmholtz function (**A**) as Thermodynamic quantities, **A** & G as criteria for Thermodynamic equilibrium and spontaneity, their advantage over entropy change. Variation of **G** & **A** with **P, V** and **T.**

(C)Third law of Thermodynamics:
Nernst heat theorem, Statement and Concept of residual entropy, Evaluation of absolute entropy from heat capacity data.

(16 Hrs)

UNIT - IV: CHEMICAL EQUILIBRIUM:

Equilibrium constant and Free energy, Thermodynamic derivation of law of mass action, Le Chatelier's principle, Reaction isotherm and reaction isochore – Clapeyron equation and Clausius – Clapeyron equation, Applications.

(10 Hrs)

UNIT-V: SOLUTIONS,DILUTE SOLUTIONS AND COLLIGATIVE PROPERTIES:

Ideal and Non – ideal solutions, Methods of expressing Concentrations of solutions, Activity and Activity coefficient. Dilute solutions, Colligative properties, Raoult's law, Relative lowering of Vapour pressure, Molecular weight determination. Osmosis, Law of Osmotic pressure and its measurement determination of Molecular weight from Osmotic pressure. Elevation of boiling point and depression of freezing point, Thermodynamic derivation of relation between Molecular weight and Elevation in boiling point and Depression in freezing point. Experimental methods for determining various Colligative properties. Abnormal molar mass, Degree of dissociation and association of solutes.

(10 Hrs)

B.Sc. CHEMISTRY –II YEAR
IV SEMESTER

ANALYTICAL CHEMISTRY – II
(PAPER CODE: CH 262)
60 HOURS (4HRS/WEEK)

UNIT-I: GRAVIMETRIC METHODS OF ANALYSIS:

Principles of Gravimetric analysis – Gravimetric factor – Gravimetric calculations. Condition for Precipitation – Theory of Precipitation. Types of Precipitants – Organic precipitants – Advantages. Purity of Precipitates – Co-precipitation and Postprecipitation. Precipitation from homogeneous solution. Crucibles – Types and maintenance. Washing of the Precipitates – Drying and ignition of Precipitates.

(12 Hrs)

UNIT-II: COLORIMETRY AND SPECTROPHOTOMETRY:

Quantitative aspects of Absorption of radiation– Beer-Lamberts law – deviations. Distinction among Colorimeter– Photometer and Spectrophotometer. Spectrophotometry – Instrumentation – Single beam and Double beam instruments. Construction of Calibration plots for quantitative analysis. Applications of Colorimetry and Spectrophotometry – Molar composition of complexes – The Job's method and The mole ratio method. Photometric titrations. Determination of Iron and Manganese compounds – Simultaneous determinations of metal ions (Cr and Mn).

(12 Hrs)

***UNIT-III: ATOMIC ABSORPTION AND ATOMIC EMISSION* SPECTROSCOPY:**

(a) Atomic absorption spectroscopy:

Principle – Instrumentation – Radiation sources (line sources)- Hollow cathode lamps and Discharge lamps. Interferences – Analytical techniques for AAS – Calibration plots. Applications – Determinations of Calcium and Magnesium in tap water.

(b)Atomic Emission Spectroscopy (Flame photometry):

Principle–Instrumentation–Interferences– Analytical techniques for Flame photometry – Calibration plots (Working curves). Determination of Alkali and Alkaline earth metals in natural water (any two metal ions).

(12 Hrs)

UNIT-IV: POLAROGRAPHY AND SOLVENT EXTRACTION:

(a) Polarography:

Basic principles – DME – Advantages and Disadvantages. Diffusion Current–The Ilkovic equation (derivation not required). Half- Wave potential–Experimental set up – Applications. Determination of Copper and Zinc in Brass.

(b) Solvent extraction:
Principles – Techniques of Solvent extraction–Batch extraction , Continuous extraction–Continuous extraction of liquids & Continuous extraction of Solids – Soxhlet extraction. Counter – current extraction. Factors favouring Solvent extraction of Inorganic species – Application of Solvent extraction.

(12 Hrs)

***UNIT-V: CHROMATOGRAPHIC METHODS*:**
Theory and Principles – Classification of chromatographic methods.

(a) Column Chromatography:
Principles and experimental procedures – Adsorbents and Solvent systems – Applications.

(b) Thin layer Chromatography:
Principles and experimental procedures – Adsorbents – preparations of TLC plates. R_f values – Applications – Separation of dyes.

(c) Paper Chromatography:
Principles – Ascending and Descending techniques. R_f values - Applications. Separation of Amino acids.

(d) Gas liquid Chromatography:
Principles – Instrumentation – Columns – Detectors – Applications.

(12 Hrs)

B.Sc.CHEMISTRY-II YEAR
IV SEMESTER LABORATORY COURSE
(Course Code: CH – P 04)

APPLIED ANALYSIS

PRACTICAL EXAMINATION- IV

DURATION: 3 HOURS **MARKS: 75**

1. Determination of Acetic acid in commercial Vinegar using NaOH.
2. Determination of Alkali content of an Antacid Tablet using HCl
3. Determination of Aspirin in formulation sample (Back Titration Method) (Aspirin plain 500mg or 650mg tablets may be used as sample)
4. Determination of Calcium content in Chalk as Calcium oxalate by Permanganometry.
5. Determination of Available Chlorine in Bleaching Powder.
6. Determination of Ascorbic acid (vitamin C) in formulation sample using standard Iodine solution.
   (Celin –500mg tablets may be used as sample)
7. Determination of % purity of Phenol. (Bromination Method)
8. Analysis of oils – Determination of Iodine value and Saponification value
9. Determination of Glucose.

B.Sc. CHEMISTRY-III YEAR
V SEMESTER

INORGANIC CHEMISTRY – III
(PAPER CODE: CH 301)
60 HOURS (4HRS/WEEK)

UNIT-I: METALLURGY AND EXTRACTION OF METALS:

Occurrence of Metals - General methods of extraction of Metals – Ore dressing – Froth flotation, Gravity separation, Magnetic separation, Electrostatic separation and Chemical separation, Hydrometallurgy, Calcination, Roasting and Smelting. Isolation of Metals – Electrolytic, Chemical and Auto reduction, Metal displacement, Complex formation followed by Metal displacement. Refining of Metals - Electrolysis, Van Arkel process and Zone refining. Extration of Metals **– Cu, Mn, Cr, and Zn.**

(12 Hrs)

***UNIT-II: LANTHANIDES AND ACTINIDES*:**

(A) LANTHANIDES:

Electronic structure, Oxidation states, Atomic and Ionic radii. Lanthanide contraction - Causes and Consequences, Magnetic properties, Complex formation. Occurrence and Isolation – Extraction of Lanthanides from Monozite and, Separation of lanthanide

(B) ACTINIDES:

General features and Chemistry of Actinides, Electronic configuration, Oxidation states, Ionic radii and Colour of Actinide ions, Complex formation, Comparison with Lanthanides. Separation of **Np, Pu** and **Am** from Uranium. Extraction of Thorium and Uranium.

(12 Hrs)

UNIT-III: COORDINATION COMPOUNDS – I:

Werner's Coordination theory and its experimental verification, Effective Atomic number concept, Classification of Ligands – Chelates – **IUPAC** Nomenclature of Coordination compounds, Isomerism in Coordination compounds, Valence bond theory of Transition metal complexes – Inner and Outer orbital complexes, Limitations of Valence bond theory.

(12 Hrs)

UNIT-IV:

(A) Hard and soft acids and bases (HSAB):

Classification of Acids and Bases as hard and soft, Pearson's HSAB concept, Acid – base strength and hardness and softness, Symbiosis, Theoretical basis of hardness and softness, Electronegativity and hardness & softness.

(B) P–BLOCK ELEMENTS-17th GROUP ELEMENTS:

General characteristics of Halogen group elements, Oxides and Oxoacids of halogens, Relative strengths of Oxoacids of the halogens, Inter halogen compounds, Pseudo halogens, and Electro positive character of Iodine.

(12 Hrs)

UNIT-V: BONDING IN METALS AND CRYSTAL DEFECTS:

General properties of Metals, Metallic bond – Free electron and Valence bond theory, Band theory of solids and its applications to Conductors, Insulators and Semi conductors. Crystal defects – Schottky and Frankel defects – Metal excess and Metal deficiency defects. Thermal defects. Alloys – Classification – Hume-Rothery ratio rule, Super conductors and their applications.

(12 Hrs)

B.Sc. CHEMISTRY-III YEAR
V SEMESTER

ORGANIC CHEMISTRY-III
(PAPER CODE: CH 321)
60 HOURS (4HRS/WEEK)

UNIT-I: HETEROCYCLIC COMPOUNDS:
Introduction: Molecular orbital picture and Aromatic characteristics of Pyrrole, Furan, Thiophene and Pyridine. Methods of synthesis and chemical reactions with particular emphasis on the mechanism of Electrophilic substitution. Mechanism of Nucleophilic Substitution reactions in Pyridine derivatives. Comparison of basicity of Pyridine,Piperidine and Pyrrole. Introduction to condensed five and six-membered heterocycles. Prepartion and reactions of Indole, Quinoline and Isoquinoline with special reference to Fischer Indole synthesis, Skraup synthesis and Bischler-Napieralski synthesis. Mechanism of electrophilic substitution reactions of Indole, Quinoline and Isoquinoline.

(12 Hrs)

UNIT-II: CARBOHYDRATES:
Definition, Classification, Monosaccharides (Glucose, Fructose, Mechanism of Osazone formation, Interconversion of Glucose and Fructose, Chain lengthening and Chain shortening of Aldoses, Objections to Open chain structure of Glucose and Fructose, Mutarotation, cyclic structure of Monosacharides, (Glucose, Fructose), Determination of ring size in Glucose and Fructose, Introduction of Disaccharides and Polysaccharides (Starch and Cellose) without involving Structure determination.

(12 Hrs)

UNIT-III: AMINO ACIDS, PEPTIDES AND PROTEINS:
Classification, Structure and Sterochemistry of Amino acids, Isoelectric point of Amino acids, Preparation and Reactions of α-amino acids, Peptides- Structure and Nomenclature, Synthesis of Polypeptides (General methods),Solid-Phase Peptide synthesis, Structure determination of Polypeptide-End group analysis. Classification of Proteins, Stucture of Proteins (details of determination of structure are not included), Protein denaturation, renaturation. Nuclic acids Introduction, Constituents of Nucleic acids, RNA and DNA, Structure of DNA.

(12 Hrs)

UNIT-IV: SYNTHETIC POLYMERS:
Addition or Chain growth Polymerization. Free radical Vinyl polymerization, Ionic vinyl polymerization. Condensation or Step growth polymerization. Polyesters, polyamides, Phenol-formaldehyde resins, Urea-Formaldehyde resins, Epoxy resins and Polyurethanes.

(12 Hrs)

UNIT-V: FATS, OIL, DETERGENTS AND SYNTHETIC DYES:

Natural fats, Edible and Industrial oils of Vegetable origin, Common Fatty acids, Glycerides, Hydrogenation of unsaturated oils. Saponification value, Iodine value, Acid value. Soaps, Synthetic detergents, Alkyl and Aryl sulphonates.

Colour and Constitution (Electronic concept).Classification of dyes. Chemistry and Synthesis of Methyl orange, Congo red, Malachite green, Alizarin and Indigo

(12 Hrs)

B.Sc. CHEMISTRY-III YEAR
V SEMESTER

PHYSICAL CHEMISTRY-III
(PAPER CODE; CHEM 341)
60 HOURS (4HRS/WEEK)

UNIT-I: PHASE EQUILIBRIUM:

Statement and meaning of the terms – Phase, Component and Degree of freedom, Derivation of Gibbs phase rule, Phase equilibria of One component system – **Water, CO_2** and **S** systems. Phase equilibria of two component systems – Solid-liquid equilibria, Simple eutectic – **Bi-Cd, Pb-Ag** systems,
De-silverisation of Lead. Solid solutions – Compound formation with Congruent melting point **(Mg-Zn)** and Incongruent melting point, (**Nacl-H_2O**), (**$FeCl_3$-H_2O**) and(**$CuSO_4$-H_2O**)systems. Freezing mixtures, Acetone - Dry ice. Liquid – liquid mixtures – Ideal liquid mixtures, Raoult's and Henry's law. Non-ideal system – Azeotropes – **HCl-H_2O** and **Ethanol-Water** systems. Partially miscible liquids – Phenol-Water, Trimethylamine-Water, Nicotine-Water systems. Lower and Upper consolute temperature. Effect of impurity on consolute temperature. Immiscible liquids, Steam distillation. Nernst distribution law – Thermodynamic derivation, Applications.

(14 Hrs)

UNIT-II: CHEMICAL KINETICS – I:
Chemical kinetics and its scope, Rate of a reaction, Factors influencing the rate of a reaction - Concentration, Temperature, Pressure, Solvent, Light, Catalyst. Concentration dependence of rates, Mathematical Characteristics of simple chemical reactions – Zero order, First order, Second order, Pseudo order, Half life and mean life. Determination of the Order of reaction Differential methods, Method of integration, Method of half life period and Isolation method. Radio active decay as a first order phenomenon. Experimental methods of Chemical Kinetics: Conductometric, Potentiometric, Optical methods, Polarimetry and Spectrophotometer.

(8 Hrs)

UNIT-III:
(A) CHEMICAL KINETICS –II:
Theories of chemical kinetics :
Effect of temperature on rate of reaction, Arrhenius equation, Concept of Activation energy, Simple Collision theory based on hard sphere model, Transition state theory (equilibrium hypothesis). Expression for the rate constant based on Equilibrium constant and Thermodynamic aspects.

(8 Hrs)

(B)CATALYSIS:

Characteristics of Catalytic reactions – Types of Catalysis – Homogenous Catalysis and Heterogeneous Catalysis – Definition and examples. Acid – Base Catalysis – General acid base catalysis – Enzyme catalysis - General characteristics – Michael's-Menten constant – Theories of catalysis –Intermediate compound formation theory – The adsorption theory – Auto catalysis.

(6 Hrs)

UNIT-IV:

(A) ADSORPTION:

Adsorption – Physisorption – Chemisorption. Factors influencing Adsorption – Adsorption isotherms Types – Freundlich Adsorption isotherm – The Langmuir theory of Adsorption – BET Theory of multilayer Adsorption. Applications of Adsorption.

(6 Hrs)

(B) PHOTOCHEMISTRY:

Interaction of Radiation with Matter, Difference between thermal and photochemical processes. Law of Photochemistry : Grothus – Drapper law, Stark – Einstein law, Jablonski diagram depicting various process occurring in the excited state, Qualitative description of Fluorescence, Phosphorescence, on –radiative proceses (Internal conversion, Inter system crossing), Quantum yield, Photosensitized reaction – Energy transfer processes (simple examples).

(8 Hrs)

UNIT-V: COMPUTERS:

General introduction to Computers, Different components of a Computer, Hardware and Software, Input – Output devices, Binary numbers and Arithmetic. Introduction to Computer languages, Programming, Operating Systems.

(10 Hrs)

B.Sc. CHEMISTRY-III YEAR
V SEMESTER

ENVIRONMENTAL CHEMISTRY – I (ELECTIVE)
(Paper Code: CH 371)
60 HOURS (4HRS/WEEK)

UNIT-I: ENVIRONMENTAL CHEMISTRY - TERMINOLOGY AND INTRODUCTION:

(A) TERMINOLOGY - Pollutant, Contaminant, Receptor, Sink, Speciation, Threshold limit value, Biological oxygen demand, Chemical oxygen demand.

(B) BASIC CONCEPTS OF ECOLOGY- Ecosystem, Food chain, Food web, Ecological pyramids, Energy flow, Bio-geo Chemical Cycles, **N, C, P, H_2O**.

(C) ENVIRONMENTAL SEGMENTS- Atmosphere, Hydrosphere, Lithosphere, Biosphere, Composition of Atmosphere, Troposphere, Stratosphere, Mesosphere, Thermosphere.

(12 Hrs)

UNIT II: AIR POLLUTION – I:

(A) AIR POLLUTION – Definition – Sources – General discussion on effects of Air pollution on Animals, Plants, Human beings and Weather.

(B) AIR POLLUTANTS (a) **NO_x** (b) **SOx** (c) **Hydrocarbons** (d) **CO**
(e) **Particulates** – Sources, Effects on Human -beings, Plants & Materials and their control.

(C) Experimental methods for the Analysis of
(1) **NO_x** (spectro photometric method)
(2) **SO_x** (West – Gaeke spectro photometric method)
(3) **Suspended Particulate matter** (by high volume air sampler).

(12 Hrs)

UNIT III: AIR POLLUTION – II:

(a) Green house effect – definition – Consequences.
(b) Acid rain – effects on Human beings, Aquatic ecosystem and Terrestrial ecosystem.
(c) **O_3** layer depletion – Mechanism – Causes – Consequences –Abatement of **O_3** depletion.
(d) Photochemical smog – Mechanism – Effects & Control.
(e) Air pollution due to Automobile exhausts.

(12 Hrs)

UNIT IV: AIR POLLUTION – III:

(A)Sources and Biochemical effects of the following
(a) **As** (b) **Hg** (c) **Cd** (d) **Pb** (e) **Ni** (f) **Se** (g) **Cr** and (h) **Asbestos.**

(B) Methods for the control of Air pollution.

(12 Hrs)

***UNIT V: NOISE POLLUTION & RADIO ACTIVE POLLUTION*:**

(A)NOISE POLLUTION :

Human acoustics –Sound and its general features –Noise and its measurement [dB] – Noise classification – Effect of Noise – Brief discussion on control of Noise pollution [Details of control of Industrial Noise pollution control methods are not required].

(B) RADIO ACTIVE POLLUTION :

Definitions - Curie – Roentgen – Rad – Gray – Rem – RBE – Sources of radiations Effects of radiations – Somatic effects – Genetic effects – Reprocessing of Spent fuel – Methods for the disposal of Radio wastes.

(12 Hrs)

B.Sc. CHEMISTRY-III YEAR
V SEMESTER

AGRICULTURE CHEMISTRY-I (ELECTIVE)
(PAPER CODE: CH 381)
60 HOURS (4HRS/WEEK)

UNIT-I:
Solid properties; Definition of Soil,Soil composition, Inorganic properties of Soil,Organic matters of Soil. Physical properties, Mechanical components-Soil colour, Soil texture, Soil structure, Soil constitution, Soil water, Soil- temperature.

(12 Hrs)

UNIT-II:
Chemical properties; Soil mineral matter-Clay minerals-Soil colloids-Ion Exchange reactions Cation exchange, Anion exchange, Soil fertility and its evaluation. Soil Organic matters and their transformation. Carbon-Nitrogen ratio; Carbon,Nitrogen cycles.

(12 Hrs)

UNIT-III:
Soil Reaction; Soil acidity-Actual acidity Soil pH and its determination-Buffer action Capacity of Soils. Effect of pH on availability of Nitogen, Phosphorous, Potassium, Calcium, Sulphur, Manganese, Iron and other Micronutrients. Acid Soil-Alkaline Soil-Their formation and reclamation.

(12 Hrs)

UNIT-IV:
Nitrogen Fertilizer; Nitrogen in plant nutrition-importance of nitrogenous fertilizers-Classification-Ammonia-Ammonium fertilizers-Ammonium Sulphate, Ammonium nitrate –Ammonium chloride. Nitrate fertilizers-Sodium nitrate-Calcium nitrate - Calcium Ammonium nitrate(CAN)-Urea-Calcium Cyanamide.

(12 Hrs)

UNIT-V:
Phosphorus Fertilizers; Phosphrous in life of Plants-Importance of Phosphatic Fertil;izers-kinds of Posphatic Fertilizers-Principle of production of Super Phosphate-Bone Meal, Basic Slag-Calcium Metaphosphate-Calcium Super Phosphate nitrate- Triols Sugar Phosphate, DAP, FACTAMPHOS, Ammoniated Super Phosphate.

(12 Hrs)

B.Sc. CHEMISTRY-III YEAR
V SEMESTER

PHARAMACEUTICAL CHEMISTRY-I (ELECTIVE)
(PAPER CODE: CH 391)
60 HOURS (4HRS/WEEK

UNIT–I:

Drugs **-** Charateristics , Classifications , Design and Assay .Different mode of Assay through Pharamacopeias. Lethal dose Effective dose and Therapeutic Index. Drug - Receptor Interaction.

(12 Hrs)

UNIT–II:

Specific and Non Specific Drugs – Pharmacological response and Thermodynamic activity structure activity relationship rate of biological response as the function of probability of reach , Dose and equilibrium constant, Ferguson principle and Non specific Action of general Anaesthetics.

(12 Hrs)

UNIT–III:

Bonding and Biological activity – H Bonding in Drug action hydrophobic interaction, Charge transfer processes, Electrostatic interaction (Ion-dipole and Dipole dipole type) Metabolic changes of drugs – Hydrolysis, oxidation, reduction, acetylation, methylation etc. **(12 Hrs)**

UNIT–IV:

Enzymes – Specificity- Role in Health and Diseases –Enzymatic activity – dependence on pH. Michalis Kinetics – Activation and Inhibition of enzymes. Enzymes and biological importance - Mechanism of enzyme catalysis.

(12 Hrs)

UNIT–V:

Analgesics – Antipyritic Analgesics – 1. Salicylic acid derivatives 2. N- aryl anthranilic acid derivatives 3. Aryl acetic acid derivates 4. Aniline and p-aminophenol Derivatives Narcotic analgesic – Morphine and related compounds Pethidines, andmethadones and benzimidazole.

(12 Hrs)

B.Sc. CHEMISTRY-III YEAR
V SEMESTER LABORATORY COURSE-I

GRAVIMETRIC ANALYSIS & INORGANIC PREPARATION
(Course Code: CH – P 05)

PRACTICAL EXAMINATION - V

DURATION: 6 HOURS **MARKS: 75**

GRAVIMETRIC ANALYSIS:

1. Determination of Barium as Barium sulphate
2. Determination of Lead as Lead chromate
3. Determination of Copper as Cuprous thiocyanate
4. Determination of Nickel as Ni-DMG complex
5. Determination of Magnesium as oxinate
6. Determination of Chloride as Silver chloride
7. Determination of Barium as Barium chromate

PREPARATION OF INORGANIC COMPLEXES:

(1) Preparation of Nickel DMG Complex
(2) Preparation of Copper tetraamine complex
(3) Preparation of Lead – thiourea complex
(4) Preparation of Potassium trioxalato chromate complex
(5) Preparation of Sodium trioxalato ferrate (III)

B.Sc. CHEMISTRY-III YEAR
V SEMESTER LABORATORY COURSE-II

ORGANIC QUALITATIVE ANALYSIS & ORGANIC PREPARATION
(Course Code: CH – P 06)

PRACTICAL EXAMINATION - VI

DURATION: 3 HOURS **MARKS: 50**

ORGANIC QUALITATIVE ANALYSIS:

1. Detection of Nitrogen, Sulphur and Halogens.
2. Tests to find whether Saturated or Unsaturated
3. Tests to find whether Aromatic or Aliphatic
4. Analysis of the following functional groups:
   Phenols, Esters, Carboxylic acids, Carbohydrates, Amines, Aldehydes, Ketones, Amides, Diamides, Anilides, and Nitro compounds.
5. Confirmation of functional groups by preparation of derivatives.

ORGANIC PREPARATIONS:

1. Acetylation of Salicylic acid
2. Acetylation of Aniline
3. Acetylation of Glucose
4. Benzoylation of Aniline
5. Benzoylation of Phenol
6. Preparation of Iodoform from Ethanol and Acetone
7. Preparation of m-Dinitrobenzene and p-Nitro acetanilide
8. Preparation of Benzoic acid from Benzaldehyde.

B.Sc. CHEMISTRY-III YEAR
VI SEMESTER

INORGANIC CHEMISTRY – IV
(PAPER CODE: CH 302)
60 HOURS (4HRS/WEEK)

UNIT-I: COORDINATION COMPOUNDS – II:

Metal – Ligand bonding in Transition metal complexes, The Crystal field theory – Crystal field splitting and Crystal field stabilization energy in Octahedral, Tetrahedral and Square planar -complexes, Factors effecting Crystal field Parameters, An elementary treatment of Ligand field -theory and MO theory of Complexes.

(12 Hrs)

UNIT-II: MAGNETIC AND SPECTRAL PROPERTIES OF TRANSITION METAL COMPLEXES:

(A) Types of Magnetic behaviour, Method of determining Magnetic Susceptibility, Spin-only formula, L-S – Coupling, Correlation of μ_S and μ_{eff} values, Orbital contribution to Magnetic moments, Magnetic behaviour of Transition metal complexes – Valence bond approach and Crystal field theory approach.

(B) Types of electronic transitions, Selection rules for d – d transitions, Spectroscopic ground states, Spectrochemical Series, Orgel – energy level diagram for d^1 and d^9 states, Discussion of the electronic spectrum of $[Ti(H_2O)_6]^{3+}$ complex ions.

(12 Hrs)

UNIT-III:

(A) Thermodynamic and Kinetic aspects of Metal complexes, A brief outline of thermodynamic stability of Metal complexes and factors affecting the stability, Substitution reactions of Square planar complexes.

(B) Applications of Metal complexes: Applications of Metal complexes in qualitative and quantitative analysis and Industrial processes and in Medicinal treatment.

(12 Hrs)

UNIT-IV: ORGANO METALLIC CHEMISTRY:

Definition, Nomenclature and Classification of Organo metallic compounds, Preparation, Properties, Bonding and Applications of Alkyls and Aryls of **Li, Al, Hg, Sn** and **Ti.** A brief account of Metal – ethylenic complexes and homogenous hydrogenation, Mono nuclear carbonyls and the nature of bonding in metal carbonyls.

(12 Hrs)

UNIT-V: BIO INORGANIC CHEMISTRY & INORGANIC POLYMERS:

(A) BIO INORGANIC CHEMISTRY:
Essential and trace elements in biological processes, Metallo porphyrins with special reference to Haemoglobin and Myoglobin. Biological role of Alkali and Alkaline earth metal ions with special reference to Ca^{2+}, Nitrogen fixation.

(B) INORGANIC POLYMERS:
Silicons and Phosphazenes as examples of Inorganic polymers, Nature of bonding in Triphosphazenes.

(12 Hrs)

B.Sc. CHEMISTRY-III YEAR
VI SEMESTER

ORGANIC CHEMISTRY-IV
(PAPER CODE: CH 322)
60 HOURS (4HRS/WEEK)

UNIT–I: ELECTRO MAGNETIC SPECTRUM: ABSORPTION SPECTRA:

(A) Ultraviolet (UV) Absorption spectroscopy – Absorption laws (Beer – Lambert law), Molar absorptivity, Presentation and analysis of UV spectra, Types of electronic transitions, Effect of conjugation. Concept of Chromophore and Auxochrome. Bathochromic, Hypsochromic, Hyperchromic and Hypochromic shifts .UV spectra of Conjugated enes and enones.

(B) Infrared (IR) absorption spectroscopy- Molecular vibrations, Hooke's law, Selection rules, Intensity and Position of IR bands, Measurement of IR Spectrum, Finger print region, Characteristic absorptions of various functional groups and Interpretation of IR spectra of simple Organic molecules.

(12 Hrs)

UNIT-II: NUCLEAR MAGNETIC RESONANCE (NMR) SPECTROSCOPY:

Proton magnetic resonance **(^{1}H NMR)** spectroscopy, Nuclear shielding and Deshielding, Chemical shift and Molecular structure , Spin-spin splitting and Coupling constants , Areas of signals ,Interpretation of PMR spectra of simple Organic molecules such as Ethyl bromide Ethanol, Acetaldehyde, 1,1,2-Tri bromo ethane, Ethyl acetate, Toluene and Acetophenone. Problems pertaining to structural elucidation of simple organic compounds using UV, IR & PMR.

(12Hrs)

UNIT-III: REARRANGEMENT REACTIONS:

Pinacole-Pinacalone rearrangement, Hofmann rearrangement, Beckmann's rearrangement, Wolf rearrangement, Benzlic acid rearrangement, Fries rearrangement, Clasien rearrangement, Benzidine rearrangement, Curtius rearrangement.

(12 Hrs)

UNIT-IV: ORGANIC SYNTHESIS VIA ENOLATES:

Acidity of α-hydrogens, Alkylation of Diethymalonates and Ethyacetoacetate, Synthesis and Synthetic application of Malonic ester and Acetoacetic ester, Keto-enol tautomerism of Ethyacetoacetate, Alkylation of 1,3-Dithianes, Alkylation and Acylation of Enamines.

(12 Hrs)

UNIT-V: TERPENOIDS AND ALKALOIDS:

(A)TERPENOIDS:

Classification, Nomenclature, Occurrence, Isolation, General methods of structure determination,Isoprene rule, Structure determination of α-terpeneol, Menthol along with synthesis.

(B)ALKALOIDS:

Definition, Occurrence, Isolation, General methods of structure elucidation of Alkaloids, Structure elucidation of Coniine, Nicotine and Confirmation by synthesis.

(12 Hrs)

B.Sc. CHEMISTRY-III YEAR
VI SEMESTER

PHYSICAL CHEMISTRY-IV
(PAPER CODE: CH 342)
60 HOURS (4HRS/WEEK)

UNIT-I: ELECTRO CHEMISTRY–I:

Electrical transport – Conduction in metals and in electrolyte solutions, Specific conductance and equivalent conductance, Measurement of equivalent conductance, Variation of equivalent and specific conductance with dilution. Migration of ions and Kohlrausch law, Arrhenius theory of electrolyte dissociation and its limitations, Weak and strong electrolytes, Ostwald's dilution law its uses and limitations. Debye-Huckel - Onsager's equation for strong electrolytes (elementary treatment only), Transport number, definition and determination by Hittorf method and Moving boundary method. Applications of conductivity measurements: Determination of degree of dissociation, Determination of $\mathbf{K_a}$ of acids, Determination of solubility product of a sparingly soluble salt, Conductometric titrations.

(**12 Hrs)**

UNIT-II: ELECTRO CHEMISTRY–II:

Types of reversible electrodes – Gas-metal ion, Metal-metal ion, Metal-insoluble salt-anion and redox electrodes. Electrode reactions, Nernst equation, Derivation of cell E.M.F. and single electrode – potential , Standard hydrogen electrode – Reference electrodes – Standard electrode potential , Sign conventions, Electro chemical series and its significance. Electrolytic and Galvanic cells – Reversible and irreversible cells, Conventional representation of electrochemical cells.

E.M.F. of a cell and its measurements. Computation of cell E.M.F. calculation of thermodynamic quantities of cell reactions **(ΔG, ΔH and ΔK**), Polarisation, Over potential and hydrogen over voltage. Concentration cell with and with out transport, Liquid junction potential, Application of concentration cells, Valence of ions, Solubility product and activity coefficient, Potentiometric titrations. Definition of **pH** and **pKa** determination of **pH** using hydrogen, Quinhydrone and glass electrodes, by potentiometric methods. Buffers – Mechanism of buffer action, Henderson – Hazel equation, Hydrolysis of salts. Corrosion – Types, Theories and methods of combating it**.**

(12 Hrs)

UNIT-III: ELEMENTARY QUANTUM MECHANICS–I:

Black body radiation, Planck's radiation law, Photoelectric effect, Heat capacity of solids, Bohr's model of hydrogen atom (no derivation) and its defects, Compton effect, De Broglie hypothesis, The Heisenberg's uncertainty principle, Sinusoidal wave equation, Hamiltonian operator, Schrödinger wave equation and its importance, Physical interpretation of the wave function, Postulates of quantum mechanics, Particle in a one dimensional box.

(8 Hrs)

UNIT-IV: MOLECULAR SPECTROSCOPY–I:

Introduction: Electro magnetic radiation, Regions of the spectrum, Basic features of different spectrometers, Statement of the Born Oppenheimer approximation, degree of freedom.

(A) MICRO WAVE SPECTROSCOPY:

Diatomic molecules. Energy levels of a rigid rotor (semi-classical principles), Selection rules, Spectral intensity, Distribution using population distribution (Maxwell – Boltzmann distribution) determination of bond length, Qualitative description of non-rigid rotor, Isotope effect.

***(B) INFRA RED SPECTROSCOPY*:**

Infrared spectrum: Energy levels of simple harmonic oscillator, Selection rules, Pure vibrational spectrum, Intensity, Determination of force constant and qualitative relation of force constant and bond energies, Effect of anharmonic motion and isotope on the spectrum, Idea of vibrational frequencies of different functional groups.

(12 Hrs)

UNIT-V:

(A) MOLECULAR SPECTROSCOPY – II:

RAMAN SPECTROSCOPY:

Concept of polarisability, pure rotational and pure vibrational Raman spectra of diatomic molecules, Selection rules.

ELECTRONC SPECTROSCOPY:

Concept of potential energy curves for bonding and antibonding molecular orbitals, Qualitative description of selection rules and Frank-Condon principle. Qualitative description of **σ , π- and n M.O** Their energy levels and the respective transitions.

(10 Hrs)

(B) PHYSICAL PROPERIES AND MOLECULAR STRUCTURE:

Optical activity, Polarization – (Clausius – Mossotti equation), Orientation of dipoles in an electric field, Dipole moment, Induced dipole moment, Measurement of dipole moment –temperature method and refractivity method, Dipole moment and structure of molecules, Magnetic properties – paramagnetism, diamagnetism and Ferro magnetism.

(6 Hrs)

B.Sc. CHEMISTRY-III YEAR
VI SEMESTER
ENVIRONMENTAL CHEMISTRY – II (ELECTIVE)
(Paper Code: CH 372)
60 HOURS (4HRS/WEEK)

UNIT-I: WATER POLLUTION–I:

(A) Definition – Unique properties of water – Sources.
(B) Eutrophication – Definition – Types – Effects – control.
(C) Hg – Toxicity – Minimata disese.
(D) Pollution of water by soaps and detergents – Classification – Environmental impacts – Abatement procedures.
(E) Thermal pollution – Causes – Effects and control.

(12 Hrs)

UNIT-II: WATER POLLUTION – II:

(A) Pollution of water by pesticides :

(a) Insecticides – Classification – Characteristics –Environmental implications – Abatement procedures.
(b) Fungicides, Herbicides – Classification – Characteristics – Environmental implications- Abatement procedure.
(c) Biological amplification – Definition – Examples of DDT & Hg.

(B) Marine oil pollution – Sources – Effects – Control.

(12 Hrs)

UNIT-III:

(A) WATER POLLUTION – III:

Sewage treatment – Primary treatment – Secondary treatment (Trickling filter, Activated sludge, Oxidation ditch, Oxidation ponds) – Tertiary treatment (Reverse osmosis, Electro dialysis, Ion exchange method). Methods for the control of water pollution.

(B) Solid waste pollution ,Treatment & Control – Classification – Methods of sewage treatment and disposal by (a) Composting (b) Sanitary land filling (c) Thermal process(d) Recycling and reuse.

(12 Hrs)

UNIT-IV: WATER ANALYSIS:

(a) Determination of Alkalinity
(b) Determination of Total hardness of water by EDTA method
(c) Determination of Cl^- by Mohr's method
(d) Determination of SO_4^{2-} by Gravimetric method
(e) Determination of D.O by Winkler's method
(f) Determination of B.O.D of water sample
(g) Determination of C.O.D of water sample
(h) Determination of PO_4^{3-} of water sample (by Spectrophotometric method)
[Simple problems related to Alkalinity, Total hardness, D.O, B.O.D & C.O.D may be discussed.].

(12 Hrs)

UNIT-V: FOOD ADDITIVES:

Intentional and Unintentional Additives -Types of Food Additives-
1. Preservatives 2. Antioxidants 3.Sequesterants 4.Acidulants Alkalis 5.Stabilisers & Thickners 6. Colourants 7.Flavours & Flavour enhancers 8.Chelating agents 9.Curing agents 10. Emulsions – Health hazards of using food additives – Sources of unintentional additives –Radioactive fall out – Agriculture contaminants – Animal additives.

(12 Hrs)

B.Sc. CHEMISTRY-III YEAR
VI SEMESTER

AGRICULTURAL CHEMISTRY-II (ELECTIVE)
(PAPER CODE; CH 382)
60 HOURS (4HRS/WEEK)

UNIT-I:

Potassium Fertilizers: Potassium in life of plants and its cotnets classification-production of potassium fertilizers and their properties.
Complex fertilizers: Complete and incomplete fertilizers, Manufacture of NPK-Calculation of fertilizer formula-Micronutrient fertilizers.Manures: FYM-Compost-Green Manuring-concentrated organic manures and their composition-Biofertilizers.

(12 Hrs)

UNIT-II:

Plant protection chemicals; Pesticides-classification-General methods of preparation-Application and Toxicity. Insecticides: Insect killer and repellants-Inorganic Insecticides Arsenics, Flourinc compounds,Mercury compounds,Born compounds,Antimony compounds, Thalliumcompounds, Phosphorous compounds. Organic Insecticides: Plant products -Nicotine- Pyrethrin Rotenone.

(12 Hrs)

UNIT-III:

Synthesis organic Insecticides-DDT,Methoxychlor,B.H.C Chlordane.
Ascaricides:Fenson,Azobenzene,parathion,Malthion,Phospomidan,
Enosulfan**.**

(12 Hrs)

UNIT-IV:

Fungicides: Inorganic Fungicide: Sulphur and its compounds-Copper compounds-Bordeaux-mercuric compounds-Organic Mercuric compounds.
Organic Fungicided: Dithiocarbamates-Phelam, Ferbam, Ziram, Maneb, Zineb, Nabam. Thiuram derivatives.

(12 Hrs)

UNIT-V:

Herbicides- Inorganic herbicides: Arsenic compounds. Barium compounds, Cyanides and thiocyanates, Chlorates, Sulphamates.Organic herbicide: Nitro compounds, Chlorated compounds, Phyazine compounds, triazine compounds, propionic acid derivatives-Alachst, Butachlor. Biological control of pests-Integrated pest Management (IPM).

(12 Hrs)

B.Sc. CHEMISTRY-III YEAR
VI SEMESTER

PHARMACEUTICAL CHEMISTRY-II(ELECTIVE)
(PAPER CODE:CH 392)
60 HOURS (4HRS/WEEK)

UNIT–I:

Basis of Drugs transport – Absorption and bioavailability absorption sites – Zero order kinetics - Dissolution and deliver crystal packing and form – solvation and wettability factors. Lipid solubility – Chemical solubility of drug in body, decompositionexcretion and termination of drug action.

(12 Hrs)

UNIT–II:

Metal Chelates and Surfactant action –Stereo chemical factors- stereo specificity of drug action with examples Hormones sources Classifciations and Biological importance.

(12 Hrs)

UNIT–III:

Anaesthtic – CNS depressants – Central relaxant (Benzo diazepine)
Tranquilisers (Rauwolfia alkaloid Diphenyl methane derivative) – Anti convulsant (Barbiturate Hydantoin) – CNS stimulant (Analeptic, purine, hallucinogens)

(12 Hrs)

UNIT–IV:

Antiseptics – Chloramine T , Cetrimide, Prontosil, Dyestuff. Antimalarial- Structure and activity principle. Antibiotic – Penicillin and Chloromycin.

(12 Hrs)

UNIT–V:

Preparation of Iodoform, Aspirin, Nerolin, Phenylsalicylate, Estimation of Citric acid & Aspirin.

(12 Hrs)

B.Sc. CHEMISTRY-III YEAR
VI SEMESTER LABORATORY COURSE-I

PHYSICAL CHEMISTRY PRACTICAL
(Course Code: CH – P 07)

PRACTICAL EXAMINATION - VII

DURATION: 3 HOURS **MARKS: 50**

1. Determination of Rate constant of the acid catalyzed hydrolysis of Ester at room temperature.
2. Kinetics of Persulphate Oxidation.
3. Distribution Coefficient of Iodine between Water and Carbon tetrachloride.
4. Determination of Molecular mass by Rast macro method.
5. Construction of phase diagram of two component system (simple eutectic system)
6. Critical solution temperature **(CST)** of Phenol-Water system.
7. Effect of added electrolyte on the miscibility temperature of Phenol-Water system.
8. Determination of Equivalent Conductance.
9. Determination of Transition temperature of the given substance by Thermometric Method.
   ($Na_2S_2O_3.5H_2O$, $SrCl_2.6H_2O$, $CH_3COONa.3H_2O$, $MnCl_2.4H_2O$)
10. Determination of the % composition of a given mixture (Non interacting systems) by viscosity method.

B.Sc. CHEMISTRY-III YEAR
VI SEMESTER LABORATORY COURSE-II

INSTRUMENTAL METHODS OF ANALYSIS
(Course Code: CH – P 08)

PRACTICAL EXAMINATION - VIII

DURATION: 3 HOURS **MARKS: 75**

(A)COLORIMETRY:

(1) Determination of Phosphate in natural water.
(2) Determination of Iron in natural water / industrial water effluent.
(3) Determination of Manganese in steel / Manganese salt solution.

(B)CONDUCTOMETRY:

(1) Determination of the strength of the given acid conductometrically using standard Alkali solution.
(2) Determination of Solubility product of a sparingly soluble electrolyte conductometrically.
(3) Determination of the Ionization constant of a weak acid conductometrically.
(4) Determination of Equivalent conductance.

(C)POTENTIOMETRY:

(1) Potentiometric determination of the strength of a strong Acid.
(2) Potentiometric determination of Fe (II) using Potassium dichromate.

MARKING SCHEME FOR PRACTICAL EXAMINTIONS

B.Sc. CHEMISTRY-I YEAR
I SEMESTER LABORATORY COURSE

ANALYTICAL TECHNIQUES
(Course Code: CH – P 01)

PRACTICAL EXAMINATION- I

DURATION: 3 HOURS **MARKS: 50**

1. Determination of Melting point/Boiling point of the given Organic compound:	10 Marks
2. Purification/ Crystallization of the given Organic compound:	10 Marks
3. Separation of the given mixture of Organic compounds:	10 Marks
4. Record:	10 Marks
5. Viva Voce:	10 Marks
Total	**50 Marks**

B.Sc. CHEMISTRY-I YEAR
II SEMESTER LABORATORY COURSE

INORGANIC QUALITATIVE ANALYSIS
(Course Code: CH – P 02)

PRACTICAL EXAMINATION- II

DURATION: 3 HOURS **MARKS: 50**

1. Dry and Wet Tests:	5 Marks
2. Confirmatory Tests for Anions:	10 Marks
3. Identification of groups:	5 Marks
4. Identification of Cations:	10 Marks
5. Record:	10 Marks
6. Viva Voce:	10 Marks
Total	**50 Marks**

MARKING SCHEME FOR PRACTICAL EXAMINTIONS

B.Sc. CHEMISTRY-II YEAR
III SEMESTER LABORATORY COURSE

VOLUMETRIC ANALYSIS
(Course Code: CH – P 03)

PRACTICAL EXAMINATION- III

DURATION: 3 HOURS **MARKS: 75**

1. Writing of Principle/Theory, Balanced Chemical Equation, Indicator, End point and brief Procedure before commencement of Practical Examination:	10 Marks
2. Observation, Calculation, Result:	40 Marks
3. Record:	10 Marks
4. Viva Voce:	15 Marks
Total	**75 Marks**

B.Sc. CHEMISTRY-II YEAR
IV SEMESTER LABORATORY COURSE
(Course Code: CH – P 04)

APPLIED ANALYSIS
PRACTICAL EXAMINATION- IV

DURATION: 3 HOURS **MARKS: 75**

1. Writing of Principle/Theory, Balanced Chemical Equation, brief Procedure within 15 minutes before carrying out the experiment:	10 Marks
2. Observation, Calculation, Result:	40 Marks
3. Record:	10 Marks
4. Viva Voce:	15 Marks
Total	**75 Marks**

MARKING SCHEME FOR PRACTICAL EXAMINTIONS

B.Sc. CHEMISTRY-III YEAR
V SEMESTER LABORATORY COURSE-I

GRAVIMETRIC ANALYSIS & INORGANIC PREPARATION
(Course Code: CH – P 05)

PRACTICAL EXAMINATION - V

DURATION: 6 HOURS **MARKS: 75**

1. Brief procedure for both experiments before experiment (5 + 5):	10 Marks
2. Observation, Calculation and Result (Gravimetric exercise):	30 Marks
3. Preparation and Re-crystallization of Complex:	15 Marks
4. Record:	10 Marks
5. Viva Voce:	10 Marks
Total	**75 Marks**

B.Sc. CHEMISTRY-III YEAR
V SEMESTER LABORATORY COURSE-II

ORGANIC QUALITATIVE ANALYSIS & ORGANIC PREPARATION
(Course Code: CH – P 06)

PRACTICAL EXAMINATION - VI

DURATION: 3 HOURS **MARKS: 50**

1. Writing of brief Procedure, Equation and Reagent(S) in Preparation:	5 Marks
2. Preparation and Re-crystallization:	10 Marks
3. Qualitative Analysis of Organic Compound:	20 Marks
4. Record:	10 Marks
5. Viva Voce:	5 Marks
Total	**50 Marks**

MARKING SCHEME FOR PRACTICAL EXAMINTIONS

B.Sc. CHEMISTRY-III YEAR
VI SEMESTER LABORATORY COURSE-I
PHYSICAL CHEMISTRY PRACTICAL
(Course Code: CH – P 07)

PRACTICAL EXAMINATION - VII

DURATION: 3 HOURS **MARKS: 50**

1. Physical Chemistry Experiment:	25 Marks
2. Manipulation:	10 Marks
3. Record:	10 Marks
4. Viva Voce:	5 Marks
Total	**50 Marks**

B.Sc. CHEMISTRY-III YEAR
VI SEMESTER LABORATORY COURSE-II
INSTRUMENTAL METHODS OF ANALYSIS
(Course Code: CH – P 08)

PRACTICAL EXAMINATION - VIII

DURATION: 3 HOURS **MARKS: 75**

1. Determination of given Sample solution by using the specified instrumental technique:	35 Marks
2. Manipulation/ Calibration Plot:	10 Marks
3. Record:	15 Marks*
4. Viva Voce:	15 Marks*
Total	**75 Marks**

* Given as 10 Marks in the Syllabus sent by the University

B.Sc ALLIED CHEMISTRY- EXAMINATION PATTERN

THEORY: Allied Chemistry –I 75 Marks 3 Hrs

Allied Chemistry –II 75 Marks 3 Hrs

PRACTICAL:

Allied Chemistry Practical-I 25 Marks 3Hrs

Allied Chemistry Practical-II 25 Marks 3Hrs

THEORY EXAMINATION- QUESTION PAPER PATTERN

- All "**5"** units of theory paper carry equal weightage in the question paper.
- There shall be **"5"** questions with internal choice "**A"**or**"B"**
- All questions are to be answered.
- Each question shall carry **"15"** marks.
- Each question can have a maximum of three sub divisions.

ALLIED CHEMISTRY FOR B.SC COURSES

SEMESTER-III
ALLIED CHEMISTRY-I
[Paper code: AC-211]
60 Hrs [4Hrs per week]

UNIT-I:

Classification and IUPAC nomenclature of Organic compounds. Hybridization (SP^3, SP^2 and SP) in Organic compounds. Localized and delocalized chemical bonds. Hydrogen bonding. Dipole moments in Organic molecules. . Homolytic and Heterolytic bond cleavage – Electrophiles, Nucleophiles and Free radicals. Carbocations and carbanions.

(12 Hrs)

UNIT-II:

Isomerism in organic compounds – structural and Stereo isomerism. Geometrical Isomerism – Cis, Trans Isomers, **E & Z** nomenclature of simple compounds. Optical Isomerism – Optical activity- Specific rotation, Enantiomers, Diastereomers and Meso compounds. **R, S** configuration in Organic molecules with single Asymmetric centre. Conformers- Newman and Sawhorse projection formulae, Conformational analysis of ethane,
n-Butane and Cyclohexane**.**

(12 Hrs)

UNIT-III:

Stoichiometry– Mole and Equivalent concepts. Concentration units – Molarity, Molality, Percentage**,** ppm, ppb**.** Types of Solutions, Stoichiometric calculations. Basic concepts of Chemical equilibrium- Equilibrium constants. Concepts of Acids and bases. Ionization of weak acids and bases. Hydrogen ion concentration. pH of acids and bases. Buffer solutions, Henderson equation of pH of buffer. Physiological buffers.

(12 Hrs)

UNIT-IV:

Radio activity- properties of **α, β** and **γ** radiations–Rate of disintegration- Half Life period- Nuclear fission and fusion- fertile and fissile nuclei- Radio active Isotopes – Applications in Medicine, Agriculture, Geology and Industry. Brief account of Nuclear reactors. Neutron activation analysis.

(12 Hrs)

UNIT-V:

Carbohydrates - Classification, Preparation Properties and structures of Ribose, Glucose, Fructose and Sucrose. (Structural elucidation not required). Mutarotation, Epimers and Anomers. Polysaccharides – Starch and cellulose–(only uses) Tests for Sugars.

(12 Hrs)

ALLIED CHEMISTRY FOR B.SC COURSES

SEMESTER-IV
ALLIED CHEMISTRY-II
[Paper code: AC-212]
60 Hrs [4Hrs per week]

UNIT-I: THERMODYNAMICS AND CHEMICAL KINETICS:

Thermodynamics: First law of Thermodynamics- Statement, Concepts of heat, Work and Internal energy, Enthalpy and heat capacity. Exothermic and Endothermic reactions. Second law of thermodynamics, Spontaneous and Non spontaneous Processes. Entropy concept.

Chemical Kinetics: Rate of Reaction- Factors affecting the rate of reaction, Order and Molecularity-Examples for first and second Order Reactions.

(12 Hrs)

UNIT-II: CHROMATOGRAPHY AND SOLID STATE:

Separation techniques- Paper, Thin layer and Column chromatography, Adsorption-Physisorption and Chemisorption-factors affecting them. Langmuir Adsorption isotherm.

Bonding in Metals and Crystal defects-Metallic bond, Band theory of Solids. Applications to Conductor, Semi-Conductor and Insulators. Crystal defects-Schottky and Frenkel defects, Metal excess and Metal deficiency defects.

(12 Hrs)

UNIT-III: AMINO ACIDS, PROTEINS AND ENZYMES:

Amino acids: Classification, Stereochemistry of Amino acids-Preparation and properties of α-Amino acids- Isoelectric point. Tests for Amino acids. Proteins-Classification and Structure of Proteins. Enzymes- Characteristics of Enzymes, Mechanism of Enzyme action; Michaelis-Menten equation.

(12 Hrs)

UNIT-IV: POLYMERS AND DYES:

Polymers-Preparation and uses of Nylon (6,6), Terylene, Polythene, Polyvinyl chloride, Natural rubber and Synthetic Rubber (Buna S rubber and Neoprene) Vulcanization.

Dyes- Modern Classification and examples, (Indigo, Congo red, Malachite green, Alizarin and Phenolphthalein).

(12 Hrs)

UNIT-V: NUCLEIC ACIDS AND DRUGS:

Nucleic Acids-Structure of DNA and RNA, brief account of m-RNA, t-RNA and v-RNA, Differences between DNA and RNA.

Drugs- Antiseptics (Dettol), Antipyretics (paracetamol), Analgesics (Aspirin), Antimalarials (Quinine), Antibiotics (Penicillin),Sulpha drugs (Sulphadiazine). (Structural elucidation not required).

(12 Hrs)

ALLIED CHEMISTRY PRACTICAL-I
III SEMESTER LABORATORY COURSE
(Course Code: AC-P01)
Volumetric Analysis and Physical chemistry practical-A
Practical Examination-I

DURATION: 3 Hours **Marks: 25**

A) 1. Determination of Oxalic acid. (permanganometry)
2. Determination of FAS. (Permanganometry)
3. Determination of Iron. (Dichrometry)
4. Determination of Potassium dichromate. (Iodometry)
5. Determination of Copper. (Iodometry)
6. Determination of Silver nitrate. (Argentometry)

B) 1. Determination of M.P. of Organic Compound.
2. Determination of enthalpy of solution of a given compound.

Marking Scheme:

Experimental:	10 + 5 = 15
Record:	10
Total:	25

ALLIED CHEMISTRY PRACTICAL-II
IV SEMESTER LABORATORY COURSE
(Course Code: AC-P02)
Organic qualitative Analysis and Physical chemistry practical-B
Practical Examination-II

DURATION: 3 Hours **Marks: 25**

(A) Organic qualitative Analysis of compounds containing single functional group:

1. Phenols
2. Carboxylic acids
3. Aldehydes
4. Ketones
5. Amines
6. Diamides
7. Reducing Sugars

(B) 1. Determination of Viscosity of given liquid
2. Determination of Transition temperature

Marking Scheme:

Experimental: 7.5 + 7.5 = 15
Record: 10
Total: 25

BOOKS SUGGESTED FOR THEORY COURSES

(A) INORGANIC CHEMISTRY

1. Basic Inorganic chemistry (Third Edition).
   - F.A.Cotton, G.wilkinson & P.L.Gaus.
   John Wilky & Sons, New York.
2. Concise Inorganic chemistry (Fifth Edition).
   - J.D.Lee
   ELBS.
3. Concepts of models of Inorganic chemistry.
   - B.Douglas, D.Mc Daniel & J.Alexander.
   John Wily.
4. Inorganic chemistry (Third Edition).
   - D.E.Shriver & P.W.Atkins.
   Oxford University press.
5. Inorganic chemistry.
   - W.W.Porterfield.
   Addition Wesley.
6. Inorganic chemistry.
   - A.G.Sharpe.
   ELBS.
7. Inorganic chemistry.
   - G.L.Miessler & D.A.Tarr.
   Prentice-Hall.
8. Inorganic chemistry.
   Principles of structure and reactivity (Fourth Edition).
   - James E Huhey, E.A.Keiter & R.L.Keiter.
   Pearson education Asia.
9. Advanced Inorganic chemistry (Fifth Edition).
   - F.A.Cotton &G.Wilkinson.
   John Wily.
10. Essentials of Nuclear chemistry.
    - Arnikar H.J.
    New Age International.
11. Source book on Atomic energy(Third Edition).
    - S.Glasstone.
    Affliated East West press Pvt. Ltd.
12. Theoritical principles of Inorganic chemistry.
    - Manku.
    Tata McGraw-Hill

B. ORGANIC CHEMISTRY:

1.Organic chemistry (Sixth Edition).
- Morrison and Boyd.
Prentice Hall of India.

2. Organic chemistry.
- L.G. Wade Jr.
Prentice Hall.

3. Fundamentals of Organic chemistry.
- Solomans.
John Wily.

4. Organic chemistry(Fifth Edition).
- F.A.Cary.
Tata Mc Graw Hill – New Delhi.

5. Organic chemistry(Fifth Edition).
- S.H.Pine.
Mc Graw Hill – New York.

6. Introduction to Organic chemistry.
-Streitweiser, Heathcock & kusover.
Macmillan.

7. Organic chemistry – Structure and Reactivity(Third Edition).
- Seyhan N. Ege.
AITBS – New Delhi.

8. Organic chemistry(Third Edition).
- P.Y.Bruice.
Pearson education Asia.

9. Organic chemistry. Vol: I, II &III .
-S.M.Mukherji, S.P. Singh & R.P. Kapoor.
New Age International – New Delhi.

10. Organic Reaction Mechanisms(Third Edition).
- R.K.Bansal.
Tata Mc Graw Hill.

11. Reaction Mechanisms in Organic chemistry(Third Edition).
- Mukherji & Singh.
Macmillan

12. Stereochemistry of Organic Compounds (Second Edition).
- D. Nasipuri.
New Age International – New Delhi

13. Stereochemistry conformations and mechanism(Fifth Edition).
- P. S. Kalsi.
New Age. International – New Delhi

14. Guide book to mechanism in Organic Chemistry (Sixth Edition).
- P. Sykes.
Orient Longman.

15. Spectrometric identification of Organic compounds (Sixth Edition).
- R. M. Silverstein & F. X. Webster.
John Wily.
16. Organic Spectroscopy (Third Edition).
- Willium Kemp
ELBS
17. Spectroscopic Methods in Organic Chemistry (Fourth Edition).
- D. Williams.
Tata Mc Graw Hill.
18. Spectroscopy of Organic Compounds (Fifth Edition).
- P. S. Kalsi.
New Age International.
19. Elementary Organic Spectroscopy.
- Y. R. Sharma.
S.Chand.
20. Applications of Absorption Spectroscopy of Organic compounds.
- K. Dyer.
Prentice Hall of India.
21. Organic chemistry. Vol: I & II.
- I. L. Finar.
Pearson education Asia.

(C) PHYSICAL CHEMISTRY :

1. Physical chemistry.
-G.B.Barrow.
Mc Graw Hill.
2. Physical chemistry.
-R.A.Alberty.
Wily.
3. The Elements of Physical chemistry.
-P.W.Atkins.
Oxford University press.
4. Physical chemistry(Sixth Edition).
-P.W.Atkins.
Oxford University press.
5. Text book of Physical chemistry. Vol: I, II, III & IV.
-Kapoor.
Macmillan India Ltd.
6. Physical chemistry Through Problems.
-S.K.Dogra & S. Dogra.
New Age International.
7. Molecular Quantum Mechanics.
-P.W.Atkins & R.S.Friedman.
Oxford University press(1997).

8. Chemical Applications of group Theory.
-F.A.Cotton.
Wily – New York (1990).
9. Symmetry and Structure.
-SFA Kettle.
Wily – New York (1995).
10. Symmetry and Spectroscopy of molecules (Second Edition).
- K.Veera Reddy.
New Age International.
11. Fundamentals of molecular Spectroscopy(Fourth Edition).
- Banwell.
Tata Mc Graw Hill.
12. Vibrational Spectroscopy – Theory and Applications.
- Satyanarayana DN.
New Age International.
13. Fundamentals of Photochemistry.
- Rohatgi K.K. & Mukherjee K.K.
New Age International.
14. Chemical Kinetics(Third Edition).
- Laidler.
Mc Graw Hill.
15. University General chemistry.
- C.N.R. Rao.
Mac millan.
16. Computers and common sense(Fourth Edition).
- R. Hunt & Shelly.
Prentice Hall India Ltd.
17. Basic Programming with Application.
- V.K. Jain.
Tata Mc Graw Hill.

(D) ANALYTICAL CHEMISTRY

1. Quantitative Analysis(Sixth Edition).
-Day & Underwood.
Prentice Hall of India.
2. Analytical chemistry(Fourth Edition).
- G.D.Christian.
John Wiley.
3. Fundamentals of Analytical chemistry(Seventh Edition).
- Skoog, West & Holler.
Harcount Asia Pvt Ltd.
4. Quantitative Analytical chemistry(Fifth Edition).
- Fritz J.S. & G.H. Schenk.
Allyn & Bacon Inc.,
5. Analytical chemistry.
- J.G.Dick.
Mc Graw Hill.
6. Principles of Instrumental Analysis(Third Edition).
- D.A.Skoog.
Saunders college publishers.
7. Instrumental methods of Analysis(Seventh Edition)
- Willard, Merritt, Dean & Settle.
CBS publishers & distributors.
8. Vogel's Text book of Quantitative chemical Analysis
(Fourth & Sixth Editions).
- J.Mendham, RC.Denney, JB.Barnes &MJKThomas.
Pearson education.
9. Principles of polarography.
- Kapoor & Agrawal.
New Age International.
10. Seperation Methods.
- M.N.Sastri.
Himalaya.
11. Basic concepts of Analytical chemistry(Second Edition).
- S.M.Khopkar.
New Age International.
12. Introduction to chromotography Theory and practice.
- V.K.Srivastava & K.K. Srivastava.
13. Analytical chemistry.
- David Krupadanam & others.
Universities press.

(E) ENVIRONMENTAL CHEMISTRY:

1. Environmental chemistry.
-S.E.Manahan.
Willard Grant press.
2. Environmental chemistry(Fifth Edition).
- A.K.De.
New Age International.
3. A Text book of Environmental chemistry and pollution control(Fifth Edition).
- S.S.Dara.
S.Chand.
4. Text book of Environmental chemistry.
- G.S.Sodhi.
Narosa publishing House.
5. Environmental chemistry(Second Edition).
- Banerji.
Prentice Hall.
6. Environmental chemistry.
- B.K.Sharma & H.Kaur.
Krishna prakashan.
7. Foods facts and principles.
- N.Shakuntala Manay & M.Shadakshara Swamy.
Wily Eastern.
8. Food Additives – Characteristics – detection and estimation.
- Mahindru.
Tata Mc Graw Hill.
9. Chemical methods for Environmental Analysis.
- Ramesh.
Macmillan.
10. Environmental chemistry Laboratory Manual.
- R.Gopalan.
Emarald publishers.
11. A Text book on Experiments and calculations in Engineering chemistry.
- S.S.Dara
S. Chand.
12. Laboratory manual in Environmental Engineering.
- P.D.Kulkarni.
Jaico publishing House.

13. Environmental Sanitation.
- Baljeet S. Kapoor.
S.Chand.

(F) AGRICULTURE CHEMISTRY

1. Agricultural Chemistry Vol.I and II B.A. Yagadin
2. Soil Science: Dr.A .Sandaran.
3. Text Book of Soil Science: J.A. Daji.
4. Fertilizers and Soil Fertility: Ulysses S. Jones.

(G)ALLIED CHEMISTRY

1. Elements of Physical Chemistry – Glasstone & Lewis.
2. Physical Chemistry – P.L. Soni.
3. Physical Chemistry – Daniels & Alberty.
4. Organic Chemistry Vol.I & II – IL Finar.
5. Organic Chemistry today – F.W. Gibbs.
6. Basic Inorganic Chemistry – Cotton & Wilkinson.
7. Metals in the Service of man – Sticet & Alexander.

BOOKS SUGGESTED FOR LABORATORY COURSES.

1. Vogel's Qualitative Inorganic Analysis.
   - Revised by Svehla.
   Pearson education Asia.
2. Vogel's Text book of Quantitative Inorganic Analysis(Fourth Edition).
   - Revised by J.Basset. R.C.Denney, G.H.Jeffery & J.Mendham.
   ELBS.
3. Standard methods of chemical analysis.
   - WW. Scott.
   The technical press.
4. Experimental Inorganic chemistry.
   - WG. Palmer.
   Cambridge.
5. Hand book of preparative Inorganic chemistry. Vol: I & II.
   - Brauer.
   Academic press.
6. Inorganic Synthesis.
   – Mc Graw Hill.
7. Experimental Organic chemistry Vol: I &II.
   - P.R.Singh, DS.Gupta & KS.Bajpai.
   Tata Mc Graw Hill.
8. Laboratory Manual in Organic chemistry.
   -R.K.Bansal.
   New Age International.

Vogel's Text book of practical Organic chemistry.
-BS.Furniss,AJ.Hannaford,V.Rogers, PWG.Smith& AR.Tatchell.
Pearson educational Asia.

9. Experiments in General chemistry.
   - CNR.Rao, UC.Agrwal.
   East west press.
11. Experiments in physical chemistry.
   - RC.Das & B.Behra.
   Tata Mac Graw Hill.
12. Advanced practical physical chremistry.
   - J.B.Yadav.
   Goel publishers.
13. Advanced Experimental chemistry Vol-I (physical).
   - JN.Gurtu & R.Kapoor.
   S.Chand.
14. Selected experiments in physical chemistry.
   - NG.Mukherjee.
   JN.Ghose & Sons.
15. Experiments in physical chemistry.
   - JC.Ghosh. Bharati Bhavan.

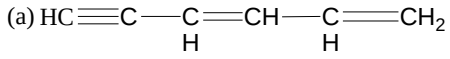
(MODEL QUESTION PAPER)
B.Sc. DEGREE EXAMINATION
I SEMESTER: CHEMISTRY
PAPER-II

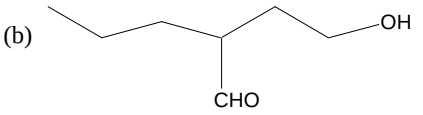
Times: 3hrs **Max. Marks**: 100

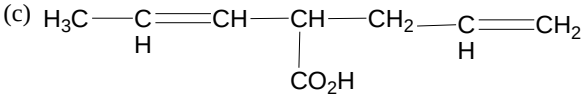
Answer **ALL** questions
Each question carries '20' Marks

UNIT-I

1.(A) (i) Provide the IUPAC name for each of the following structural formulas.

(a) 

(b) 

(c) 

(ii) Draw the structural formula for each of the following compounds.
(a) 5,5-Dimethyl-3-oxohexanoic acid
(b) 1-cyclohexyl-2,2-dimethyl-1-propane

(iii) Discuss the salient features of IUPAC system of naming organic compounds with suitable examples. (6+4+5)

(or)

[B] (i) Draw the structure and the correct IUPAC names of the following compounds.
(a) 4-methyl-3-hexene.
(b) Ethyl isoprophyl ketone.
(c) 5-Chloro-4-methylhexane.

(ii) Provide IUPAC names and structural formulas for the following compounds, whose common names are given.
(a) Crotonic acid
(b) Glycerol

(iii) Write a short not on
(a) Homologous series
(b) Functional group priorities. (6+4+5)

UNIT-II

2 [A] (i) what is meant by hybridization? Explain different types of hybridizations possible in organic compounds with suitable examples.

(ii) Explain the following

(a) Phenol is more acidic than ethanol.
(b)Ammonia is a weaker base than methylamine.

(iii) Diethyl ether and 1-Butanol are isomer, and they have similar solubilities in water. However their boiling points are very different. Explain why these two compounds have similar solubility properties but dramatically different boiling points.

$CH_3CH_2OCH_2CH_3$ $CH_3CH_2CH_2CH_2OH$
Bp: 35°C Bp: 118°C
Solubility:= 8g / 100mL water Solubility:=8g/100mL water

(5+5+5)

[or]

[B] (i) what is meant by hyperconjucation? Using hyperconjucation effect explain the relative stabilitie of 1-Butene and 2-Butene.

(ii) Explain the concept Resonance with suitable examples.
(iii) CCl_4 has a zero dipolemeoment, where as CH_3Cl a finite dipolemoment. explain

(5+5+5)

UNIT-III

3.[A](i) Explain different types of organic reactions with suitable examples.

(ii) Draw an energy-profile diagram for a two step exergonic reaction, in which the first step is rate determining. Label the parts that represent the reactants, products, transition states, intermediate, activation energies and free energy change.

(10+5)

[Or]

[B](i) Define and illustrate the following with suitable examples.
(a)Electrophile
(b) Nucleophile
(c) Heterocyclic cleavage
(d) Carbanion
(e) Transitionstate.

(ii) Write short not on the factors influencing the solubility of Carbocations.

(10+5)

UNIT-IV

4. [A](i) Draw the possible geometric isomer for each of the following compounds and assign "E" or "Z"

(a) 1-Bromo-2-Chloropropaene.
(b) 2-phenyl-2-butene
(c) 3-Methyl-2-hexene.

(ii) Using the Newman projection formulas, draw the various conformers of 1,2-Dibromoethane and label each conformer with a suitable name. Also draw diagram of PE Vs dihedralangle for rotation about the c-c single bond of 1,2-Dibromoethane.

[Or] (6+9)

[B](i) Draw the stable conformer for each of the following compounds.
(a) trans-1,2-dimethyl cyclohexane.
(b) cis-1,3-dimethyl cyclohexane.
(c) trans-1,4-dimethyl cyclohexane.

(ii) Discuss the various methods employed for the determination of the configuration of geomentric isomers.
(6+9)

UNIT-V

5 [A](i) Discuss the following methods of formation of alkanes with suitable examples. Also discuss the mechanism of the reactions.
(a) Kolbe's electrolysis.
(b) Decarboxylation of carboxylic acids.

(ii) What are the primary secondary, tertiary and Quaternary carbons? Give the IUPAC names of two alkyl groups derived from Isopentane.
(10+5)

[Or]

[B](i) Discuss the salient features of Bayer's stain theory of cycloalkanes.

(ii) Explain the mechanism of free radical chlorination of alkanes with reference to chlorination of methane.
(10+5)

(Model Question Paper)

SEMESTER I

INORGANIC CHEMISTRY I (CH 101)

Time: 3hours **Max**: 100 Marks

Answer five questions choosing one from each unit (internal choice).

Each question carries 20 marks

UINT-I

a) Draw the shapes of s, p and d orbitals

b) Write electronic configuration of Cr^+, Cl^-, Cu, Mg, and Ar.

c) Discuss the factors affecting isomerisation energy and how Ionisation energy is found out.

Or

d) Define Heisenberg's uncertainty principle and atomic radius.

e) Distinguish electron affinity and electronegativity

f) Discuss the four quantum numbers in detail

(5+5+10)

UNIT-II

2 a) Give the shapes of NH3, ClF3 and H2O and draw the geomentry

b) What are the limitations of valence bond theory?

c) Write a note on Born Haber Cycle and radius ratio

or

d) Draw the geomentry of H_3O^+, ICl_2^- and SF_4

e) Explain sp hybridization in $BeCl_2$

f) Discuss with illustrations Fajan's rules.

(5+5+10)

UNIT-III

3. a) Mention five uses of helium

b) Justify the position for inert gases in the periodic table

c) Discuss the preparation, properties and structures of fluorides of xenon

or

d) How are LiCH3 and $(C_6H_5)_2Mg$ prepared.

e) What are the salient features of hybrids of alkali metals?

f) Discuss the similarities of alkali metals.

(5+5+10)

UNIT-IV

4. a) Write the structure of diborane and Borazine

b) What are the resemblances between Boron and Aluminium

c) Write a not on LiAlH4 and born nitride

or

d)Why boran is related to silicon. Illustrate with two examples.
e) How are diborane and borazine prepared?
f) Write a note on BF_3, $AlCl_3$ and $NaBH_4$

(5+5+10)

UNIT-V

5. a) Draw the structure of diamond and graphite
b) Explain catenation with two examples
c) Write a note on fullarene, CF2Cl2 and SiC

or

d) Justify the inclusion of Ge, Sn, Pb in 14^{th} group.
e) Write a note on B4C
f) Discuss the structure of silicates

(5+5+10)

PONDICHERRY UNIVERSITY
BACHELOR OF SCIENCE
(COMPUTER SCIENCE)
REGULATIONS
(Effective from the academic year 2009-2010)

Aim of the Course

The Degree of Bachelor of Computer Science aims to introduce the students to the Computer Science and its applications. At the end of the course, the students are expected to have good working knowledge in Computer Systems and Applications.

Eligibility for Admission

Candidates for admission to B.Sc. in Computer science shall be required to have passed Higher Secondary Examination conducted by the Government of TamilNadu with Computer Science / Mathematics / Business Mathematics as one of the subjects of study or an examination accepted as equivalent thereto, subject to such conditions as may be prescribed therefore.

Lateral Entry

Candidates who have passed Diploma in Computer Science / Computer Technology / Information Technology / Computer Application in I Class (10+3 years of study) are eligible to apply for the lateral entry to the 2nd year of the course subject to availability of seats, but limited to 10% of the sanctioned intake.

Duration of the Course

The course shall be of three years duration spread over six semesters. The maximum duration to complete the course shall be 5 years.

Medium

The medium of instruction shall be English.

Passing Minimum

Passing Eligibility & Classification for the award of the Degree as existing for the other B.Sc. Degree Courses.

PONDICHERRY UNIVERSITY

BACHELOR OF SCIENCE

(COMPUTER OF SCIENCE)

CURRICULUM

(Effective from the academic year 2009 – 2010)

FIRST SEMESTER

Sl. No.	Paper	Lecture hrs/week	Practical hrs/week	Duration of Exam	Max. Marks
1.	Language –I	6	-	3	100
2.	English-I	6	-	3	100
3.	Main Paper –I- Fundamentals of Computer Science	5	-	3	100
4.	Main Paper – II- Digital Electronics	4	-	3	100
5.	Allied – I – Mathematics for Computer Science	5	-	3	100
6.	Practical –I. Computer Practice Lab	-	2	3	100
7.	Practical -II. Digital Electronics Lab	-	2	3	100

SECOND SEMESTER

Sl. No.	Paper	Lecture hrs/week	Practical hrs/week	Duration of Exam	Max. Marks
1.	Language –II	6	-	3	100
2.	English-II	6	-	3	100
3.	Main Paper –III-Principles of Programming and C	5	-	3	100
4.	Main Paper – IV- Computer Organization	4	-	3	100
5.	Allied – II – Numerical Methods	5	-	3	100
6.	Practical –III- Advanced Programming in C	-	2	3	100
7.	Practical -IV.- Numerical Methods Lab (Using C)	-	2	3	100

THIRD SEMESTER

Sl. No.	Paper	Lecture hrs/week	Practical hrs/week	Duration of Exam	Max. Marks
1.	English – Communication Skills -I	5	-	3	100
2.	Main Paper –V- Data Structures	5	-	3	100
3.	Main paper –VI- Object Oriented programming	5	-	3	100
4.	Main Paper-VII- Microprocessors and Assembly language Programming	4	-	3	100
5.	Allied – III - Probability and Statistics	5	-	3	100
6.	Practical –V- Data Structure and OOPs lab	-	3	3	100
7.	Practical –VI- Microprocessors and Assembly language Programming Lab	-	3	3	100

FOURTH SEMESTER

Sl. No.	Paper	Lecture hrs/week	Practical hrs/week	Duration of Exam	Max. Marks
1.	English – Communication Skills -II	5	-	3	100
2.	Main Paper –VIII- Java programming	5	-	3	100
3.	Main paper –IX- Computer Algorithm	5	-	3	100
4.	Main Paper –X -Operating System	4	-	3	100
5.	Main Paper-XI- Data Base Management System	5	-	3	100
6.	Practical –VII- JAVA Lab	-	3	3	100
7.	Practical –VIII- RDBMS Lab	-	3	3	100

FIFTH SEMESTER

Sl. No.	Paper	Lecture hrs/week	Practical hrs/week	Duration of Exam	Max. Marks
1.	Main Paper –XII- Computer Network	5	-	3	100
2.	Main Paper –XIII – Visual Programming	4	-	3	100
3.	Main paper –XIV- Software Engineering	5	-	3	100
4.	Main Paper –XV- System Software	5	-	3	100
5.	Elective –I	5	-	3	100
6.	Practical –IX- Computer Networks Lab and OS (UNIX)Lab	-	3	3	100
7.	Practical –X-Visual Programming Lab	-	3	3	100

SIXTH SEMESTER

Sl. No.	Paper	Lecture hrs/week	Practical hrs/week	Duration of Exam	Max. Marks
1.	Main Paper –XVI- Artificial Intelligence	5	-	3	100
2.	Main Paper –XVII-Web Technology	5	-	3	100
3.	Elective –II	5	-	3	100
4.	Practical –XI-Web Technology Lab		3	3	100
5.	Project		12	Viva-Voce	100*

* Internal Assessment : 50 marks & Project Report and Viva-Voce: 50 marks

LIST OF ELECTIVES

1. Multimedia Concepts
2. Resource Management Techniques
3. Distributed Computing
4. Information Security
5. Software Testing
6. Soft Computing
7. Computer Graphics
8. Data Warehousing and Mining
9. Mobile Computing
10. Compiler Design
11. Automata Theory
12. Software Project Management

FIRST SEMESTER

MAIN PAPER - I

FUNDAMENTALS OF COMPUTER SCIENCE

UNIT I

Introduction of computers- Generations of Modern computers Classification of digital Compuer. Memory Units: RAM, ROM, PROM, EPROM, and EEPROM Auxilary Storage Devices: Magnetic storage devices-Floppy Diskettes,Hard disks,Removable Hard disks,Magnetic Tapes,Optical Storage-CD-ROM.

UNIT II

Input Devices: Keyboard, Mouse, Track ball, Joystick, Scanner, Digital Camera, MICR, OCR, Barcode Reader, Touch Screen, Light Pen. Output Devices: Monitor, Printer, Plotter, Sound Card and Speaker.

UNIT III

Programming Languages; Machine Language, Assembly Language, High Level Language, Types of High Level Language - Introduction to Software Development: Defining the Problem, Program Design, Coding, Testing, Documenting, and maintaining the program.

UNIT IV

Introduction to C- Character set,Tokens, Identifiers and keywords. Data type, Declarations, Expressions, statements and symbolic constants, Input-Output: getchar, putchar, scanf, printf, gets, puts, Pre-processor commands, #include, define, preparing and running a complete C program.

UNIT V

Operators and expressions: Arithmetic, Unary, Logical, bit-wise, assignments and conditional operator, comma operator , Library functions. Control statements: While, do, for statement, jump in loops, nested loops, if-else, switch, break, continue and goto statements.

TEXT BOOK

1.Alexis Leon and Mathews Leon, “Introduction to Computers”, Leon TECHWorld, 1999.
2.E. Balagurusamy , “Programming In ANSI C”, Tata McGraw Hill , 2004

REFERENCE

1.Peter Norton, “Introduction to Computers”, Second edition, Tata McGraw Hill Publications 1998.
2.Byron S. Gottfried, “Programming with C” , Schaum’s Outline Series, TMH ,2nd Edition 1998.

3. Kris A. Jamsa , “Programming in C ” , Galgotia Publications PVT.Ltd. (1988).

4.Kernighan, B.W..,and Ritchie, D.M.., “The C Programming Language” Prentice Hall of India, 1989.

FIRST SEMESTER

MAIN PAPER – II

DIGITAL ELECTRONICS

UNIT I

Binary systems – Boolean Algebra and Logic Gates – Simplification of Boolean Functions – Product of Sums simplification – The Map method – Two, Three, Four and Five Variable Maps – Don't Care conditions.

UNIT II

Combinational Logic: Design Procedure – adders – subtractors – code conversion – multilevel NAND circuits- multilevel NOR circuits.

UNIT III

Combinational Logic: With MSI and LSI: Binary parallel adder – decimal adder – magnitude comparator – decoders – multiplexers – ROM - Programmable logic array.

UNIT IV

Sequential logic: Flip flops – Types – Trigerring of Flip flops – Master Slave flip flop – Edge triggered flip flop – Analysis of clocked sequential circuits – state reduction and assignment.

UNIT V

Design of sequential circuits : Flip flop excitation table – design procedure – design with unused state – design of counters – design of BCD counters – design with state equation.

TEXT BOOK

1.M. Morris Mano, "Digital Logic and Computer Design ",Prentice – Hall India Private Limited. 29th reprint, August 2002. (Chapters 1 to 7)

REFERENCE

1.Albert Paul Malvino & Donald P. Leach "Digital Principle & Applications",Mc-Graw Hill International editions, 5th edition.

2. Roger L. Tokheim, " Digital Principles", Mc-Graw hill International editions. 2nd edition.

FIRST SEMESTER

ALLIED PAPER – I

MATHEMATICS FOR COMPUTER SCIENCE

Unit I

Matrices – definition – special types of matrices – operations – symmetric matrices – skew symmetric matrices – Hermitian and skew Hermitian matrices – Inverse – Orthogonal matrices – Solutions of Simultaneous equations – Rank of a matrix – Eigen values and eigenvectors – Cayley Hamilton Theorem.

Unit II

Mathematical Logic – Connectives – Statement Forms – Paranthesis – Truth Table – Tautology and Contradiction/Logical Implications and equivalences – Disjunctive and Conjunctive normal forms.

Unit III

Sets – Relation – functions – Poset – Hasse Diagram – Lattice and its Properties – Boolean Algebra – Properties – Karnaugh Map (Two, Three and Four Variables Only).

Unit IV

Graph Theory: Introduction – application of graphs – Finite and Infinite Graphs – Incidence and Degree – Isolated Vertex, Pendant Vertex and Null Graph. Paths and Circuits – Connected Graph, Disconnected Graphs and components – Euler Graphs – Operations on Graphs – Hamiltonian Paths and Circuits

Unit V

Trees and Fundamentals Circuits: Trees – Some properties of Trees – Pendant Vertices in a Tree – Distance and Centers in a Tree – Rooted and Binary Trees – On Counting Trees – Spanning Trees – Fundamental Circuits

Text Books

1. Manicavachagom Pillay and others ,"Algebra",11th Revised edition. Vol II.,S.V. Publications, (Unit – 1)
2. Narsingh Deo, "Graph Theory with applications to Engineering and Computer Science", PHI, 1997. (Unit –4, 5)
3. Trembly & Manohar, "Discrete Mathematics for Computer Science", TMH, 1997 (Units – 2, 3).

FIRST SEMESTER

PRACTICAL – I

COMPUTER PRACTICE LAB

MS-WORD

1. Text Manipulations and Text Formatting
2. Usage of Bookmarks, Footnotes, Columns & Hyperlink
3. Usage of Header, Footer, Bulleting and Numbering & Borders and Shading
4. Usage of Tables - Sorting & Formatting
5. Usage of Spell Check, Find and replace
6. Picture insertion and alignment
7. Creation of documents using templates
8. Mail Merge, Envelopes and Labels

MS-EXCEL

9. Cell Editing and Formatting
10. Usage of Formulae and Built-in functions
11. Data Sorting, filter, form, subtotal, validation, Goal seek
12. Inserting Clip arts, objects, pictures and Data Filter, Validation, Subtotals
13. Usage of auditing, comments
14. Graph
15. Usage of Auto Formatting, Conditional Formatting & Style

MS - POWER POINT

16. Inserting New slides, text box, object, charts, tables, pictures, movies and sound
17. Slide layout, Colour Scheme, Background and Design template
18. Preparation of organizational charts
19. Preset and custom animation, action buttons and settings, Slide Transitions and animations, view show, slide sorter view
20. Presentation using Wizards
21. Usage of Design templates

Introdcution to C- PROGRAMMING

22. Check for Biggest Number ,Prime Number, Armstrong number,
23. Fibonacci Series
24. Summation of the series: Sin (x) , Cos(x), Exp(x)

FIRST SEMESTER
PRACTICAL- II
DIGITAL ELECTRONICS LAB

1. Study of the logic gates
   i) AND
   ii) OR
   iii) Inverter
   iv) Buffer

2. Study of the logic gates
   i) NAND
   ii) NOR
   iii) XOR
   iv) EXCLUSIVE – NOR

3. Simplification of Boolean functions XY+X'Z + YZ

4. Simplification of Boolean functions F = X'YX + X'YZ' + XY'Z'+xy'z

5. Design the HALF-ADDER.

6. Design the HALF-SUBTRACTOR

7. Design the FULL-ADDER circuit.

8. Design the FULL-SUBTRACTOR circuit.

9. Design the Decoder.

10. Design the Multiplexer.

SECOND SEMESTER

MAIN PAPER – III

PRINCIPLES OF PROGRAMMING AND C

UNIT I

Introduction to Programming – Algorithms, Flowchart, Source Program, Object Program, Compilers, Interpreters, Assemblers, Modular Programming: Structured Programming, Top-down approach.

UNIT II

Arrays: Defining and processing. One dimensional arrays- Two dimensional arrays. Initializing One and Two dimensional arrays- Multi dimensional arrays. Character Arrays and Strings- Introduction. Declaring and initializing String variables – Comparison of Two Strings –String -handling functions, Table of Strings

UNIT III

Functions: Defining and accessing: Passing arguments, Function prototypes, Function calls- Categories of functions- Nesting of functions- Recursion. Use of library functions, Scope , Visibility and Lifetime of variables.

UNIT IV

Structure: Defining and processing. Structure initialization – Operations on individual members—Arrays of structures – Arrays within Structures– Structures and Functions- Passing to a function, Union.

UNIT V

Pointers: Declarations and initialization of pointer variables ,Accessing pointer variables, Passing to a function. Operations on pointers, pointer and arrays. Array of pointers, Pointer to Functions. Data Files: Open, close, create, process unformatted data files.

TEXT BOOK

1.E.Balagurusamy, “Programming in ANSC C”, Tata McGraw Hill, 2004
2. Byron S. Gottfried, “Programming with C” , Schaum’s Outline Series, TMH ,2nd Edition 1998.

REFERENCE

1. Kris A. Jamsa , “Programming in C ” , Galgotia Publications PVT.Ltd. (1988)
2. Kernighan, B.W..,and Ritchie, D.M.., “The C Programming Language” Prentice Hall of India, 1989.

SECOND SEMESTER

MAIN PAPER – IV

COMPUTER ORGANIZATION

UNIT I

Sequential Logic: Design of shift registers – design of ripple counters with examples – Design of synchronous counter with examples – timing sequences.

UNIT II

Register transfer logic – Inter register transfer – Arithmetic, Logic and shift micro – operations – Conditional control statements – fixed point binary data – overflow – Arithmetic shifts – Instruction codes – Design of simple computer.

UNIT III

Processor Logic Design – Processor Organization – Arithmetic Logic Unit – Design of Arithmetic Circuit – Design of Logic Circuit – Design of Arithmetic and Logic Unit – status register – Design of Shifter – Processor Unit – Design of Accumulator.

UNIT IV

Control Logic Design – Control Organization – Hard Wired Control with example – Microprogram Control – Control of Processor Unit – PLA Control with example – Microprogram Sequencer.

UNIT V

Instructions: Basic sets of instruction – Addressing modes – STACK – Subroutines and Interrupts. Memory Organization: RAM and ROM chips – RAM, ROM types – Memory Address Map – Memory Connections to Microprocessor.

TEXT BOOK

1. M. Morris Mano, "Digital Logic and Computer Design", Prentice – Hall of India Pvt. Limited. 29th Reprint-2002.

REFERENCE BOOK

1. Albert Paul Malvino & Donald P. Leach "Digital Principle & Applications" Mc-Graw Hill International editions, 5th edition.

SECOND SEMESTER

ALLIED PAPER – II

NUMERCIAL METHODS

UNIT I

Solution of Transcendental and polynomial equations: Bisection methods - Newton Raphson method – Methods of False Position – Secant methods – Methods of Successive approximations – Solution of Polynomial equations by Newton Raphson method, Horner's Method.

UNIT II

Solutions to simultaneous equations by Back substitution method – Gauss elimination method – Gauss Jordan method – Iterative method - Gauss Seidel method and Finding Inverse of a Matrix.

UNIT III

Interpolation – Finite differences – Newton forward and backward Interpolation formula – operators and the relationship between them. Interpolations with unequal intervals, Lagrange's Interpolation formula, Newton's Divided Differences Interpolation formula.

UNIT IV

Numerical Differentiation – Numerical Integration – Simpson's and Trapezoidal formulae.

UNIT V

Numerical solutions of ordinary differential equations (initial value problems) – Taylor series method – Euler method. Runge Kutta method – Predictor – corrector methods – Milnes and Adams method.

TEXT BOOK

1.S.S. Sastry, "Introductory Methods of Numerical Analysis", PHI, Third Edition

2.M.K. Venkataraman, "Numerical Methods in Science and Engg" The National Publishing Company , Madras Third Edition July 1995.

3.A.Singaravelu, ".Numerical Methods for B.E., B.Tech., M.C.A" , Meenakshi Publications New Edition June 2002.

SECOND SEMESTER

PRACTICAL - III

PROGRAMMING IN C

1. Array Operations
2. String Manipulations
    a. Counting number of vowels, consonants, words, white spaces in a string
    b. Reversing a string and check for palindrome
    c. Finding the number of occurrences of a sub string in a given string
    d. Sub string replacing and removal

3. Using Functions
4. Recursion
    a. Factorial
    b. Reversing a string
    c. Fibonacci Sequence
5. Matrix Manipulations using functions and Case structure
    a. Addition & Subtraction
    b. Multiplication
    c. Transpose
    d. Check if the given matrix is a Magic square
6. Searching
7. Sorting
8. Structures
9. Pointers
10. Files

SECOND SEMESTER

PRACTICAL – IV

NUMERICAL METHODS LAB USING C

1. Solve f(x) = 0 by Bi-section method.
2. Solve f(x) = 0 by Newton – Raphson method.
3. Solve n simultaneous equations with n – variables by Gauss – Seidel method
4. Construct a finite difference table.
5. Interpolate the value of y for given value of x by Lagrange's Interpolation formula.
6. Evaluate $\int_a^b f(x)\,dx$ by Simpsons $1/3^{rd}$ rule.
7. Evaluate $\int_a^b f(x)\,dx$ by Trapezoidal rule.
8. Solve $dy/dx = f(x,y)$, $y(x_0) = y_0$ by R-K method.

THIRD SEMESTER
ENGLISH – COMMUNICATION SKILLS –I

A. The Basic -Applied Grammar and Usage

UNIT I

Rules of the Language:

Parts of Speech: Nouns and Pronouns -Correct usage; Adjectives and Degrees of 'Comparison; Verbs -kinds; Tenses; Tense forms; Adverbs; Agreement of the subject with the verb; Phrasal verbs, voice change; Auxiliaries; prepositions -common errors; conjunctions - their correct uses, Clauses -kinds -usage; Articles -determiners, question, tags; Direct and Indirect speech, correction of sentence; Punctuation.

UNIT II

Vocabulary Building:

Idioms -different kinds. Phrases, Fixed Expressions, common foreign words and expressions (e.g. adhoc) -Word for formation - different processes; spelling; one-word substitutes; word often confused and misused.

B. Spoken English

UNIT III

Pronunciation Drills (Identifying problem areas), vowels consonants, IPA, Phonetic Notations -how to look up a word Dictionary for correct pronunciation.

UNIT IV

Conversational English (both theory and practical) stress, Tonal Variations, their importance; what is an interview? How to face an interview?; How to participate in a debate?; What is a Meeting? -

Procedures -How to convene?; Discussion -How to participate.

C. Process of writing

UNIT V

Sentence Patterns and Paragraph writing. Logical writing - topical sentences - arrangement of facts -supporting materials.

Text Books

1. Functional Grammar: Tickoo and Subramanian
2. English Grammar. Composition and Commercial Correspondence: Pink and Thomas.
3. Communication Skills -A Practical Approach: Hema Srinivasan, Alamelu Ramakristhna. Valli Arunachalam (Frank Bros. and Co.)
4. English for competitive examination Dr. V. Ayothi and Dr. R. Vedavali , New century book house, 2002

THIRD SEMESTER

MAIN PAPER – V

DATA STRUCTURE

UNIT I

Introduction –How to create programs- How to analyze programs – Ordered lists- Sparse Matrices – Stacks- Queues.

UNIT II

A mazing problem – Evaluation of Expressions – Multiple Stack and Queues – Linked Lists – Single Linked Lists – Linked Stacks and Queues – Polynomial Addition.

UNIT III

More on Linked Lists – Double Linked Lists – Dynamic storage Management garbage collection and compaction

UNIT IV

Trees – basic terminology – Binary Trees – Binary tree representations – Binary Tree traversal – Threaded Binary Trees – Applications of Trees.

UNIT V

Graphs – Terminology and Representations- Traversals- Shortest path- Connected Components – Networking Activity - Critical Paths.

TEXT BOOK

1. Ellis Horowitz and Sartaj Sahni , " Fundamentals of Data Structures ", Galgotia Book Source – New Delhi.

REFERENCE

1. Bhagat Singh And Thomas L.Nayos , "Introduction to Data Structure" ,Galgotia Book Source

THIRD SEMESTER

MAIN PAPER – VI

OBJECT ORIENTED PROGRAMMING

UNIT I

Introduction to Object Oriented Programming (OOP),C++ programming basic, Loops and decisions: Relational operators, loops, decision, logical operators, precedence.

UNIT II

Structures, enumerated data types. Function: simple functions, passing argument to functions, returning values from functions, reference arguments, overloaded functions, inline functions, variable and storage classes.

UNIT III

Objects and classes: Classes and Objects, Specifying the class, using the class, constructors, destructors, object as function arguments, returning object from function. Arrays: Arrays fundamentals, Array a Class member data, Array of objects, Strings. Operator overloading: unary operator, overloading binary operators, Data conversion.

UNIT IV

Inheritance: Derived Base class, derived class constructors, overloading member functions, class hierarchies, public and private inheritance, levels of inheritance multiple inheritance. Pointers: Address and pointers, pointers and arrays, pointers and functions, pointers and strings, Memory management, pointer to objects.

UNIT V

Virtual functions and other functions: Virtual functions, Friend functions, Static functions, this pointer. Files and Stream: String I/O, Object I/O with multiple objects, file pointer, disk I/O with member functions.

TEXT BOOK

1. Robert Lafore , " Object – Oriented Programming C++ " , Galgotia Pub.

REFERENCE

1. Stephen Parta , " C++ Primer Plus " , Galgotia Pub.
2. E.Balagurusamy , Object Oriented Programming with C++"

THIRD SEMESTER

MAIN PAPER – VII

MICROPROCESSOR and ASSEMBLY LANGUAGE PROGRAMMING

UNIT I

Organization of Microcomputer - What is microprocessor – Introduction to microprocessor families up to date – Buffer – Decoder – Encoder – Latch – examples of latches – Tri-state Devices – Internal architecture of 8085 Microprocessor – functions of various block and signals – demultiplexing address and data bus – generating control signals. Brief Introduction to the architecture of Z80 – Comparison of Z80 and 8085 – Introduction of Intel 8086/8088 Microprocessor (H/W & S/W components only).

UNIT II

Detailed study of 8085 – addressing modes, Instructions, classifications and format, Types of instructions – arithmetic, logical, data transfer, branch, stack, I/O and machine control instructions – subroutines – Instructions and Operation stat us – Instruction Cycles – machine cycle – T-state – fetch & execute cycles.

UNIT III

Assembly Language Programming in 8085 – data transfer operations in blocks (move, exchange, copy) – arithmetic operations – evaluation of simple arithmetic expression – Sorting of unsigned numbers – Logical operation – Code conversion – handling subroutines, writing program in Assembler.

UNIT IV

Interfacing Memory and I/O devices – address space partitioning – Memory interfacing – Memory mapped I/O and I/O mapped I/O – Parallel I/O interfacing basic concepts – PPI**.**

UNIT V

Methods of data transfer – Programmed data transfer schemes namely synchronous, asynchronous and interrupt driven methods – 8085 interrupts – hardware and software interrupts – enabling, disabling and masking of interrupts – DMA method of data transfer, Software Controlled asynchronous I/O using SID and SOD lines. Applications of microprocessor – A temperature monitoring System.

TEXT BOOK

1. Ramesh S. Gaonkar , Microprocessor architecture, Programming and Application " ,Wiley Eastern Limited, 1985.
2. A.P. Mathus , " Introduction to Microprocessor " , Tata McGraw Hill Publishing co, 3rd edition.

THIRD SEMESTER

ALLIED – III

PROBABILITY AND STATISTICS

UNIT I

Introduction – Motivation – Probability Models Sample Space Events – Algebra of Events – Graphical methods of representing events using the graph – Probability Axioms – Combinational Problems – Conditional Probability – Independence of Events - Baye's rule – Bernoulli trials.

UNIT II

Discrete Random variable: Introduction – Random variables and their event spaces – The probability Mass function. Distribution functions – Special discrete distributions: The Bernoulli PMF. Bernoulli – Poisson, continuous random variable – normal distribution.

UNIT III

Expectation – Introduction – Moments – Expectation of functions of more and than one random variable.

UNIT IV

Test of Hypothesis: Introduction – Procedure of testing hypothesis – Type 1 & Type 2 Errors – Standard errors & Sampling distribution – Test for significance for large samples

UNIT V

Test of significance for sample's – Students T distributions – Test the Significant of the mean of random sample – Tests for difference between the mean's of two samples [Independence samples – Dependent samples] F.

TEXT BOOK

1. S. P. Gupta, "Statistical Methods", S. Chand and Sons.
2. S. C Gupta and V. K. Kapoor, "Fundamentals of Mathematical Statistics", 11th Edition, S. Chand and Sons.

THIRD SEMESTER

PRACTICAL - V

DATA STRUCTURE and OOPS LAB

DATA STRUCTURES

1. Stacks, Queues using arrays
2. Linked List: Insertion and Deletion
3. Polynomial addition using linked list and Arrays
4. Stack and Queue using Linked List
5. Doubly linked List: Insertion and Deletion
6. Binary tree Traversal [inorder, preorder, postorder]
7. Graph Traversal [breadth first, depth first]

OOPS LAB

1. Simple functions & Inline functions
2. Function overloading & Operator Overloading
3. Usage of classes and Objects
4. Constructors and Destructors
5. Inheritance & Multiple Inheritance
6. Pointers
7. Virtual Functions, Friend functions, this pointer and Static functions
8. Files

THIRD SEMESTER

PRACTICAL – VI

MICROPROCESSOR AND ASSEMBLY LANGUAGE PROGRAMMING

1. Addition and Subtraction
2. Multiplication and Division
3. Sorting
4. Evaluation of expression
5. Block operations
6. Code Conversion
7. Applications

FOURTH SEMESTER

ENGLISH – COMMUNICATION SKILLS - II

UNIT I

Study Skills:
a) How to use a dictionary and a library.
b) Effective writing -reasoning out passages.
c) Reading Comprehension.
d) Note-taking.

UNIT II

Precise writing

UNIT III

Report writing -Technical and Scientific report writing. Information Transfer - Tables, Graphs, Organograms, Pie-charts, Bar-charts, Schematic diagrams.

UNIT IV

Commercial Correspondence (The form and arrangement of commercial letters - varieties)
a) Trade Inquiries
b) Orders, Offers, Quotations
c) Confirmation and Execution of orders
d) Refusal and Cancellation of orders
e) Letters of Complaints
f) Circular letters
g) Sales letters

UNI T V

Drafting
a) Drafting of official/non-technical reports (routine and non-routine)
b) Drafting of minutes, short speeches, memoranda, News releases, Postal cards and Reply cards, Telegrams, Mailgrams, Cablegrams, Radiograms.
c) Application for a situation (Curriculum vitae etc.,)

TEXTBOOKS

1.Communication Skills: A Practical Approach, Hema Srinivasan
2.Market Reports: Lorenzo
3.The Business Guide to Effective Writing: Fletcher & Gowing, Newlight Publications, New Delhi.
4.Writers Guide (6th edition) : Wilna R. Ebbit & David R. Ebbit.
5. Effective communication (7th Edition)
6.Business Correspondence: Lorenzo
7. Commercial Correspondence: M. Majumdar

FOURTH SEMESTER

MAIN PAPER - VIII

JAVA PROGRAMMING

UNIT I

Basic concepts of Oops : objects and classes, Abstraction , encapsulation , Inheritance ,polymorphism-constructor- and destructors.

UNIT II

Introduction to JAVA : JAVA features, Java program structure – Java tokens – Java Literals –Java Datatypes-Type Casting Operators –Arrays, Multi Dimensional array –Control statements.

UNIT III

Classes-Objects-Methods-method Overloading –Array of Objects .
Inheritance: Types-Method Overriding , Abstract classes-Interfaces , packages

UNIT IV

Overviews of Applets : Applet basics – Applets life cycle-creating an executable Applet in Html file AWT : working with graphics – working with frame window- Using Awt Controls : label – Buttons – Checkbox- Check Box Groups- Choice control.-text field-Multi Threading - Creating Thread – Extending Threads .

UNIT V

Event handling : Event classes – Event Listener Interfaces-handling Mouse Events- Exception handling : Fundamental –using try and catch –throw-finally statements. I/O basics: Input Stream – Output stream-file input stream – file output stream –data input stream –data output stream.

TEXT BOOK

Herbert Schildt - JAVA 2 (The Complete Reference)- Fourth Edition – TMH ,Fifth Reprint 2002, BPB Publications.

REFERENCE

1. E.Balagurusamy , “Programming with Java”, 2 nd Edition , Tata Mc.Graw-Hill publishing company Ltd .

2. C.Xavier , “Programming with Java2 ”,Scitech Publications Ltd.

FOURTH SEMESTER

MAIN PAPER – IX

COMPUTER ALGORITHM

UNIT I

Introduction – What is an algorithm? Writing structured programs – Analyzing Algorithms –Heap and heap sort – Graphs- hashing.

UNIT II

Divide and Conquer ; The general method – Binary search – Finding the maximum and minimum – Merge Sort – quick sort – selection – Strassen's matrix multiplication .

UNIT III

The Greedy method ; the general method – optimal storage on tapes – knapsack problem – job sequencing with deadlines-optimal merge patterns – minimum spanning tree- tree vertex splitting.

UNIT IV

Dynamic programming ; General method – multistage graphs .Backtracking – The General method – The 8 Queen problems – Sum of subsets –Graph coloring

UNIT V

Branch and bound – The Greedy method-0/1 Knapsack problem – Traveling Salesman problem.

TEXT BOOK

1. Ellis Horowitz and Sartaj Sahni , "Fundamentals of Computer Algorithms" , Galgotia Publications Pvt. Ltd.

REFERENCE

1. Aho A.V. & Hopercraft.E. , "Design and Analysis of algorithms " Addison Wesley.

FOURTH SEMESTER

MAIN PAPER - X

OPERATING SYSTEM

UNIT I

Operating System – Introduction – Basic Concept and Terminology - An OS Resource Manager – OS process view point – OS hierarchical and extended machine view – Memory management: Single Contiguous memory allocation – Introduction to multiprogramming.

UNIT II

Memory Management: Relocatable partitioned memory management – Paged memory management – Demand paged memory management - Segmented memory management – Segmented and Demand- paged memory management – Swapping and Overlays.

UNIT III

Job and Processor scheduling: Process control block – scheduling policies – scheduling algorithms: In non multiprogramming environment – In multiprogramming environment.

UNIT V

Process Synchronization: Race Condition – Hardware solution to mutual exclusion problem: Test and Set instruction – Wait and Signal mechanism – semaphores. Deadlock: conditions – prevention – Banker's algorithm – Detection and Recovery.

UNIT V

Device Management: I/O devices – device management functions – serial and direct access storage devices – Disk scheduling – File management Functions – file organization – allocation methods.

TEXT BOOK

1. Stuart E. Madnick and john Donovan , " Operating System ", Tata McGraw – Hill

2. Prof. R. Sriddhar , "Fundamentals of Operating System" , Dynaram Publication , Bangalore Company

FOURTH SEMESTER

MAIN PAPER – XI

DATA BASE MANAGEMENT SYSTEMS

UNIT I

Introduction – Basic Terminology – Data Base definition – Objectives of Data Base Organization – File System versus Database System – Entities and Attributes – Schemes and Sub-schemes – Data Base Management System – DBMS Architecture.

UNIT II

Data Models – Tree Structures – Plex Structure – Relational Data Base – Third Normal Form – Canonical Data Structures – Data Independence – Enhanced E.R. Modeling.

UNIT III

SQL Statements: Data Retrieval: SELECT, Data Definition Languages: CREATE, ALTER, DROP, RENAME, TRUNCATE, Data Manipulation Language : INSERT – UPDATE, DELETE –MERGE. Transactional Control: COMMIT, ROLLBACK, SAVEPOINT, Data Control Language: GRANT, REVOKE – SELECT ORDER BY – SELECT GROUP BY – Searches Involving Multiple Tables – Natural Join – Outer Join – Creating and Manipulating Views.

UNIT IV

Difference between the Physical and Logical Organization – Addressing Techniques – Hashing – Indexed searching techniques, chains and Rings structures.

UNIT V

Locking Techniques – Time stamp ordering – Validation techniques - Granularity of data items – Recovery Concepts - log based Recovery – Database Security issues – Access Control – Statistical Database Security.

TEXT BOOK

1. James Martin , "Computer Data base Organization ", Second Edition – Prentice – Hall
2. Henry F. Korth Abraham Silberschatz , "Database System Concepts ", Fourth Edition – McGraw – Hill International Editions 2002

REFERENCE

1. C.J. Date, "An Introduction to Database System", seventh edition, pearson Education, New Delhi, 2002.

FOURTH SEMESTER

PRACTICAL VII

JAVA LAB

I Application

1. Finding area and Perimeter of a circle. Use buffered reader class
2. Substring removal from a string. Use StringBuffer class
3. Determining the order of numbers generated randomly using random class
4. Implementation of Point class for image manipulation
5. Usage of calendar class and manipulation
6. String manipulation using char array
7. Database creation for storing telephone numbers and manipulation
8. Usage of vector classes
9. Implementing thread based applications and exception handling
10. Implementing Packages

II Applets

11. Working with frames and various controls
12. Dialogues and Menus
13. Panel and Layout
14. Graphics
15. Colour and Font

FOURTH SEMESTER

PRACTICAL VIII

RDBMS LAB

1. Creating tables.
2. Manipulation of tables.
3. Practising all Sql Queries.
4. Creating Pl- Sql programs for any 3 applications
5. Generating reports.
6. Relating databases using keys and generating required reports such as
   - Electricity bill processing
   - Pay roll processing
   - Personal information system
   - Question database and conducting Quiz

FIFTH SEMESTER

MAIN PAPER – XII

COMPUTER NETWORK

UNIT I

Introduction – Uses of Computer Networks – Networking Hardware- Networking Software – Reference Models- OSI, TCP/IP comparison of OSI and TCP/IP Model- Network Standardization – Metric units.

UNIT II

The Physical Layer –Guided transmission media-wireless transmission – Communication satellite – public switched network –Mobile telephone system. Data Link layer- Design Issues- error detection and correction – Elementary and Link protocols – Data Link layer in the Internet.

UNIT III

The Medium Access Sub Layer – The Channel Allocation problem- Multiple access protocols –Aloha. Carrier sense multiple access protocols , Collision free protocols – IEEE 802 for LANs and MANs- wireless LANs –802.11, Data Link layer switching –Repeaters, Hubs, Bridges, switches , Routers and Gateways.

UNIT IV

The Network layer –Design issues-routing algorithms-shortest path, flooding, Flow-based routing, Hierarchical Routing – Broadcasting routing- congestion control algorithms – General principles- congestion prevention policies, Internetworking – Network layer in the Internet- IP Protocol , IP Address, internet Multicasting- Mobile IP

UNIT V

The Transport Layer – Transport Service- Elements of transport protocols – UDP , Remote procedure Call –TCP , TCP Connection management, wireless TCP and UDP. The Application Layer- Domain name system- electronic Mail- The world wide web – network security- Cryptography – Introduction to Cryptography – Substitution ciphers – Transposition ciphers – Fundamental Cryptographic principles- web security-Threats, secure naming , SSL- The secure sockets Layer.

TEXT BOOK

1. Andrew S. Tannenbaum , “Computer Networks” , Fourth Edition –EEE

REFERENCE

1. Cerd E.Keiser , “LOCAL AREA NETWORKS ” , Mc.Graw.Hill.

FIFTH SEMESTER

MAIN PAPER – XIII

VISUAL PROGRAMMING

UNIT I

Introduction to GUI - Visual Basic : Starting and Exiting Visual Basic – Project Explorer – Working with Forms – Properties Window – Using the Toolbox – Toolbars – Working with Projects – Programming Structure of Visual Basic applications – Event and Event driven procedures

UNIT II

Adding code and using events: Using literals – data types - declaring and using variables – using the operator – subroutines and functions – looping and decision control structures – if then else structure – select structure , for next , do.. loop and while.. wend.- Using intrinsic Visual basic Controls with methods and Properties: Label ,Text box, Command button, Frame, Checkbox, option button, List box, Combo box, Drive List box, directory List box and file list box – Formatting controls – control arrays, Tab order

UNIT III

Functions and Procedure - Passing arguments by value and reference – Arrays, dynamic arrays – User defined datatypes – symbolic constants – using Dialog boxes: Input box , Message box functions - String functions, date and Time function , numeric functions

UNIT IV

Menus: creating menus, adding code to menus, using MDI forms - MDI form basic – building MDI form – creating MDI Child Forms

UNIT V

Database object (DAO) and properties – accessing Recordset objects – Move first, MoveLast, MovePrevious and MoveNext methods – Begin , Commit and Rollback transaction – accessing Microsoft Access files. Active Data Objects (ADO) ADO and OLE DB and ADO Primer – What are OLE DB and ADO? – ADO object Model – Converting DAO Code to Use ADO – Connecting to the database – Retrieving a recordset – Creating a query dynamically – Using a parameterized query – using action queries - Adding records – Editing records –closing the database connection**.**

TEXT BOOKS

1. Gary Cornwell “Visual basic 6”, Tata McGraw –Hill
2. Scott warner “Teach yourself Visual basic 6”, Tata McGraw-Hill
3. Noel Jerke “The Complete Reference”, Tata McGraw-Hill
4. Eric A. Smith, Valar Whisler, and Hank Marquis “Visual Basic 6 programming”

FIFTH SEMESTER

MAIN PAPER – XIV

SOFTWARE ENGINEERING

UNIT – I

Software – Software characteristics – software applications Software Engineering – A Generic view – Software process – Software process model – The Linear sequential Model – Prototyping Model – RAD Model – Fourth Generation Techniques.

UNIT – II

Measures, Metrics and Indicators – Software metrics – Process metrics – Project metrics. Software measurement – size oriented metrics – Function oriented metrics – Measuring Quality – Metrics for small organization – Establishing a software metrics program.

UNIT – III

Software Project Planning – objectives – Feasibility – Software project Estimation – Empirical Estimation models. The structure of Estimation models – COCOMO model. Software Risks – Software Quality Assurance.

UNIT – IV

Software Testing Technique - Software Testing Fundamentals Testing objectives – Testing Principles - Testability - Test case Design – White Box Testing - Basic path testing – Control Structure Testing – Black Box Testing.

UNIT – V

Software Testing Strategies – A strategic approach to Software testing – Verification and validation – strategic issues – UNIT testing – Integration testing – Validation Testing – System testing – The Art of Debugging.

TEXT BOOK

1. Pressman. R.S. , "Software Engineering " , McGraw – Hill 2nd Edition.

REFERENCE

1. Richard Fairley, "Software Engineering Concepts" McGraw Hill Pub.

FIFTH SEMESTER

MAIN PAPER – XV

SYSTEM SOFTWARE

UNIT I

Background: Machine structure – memory - register – data – instructions – special features.

Assembly languages: Address modifications – Using instruction – Using index register – looping – simple assembly language programs.

UNIT II

Assemblers: Purpose – pass 1 and pass 2 of assembly with flow chart – symbol table – literal table – base table generation.

UNIT III

Macros: Concept – definition – macro call – macro call with arguments – conditional macros – nested macros**.**

Macro processor: Definition – generation of macro definition table – macro name table – argument list array – two pass-macro processors – simple two-pass algorithms.

UNIT IV

Loaders: concept – General loader scheme – four functions of a loader – allocation – relocation – linking and loading as accomplished by absolute – relocating and direct – linking loader.

UNIT V

Features of High level languages: PL/1 – language – data types and structure – storage allocation and scope of names – accessing flexibility - functional modularity – asynchronous operation.

Compiler: Definition – lexical analysis – syntax analysis interpretation – parse tree – storage allocation – code generation – optimization – structure of compiler.

TEXT BOOK

1. John J. Donavan ," System programming " .
2. Leland L.Beck "System Software – Introduction to system program "
3. Damdhare., "Introduction to system software "

FIFTH SEMESTER

PRACTICAL -IX

COMPUTER NETWORKS LAB and OS(UNIX) LAB

1. Text Message Sending and Receiving
2. File Transmission
3. Basic Chat Application
4. Simple Mailing Application
5. Client Server Application

OS (UNIX) LAB

1. Practicing UNIX Commands System Calls
2. Shell Programming
3. Inter Process Communication (Message passing)

FIFTH SEMESTER

PRACTICAL -X

VISUAL PROGRAMMING LAB

1. Building simple applications
2. Working with intrinsic controls and ActiveX controls
3. Application with multiple forms
4. Application with dialogs
5. Application with Menus
6. Application using data controls
7. Application using Common Dialogs
8. Drag and Drop Events
9. Database Management
10. Library information system
11. Students mark sheet processing
12. Telephone directory maintenance
13. Gas booking and delivering

SIXTH SEMESTER

MAIN PAPER –XVI

ARTIFICAL INTELLIGENCE

UNIT I

What is Artificial Intelligence – A definition – Underlying Assumption – A.I. Technique – space search – Production systems – Control Strategies – Heuristic search – Problem characteristics – Production system characteristics.

UNIT II

Basic problem solving methods – Forward Versus backward reasoning – Problem trees versus problem graphs – Heuristic search Techniques: Generate and test – Hill climbing – Breadth First Search – Breadth First Search – Problem reduction constraint satisfaction – Means – ends analysis – Knowledge representation issues: Representation and Mapping – Approaches to Knowledge representation.

UNIT III

Predicate logic: Representing simple facts in logic – representing Instance and Is a relationship – Computable functions and Predicates – Resolution. Frames – strong slot and filler structures: Conceptual Dependency – Scripts. Advanced Problem – Solving System.

UNIT IV

Game playing – The minimax search Procedure – Adding Alpha – Beta cut offs – Planning Overview – An Example Domain: The Blocks World – Components of Planning – Nonlinear planning – Using Constraint Posting – Hierarchical Planning – Other planning Techniques – The black board approach – Delta –min communication through objects.

UNIT V

Experts Systems – Definition of Expert Systems – Characteristics of an Expert Systems – Architecture of Expert Systems – role of expert system knowledge acquisition – advantages and limitation of expert system – example expert System: MYCIN.

TEXT BOOK

1. Elaine Rich, Kevin Knight , “Artificial intelligence”, Mc.Graw – Hill edition

2. S.Janakiraman, K. Sarukesi, GopalKrishnan.P, “Foundations of Artificial intelligence and expert systems”, Macmillan Series.

SIXTH SEMESTER

MAIN PAPER –XV II

WEB TECHNOLOGY

UNIT I

Introduction to Internet – Resource of Internet H/W & S/W requirement of Internet – Domain naming system registering our domain name – URL protocol server name port relative URLs Overview of web browsers – ISDN dialup of leased line connection – Internet service providers – Internet services protocols concepts, Internet client and Internet servers, Introduction to TCP/IP FTP SMTP POP3(Brief treatment)

UNIT II

Introduction to HTML – Elementary tags in HTML – List in HTML – Displaying Text in lists – Using ordered lists – using unordered lists – Directory list.

Definition Lists – combining List Types Graphics and image Format – Graphics and HTML Documents.

Images and Hyperlink anchors – Image maps – Tables Frames – Forms – Background Graphics and color.

UNIT III

Introduction to DHTML – Introduction to style sheets – Setting the default style sheet language – Inline style information – External Style sheets – Cascading Style sheets.

UNIT IV

Introduction to VB Script – Declaring variables – Adding data and Time Function to scripts – Using mathematical operators and functions using conditional statements. Creating functions using logical connectives and operators, A simple page VB Script and forms. Introduction to server side scripts.

UNIT V

Introduction to ASP – Database Management with ASP: Database access with ADO, working with ADO's Connection object, Using Command objects, Working with ADO's Recordset Object.

TEXT BOOK

1. HTML 4.0 Source Book
2. Ackermann, " Learning to use the Internet"
3. Mary jane Mara , " VB Script Source Book"
4. Scot Johnson, " Using Active Server Pages "

SIXTH SEMESTER

PRACTICAL - XI

WEB TECHNOLOGY LAB

1. Usage of Simple HTML commands, Graphics and image formats and hyperlinks
2. Usage of Tables, Frames, Forms, Background Graphics and Color
3. Simple Website using HTML
4. Simple DHTML and Cascading style sheet
5. Simple VbScript
6. Web page using VBScript
7. ASP Application

SIXTH SEMESTER

ELECTIVE - 1

MULTIMEDIA CONCEPTS

UNIT I

Multimedia – Definition – Applications – Types – Specification: Hardware and Software – Authoring tools – Needs.

UNIT II

Multimedia Components Audio: Definition – MDI and digital audio – file extensions.

Text: Definition – Fonts – Titling – Hypertext – Text edition tools – File extensions.

Graphics: Colors – Graphics in multimedia. Source of Images – 3D graphics – Raster and Vector graphics – hyper graphics, Image Processing software tools – File extensions.

Animation: Object and cell animation. 2D and 3D animation techniques – software tools – File extensions.

Video: Digital video – Full motion and full screen videos – cut, copy and paste and zooming – File extensions.

UNIT III

Digital video and Image compression: Evaluating a compression system, redundancy and visibility – video compression techniques – Images compression – JPEG, M PEG, DVD, CD Family CO family – CDI-overview.

UNIT IV

Multimedia Project – Multimedia Project Design concept – Project Planning and Costing – The Multimedia Team – Delivering a Multimedia Project.

UNIT V

Multimedia in Internet – Designing for the WWW – Working on the web – Text, Images, Sound and Animation for web.

Introduction to basic HTML tags.

TEXT BOOK

1. John I.Kogel Buford ," Multimedia System:" , Addison Wesley Press.
2. S.Gokul. , Multimedia Magic , BPB Publication.
3. Tay Vaughan ,"Multimedia: Marketing it Work.", Tata McGraw Hill publishing company Ltd.

ELECTIVE- II

RESOURCE MANGEMENT TECHNIQUES

UNIT I

Concept and scope of operation research (OR) – Development of OR – Phases of or – Model in OR.Linear proframming : Methods of soulation –Graphical and SIMPLEX methods of solution – Standard form and pivoting, canonical form, optimal, unbounded and infeasible forms, solving linear programs in canonical forms, obtaining canonical forms from standard form, the SIMPLEX algorithm

UNIT II

Integer Programming: The Integer Programming Problem – Implicit Enumeration – Solution by Branch and Bound – 0-1 Integer Programs – Integer Programming Formulation Examples – Integer Programming Formulation Techiques.

UNIT III

LP Transportation Model: Definition and application of the transportation model, solution of the transportation model, the assignment model, the transshipment model, Travelling Salesman problems.

UNIT IV

Network Scheduling by PERT/CPM : Introduction, Network and basic components, Rules of network construction, time calculation in networks, critical path method(CPM), PERT, PERT calculations, Negative float and negative slack, advantages of PERT/CPM.

UNIT V

Sequencing models and related problems : Processing n Jobs through two Machines, Processing n Jobs through three Machines, Processing two Jobs through m Machines, Processing n Jobs through m Machines.

TEXT BOOK

1. Operations Research by Hamdy A.Taha (Publishers: Macmillan copyright 1989.)
2. Operations Research by Kanti Swarup, P.K. Gupta & Manmohan. S.chand & Company Ltd.
3. Introduction to Operations Research Jpseph G. Edker Michael Kupferschmid John Wiley & Sons, Inc

ELECTIVE - 3

DISTRIBUTED COMPUTING

UNIT I

Introduction –Evolution of Distributed computing system- Distributed computing System modules- Why are Distributed computing system gaining popularity -What is Distributed operating system -Issues in Designing a Distributed operating system.

UNIT II

Introduction to Distributed computing Environment (DCE)-DCE components Communication protocols-Example of message transfer in the OSI modules- Message passing-Desirable features of a good message passing system-Issues in IPC By message passing-Synchronization-Buffering

UNIT III

Synchronization-Introduction-Clock Synchronization-Issues-Algorithms –Event Ordering-Mutual Exclusion – Election Algorithms

UNIT IV

Process Management-Process Migration –Features of a Good process Migration Mechanism- Process Migration Mechanism-Freezing and Restarting a Process –-Threads-Motivations of using Threads-Models for Organizing Threads- Issues in designing a Thread package

UNIT - V

Security-Introduction - Potential attacks to computer systems- Cryptography Basic concepts and Terminology –Access control –Protection Domains –Access Matrix- Design Principles.

TEXT BOOK

1. Andrew S. Tanenbaum & Maarten van Steen, "Distributed Systems – Principles and Paradigms", Prentice-Hall India, 2002."

REFERENCE

1. Pradeep K .Sinha, " Distributed Operating System-concepts and Design "- PHI-2002.

ELECTIVE – 4

INFORMATION SECURITY

UNIT I

Introduction to Computer Security: information security and network basics; information security and its role in an organization; legal and regulatory issues; government homeland security initiatives and how they impact business and individuals

UNIT II

Threats; internal threats: employees, contractors, third parties; external threats: criminals, corporate espionage, hackers, cyber warfare, cyber terrorism; psychology of computer criminals and info-terrorists and associated ethical issues

UNIT III

Cryptography -Secret Key Cryptography -Public Key Cryptography -Key Distribution and Management

UNIT IV

OS Security -Access Control -Vulnerability Analysis -Computer Viruses and Worms

UNIT V

Network Security --TCP/IP Security -Application Level Protocol Security -Web Security -Intrusion Detection

TEXTBOOK

1. M. Bishop, "*Computer Security Art and Science"*, Addison Wesley**,**

2. Michael E. Whitman and Herbert J. Mattord *,"Principles of Information Security"***,** *Thomson/Course Technology*

3. Christopher King, Ertem Osmanoglu, Curtis Dalton *"Security Architecture: Design, Deployment and Operations", McGraw-Hill Osborne Media; 1st edition (July 30, 2001)*

ELECTIVE - 5

SOFTWARE TESTING

UNIT I

Software Testing Principles – Need for Testing – Psychology Of Testing - Testing Economics – White Box, Black Box, Grey Box Testing – SDLC and Testing – Verification & Validation – Weyker's Adequacy Axioms

UNIT II

Testing Strategies – White Box Testing Techniques – Statement Coverage – Branch Coverage – Condition Coverage – Decision/ Condition Coverage – Multiple Condition Coverage – Dataflow Coverage – Mutation Testing – Automated Code Coverage Analysis – Black Box Testing Techniques – Boundary Value Analysis – Robustness Testing –Equivalence Partitioning – Syntax Testing – Finite State Testing – Levels of Testing – Unit, Integration and System Testing

UNIT III

Testing Object Oriented Software – Challenges – Differences from testing non-OO Software – Class testing strategies – Class Modality – State-based Testing – Message Sequence Specification.

UNIT IV

Testability And Related Issues – Design for Testability – Observability & Controllability – Built-in Test – Design by Contract – Precondition, Post condition and Invariant – Impact on inheritance – Applying in the real world Regression Testing - Challenges – test optimization.

UNIT V

Miscellaneous Topics – Automated Tools for Testing – Static code analyzers – Test case generators – GUI Capture/Playback – Stress Testing – Testing Client – server applications – Testing compilers and language processors – Testing web-enabled applications.

REFERENCE

1. Glenford J.Myers, "The Art of Software Testing", John Wiley & Sons, 1979.
2. Boris Beizer, "Black – Box Testing Techniques for Functional Testing of software and systems", John Wiley & Sons, 1995.
3. P.C.Joregensen, "Software Testing – A Craftman's Approach", CRC Press, 1995.
4. William E.Perry, "Effective Methods for Software Testing (2nd Edition)", John Wiley & Sons, 2000.
5. Robert V.Binder, "Testing Object-Oriented Systems: Models Patterns and Tools", Addison Weasley, 2000.
6. Boris Beizer, Van Nostrand Rein hold, "Software Testing Techniques (2nd Edition)", 1990.

ELECTIVE -6

SOFT COMPUTING

UNIT I

ARTIFICIAL NEURAL NETWORKS
Basic concepts - Single layer perception – Multilayer perception – Supervised and unsupervised learning – Back propagation networks –

UNIT II

FUZZY SYSTEMS
Fuzzy sets and Fuzzy reasoning – Fuzzy matrices – Fuzzy functions – Decomposition – Fuzzy automats and languages – Fuzzy control methods – Fuzzy decision making.

UNIT III

NEURO-FUZZY MODELING
Adaptive networks based Fuzzy interface systems – Classification and Regression Trees – Data clustering algorithms – Rule based structure identification –
Neuro-Fuzzy controls – Simulated annealing

UNIT IV

GENETIC ALGORITHMS
Survival of the Fittest – Fitness computations – Cross over – Mutation – Reproduction – Rank method – Rank space method.

UNIT V

SOFTCOMPUTING AND CONVENTIONAL AI
AI search algorithm – Predicate calculus – Rules of interference – Semantic networks – Frames – Objects

REFERENCE

1. Jang J.S.R.,Sun C.T. and Mizutani E, " Neuro-Fuzzy and Soft computing ", Prentice Hall 1998
2. Timothy J.Ross, " Fuzzy Logic with Engineering Applications ", McGraw Hill,1997
3. Laurence Fausett, " Fundamentals of Neural Networks ", Prentice Hall,1994
4. George J.Klir and BoYuan, " Fuzzy sets and Fuzzy Logic ",Prentice Hall,USA 1995
5. Nih J.Nelsson, " Artificial Intelligence – A New Synthesis ",Harcourt Asia Ltd.,1998
6. D.E.Goldberg, " Genetic Algorithms: Search, Optimization and Machine Learning ",Addison Waslay N.Y.,1989

ELECTIVE-7

COMPUTER GRAPHICS

UNIT I

Introduction to computer graphics – display devices- Hardcopy devices – interactive input devices – display processors-graphic adaptors-graphics software – output primitives.

UNIT II

Two-dimensional transformations- windowing and clipping- cliping algorithms

UNIT III

Segmented display files-display file compilation-modeling and sodeling transformation.

UNIT IV

Three-dimensional concepts-three-dimensional representations-three-dimensional transformations.

UNIT V

Three-dimensional viewing-hidden surface and hidden line removal-shading and color models

TEXT BOOK

1. Computer Graphics by Donald hearn and Pauline baker, Prentice hall, New delhi,1986.

REFERENCE

1. Computer Graphics, A programming approach by Steven Harrington, McGraw hill, 1986.

ELECTIVE – 8

DATA WARE HOUSING AND MINING

UNIT I

Evolution of database technology – Introduction to Data warehousing and data mining

UNIT II

Data warehouse: Differences between operational database systems and data warehouses, multidimensional data model, data warehouse architecture, Data warehouse implementation

UNIT III

Data mining: Data preprocessing, Data mining primitives, languages & system architectures, concept description: characterization and comparison, Mining association rules, classification and prediction

UNIT IV

Applications and trends in data warehousing

UNIT V

Applications and trends in data mining

TEXT BOOKS

1.Sam anahory and Dennis murray, “Data warehousing in the real world”, Addison Wesley, 1997.
2.Jiawei Han, et.al., “Data mining: concepts and techniques”, Morgan Kaufmann publishers, 2001.

ELECTIVE – 9

MOBILE COMPUTING

UNIT I

Introduction – Medium access control – Telecommunication systems – Satellite systems – Broadcast systems.

UNIT II

Standard – Wireless LAN – IEEE 802.11 – HIPERLAN – Bluetooth.

UNIT III

Adhoc Networks – Characteristics – Performance issues – Routing in mobile hosts.

UNIT IV

Network Issues – Mobile IP – DHCP – Mobile transport layer – Indirect TCP – Snooping TCP – Mobile TCP – Transmission / time-out freezing – Selective retransmission – Transaction oriented TCP.

UNIT V

Application Issues – Wireless application protocol – Dynamic DNS – File systems – Synchronization protocol – Context – aware applications – Security – Analysis of existing wireless network.

TEXT BOOKS

1.J.Schiller, "Mobile Communication", Addison Wesley,2000.
2.William C.Y.Lee, "Mobile Communication Design Fundamentals", John Wiley,1993.

ELECTIVE -10

COMPILER DESIGN

UNIT I

Introduction to compilers-what is a com piler-overview of the Compilation Process –Typical Compiler Structures- Implementing a compiler- Programming Language Grammar-Elements of a Formal Language Grammar-Derivation, Reduction- and Syntax Trees- Ambiguity –Regular Grammars and Regular Expressions-Important Definitions and relations concerning Grammars Scanning and parsing Techniques-The Scanner Top Down Parsing-Bottom Up Parsing –syntax Directed Translation.

UNIT II

Symbol Table Organization-Elementary symbol-Table organisation – Hash Table Organisation-Linked List and Tree Structured Symbol Tables.

UNIT III

Compilation of Expressions-Intermediate Code-Forms-Code Generation for Expressions.

UNIT IV

Compilation of control structures- Control Transfers-procedure Calls-Conditional Execution-Iteration Control Constructs.

UNIT V

Error Detection, Indication and Recovery –Code Optimization-Lexical and Syntax Errors-Semantic Errors-The Error Print Routine-Run Time Errors –Debugging Aids and options.

TEXT BOOK

1. Compiler Construction Principles and practice by D.M. Dhamdhere

REFERENCE

1. Prinicples of Complier Design Alfred V.Aho & Jeffrey D.Ullman.

ELECTIVE -11

AUTOMATA THEORY

UNIT I

Preliminaries-Strings,alphabets and languages-Graphs and trees-inductive proofs-set notation-relations-Finite Automata and Regular Expressions-Finite State systems-basic definitions Nondeterministic finite automata-finite automata with E moves-Regular expressions-automata with output-Applications of finite automata.

UNIT II

Properties of Regular Sets-The pumping lemma for regular sets-Closure properties of regular sets.

UNIT III

Context-free Grammar-Motivation and introduction-context-free grammars-Derivations trees-Simplification of context-free grammars-chomsky normal form-Greibach normal form.

UNIT IV

Pushdown Automata – Informal description-definitions-Pushdown automata and context-free languages. Properties of context-free languages-the pumping lemma for CFL's-closure properties of CFL's.

UNIT V

Turing Machines-Introduction-The turing machine model-Computable languages and functions-Techniques for Turing machine construction-Modifications of Turing machines.

TEXT BOOK

1. Introduction to Automata Theory, Languages and Computation by John E.Hopcroft and Jeffery D.Ullman

ELECTIVE-12

SOFTWARE PROJECT MANAGEMENT

UNIT I

Introduction to Project Management Importance of software project management -Project Problems with Software Projects . Project Management- Stages of Project .. The Feasibility Study - The Cost-benefit Analysis

UNIT –II

Planning-. Project Execution--Project and Product Life Cycle-The Stakeholder of Project - All parties of project - The Role of Project Manager- Project Management Framework-Software Tools for Project Management - Project Planning

UNIT – III

Scope Management -Methods for Selecting Projects - Project Charter- Scope Statement-Work Breakdown Structure - Stepwise Project Planning-Overview - Main Steps in Project Planning - Use of Software (Microsoft Project) to Assist in Project Planning Activities Project Scheduling .

UNIT – IV

Importance of Project Schedules -. Schedules and Activities . Sequencing and Scheduling Activity Project Network Diagrams Network Planning Models Duration Estimating and Schedule Development Critical Path Analysis -Program Evaluation and Review Technique (PERT) to Assist in Project Scheduling -. Project Cost Management .

UNIT -V

Importance and Principles of Project Cost Management - Resource Planning - Cost Estimating Types of Cost Estimates . Expert Judgment - Quality of Information Technology Projects Risk management-The Importance of Project Risk Management Common Sources of Risk in IT projects Risk Identification Risk Quantification Risk Response Development and Control Using Software to Assist in Project Risk Management

TEXT BOOKS

1. Information Technology Project Management Kathy Schwalbe, International Student Edition, THOMSON Course Technology, 2003
2. Software Project Management Bob Hughes and Mike Cotterell, Third Edition, Tata McGraw-Hill
3. Microsoft Office Project 2003 Bible , Elaine Marmel, Wiley Publishing Inc.

B.Sc. MATHEMATICS PROGRAMME

SYLLABUS

2009-2010 onwards

PONDICHERRY UNIVERSITY

PUDUCHERRY – 605 014

B.Sc. MATHEMATICS PROGRAMME

Regulations

Eligibility for admission:

A candidate for admission into B.Sc. programme shall have passed HSC (Plus Two) with Mathematics as a subject of study.

Duration of study:

The course duration shall normally be of three years spread over six semesters. The maximum duration to complete the course shall be 6 years.

Medium:

The medium of instruction shall be English.

Passing minimum:

40% of marks in each paper.

Conditions for Affiliation:

The following are the requirements for the grant of affiliation for B.Sc. Mathematics programme in the institutions affiliated to Pondicherry University:

(i) Faculty strength for B.Sc. Mathematics programme: 2 regular faculty in the first year.
Additional 2 regular faculty in the second year.
Additional 4 regular faculty in the third year.
A total of 8 regular faculty for the whole programme.

(ii) Qualifications for the faculty: The faculty shall possess the qualifications as prescribed by UGC.

(iii) Recruitment of faculty: The recruitment of faculty shall be through a duly constituted Selection Committee with a nominee of the University, by advertisement

(iv) Class rooms: 3 permanent rooms with furniture, platform and black board.
(v) Faculty room: 1 permanent room with furniture.
(vi) Computers: 4 for the faculty.
(vii) Library:
Books: 15 copies of each prescribed text book;
1 copy of each prescribed reference book.
(viii) Computer Lab facilities are required for the computer papers with 1 computer for every 2 students

SYLLABUS

1. This syllabus is effective for the candidates admitted from the Academic year 2009 – 2010 onwards.
2. The syllabus will be common for all the affiliated institutions offering B.Sc. Mathematics programme.
3. Semester System will be followed for all the affiliated institutions.

COURSE PATTERN FOR B.Sc. MATHEMATICS MAIN

FIRST SEMESTER:

1. ALGEBRA AND TRIGONOMETRY -I
2. CALCULUS –I
3. VECTOR ANALYSIS AND GEOMETRY – I

SECOND SEMESTER:

1. ALGEBRA AND TRIGONOMETRY –II
2. CALCULUS –II
3. VECTOR ANALYSIS AND GEOMETRY – II

THIRD SEMESTER:

1. ADVANCED CALCULUS
2. REAL ANALYSIS-I
3. STATISTICS-I

FOURTH SEMESTER:

1. THEORY OF NUMBERS, MULTIPLE INTEGRALS AND FOURIER TRANSFORM
2. REAL ANALYSIS-II
3. STATISTICS-II

FIFTH SEMESTER:

1. ABSTRACT ALGEBRA
2. COMPLEX ANALYSIS – I
3. MECHANICS – I: STATICS
4. OPERATIONS RESEARCH – I
5. PROGRAMMING IN C

SIXTH SEMESTER:

1. DISCRETE MATHEMATICS
2. COMPLEX ANALYSIS – II
3. MECHANICS – II: DYNAMICS
4. OPERATIONS RESEARCH – II
5. NUMERICAL ANALYSIS USING C

Semester - I

Paper - I **B111 NR**

BMG 101 – a ALGEBRA AND TRIGONOMETRY - I

Symmetric, skew symmetric, Hermitian and skew-Hermitian matrices. Elementary operations on matrices. Inverse of a matrix. Linear independence of row and column matrices. Row rank, column rank and rank of a matrix. Equivalence of column and row ranks. Eigen values, eigenvectors and the characteristic equation of a matrix. Cayley Hamilton theorem and its use in finding the inverse of a matrix. Applications of matrices to a system of linear equations. Theorems of consistency of a system of linear equations.

Relations between the roots and coefficients of a general polynomial equation in one variable. Transformation of equations. Descarte's rule of signs. Solution of cubic equations. Biquadratic equations.

De Moivre's Theorem and its applications. Direct and inverse circular and hyperbolic functions.

Reference books:

1. I.N.Herstein, Topics in algebra. Wiley Eastern Ltd, New Delhi, 1975.
2. T.K.Manicavachagom Pillay, T.Natarajan and K.S.Ganapathy, Algebra Volume - 1, S.Viswanathan (Printers & Publishers) Pvt. Ltd, 1999.
3. S.Narayanan and T.K.Manicavachagom Pillai, Trigonometry, S.Viswanathan (Printers & Publishers) Pvt. Ltd, 1997.
4. T.K.Manicavachagom Pillai, Matrices.

Note: TEN questions are to be set and Three – Fifths of the paper carries full marks.

Semester – I

Paper – II **B112 NR**

BMG 102 - a CALCULUS –I

Differential Calculus:

Є- δ Definition of the limit of a function. Basic properties of limits. Continuous functions and classification of discontinuities. Differentiability. Successive differentiation, Leibniz theorem. Maclaurin and Taylor series expansions. Asymptotes. Curvature. Test for concavity and convexity. Points of inflexion. Multiple points. Tracing of curves in cartesian and polar co-ordinates.

Integral Calculus:

Integration of irrational algebraic functions and transcendental functions. Reduction formulae. Definite integrals. Quadrature. Rectification. Volumes and surfaces of solids of revolution.

Reference books:

1. T.K.Manickavachagom Pillai, Calculus Volume – I (May 1992 Edition), Chapters I, III, VII, X (Section 2), XI
2. T.K.Manickavachagom Pillai, Calculus Volume – II (July 1992 Edition) Chapter I (Sections 8 to 14) and Chapter II.
3. Murray R Spiegel, Theory and Problems of Advanced Calculus, Schaum's Outline Series, Schaum Publishing Co., New York

Note: TEN questions are to be set and Three – Fifths of the paper carries full marks.

Semester – I

Paper – III **B113 NR**

BMG 103 - a VECTOR ANALYSIS AND GEOMETRY – I

Vector Analysis:

Scalar and vector product of three vectors.

Product of four vectors.

Reciprocal vectors.

Vector differentiation.

Gradient, divergence and curl.

Geometry:

General equation of second degree.

Tracing of conics.

System of conics.

Confocal conics.

Polar equation of a conic.

Reference books:

1. Durai Pandian, Vector Analysis (Relevant chapters)
2. T.K.Manickavachagom Pillai and T.Natarajan, Analytical Geometry of 2D - Part 1 Geometry : Conics and Polar Equation of a Conic (Relevant chapters)
3. Murray R.Spiegel, Theory and Problems of Advanced Calculus, Schaum Publishing Company. New York.
4. Murray R.Spiegal, Vector Analysis, Schaum Publishing Company, New York.

Note: TEN questions are to be set and Three – Fifths of the paper carries full marks.

Semester - II

Paper – IV **B121 NR**

BMG 101- b ALGEBRA AND TRIGONOMETRY – II

Mappings, equivalence relations and partitions. Congruence modulo n.

Definition of a group with examples and simple properties. Subgroups. Generation of groups. Cyclic groups. Coset decomposition. Lagrange's theorem and its consequences. Fermat's and Euler's theorems. Homomorphism and isomorphism. Normal sub groups. Quotient groups. The fundamental theorem of homomorphism. Permutation groups. Even and odd permutations. The alternating group A_n. Cayley's theorem. Introduction to rings, subrings, integral domains and field. Characteristic of a ring.

Logarithm of a complex quantity. Expansion of trigonometrical functions. Gregory's series. Summation of series.

Reference books:

1. I.N.Herstein, Topics in Algebra. Wiley Eastern Ltd, New Delhi, 1975.
2. S.Narayanan and T.K. Manicavachagom Pillai, Trigonometry, S.Viswanathan (Printers & Publishers) Pvt. Ltd, 1997.

Note: TEN questions are to be set and Three – Fifths of the paper carries full marks.

Semester – II

Paper – V **B122 NR**

BMG 102 - b CALCULUS –II

Ordinary Differential Equations:

Degree and order of a differential equation. Equations of first order and first degree. Equations in which the variables are separable. Homogeneous equations. Linear equations and equations reducible to the linear form. Exact differential equations. First order higher degree equations solvable for x, y, p. Clairaut's form and singular solutions. Geometrical meaning of a differential equation. Orthogonal trajectories. Linear differential equations with constant coefficients. Homogeneous linear ordinary differential equations.

Linear differential equations of second order. Transformation of the equation by changing the dependent variable / the independent variable. Method of variation of parameters.

Ordinary simultaneous differential equations.

Reference books:

1. T.K.Manickavachagom Pillai, Calculus Volume – II (July 1992 Edition), Chapters VIII, IX and X.
2. D.A.Murray, Introductory Course in Differential Equations, Orient Longman (India), 1967.

Note: TEN questions are to be set and Three – Fifths of the paper carries full marks.

Semester – II

Paper – VI **B123 NR**

BMG 103 - b VECTOR ANALYSIS AND GEOMETRY – II

Vector Analysis:

Vector integration.

Theorems of Gauss, Green and Stokes (Statements only) and problems based on these.

Beta and Gamma functions.

Geometry:

Plane.

The straight line and the plane.

Sphere.

Cone.

Cylinder.

Reference books:

1. T.K.Manickavachagom Pillai and T.Natarajan, A Text Book of Analytical Geometry - Part II- 3D Geometry, 2001 Edition.
   Chapters 2, 3, 4, 5 (Sections 1 to 8).

2. S.L.Loney, The Elements of Coordinate Geometry, Macmillan and Company, London.

Note: TEN questions are to be set and Three – Fifths of the paper carries full marks.

Semester - III

Paper - VII **B131 NR**

BMG 201 – a ADVANCED CALCULUS

1. Partial Differential Equations:

   1.1. Formation of equations by elimination of constants and arbitrary functions.
   1.2. Definitions of general, particular and complete solutions. Singular integral (Geometrical meanings not expected).
   1.3. Lagrange's method of solving the linear equation P p + Q q = R. (Geometrical interpretations not expected). Charpit's method.
   1.4. Partial differential equations of second and higher orders. Classifications of linear partial differential equations of second order. Homogeneous and non-homogeneous equations with constant coefficients.

2. Laplace Transforms:

   2.1. Definitions. Transform of 1, transform of the functions e^{-at}, cos at, sin at and t^n, where n is a positive integer, sinh at, cosh at.
   2.2. First shifting theorem: If the Laplace transform of a function f(t) is Ø(s), then the Laplace transform of e^{-at} f(t) is Ø(s+a),
   Laplace transforms of e^{-at} cos bt, e^{-at} sin bt, e^{-at} t^n.
   2.3. Second shifting theorem.
   2.4. Transforms of f '(t) and f ''(t).
   2.5. Inverse transforms relating to the above standard forms.
   2.6. Application to solution of ordinary differential equations with constant coefficients, involving the above transforms.

Text book:

T.K.Manickavachagom Pillai, Calculus, S.Viswanathan (Printers & Publishers) Pvt. Ltd. (Relevant portions).

3. Fourier Series:

   3.1. Definition – Finding Fourier coefficients for a given periodic function with period 2π. Odd and even functions. Half range series.

Text book:

M.K.Venkataraman, Engineering Mathematics (Relevant portions).

Note: 10 questions are to be set and 6 are to be answered. All questions carry equal marks.

Semester - III

Paper - VIII **B132 NR**

BMG 202 – a REAL ANALYSIS – I

1. Sets and Functions:

   Sets and elements – Operations on sets – Functions - Real valued functions – Equivalence – Countability – Real numbers – Least upper bound – Greatest lower bound.

2. Sequence of Real Numbers:

   Definition of sequence and subsequence – Limit of a sequence – Convergent sequence – Bounded sequence – Monotone sequence – Operation on convergent sequence - Limit superior and limit inferior – Cauchy sequence.

3. Series of Real Numbers:

   Convergence and divergence – Series with non-negative terms – Alternating series – Conditional convergence and absolute convergence – Rearrangement of series (statements only) – Tests for absolute convergence (statements only) - Series whose terms form a non-increasing sequence – Summation by parts.

4. Limits and Metric Spaces:

   Limit of a function on the real line - Metric spaces (Examples 4 and 5 under 4.2 c to be omitted) - Limits in metric spaces.

5. Continuous Functions on Metric Spaces:

   Functions continuous at a point on the real line – Reformulation – Functions continuous on a metric space – Open sets and closed sets - More about open sets – Connected sets.

Text book:

Treatment as in Richard R Goldberg, Methods of Real Analysis, Indian Edition, 1970.

Note: 10 questions are to be set and 6 are to be answered. All questions carry equal marks.

Semester - III

Paper - IX **B133 NR**

BMG 203 – a STATISTICS – I

1. Probability of an event - Probability space – Total probability - Conditional probability – Bayes theorem – Random variables – Discrete and continuous – Distribution function – Expected value and moments – Moment generating functions and characteristic functions – Tchebechev's inequality.

2. Binomial, Poisson, normal and uniform distribution - Concept of bivariate distribution - Marginal and conditional distributions.

3. Construction of univariate and bivariate frequency distributions - Diagrammatic and graphical representation of data and frequency distributions - only bar and pie diagrams and line diagrams - Frequency polygon - Frequency curve and histogram- Cumulative frequency distributions - Ogives and Lorenze curves - Measures of central tendency – Dispersion - Skewness and kurtosis for numerical data.

Text book:

S.C.Gupta and V.K.Kapoor, Fundamentals of Mathematical Statistics.

Note: 10 questions are to be set and 6 are to be answered. All questions carry equal marks.

Semester - IV

Paper - X **B141 NR**

BMG 201 – b THEORY OF NUMBERS, MULTIPLE INTEGRALS AND FOURIER TRANSFORM

1. Theory of Numbers:

   Prime and composite numbers - Resolution of a composite number into prime factors - Divisors of a given number N - Euler's function Ø(N) - Value of Ø(N) - Integral part of a real number - The highest power of a prime P contained in n! – Congruences - Fermat's theorem and Wilson's theorem.

   Text book:

   T. Natarajan and T.K.Manicavachagom Pillai, Algebra, S.Viswanathan (Printers & Publishers) Pvt. Ltd, Chennai (Relevant portions).

2. Multiple Integrals:

   2.1 Jacobian - Double and triple integrals - Evaluation in simple cases using Jacobians.
   2.2. Changing the order of integration- simple problems

   Text book:

   T.K.Manicavachagam Pillai, Calculus - Volume II, S.Viswanathan (Printers & Publishers) Pvt. Ltd, Chennai (Relevant portions)

3. Fourier Transform:

   Definition - Properties of Fourier transform - Linear property - Shifting property - Change of scale property - Modulation theorem - Fourier transform of integrals - Relation between Fourier and Laplace transforms - Convolution theorem for a Fourier transform - Parseval's identity - Fourier sine transform and Fourier cosine transform.

   Text book:

   M.K.Venkataraman, Engineering Mathematics (Relevant portions).

Note: 10 questions are to be set and 6 are to be answered. All questions carry equal marks.

Semester - IV

Paper - XI **B142 NR**

BMG 202 – b REAL ANALYSIS – II

1. Completeness and Compactness:

   Bounded sets and totally bounded sets - Complete metric spaces - Compact continuous functions on compact metric spaces - Continuity of the inverse function - Uniform continuity.

2. Calculus:

   Sets of measure zero - Definition of the Riemann integral - Existence of the Riemann integral - Properties of the Riemann integral – Derivatives - Rolle's theorem - The Law of the Mean - Fundamental theorem of Calculus - Improper integrals (continued).

3. The Elementary Function, Taylor Series:

   Hyperbolic function - The exponential function - The logarithmic function - Definition of x power a - The trigonometric function - Taylor function - The binomial theorem - L'Hopital's rule

Text book:

Treatment as in Richard R Goldberg, Methods of Real Analysis, Indian Edition, 1970.

Note: 10 questions are to be set and 6 are to be answered. All questions carry equal marks.

Semester - IV

Paper - IX **B143 NR**

BMG 203 – b STATISTICS – II

1. Correlation and regression analysis.

   (Sections 10.1 to 10.7 of Reference book No.1)

2. Theory of attributes.

   (Sections 11.1 to 11.8.2 of Reference book No.1)

3. Tests of significance - Standard error - Large sample tests - Exact test based on t, chi-square and F-distributions with regard to mean, variance and correlation coefficient - Test □f independence in congruency tables - Tests of goodness of fit - Test of hypothesis - Neymann Pearson theory - Concepts of most powerful test.

4. Analysis of variance:

   One way classification - Two way classification. (Sections A-5.4 to A-5.7 of Reference book No.2)

Reference books:

1. S.C.Gupta and V.K.Kapoor, Fundamentals of Mathematical Statistics.
2. S.C.Gupta, Statistics.
3. R.S.N.Pillai and V.Bagavathi, Statistics.

Note: 10 questions are to be set and 6 are to be answered. All questions carry equal marks.

Semester - V

Paper - XIII **B151NR**

BMG 301- a ABSTRACT ALGEBRA

1. Ring theory:

   Ring homomorphism - Ideals and quotient rings - More ideals and quotient rings.

2. Ring Theory continued:

   The field of quotients of an integral domain - Euclidean rings - A particular Euclidean ring - The domain of Gaussian integers.

3. Vector spaces:

   Basic concepts of vector spaces - Linear independence and bases - Dual spaces.

4. Inner product spaces:

   Definition of inner product - Inner product spaces - Cauchy Schwartz inequality - Orthogonal vectors - Orthogonal complements - Ortho normal sets and bases - Gram Schmidt orthogonalization process.

5. Linear Transformations:

   Definition of a linear transformation - The algebra of linear transformations - Characteristic roots and characteristic vectors.

   Text book:

   I.N.Herstein: Topics in Algebra, John Wiley & Sons, New York, 1999.

   Unit 1: Chapter 3: Sections 3.3 to 3.5
   Unit 2: Chapter 3: Sections 3.6 to 3.8
   Unit 3: Chapter 4: Sections 4.1 to 4.3
   Unit 4: Chapter 4: Section 4.4
   Unit 5: Chapter 6: Sections 6.1 to 6.2

Note: 10 questions are to be set, with two questions from each unit. A candidate has to answer any 6 questions. All questions carry equal marks.

Semester - V

Paper - XIV **B152 NR**

BMG 302 – a COMPLEX ANALYSIS – I

1. Complex numbers – Definitions - Algebraic properties - Cartesian co-ordinates - Triangular inequality - Polar co-ordinates - Powers and roots – Region in the complex plane - The point at infinity.

2. Analytic functions - Functions of a complex variable – Mapping – Limit - Theorems on limits – Continuity – Derivatives - Differentiation formula - Cauchy Riemann equations - Sufficient conditions.

3. Cauchy Riemann equations in polar form - Analytic functions - Hormonic functions.

4. Elementary functions - Exponential function - Trigonometric functions and their properties - Hyperbolic functions - Logarithmic function - Branches of log z - Further properties of logarithms - Complex exponents - Inverse trigonometric functions.

5. Mapping by elementary functions - The linear function 1/z - Linear fractional transformation - The function z^n - The function $z^{1/2}$ - The functions W = exp z, W = sin z, W = cos z - Successive transformation W= z + 1/z.

Text book:

R.V.Churchil, Complex Variables and Applications.

Unit 1: Chapter 1
Unit 2: Chapter 2 (Relevant portions)
Unit 3: Chapter 2 (Relevant portions)
Unit 4: Chapter 3
Unit 5: Chapter 4

Note: 10 questions are to be set, with two questions from each unit. A candidate has to answer any 6 questions. All questions carry equal marks.

Semester - V

Paper - XV **B153 NR**

BMG 303 - a MECHANICS I: STATICS

1. Forces:

   Definition of a force - Types of forces: gravity, tension, resistance, friction - Magnitude and direction of the resultant of forces on a particle - Equilibrium of a particle.

2. Equilibrium of a Particle:

   Equilibrium of a particle acted on by three forces - The triangle of forces - Necessary and sufficient conditions for the equilibrium of a particle under three forces - Lami's theorem - Necessary and sufficient condition for the equilibrium of a particle under a system of forces - Equilibrium of a particle on a rough inclined plane.

3. Forces on a Rigid Body:

   Equivalent systems of forces - Resultant of parallel forces - Couples - Resultant of several coplanar forces - Moment of the resultant force - Varignon's theorem - Couples in a plane or in parallel planes - Resultant of a couple and force.

4. Three coplanar forces on a rigid body - Equation of the line of action of the resultant - Equilibrium of the rigid body under three coplanar forces.

5. Hanging Strings:

   Equilibrium of a uniform homogeneous string - Sag - Suspension bridge.

Text book:

P.Duraipandian, Laxmi Duraipandian and Muthamizh Jayapragasam, Mechanics, S.Chand and Company Ltd, New Delhi, 1997.

Unit 1: Chapter 2
Unit 2: Chapter 6
Unit 3: Chapter 7 (up to Section 7.9)
Unit 4: Chapter 7, Sections 7.10 to 7.12
Unit 5: Chapter 11

Note: 10 questions are to be set, with two questions from each unit. A candidate has to answer any 6 questions. All questions carry equal marks.

Semester - V

Paper - XVI **B154 NR**

BMG 304 – a OPERATIONS RESEARCH – I

1. Linear programming problem – Graphical method - Simplex method.

2. Transportation problem.

3. Assignment problem – Travelling salesman problem.

4. Replacement problem – Replacement of items that deteriorate with time - Replacement of items that fail completely.

5. Network analysis – Basic concepts – Construction of network diagram – CPM – PERT.

Text book:

Kanti Swarup, P.K.Gupta and Man Mohan, Operations Research, 1991.

Unit 1: Chapter 2 – Sections 2.1 to 2.3 and Chapter 3 – Sections 3.1 to 3.3
Unit 2: Chapter 6 – Sections 6.1 to 6.8
Unit 3: Chapter 7 – Sections 7.1 to 7.4
Unit 4: Chapter 18 – Sections 18.1 to 18.3
Unit 5: Chapter 19 – Sections 19.2 to 19.4 and 19.6 to 19.7

Note: 10 questions are to be set, with two questions from each unit. A candidate has to answer any 6 questions. All questions carry equal marks.

Semester - V

Paper - XVII **B155 NR**

BMG 305 - a PROGRAMMING IN C

1. C language fundamentals - Character set - Identifiers and keywords - Data types - Declarations – Expressions - Statements and symbolic constants - Input- Output- The functions getchar, putchar, scanf, printf, gets, puts – Processor commands: include, define - Preparing and running a complete C program - Operators and expressions- arithmetic, unary, logical, bitwise, assignments and conditional operator - Library functions.

2. Control statements: while, do-while statements - Nested loops - If-else, switch, break, continue and go to statements - Comma operator - Arrays: defining and processing - multi dimensional arrays - Strings and operations on stirrings.

3. Functions - Defining and accessing - Passing arguments - Function prototypes – Recursion - Use of library functions - Storage classes: automatic, external and static variables.

4. Structure: Defining and processing - Passing structure to function – Union.

Pointers: Pointers and arrays - Pointer and string - Pointer and function.

5. Simple file operations: The pointer as a file - Low level file operations - Random access file operation.

Text book:

V.Rajaraman: Computer Programming in C, Prentice Hall of India, New Delhi.

Scheme of Examination:

Passing minimum: Theory: 30 marks out of 75.
Practical: 10 marks out of 25.

For the theory examination, 10 questions are to be set, with two questions from each unit. A candidate has to answer any 6 questions. All questions carry equal marks.

The practical examination to be conducted as an external examination by the University by appointing an examiner from the faculty of Mathematics department, involved in the teaching of the subject.

Semester - VI

Paper - XVIII **B161 NR**

BMG 301 - b DISCRETE MATHEMATICS

1. Mathematical Logic:

   Connectives – Well formed formulas – Tautology – Equivalence of formulas – Duality law – Tautological implications – Normal forms.

2. Algebraic Structures:

   Algebraic systems and their properties – Semigroups and monoids – Homomorphisms of semi groups and monoids – Subsemigroups and submonoids – Grammars and languages – Syntax analysis – Polish expressions and their compilation – Finite state machines.

Text book:

J.P.Trembley and R.Manohar, Discrete Mathematical Structures with Applications to Computer Science, Mc Graw Hill Book Company, 1997.

Chapters 3 and 4 (Sections 3.1, 3.2, 3.3, 3.4 and 4.6).

3. Graph Theory:

   Definition – Application of graphs – Finite and infinite graphs – Incidence and degree – Isolated vertex, pendent vertex and null graph – Isomorphism – Sub graphs.

4. Paths and Circuits:

   Walks, paths and circuits – Connected graphs, disconnected graphs and components – Euler graphs – Operations on graphs – More on Euler graphs - Hamiltonian paths and circuits.

5. Trees:

   Trees – Some properties of trees – Pendent vertices in a tree – Distance and centers in a tree – Rooted and binary trees – Counting trees - Spanning trees.

Text book:

Narasinga Deo: Graph Theory with Applications to Engineering and Computer Science, Prentice Hall of India Private Limited, New Delhi.

Relevant portions in Chapters 1, 2 and 3.

Note: 10 questions are to be set, with two questions from each unit. A candidate has to answer any 6 questions. All questions carry equal marks.

Semester - VI

Paper - XIX **B162 NR**

BMG 302 – b COMPLEX ANALYSIS – II

1. Integrals:

Definite integrals – Contours – Line integrals – Examples – The Cauchy Goursat's theorem – A preliminary lemma – Proof of Cauchy Goursat's theorem – Simply and multiply connected domains - Indefinite integrals.

2. The Cauchy integral formula - Derivatives of analytic functions - Morera's theorem - Maximum moduli of functions - The fundamental theorem of algebra.

3. Series:

Convergence of sequences and series - Taylor series - Observations and examples - Laurent series - Further properties of series.

4. Residues and Poles:

Singularities - Definitions and examples – Residues - The residue theorem - The principal part of a function – Poles - Quotient of analytic function.

5. Contour Integration:

Type – 1: $\int f(\sin \theta, \cos \theta)\, d\theta$

Type – 2: $\int f(x)\, dx$

Type – 3: $\int p(x) / q(x) (\cos(mx))\, dx$, $\int p(x) / q(x) (\sin(mx))\, dx$

Text book:

R.V.Churchil, Complex Variables and Applications.

Unit 1: Chapter 5 (Relevant portions)
Unit 2: Chapter 5 (Relevant portions)
Unit 3: Chapter 6
Unit 4: Chapter 7 (Relevant portions)
Unit 5: Chapter 7 (Relevant portions)

Note: 10 questions are to be set, with two questions from each unit. A candidate has to answer any 6 questions. All questions carry equal marks.

Semester - VI

Paper - XX **B163 NR**

BMG 303 - b MECHANICS – II: DYNAMICS

1. Kinematics:

   Velocity - Relative velocity – Acceleration - Angular velocity - Relative angular velocity - Rectilinear motion - Work, power and energy.

2. Central Orbit:

   Central forces and central orbit - Equations of a central orbit - Law of force and speed for a given orbit - Determination of the orbit when the law of force is given - Kepler's laws of planetary motion.

3. Motion of a Projectile under Gravity:

   Motion of a projectile - Nature of a trajectory - Results pertaining to the motion of a projectile - Maximum horizontal range - Trajectories with a given speed of projection and a given horizontal range - Speed of a projectile - Range of an inclined plane - Maximum range on the inclined plane - Envelope of the trajectories.

4. Simple Harmonic Motion and Moment of Inertia:

   Definition of simple harmonic motion - Composition of two simple harmonic motions of the same period.
   Moment of inertia - Theorems of moment of inertia - Theorem of perpendicular axes - Theorem of parallel axes.

5. Two Dimensional Motion of a Rigid Body:

   Two dimensional motion of a rigid body - Motion of a rigid body rotating about a fixed axis - Compound pendulum - Reaction of the axis on a rigid body revolving about a fixed axis - Equations of motion for a two dimensional motion - Motion of a uniform disk rolling down an inclined plane.

Text book:

P.Duraipandian, Laxmi Duraipandian and Muthamizh Jayapragasam, Mechanics, S.Chand and Company Ltd, New Delhi, 1997.
Unit 1: Chapters 1 and 4
Unit 2: Chapter 15
Unit 3: Chapter 13 (up to Section 13.9)
Unit 4: Chapter 5 (Sections 5.1 and 5.3 only) and Chapter 16
Unit 5: Chapter 17

Note: 10 questions are to be set, with two questions from each unit. A candidate has to answer any 6 questions. All questions carry equal marks.

Semester - VI

Paper - XXI **B164 NR**

BMG 304 – b OPERATIONS RESEARCH – II

1. Sequencing Problem:

   Problems with n jobs through 2 machines - Problems with n jobs through 3 machines - Problems with n jobs through m machines.

2. Dynamic Programming:

   Recursive approach – Computational procedure – Tabular method – Solution of LPP by dynamic programming.

3. Inventory Control:

   Deterministic Models:

(i) Uniform rate of demand, infinite rate of production, no shortages
(ii) Uniform rate of demand, finite rate of replenishment, no shortages
(iii) Uniform rate of demand, instantaneous production, with shortages
(iv) Uniform rate of demand, instantaneous production, with shortages and fixed time

4. Games and Strategies:

   Competitive games – Two person zero sum game – Maximin - Minimax principle – Saddle point – Solution using the principle of dominance - Graphical solution.

5. Simulation Technique:

   Introduction – Even type simulation – Generation of random phenomena – Monte Carlo technique - Simulation technique applied to inventory problems.

Text book:

Kanti Swarup, P.K.Gupta and Man Mohan, Operations Research, 1991.

Unit 1: Chapter 9 – Sections 9.1 to 9.6
Unit 2: Chapter 10 – Sections 10.1 to 10.5
Unit 3: Chapter 11 – Sections 11.2 to 11.5, 11.18
Unit 4: Relevant portions
Unit 5: Relevant portions

Note: 10 questions are to be set, with two questions from each unit. A candidate has to answer any 6 questions. All questions carry equal marks.

Semester - VI

Paper - XXII **B165 NR**

BMG 305 - b NUMERICAL ANALYSIS USING C

1. Numerical solution of algebraic and transcendental equations - Bolzono's bisection method - Successive approximation method – Regula falsi method – Newton-Raphson method - Numerical solution of simultaneous linear algebraic equations – Gauss elimination method - Gauss Jordan elimination method - Gauss Seidel iteration method.

2. Finite difference operator – Solution of first and second order linear difference equations with constant coefficients – Non-homogeneous linear difference equation with constant coefficients.

3. Interpolation - Newton-Gregory forward and backward interpolation – Newton's divided difference formula – Lagrange's interpolation formula for uneven intervals – Gauss interpolation formula - Numerical differentiation – Numerical integration – Trapezoidal rule – Simpson's $1/3^{rd}$ rule.

4. Numerical solution of ordinary differential equation of first and second order - Simultaneous equations – Taylor series method – Picard's method.

5. Euler's method – Improved Euler's method – Modified Euler's method – Runge-Kutta method of second and fourth order – Milne's predictor corrector method.

Text book:

M.K.Venkataraman, Numerical Methods in Science and Engineering, National Publishing Co, Chennai, 2001.

Unit 1: Chapters 3 and 4
Unit 2: Chapter 5
Unit 3: Chapters 6 and 9
Unit 4: Chapter 11 (Relevant portions)
Unit 5: Chapter 11 (Relevant portions)

Scheme of Examination:

Passing minimum: Theory: 30 marks out of 75.
Practical: 10 marks out of 25.

For the theory examination, 10 questions are to be set, with two questions from each unit. A candidate has to answer any 6 questions. All questions carry equal marks.

The practical examination to be conducted as an external examination by the University by appointing an examiner from the faculty of Mathematics department, involved in the teaching of the subject.

PONDICHERRY UNIVERSITY

SYLLABUS FOR B.Sc (PHYSICS)

For the student admitted from the academic year 2008-2009 onwards

SYLLABUS FOR B.Sc (PHYSICS)

(*For the student admitted from the academic year 2008-2009 onwards*)

PAPER DETAILS

SL NO	PAPER NO	PAPER TITLE	SEMESTER
1	PHYS 111	MECHANICS OF PARTICLES, RIGID BODIES AND CONTINUOUS MEDIA	I
2	PHYS 112	KINETIC THEORY AND THERMODYNAMICS	I
3	PHYS 121	OSCILLATIONS, WAVES AND ACOUSTICS	II
4	PHYS 122	QUANTUM MECHANICS	II
5	PHYS 120	PHYSICS PRACTICAL -I	II
6	PHYS 231	OPTICS	III
7	PHYS 232	ELECTRICITY	III
8	PHYS 241	MAGNATISM AND ELECTRO DYNAMICS	IV
9	PHYS 242	ELECTRONICS	IV
10	PHYS 240	PHYSICS PRACTICAL - II	IV
11	PHYS 351	STATISTICAL MECHANICS	V
12	PHYS 352	SOLID STATE PHYSICS	V
13	PHYS 353	LASER AND MOLECULAR SPECTROSCOP	V
14	PHYS 354	DIGITAL ELECTRONICS	V
15	PHYS 355	ASTROPHYSICS (OPTIONAL)	V
16	PHYS 361	ELECTROMAGNETIC WAVES AND RELATIVITY	VI
17	PHYS 362	ATOMIC PHYSICS	VI
18	PHYS 363	NUCLEAR PHYSICS	VI
19	PHYS 364	COMMUNICATION ELECTRONICS - II	VI
20	PHYS 365	NUMERICAL METHODS AND COMPUTER APPLICATIONS	VI
21	PHYS 350	PHYSICS PRACTICAL – III	VI
22	PHYS 360	PHYSICS PRACTICAL – IV	VI

SYLLABUS FOR B.Sc (PHYSICS)

(*For the student admitted from the academic year 2008-2009 onwards*)

I-SEMESTER

PHYS 111: MECHANICS OF PARTICLES, RIGID BODIES AND CONTINUOUS MEDIA

UNIT-1

Laws of motion: Laws of motion, Conservative forces and potential energy- Law of conservation of momentum and energy for a single particle- Angular velocity, angular momentum, and torque- Law of conservation of angular momentum for single particle- Rotating frame of reference- Centrifugal and Coriolis forces- Foucault pendulum.

System of particles. Equation of motion- Centre of mass- Conservation of momentum and angular momentum of system of particles- Rigid body- Degrees of freedom- Euler's theorem.

UNIT-II

Motion under central force: Motion under central force and conservation of angular momentum- Kepler's laws- Fields and potentials- Gravitational potential and field and potential due to spherical shell and uniform solid sphere of mass- Gravitational self energy- Self energy of a uniform solid sphere of mass- Elastic and inelastic collisions between two smooth spheres and between a smooth sphere and a solid surface (direct and oblique)- Determination of final velocities, impulse, and loss of KE- Two body problem- Reduced mass- Scattering and scattering cross sections- Rutherford scattering by hard sphere.

UNIT-III

Rigid body dynamics: Angular momentum of a rigid body- Moment of inertia tensor- Principal axes of inertia- Various types of tops- Euler's equation of motion for rotation- Precessional motion (qualitative) - Gyroscope.

Rotation of a rigid body about a fixed axis- Component of angular momentum and moment of inertia about a fixed axis- Parallel and perpendicular axes theorems- Moments of inertia (about various axes) of thin rod, circular disc, solid sphere, spherical shell, diatomic and triatomic molecules.

UNIT-IV

Continuous media: Elastic constants for an isotropic solid- Their inter-relation- Torsion of a cylinder- Bending of a beam- Cantilever.

Kinematics of moving fluids- Equation of continuity- Euler's equation- Bernoulli's theorem- Velocity of efflux- Venturimeter- Viscous fluids- Streamline and turbulent flow- Flow though a capillary tube- Reynold's number- Stokes law.

Surface tension and surface energy- Molecular interpretation- Pressure on a curved liquid surface.

TEXTBOOKS

1. D S Mathur, Mechanics, (S. Chand & Co.)
2. D S Mathur, Elements of properties of matter, (S.Chand & Co.)
3. M.Narayanamurthy et. al., Mechanics, (National Publishing House.)
4. P P Gupta, Hydrodynamics, (S. Chand & Co)

REFERENCE BOOKS

1. R G Takwale & PS Puranik, Introduction to Classical Mechanics, (Tata McGraw-Hill)
2. S L Gupta,V Kumar & H V Sharma, Classical Mechanics, (Pragati Prakashan, Meerut.)
3. N C Rana & P S Joag, Classical Mechanics, (Tata McGraw-Hill.)
4. F. Chorlton, Textbook of fluid dynamics, (CBS Publishers and Distributors.)

SYLLABUS FOR B.Sc (PHYSICS)

(*For the student admitted from the academic year 2008-2009 onwards*)

I-SEMESTER

PHYS 112: KINETIC THEORY AND THERMODYNAMICS

UNIT-I

Ideal gas: Review of the kinetic model of an ideal gas- interpretation of temperature- Equipartition of energy; specific heats of gases, Real gas: Van der Waal's model; equation of state, nature of Van der Waal's forces, critical constants- Transport Phenomena: mean free path, transport of momentum (viscosity), of energy (thermal conduction) and matter (diffusion)-

UNIT-II

Joule Thomson and adiabatic cooling: Joule Thomson expansion- constancy of U + PV- cooling in J-T expansion- adiabatic expansion of an ideal gas- principles of regenerative and cascade cooling- liquefaction of gases- Linde's method- Low temperatures: Production and measurement of very low temperatures.

UNIT-III

The laws of thermodynamics, Black body radiation: The zeroth law- indicator diagrams- work done- the first law- internal energy- Carnot cycle and its efficiency- Carnot's theorem- the second law. Entropy as a thermodynamic variable; reversible and irreversible processes. Principle of increase of entropy. Thermodynamic scale of temperature: its identity with perfect gas scale- impossibility of attaining the absolute zero (third law).

UNIT-IV

Thermodynamic relationships: Maxwell's equations- application to Clausius-Clapeyron equation and Joule-Thomson effect- Thermodynamic potentials- Relation to thermodynamic variables- equilibrium in thermodynamic systems- simple applications.

Temperature & radiation- Stephen-Boltzmann law- spectral distribution- Wien's displacement law. Rayleigh-Jeans law and the ultraviolet catastrophe- Planck's hypothesis- mean energy of an oscillator and Planck's law.

TEXT BOOKS

1. Brijlal and Subramanian, Heat and thermodynamics, (S.Chand & Co)
2. Mathur, Heat and thermodynamics, (S.Chand & Co).
3. J B.Rajam and CL.Arrora, A Textbook of Heat and thermodynamics, (S.Chand & Co)
4. A.B.Gupta and H.Roy, Thermal Physics, (Allied Books, New Delhi)

REFERENCE BOOKS

1. D P Khandelwal and A K Pande, Thermodynamics and Statistical Physics (Himalaya Publication House, Bombay)
2. C Kittel and H Kroemer, Thermal Physics, (CBS Publishers, Delhi)
3. M W Zemanasky, Heat and Thermodynamics, (McGraw-Hill)

SYLLABUS FOR B.Sc (PHYSICS)

(*For the student admitted from the academic year 2008-2009 onwards*)

II-SEMESTER

PHYS 121: OSCILLATIONS, WAVES AND ACOUSTICS

UNIT- I

Free, damped and forced oscillations: Equilibrium- concept of potential well- small oscillations about stable equilibrium- differential equation of SHM- solutions- simple pendulum- compound pendulum- loaded spring- loaded cantilever- linear and transverse oscillations of a mass between two springs- diatomic molecule.

Damped oscillations- critical damping- Q of an oscillator- Forced oscillator with one degree of freedom- transient and steady state oscillations- resonance energy absorption- and low and high frequency responses.

UNIT-II

Free oscillations of system with two degrees of freedom, Fourier analysis: Two dimensional oscillator - normal modes- Fourier series and Fourier coefficients- simple examples- expression for Fourier coefficients.

UNIT- III

Waves in continuous media: Speed of transverse waves on a uniform string- characteristic impedance to transverse waves by a string- boundary conditions and normal modes in a string- speed of longitudinal waves in a fluid- velocity of sound in air- dependence on pressure and temperature- normal mode vibrations of air columns.

Energy density and energy transmission in waves- dispersion in waves- group velocity and phase velocity.

Linear homogeneous equations and the superposition principle: interference- beat combination-tones.

UNIT-IV

Applied acoustics: Transducer and their characteristics- acoustics of halls- reverberation period- Sabines formula**.**

Ultrasonics: generation of ultrasonic waves- piezoelectric and magnetostriction methods- detection- medicinal and industrial applications of ultrasonic waves.

TEXT BOOKS

1. Bajaj, Waves and oscillations (Tata McGraw Hill)
2. D P Khandelwal, Oscillations and Waves (Himalaya Publishing House, Bombay)
3. R.Murugeshan, Sound, (S.Chand & Co).
4. M.Ghosh, A Text Book- of Sound (S.Chand & Co).

REFERENCE BOOKS

1. I G Main, Vibrations and Waves (Cambridge University Press)
2. H J Pain, The Physics of Vibration and Waves (Wiley ELBS, 1976)
3. R K Ghosh, The Mathematics of waves and vibrations (Macmillan, 1975)
4. A P French, Oscillations and waves (MIT Introductory Physics Series).
5. S.P. Puri, Vibrations and Waves (Tata McGraw - Hill).

SYLLABUS FOR B.Sc (PHYSICS)

(*For the student admitted from the academic year 2008-2009 onwards*)

II-SEMESTER

PHYS 122: QUANTUM MECHANICS

UNIT-I

Wave Mechanical Concepts: Rise and fall of Planck-Bohr quantum theory, Duality of radiation and matter, de Broglie's hypothesis, justification for the relation $\lambda = h/p$, experimental confirmation. Phase and group velocities of a wave; formation of a wave packet, illustrations. Uncertainty principle relating to position and momentum, relating to energy and time. Double slit experiment.

UNIT-II

Schrodinger equation : Einstein de-Broglie relations as a link between particle and wave properties, general equation of wave propagation, propagation of matter waves, time dependent and time independent Schrodinger equations, physical meaning of ψ, conditions to be satisfied by ψ. Postulatory approach to wave mechanics, operators, observables and measurements.

UNIT-III

Simple one-dimensional problems: Particle in a box with rigid walls, concept of a potential well, wave functions and, energies for the ground and excited states; quantization of energy. One dimensional harmonic oscillator, zero-point energy.

Other one-dimensional problems; step potentials, penetration through rectangular barrier, transmission coefficients, quantum mechanical tunneling.

UNIT -IV

Operator method: Operators, Eigenvalues and Eigenfunctions; linear operators, product of two operators, commuting and non commuting operators, simultaneous eigenfunctions, orthogonal functions. Hermitian operators, their eigenvalues and eigenfunctions, expectation values of an operator.

Application of operator methods; simple harmonic oscillator, step-up and step-down operators, eigen functions and eigen values of the ground state and excited states; Probability density and its variation with degree of excitation(qualitative).

TEXTBOOKS

1. V. Devanathan, Quantum Mechanics (Narosa Publishing House).
2. R.K.Srivastava, Quantum Mechanics (Prentice Hall of India, 2007)
3. S.P.Khare, Modem Physics (Rastogi Publications)
4. G.S.Chaddha, Quantum Mechanics (New Age Int. Pub.)
5. P.M. Mathews and K.Venkatesan, A Text Book of Quantum Mechanics (Tata McGraw Hill).
6. Aruldhas, Quantum Mechanics (Prentice Hall of India, 2006)

REFERENCE BOOKS

1. Leonard I Schiff, Quantum Mechanics (McGraw Hill Int. Edition)
2. Ghatak & Lokanathan, Quantum Mechanics: theory and application (Macmillan)
3. J.J.Sakurai, Modern Quantum Theory Rev.ed. (Addision Wesley Pub. Co.)
4. P.T.Mathews, Quantum Mechanics (McGraw Hill).
5. W. Greiner, Quantum Mechanics (Springer Verlag).

SYLLABUS FOR B.Sc (PHYSICS)

(*For the student admitted from the academic year 2008-2009 onwards*)

II-SEMESTER

PHYS 120: PHYSICS PRACTICAL -I

Choose any 16 experiments from the list given below

LIST OF EXPERIMENTS

1. Compound pendulum - determination of g, radius of gyration and moment of inertia
2. Young's modulus - non-uniform bending - pin & microscope.
3. Young's modulus - cantilever - pin & microscope.
4. Surface tension of a liquid and interfacial surface tension between water and kerosene by the method of drops.
5. Rigidity modulus - torsional oscillations without masses.
6. Specific heat capacity of a liquid and emissivity of a surface - method of cooling.
7. Thermal conductivity of a bad conductor- Lee's disc method.
8. Sonometer - determination of frequency and verification of laws of transverse vibrations.
9. Melde's apparatus - determination of frequency.
10. Spectrometer- refractive index of a liquid - hollow prism.
11. Spectrometer - calibration of a grating - minimum deviation method.
12. P.O. box - resistivity and verification of laws of resistance.
13. P.O. box - temperature coefficient of the material of a coil of wire.
14. Potentiometer - calibration of low range voltmeter (0 - 1.5 V).
15. Potentiometer - calibration of ammeter (0-1.5 amps).
16. Oscillations on a bifilar suspension
17. Y - Searle's method for determining Y, n and η of a material.
18. Variation of period of oscillations of a spring (or rubber band) with mass and spring constant
19. Jolly's constant volume air thermometer - determination of melting point of wax
20. Study of characteristics of a thermistor
21. Emf of thermocouple using digital thermometer
22. Kater's pendulum - determination of acceleration due to gravity at a place
23. Stoke's method of viscosity determination
24. Terminal velocity for bodies falling through a fluid
25. Study of laws of parallel and perpendicular axes fir estimation of moment of inertia
26. Computer simulation of spherical body falling in a viscous liquid.
27. Computer simulation of damped oscillator.
28. Computer simulation of analyzing a square wave-form for its harmonic components.
29. Computer simulation of Generation of phase space plots of simple harmonic oscillator
30. Computer simulation of motion of a single pulse.
31. Computer simulation of motion of equation of motion for a system of particles
32. Computer simulation of motion of molecular rotations as rigid bodies.
33. Computer simulation of motion of Study of coupled oscillators.

TEXTBOOKS

1. D P Khandelwal, Laboratory Manual of Physics for UG classes (Vani Pub. House, New Delhi)
2. B Saraf et al, Physics through Experiments, Vol. 1, Mechanical Systems, (Vikas Publication House. New Delhi)
3. Verma, Ahluwalia, Sharma, Computational Physics, an Introduction (New Age Int. (P) Ltd.)

REFERENCE BOOK

1. V Y Rajopadhye and V L Purohit, Text book of experimental Physics

SYLLABUS FOR B.Sc (PHYSICS)

(*For the student admitted from the academic year 2008-2009 onwards*)

III-SEMESTER

PHYS 231: OPTICS

UNIT-I

Ray optics: Fermat's principle and its applications: Principle of extremum path, proof of laws of reflection and refraction, paraxial approximation, matrix method in paraxial optic, ABCD law, ray equation and its solutions

UNIT-II

Reflection and refraction*:* Snell's law of reflection and refraction, Fresnel's law of reflection and refraction (amplitude and phase), reflection and refraction at spherical surfaces: formula for refraction at single spherical surface, sign convention. Thick lenses: matrix methods in paraxial optics, basic ideas of unit planes and nodal planes, cardinal points of an optical system; general relationships, combination of thin lenses.

Aberration in images: chromatic aberrations; achromatic combination of lenses in contact and separated lenses; Monochromatic aberrations and their reduction.

UNIT-III

Electromagnetic optics: Representation of electromagnetic waves, wave vector and direction of propagation, concept of plane polarized wave and its equation.

UNIT-IV

Interference and diffraction: Interference of light, two beam interference by division of wave front. Haidinger fringes, Newton's rings. Michelson interferometer; its uses for determination of wavelength, concept of coherence using Michelson interferometer; temporal and spatial coherence. Multiple beam interference, interference due to two plane parallel system. Fabry-Perot interferometer, concept of finesse.

Fresnel diffraction: Half-period zones, zone plate, Fresnel diffraction at straight edge, explanation of rectilinear propagation, Fresnel diffraction at a circular aperture, Fresnel diffraction at a circular disc.

Fraunhofer diffraction: Diffraction at a single slit, a circular aperture and a circular disc; Resolution of images; Rayleigh criterion, resolving power of a telescope and a microscope, outline (no derivations) of phase contrast microscopy. Diffraction grating: Diffraction at double and N parallel slits; plane diffraction grating, resolving power of gratings and prisms.

Double refraction, interference of polarized light, phase retardation plates (quarter and half wave plates).

TEXTBOOKS

1. Ajoy Ghatak, Optics, (Tata McGraw Hill)
2. Ajoy Ghatak, Introduction to Modern Optics (Tata McGraw Hill)
3. Brijilal and Subramanian, Optics ((S.Chand & Co).
4. S.L. Kakani and H.C. Bhandrai, Optics (S.Chand & Co)
5. Jenkins and White, "Fundamentals of Optics" (McGraw-Hill)

REFERENCE BOOKS

1. F G Smith and J H Thomson, "Manchester Physics Series: Optics" (English Language Book Society and John Wiley and Sons Ltd. London, 1977)
2. K D Meller, "Optics" (Oxford University Press)
3. Smith and Thomson, "Optics" (John Wiley and Sons, 1980)
4. R S Longhurst, "Geometrical and Physical Optics" (Longmans, 1966)
5. A.N.Matveev, "Optics" (Mir Publishers 1988)
6. Jurger R. Meyer -Arednt " Introduction to Classical and Modern Optics" (Prentice Hall)

SYLLABUS FOR B.Sc (PHYSICS)

(*For the student admitted from the academic year 2008-2009 onwards*)

III-SEMESTER

PHYS 232: ELECTRICITY

(Note: *Vector language is to be used all through)*

UNIT-I

Electric field: Coulomb's law, Unit of charge (SI and other systems of unit). Conservation and quantization of charge. Field due to different charge distributions. Monopole, dipole, quadrupole, line charge, sheet charge. Torque on dipole in uniform field and non-uniform fields.

Flux of an electric field. Gauss's theorem. Application to deduce E fields. Force per unit area on the surface of a charged conductor.

UNIT-II

Potential: Line integral of electric field and electric potential. Field as the gradient of potential. Potential and field due to spherical shell charge distribution and uniform spherical volume charge distribution. Potential energy (self energy) of a system of charges. Self energy of a spherical volume charge distribution. Energy associated with E field. Differential form of Gauss's law. Poisson's equation. Laplace's equation. Boundary conditions, and Uniqueness theorem.

Electric field around conductors. Induced charges. Field and potential inside a conductor. Field near the surface of a conductor. Method of images.

UNIT-III

Electric fields in matter*:* Atomic and molecular dipoles. Induced dipoles. Polarizability tensor. Electronic and molecular contributions. Electrical field caused by polarized matter. E and D fields. Permittivity, dielectric constant. Capacitor filled with dielectric. Field equations in presence of dielectric. The field of a polarized sphere. Dielectric sphere in a uniform field. Energy in dielectric systems. Polarizability and susceptibility. Frequency dependence of polarizability. Claussius-Massotti equation.

UNIT-IV

Electric current: Current density and current. Non-steady currents and continuity equation. Kirchoffs laws. Network theorems and their applications. Non-Ohmic circuitry, thermistor.

Varying current: Rise and decay of currents in LR, CR circuits and LCR circuits - resonance. Time constant. Integrating and differentiating circuits.

TEXTBOOKS

1. K K Tewari, Electricity and Magnetism (S Chand and Co.)
2. Brijlal and Subramaniam, Electricity and Magnetism (S Chand and Co.)
3. D N Vasudeva, Electricity and Magnetism (S Chand and Co.)
4. S. Mahajan and A. A. Rangawala, Electricity and Magnetism, (Tata Me Graw - Hill)
5. Khare and Srivastava, Electricity and Magnetism, (Atmaram and sons, New Delhi.)

REFERENCE BOOKS

1. S Mahajan & A A Ranganwala, Electricity and Magnetism, (Tata McGraw-Hill)
2. Reitz & Millford, Electricity and Magnetism (Addison - Wesley)
3. Nelkon and Parker, Advanced level physics (Heinemann Educational, London)
4. Halliday, Resnick, Walker: Fundamentals of Physics, 7th Edition (John Wiley & Sons Inc.)
5. Pugh and Pugh, Principles of Electricity and Magnetism, (Addison - Wesley)

SYLLABUS FOR B.Sc (PHYSICS)

(*For the student admitted from the academic year 2008-2009 onwards*)

IV-SEMESTER

PHYS 241: MAGNATISM AND ELECTRO DYNAMICS

(Note: *Vector language is to be used all through*)

UNIT-I

Magnetic field: Magnetic field B seen through Lorentz force on a moving charge, unit for B defined through force on a straight current, torque on a current loop in B field, magnetic dipoles in atoms and molecules.

Magnetic field due to currents, Biot and Savart's law. Field equations in magnetostatics. Ampere's law. Fields due to a straight wire, magnetic dipole, circular current and solenoid. Magnetic fields in matter: Magnetizing current, magnetization vector, Hand B fields, magnetic permeability, susceptibility. Comparison of magnetostatics and electrostatics. Relation connecting (E, D) and relation connecting (B, H).

UNIT-II

Electromagnetic Induction, vector and scalar potentials: Faraday's law for electromagnetic induction: Faraday's law in integral and differential forms; self-inductance of a solenoid and of a straight conductor, energy stored in an inductor and in the magnetic field. Displacement current; modified Ampere's law.

Electromagnetic potentials: Magnetic vector potential A and scalar potential <D. Gauge transformations and gauge invariance of potentials, Poisson's equation for A in terms of current density.

UNIT-III

Alternating currents: Skin effect for resistance at high frequencies', complex impedance, reactance, impedances of LCR series and parallel circuits, resonance, Q-factor, power dissipation and power factor. AC bridges; Anderson's and Owens bridges.

Generators: Three-phase electrical power supply, delta and star connections

UNIT-IV

Motion of charged particles in E and B fields: Case of cathode ray oscillograph, positive ray parabola, velocity selector, magnetic focusing, principle of mass spectrograph.

TEXTBOOKS

1. K.K.Tewari, Electricity and Magnetism (S.Chand & Co).
2. Murugeshan, Electricity and Magnetism (S.Chand & Co).
3. S.L.Guptha, S.P. Singh, V. Kumar Electrodynamics (Pragati Prakasan).
4. A S Mahajan and A A Rangawala, Electricity and Magnetism (Tata McGraw-Hill
5. D.J. Griffiths; Introduction to Electrodynamics (Prentice-Hall of India 1989)

REFERENCE BOOKS

1. Pugh and Pugh, Principles of Electricity and Magnetism (Addison-Wesley)
2. Panofsky and Phillips, Classical Electricity and Magnetism (India Book Co.)
3. S S Atwood, Electricity and Magnetism (Dover publication)
4. Reitz and Milford, Introduction to Electrodynamics (Addison-Wesley)
5. J.B. Marion, Classical electromagnetic radiation, (Academic Press)

SYLLABUS FOR B.Sc (PHYSICS)

(*For the student admitted from the academic year 2008-2009 onwards*)

IV-SEMESTER

PHYS 242: ELECTRONICS

UNIT-I

Junction diode, special diodes, and their general uses*:* Classification of Conductors, insulators and semi-conductors on the basis of energy band diagram - Intrinsic and extrinsic semiconductors. P- type and N-type semi-conductors. Formation of PN junction diode - Forward and reverse characteristics - Diode resistance - Effect of temperature on extrinsic semiconductors, Half wave, Centre tap and Bridge rectifiers, Expression for average dc voltages, qualitative ideas of filters, clipping and clamping circuits - their general applications.

Zener diode - Volt- ampere characteristics - Avalanche and Zener breakdown mechanisms - Zener voltage. Simple voltage regulator circuit using zener diode. LED, Photodiode.

UNIT-II

Bipolar junction transistors, biasing and hybrid parameters: Construction of NPN and PNP transistors - their operation modes - operation of NPN and PNP transistors - CB, CE and CC configurations and their biasing, Input, Output and transfer characteristics of BJTs in CB and CE modes - Active, saturation and cut-off regions - Bias stability - Load line analysis - operating point.

The need of transistor biasing for faithful amplifications. Variations of transistor parameters - stability factor and stabilization - Thermal runaway - Methods of transistor biasing - Base bias - Base bias with emitter feedback - Base bias with collector feed-back - Voltage divider bias, h-parameters of a transistor and their notations - hybrid equivalent circuits for CE, CB and CC mode transistors. Single stage RC coupled amplifier, calculation of mid frequency gain using h-parameters, frequency response curve (qualitative).

UNIT-III

JFETS and MOSFETS: Construction of n-channel and p-channel JFETs - operation of n-channel JFET - Drain characteristics of n-channel JFET - Transfer characteristics - parameters of JFET - comparison between BJT and JFET. JFET biasing circuits. MOSFETS, characteristics and parameters.

UNIT-IV

Operational amplifiers and oscillators: Principles of operational amplifiers, offset parameters, differential gain, CMRR, applications of op-amp: as inverting and non-inverting amplifiers, summing amplifier, difference amplifier, differentiator, integrator, and comparator.

Concept of feedback mechanism, oscillators, Barkhausen criterion, RC oscillators (Wein bridge & Phase shift), Multivibrators.

TEXTBOOKS

1. R.S. Sedha, A textbook of applied electronics, 2005 (S. Chand & Co.,)
2. V.K. Metha, Principles of electronics, 2005 (S. Chand & Co.,)
3. Millmann & Halkias, Integrated Electronics (Tata Me Graw Hill.)
4. M.K.Bagde, S.P. Singh, Element of Electronics (S.Chand & Co.)
5. D.Chathopadhyay & Rakshit, Electronic Fundamental and Applications (New Age International)
6. S. Salivahanan and N. Suresh Kumar, Electronic devices and electronic circuits, 2004 (TMH)
7. Malvino, Electronic principles, 6th Edition (TMH).

REFERENCE BOOKS

1. B.L. Theraja, Basic Electronics, 2005 (S. Chand & Co.,)
2. G. Nagarajan, Electronic devices, 2005 (Lakshmi Publications)
3. U.A. Bakshi and A.P. Godso, Electron devices, 2005 (Technical Publications, Pune).
4. Millman and Halkias,Electronic devices and Circuits, (Mc Graw Hill)
5. Horowitz and Hill, Art of Electronics (Cambridge University Press).

SYLLABUS FOR B.Sc (PHYSICS)

(*For the student admitted from the academic year 2008-2009 onwards*)

IV-SEMESTER

PHYS 240: PHYSICS PRACTICAL - II

Choose any 18 experiments from the list given below

LIST OF EXPERIMENTS.

1. Young's modulus - Uniform bending - scale & telescope
2. Young's modulus - Koenig's method.
3. Rigidity modulus - Torsional pendulum with masses.
4. Rigidity modulus - Static torsion.
5. Specific latent heat of fusion of ice.
6. Specific Heat capacity of a liquid - Joule's calorimeter.
7. Spectrometer- determination of wavelength - Minimum deviation method.
8. Spectrometer calibration of grating- Normal incidence method.
9. Spectrometer - i-d curve.
10. M and B_H using deflection and vibration magnetometer.
11. Field along the axis of the circular coil carrying current and determination of B.
12. Carry-Foster's bridge - Resistivity of the material of the coil of wire.
13. Carry-Foster's bridge-'Temperature co-efficient of the material of a wire.
14. Potentiometer - Internal resistance of a cell.
15. Potentiometer -Calibration of high range voltmeter.
16. Figure of merit of a periodic moving coil galvanometer.
17. B.G- Comparison of emf of two cells.
18. B.G. - Comparison of capacities.
19. Melde's string-Specific gravity of a solid and liquid.
20. Determining the focal length of a high power microscope objective.
21. Study of interference fringes in a bi-prism arrangement
22. Study of polarization of light by simple reflection.
23. Study of optical rotation by solutions.
24. Study of the rise and decay of current in a RC circuit
25. Study of the rise and decay of current in a RL circuits
26. Study of the impedance of an inductor at varying frequencies to measure R and L
27. Study of the impedance of a capacitor of varying frequencies to measure C.
28. Computer simulation of effect of magnetic field on charged particles
29. Computer simulation circuit analysis using Kirchhoff’s laws.
30. Computer simulation of double slit interference
31. Computer simulation of propagation of electromagnetic waves.

TEXTBOOKS

1. D P Khandelwal, A Laboratory Manual in Physics for Undergraduate Students (Vani Publication, New Delhi)
2. B Saraf et al. "Physics through Experiments, Vol. II., EMF constant and varying, (Vika Publications, New Delhi)
3. V Y Rajopadhye and V L Purohit, Text book of experimental Physics
4. Verma, Ahluwalia, Sharma, Computational Physics, an Introduction (New Age Int. (P) Ltd.)

REFERENCE BOOKS

1. Olon, "Experiments in Modern Physics"
2. Adrian C. & Melissinos, Experiments in Modern Physics (Academic Press).

SYLLABUS FOR B.Sc (PHYSICS)

(*For the student admitted from the academic year 2008-2009 onwards*)

V-SEMESTER

PHYS 351: STATISTICAL MECHANICS

Unit -I

Basic Concepts: Definition of system-Microstates and microscopic physical quantities, macrostates and macroscopic physical quantities-phase space- p-space and T-space and their properties. Isolated system - Postulates of statistical Mechanics. Number of microstates and thermodynamic entropy.

Unit- II

Classical Statistics: Introduction, Classical Maxwell-Boltzmann distribution law, MB distribution for molecules of more than one kind, Evaluation of Lagrange multipliers a and p, application of MB distribution, most probable, average and RMS velocities, calculation of internal energy , calculation of Cv and Cp. Principle and proof of law of equipartition of energy, calculation of gas pressure, entopy of an ideal gas. Limitations of MB distribution.

Unit- III

Quantum Statistics: Transition from classical to quantum statistics. Indistinguishability and quantum statistics, Quantization of energy - volume of a cell in phase space (quantum description). Calculation of accessible states for free particles in one and three dimensions (quantum approach). Energy states and mean energy of a quantum oscillator. Indistinguishabilty of particles in a system- Bose Einstein energy distribution law (derivation). Evaluation of the constant e^{u} , Pauli's exclusion principle- Fermi - Dirac energy distribution law (derivation).

Unit- IV

Applications of Quantum Statistics: BE Statistics: Calculation of energy and pressure of a gas, Degeneracy of molecular hydrogen and helium, BE condensation, Black body radiation. FD Statistics: Calculation of energy and pressure of a gas, slight and strong degeneracy, thermodynamic function of degenerate Fermi gas. Free electron gas. Comparison MB, BE and FD statistics.

TEXTBOOKS:

1. B.B.Laud, Statistical Mechanics, (New Age International Publishers.)
2. Sharma and Sarkar, Thermodynamics and Statistical Physics, (Himalaya Pub. House)
3. Gupta and Kumar, Statistical Mechanics, (Pragati Prkashan).
4. Mrugeshan, Modern Physics, (S.Chand & Co.)
5. Arthur Beiser, Concepts of Modern Physics (TMH)

REFERENCE BOOKS:

1. F.Reif, Statistical Physics, Berkeley Physics Course -Volume 5.
2. K.Huang, Statistical Mechanics, (Wiley Eastern.)
3. Saha and Srivastava, A treatise on Heat, (The Indian Press, Allahabad.)
4. Ritchtmyer , Kennard,Cooper, Introduction to Modern Physics (Tata McGraw Hill.)
5. A.N.Matveev, Molecular Physics (Mir Publishers.)

SYLLABUS FOR B.Sc (PHYSICS)

(*For the student admitted from the academic year 2008-2009 onwards*)

V-SEMESTER

PHYS 352: SOLID STATE PHYSICS

UNIT-I

Basics of Crystallography*:* Crystal geometry: Crystal lattice; crystal planes and Miller indices, unit cells. Typical crystal structures; coordination number, packing fraction. Symmetry elements; rotation, inversion and reflection, basics of point groups and crystal classes, space groups, reciprocal lattice Crystallography: Diffraction of X-rays by a crystal lattice. Laue's formulation of X-ray diffraction, Laue spots rotating crystal.

UNIT-II

Lattice Vibrations: Types of bonding in solids: Covalent, Ionic, metallic and Van der Waals bonding, hydrogen bond. Lattice Vibrations: Elastic and atomic force constants; Dynamics of a chain of atoms, chain of two types of atoms, optical and acoustic modes, interaction of light with ionic crystals. Einstein's and Debye's theories of specific heats of solids.

UNIT-III

Electrical Conduction in Solids: Conduction in metals: Drude's theory, DC conductivity, Hall effect and magneto resistance, AC conductivity, plasma frequency, thermal conductivity of metals, Fermi-Dirac distribution, thermal properties of free-electron gas. Conduction in semiconductor: Bands in solids; metals, insulators and semiconductor - electrons and holes - effective mass, donor and acceptor impurity levels.

UNIT -IV

Magnetic Properties of Solids: Magnetism: Diamagnetism, Paramagnetism due to free ions and conduction electron Curie's law, ferromagnetism, domains, hysterisis loop, outline of antiferro- and ferrimagnetism, ferrites. Superconductivity: Zero resistivity; critical temperature, critical B field. Meissner effect Type I and Type II superconductors, specific heat and thermal conductivity.

TEXTBOOKS

1. C Kittel, Introduction to Solid State Physics (Wiley Eastern , Ed., 1976)
2. S.O. Pillai, Solid State Physics (New Age International Ltd, New Delhi).
3. J.P.Srivastava, Elements of Solid State Physics, 2nd Ed.(PHI, 2007)
4. J S Blackmore, Solid State Physics (Cambridge University Press, 1985)
5. L. V. Azaroff, Introduction to Solids, Tata McGraw Hill, 1987)
6. Saxena, Gupta and Saxena, Fundamentals of Solid State Physics, 12th Ed. (Pragathi Prakasan).

REFERENCE BOOKS

1. Mermin and Ashcroft, Solid State Physics (New York, Holt, Rinehart and Winston)
2. W A Harrison, Electronic structure and the properties of solids (Freeman, 1980)
3. J P McKelvey, Solid state and semiconductors physics (Krieger, 1982)
4. H M Bosenberg, The Solid State" (Oxford University press, 1979)
5. S L Altmann, "Band Theory of Metals, The Elements" (Pergamon Press, 1970)
6. A J Dekker, Solid State Physics (Prentice-Hall, 1957)

SYLLABUS FOR B.Sc (PHYSICS)

(*For the student admitted from the academic year 2008-2009 onwards*)

V-SEMESTER

PHYS 353: LASER AND MOLECULAR SPECTROSCOPY

UNIT-I

Laser System, Types and Applications: Origin of spectral width, Schalow-Townes limit, Purity of a spectral line; Coherence: spatial and temporal, Einstein's A and B coefficients; Conditions for laser action; existence of a metastable state, population inversion by pumping and cavity resonance condition.

Ruby Laser, He-Ne Laser, Dye laser; Applications of lasers: Laser communication, Medical applications and Material processing. Elementary idea of second harmonic generation.

UNIT- II

Spectroscopic Methods: Emission spectroscopy: Emission source, prism and grating spectrographs, constant deviation systems, monochromators. Absorption spectroscopy: Continuum source for absorption studies, single-beam and double beam IR spectrometers.

UNIT-III

Rotation and Vibration of Molecules: Classification of molecules as various tops, Rotational energy levels of diatomic molecules(no derivation), internuclear distance. Pure rotation spectra; selection rules, isotope effects on rotational energies. Vibrational energy levels, force constants, anharmonicity, dissociation energy, Spectra of diatomic molecules: Vibration-rotation spectra; selection rules, P, Q.
and R branches.

UNIT -IV

Electronic levels, Raman Effect: Sharing of electrons; formation of molecular orbitals, molecular orbitals in H^+ ion, MO theory of H_2 molecule, diatomic molecular orbitals, molecular orbital energy level diagram. Electronic band systems, sequences and progressions, Franck-Condon principle. Raman effect: Stokes and anti-Stokes lines, quantum theory of Raman effect, selection rules in Raman and IR spectra.

TEXTBOOKS

1. C.N. Banwell, Fundamentals of molecular spectroscopy, (Tata-Mc-Graw Hill)
2. G Aruldhas, Molecular Structure & Spectroscopy, (Prentice-Hall of India)
3. Walker and Straughan; Spectroscopy, Vol 1, II, III (Wiely)
4. M.N.Avadhanulu, An Introduction to Lasers (S.Chand and Co)

REFERENCE BOOKS

1. B B Laud; Lasers and Non-linear Optics, (Wiley Eastern, 1985)
2. G Herzberg; "Molecular spectra and Molecular structure, (prentice Hall, New York)
3. R C Johnson; An Introduction to Molecular spectra (Methuen).

SYLLABUS FOR B.Sc (PHYSICS)

(*For the student admitted from the academic year 2008-2009 onwards*)

V-SEMESTER

PHYS 354: DIGITAL ELECTRONICS

UNIT-I

Digital Principles: Number system, binary arithmetic, Basic gates and universal gate operations. Boolean algebraic theorems and properties - Karnaugh map: two and four variable map, POS and SOP simplification, NAND and NOR implementation, don't care condition, Logic families: characteristics and parameters. TTL gates, TTL open collector gates Three state devices, CMOS gates, TTL - CMOS interface. Combinational logic design: parity checker, half and full adders, demultiplexer, multiplexer, decoders, encoders, PAL

UNIT-II

Flip Flops and Counters: RS flip-flops, clocked RS flip-flop, edge-triggering. JK flip-flop, D-type flip-flop, JK master slave flip-flop design procedure; serial-in-serial out. serial-in-parallel out shift registers asynchronous counters ; decade counter (Mod 10 counter); design counters. NE 555 counter inastable mode.

UNIT-III

A/D, D/A Converters: Principle of variable network and binary ladder type: four bit D/A converter, A/D converter, counter method and successive approximation, resolution and accuracy of D/A and A/D converter; frequency counters and digital voltmeters.

UNIT -IV

Microprocessors: Components of a microprocessor system, Architechture of 8085, Addressing modes, instruction set. pin configuration, stack operation, memory stack and cascade stack, assembly language programming of Intel 8085. Software programmes involving addition and subtraction. Simple i/o operations using 8255 ports. Elementary introduction to 16 bit processor

TEXTBOOKS

1. Malvino & Leach, Digital Principles and Applications (Tata McGraw Hill)
2. R.P Jain, Modem Digital Electronics, (Tata McGraw-Hill. New Delhi)
3. Morris Mano.M, Digital logic and computer design, (Prentice Hall of India)
4. Ramesh S. Gaonkar, Microprocessor Architecture, Programming, and Applications with the 8085 (Prentice Hall)

REFERENCE BOOKS

1. Milliman & Halkias, Integrated Electronics (Tata McGraw-Hill)
2. Floyd L. Thomas; "Digital fundamentals" (Universal Book stall.)
3. Jacob Millman, Microelectronics, (McGraw Hill)
4. Badri Ram, Fundamentals of Microprocessors and microcomputers, (Dhanpat Rai Publication)

SYLLABUS FOR B.Sc (PHYSICS)

(*For the student admitted from the academic year 2008-2009 onwards*)

V-SEMESTER

PHYS 355: ASTROPHYSICS (OPTIONAL)

UNIT-I

Radiointerferometry: Radiogalaxie - characteristics and classification - Radiointerferometry - quarsers - radio and optical properties of quarsers - red shift of quarters.

Basics of orbiting telescope, Hubble space telescope, Focault's experiment, Van Allenbelts, Aurora.

UNIT-II

Astronomical Objects: Red giants, Heavy element synthesis, white dwarfs - Chandrasekar's mass limit, rotating black holes, Shwarzchild radius.

Tidal and Planetesimal theories - Kupier's proto-planet theory, Hertzsprung-Russel diagram applications, outline of Saha's ionization theory.

UNIT-III

Solar system: Structure of photosphere, chromosphere, corona and their characteristics - Mechanism of energy production in the Sun, Solar prominences, spicules and plages.

Steady state theory, evidence in favour of Big-bang theory - Future of the Universe, pulsating theory standard model, inflation.

UNIT -IV

Applications: Bio-astronomy. Habitable planets - project SETI and other search for extra terrestrial civilizations - UFO phenomenon.

Rocket equation, thrust and acceleration, space shuttles. Theory of Geosynchronous satellite, Trajectory adjustments, Launch site tracking, radio telemetry, space probes.

TEXTBOOKS

1. Baidyanathan Basu, An Introduction to Astrophysics (Prentice Hall of India)
2. K.D.Abhyankar, Astrophysics -Stars and Galaxies (University Press India)
3. J.V.Narlikar, Introduction to Cosmology (Cambridge University Press, UK).

REFERENCE BOOKS

1. Ion Nicolson, Unfolding our Universe (Cambridge University Press)
2. D.D. Clayton, Principles of Stellar Evolution and Nucleosynthesis, (McGraw Hill, NewYork)
3. Robert Dixen, Dynamic Astronomy (Prentice Hall International)

SYLLABUS FOR B.Sc (PHYSICS)

(*For the student admitted from the academic year 2008-2009 onwards*)

VI-SEMESTER

PHYS 361: ELECTROMAGNETIC WAVES AND RELATIVITY

UNIT-I

Maxwell's equations and electromagnetic waves: Maxwell's equations in Integral and differential forms. Plane-wave solution for Maxwell's equation; speed of waves and refractive index of a medium, Orthogonality of E, B and propagation vector, Characteristic impedance, POynting vector; energy of propagation. Reflection and transmission at dielectric boundaries, normal incidence, oblique incidence, polarization by reflection, Brewster's angle. Electromagnetic waves in conductors: Modified field equation; attenuation of the wave, penetration depth, reflection and transmission at dielectric- conductor boundary at normal incidence.

UNIT-II

Electromagnetic Radiation: Radiation of oscillating dipole: Concept of retarded potentials, Fields of oscillating dipole, fields in the radiation zone and their polarization. Radiation from accelerated charges: Lienard and Wiechert potentials. *E* and *B* fields of a moving charge (qualitative discussion of final expressions, no derivation), the generalized Coulomb field, velocity and acceleration fields. Bremstrahlung and Cerenkov radiation (both qualitative).

UNIT-III

Relativity and Lorentz transformations: Galilean transformations; Newtonian relativity. Instances and their failure; electromagnetism, aberration of light, Michelson-Morley experiment. Einstein's basic postulates and geometric derivation of Lorentz transformations; length contraction, time dilation, simultaneity, synchronization of clocks, Einstein's velocity addition rule, Doppler effect in light.

UNIT-IV

Relativistic dynamics: Variation of mass with velocity, mass energy equivalence, relativistic formulae for momentum and energy. The structure of space-time: Four-vectors; invariance of an interval, time like, space like and light like intervals, Minkowski world. Relativistic electrodynamics: Electric field of a point charge in uniform motion, transformation of E and B fields, covariance of Maxwell's equations in vacuum.

TEXTBOOKS

1. A S Mahajan and A A Rangawala Electricity and Magnetism-(Tata McGraw-Hill);
2. S.L.Guptha, S.P. Singh, V. Kumar Electrodynamics (Prakati Praksan).
3. A.P. French, Special Relativity (The English Language Book Society and Nelson)
4. DJ. Griffiths, Introduction to Electrodynamics (Prentice-Hall of India, 1989)
5. Murugesan, Modem Physics, (S.Chand & Co.)

REFERENCE BOOKS

1. E. C. Jordan and K.G. Balmain; Electromagnetic Waves and Radiating Systems, II Edition (Prentice-Hall of India, New Delhi, 1971)
2. Reitz and Milford, Introduction to Electrodynamics (Addision-Wesley)
3. J.B. Marion, Classical electromagnetic radiation (Academic Press)
4. R.P. Feymann, R.B. Leighton and M. Sands, The Feymann Lectures Physics, Vol. 11 (B.l Pub.)
5. D. R. Corson and P. Lorrain, Introduction to Electromagnetic Fields and Waves (Freeman-Taraporevala, Bomaby,1970)

SYLLABUS FOR B.Sc (PHYSICS)

(*For the student admitted from the academic year 2008-2009 onwards*)

VI-SEMESTER

PHYS 362: ATOMIC PHYSICS

UNIT-I

Angular Momentum: Orbital angular momentum, operators for its Cartesian components, commutation relations, step operators L^+ and L^-, Angular momentum operators in spherical polar coordinates. Eigenvalues of I^2 and L_a. Schrodinger equation for hydrogen atom in spherical polar coordinates, separation into radial and angular variables, qualitative discussion of spherical harmonics.

UNIT-II

Spin of an Electron: Stem-Gehrlach experiment, Uhlenbeck and Goudsmit's hypothesis of electron spin; Pauli's method of spin variable, along with the three coordinates in Schrodinger equation. Eigenvalues and eigen functions of the spin operator, Pauli spin operators and commutation relations.

UNIT-III

Atomic and X-ray Spectra: Atomic spectra, Coupling schemes, L - S, J - J couplings, Spectral terms, s, p, d, f, notation, selection rules. Spectra of mono- and divalent atoms: Doublet fine structure of hydrogen lines; screening constants for monovalent atoms, series limits, doublet structure of alkali spectrum. X-ray spectra: The continuum X-ray spectrum; Duane and Hunt limit. Characteristic X-rays; Moseley's law, doublet fine structure, X-ray absorption spectra, absorption edges.

UNIT -IV

Effect of magnetic field on energy levels*:* Angular momentum and magnetic moment of electron due to orbital motion Gyromagetie ratios for orbital and spin motions; Bohr magneton, vector model, Lande g factor, Normal and anomalous Zeeman effects with reference to sodium D-lines.

TEXTBOOKS

1. J.B.Rajam, Atomic Physics (S.Chand & Co)
2. Beiser, Concepts of Modem Physics, (McGraw Hill International)
3. Richtmeyer et al, Introduction to Modem Physics (Tata McGraw Hill, India)
4. Murugesan, Modem Physics, (S.Chand & Co.)

REFERENCE BOOKS

1. Walker and Straugh; "Spectroscopy, Vol 1,11, III, (Wiely)
2. G Herzberg; Atomic spectra and atomic structure, (Courier Dover Publication)
3. R C Johnson, Introduction to Molecular spectra, (Methuen)
4. S.P.Khare, Modem Physics, (Rastogi Publications).

SYLLABUS FOR B.Sc (PHYSICS)

(*For the student admitted from the academic year 2008-2009 onwards*)

VI-SEMESTER

PHYS 363: NUCLEAR PHYSICS

UNIT-I

Nuclear Properties, Nuclear Forces And Models: Nuclear charge, size, radius - Nuclear composition - Isotopes, Isobars, Isotones and Isomers - Nuclear mass, mass defect, packing fraction -Nuclear density and volume - Nuclear magnetic moment - Electric quadrupole moment - Binding energy, Explanation of B.E curve - Nuclear stability. Nuclear forces and properties -Two-nucleon system, deuteron problem, Yukawa theory of mesons.

Liquid drop model - Weizsacker's semi empirical mass formula - Shell model - magic numbers - merits and demerits of LDM and shell model - Collective model (conceptual ideas only).

UNIT-II

Radioactivity*:* Characteristic properties of radioactive radiations — disintegration - laws of radioactive decay - Half life period - Mean life time - Geiger Nuttal law - radioactive equilibrium - radio carbon dating - Alpha decay - Gamow's theory - Beta decay - Fermi theory - Gamma decay - Nuclear radiation - energy levels.

UNIT-III

Nuclear Reactions and Reactors: *Nuclear Reactions:* Conservation theorem - Q-value - threshold energy - cross section of nuclear reactions - excited states - compound nuclear production - detection of neutrinos. Nuclear fission - neutron reactions - chain reactions.

Reactors, parts of reactors - criticality - critical size and mass - Thermal and Breeder reactors - Nuclear fusion - Fusion reactors - magnetic confinement - magnetic bottle – thermo nuclear reactions (elementary ideas only)

UNIT-IV

Particle Accelerators, Detectors and Elementary Particles: *Accelerators:* Need for accelerators - LIN AC - Cyclotron, synchrocyclotron. Betatron - Phase stability- superconducting magnets.

Detectors: Geiger Muller counter - cloud chamber - photographic emulsion technique - Bubble chamber - Scintillation counter.

Elementary particles: classification -Hadrons and Leptons, Baryons and Mesons, quarks and quark model hadrons.

TEXTBOOKS

1. M.L.Pandya and R.P.S.Yadav, Elements of Nuclear Physics, (Kedar Nath Ramnath Meerut, 1993)
2. D.C.Tayal, Nuclear Physics. (Himalaya Pub. House, 1991)
3. B.B.Srivastava, Fundamentals of Nuclear Physics, (Rastogi Publications, 2006)
4. Arthur Beiser, Concepts of Modem Physics, (Tata McGraw Hill, 2003)
5. M.P.Khanna, Introduction to Particle Physics, (Prentice Hall of India, 2004).

REFERENCE BOOKS

1. Bernard L.Cohen, Concepts of Nuclear Physics, (Tata McGraw Hill, 1971)
2. S.B.Patel, Nuclear Physics — An Introduction, (New Age Int 2005)
3. R.R.Roy and B.P.Nigam, Nuclear Physics -Theory and Expt. (New Age Int,1996.)
4. Samuel S. M. Wong, Introductory Nuclear Physics, (Prentice Hall of India, 2002)
5. Gordon Kane, Modem Elementary Particle Physics, (Addison Wesley Inc., 1987).

SYLLABUS FOR B.Sc (PHYSICS)

(*For the student admitted from the academic year 2008-2009 onwards*)

VI-SEMESTER

PHYS 364: COMMUNICATION ELECTRONICS - II

UNIT- I

Modulation: Amplitude modulation, modulation index, sidebands, power output, Base modulation, Detection: Diode and transistor detectors, super-heterodynereceivers, double conversion receivers. Frequency modulation; theory, side bands, qualitative discussion of Bessel harmonics band width, modulation percentage, direct FM transmitter, - FM detectors, the slope detectors, the discriminator, ratio detector.

UNIT-II

Image Transmission: Image transmission principles, scanning, synchronization & blanking pulse ; composite signal; TV camera: Image orthicon ; B/W TV transmitter & receiver (block diagram); NTSC & PAL systems; transmission of colour information; colour TV transmitter & reviver (block diagram); colour picture tube - shadow mask tube; TV channels & their frequencies; cable TV (elementary ideas).

UNIT-III

Wave Propagation in Space: Ground waves propagation, line of sight distance, reflection of radio waves by earth's surface. Space wave propagation, effect of earth's curvature, duct propagation; sky waves, theory of Ionospheric refractive index and bending of sky waves, expression for skip-distance &maximum usable frequency; ionospheric anomalies.

UNIT-IV

Antenna: Basic antenna action, antenna parameters; Expressions *for E & B* radiated, power radiated, power pattern, radiation resistance, directive gain and directivity of short doublet and half-wave antenna; general principle & power pattern of Two element (half-wave) array, qualitative .ideas of: end- fire array, broad side array, Yagi antenna, helical antenna, parabolic reflectors.

TEXTBOOKS

1. Gupta & Kumar, Hand book of electronics (Pragati Prakashan).
2. M.L.Gupta, Electronic & Radio Engineering (Dhanpat Rai & sons).
3. Roody & Coolen, Electronic Communications (Printice Hall of India).
4. G. Kennedy, Electronic Communications Systems (Tata McGraw Hill, India).

REFERENCE BOOKS

1. Ramabhadran, Basic Telecommunication (Khanna Publishers).
2. Ramabhadran, Telecommunication Principles - Circuits & Systems (Khanna Publishers).
3. Kiver Kaufman, Television Electronics, Theory & Servicing (CBS publishers).

SYLLABUS FOR B.Sc (PHYSICS)

(*For the student admitted from the academic year 2008-2009 onwards*)

VI-SEMESTER

PHYS 365: NUMERICAL METHODS AND COMPUTER APPLICATIONS

UNIT-I

Numerical Methods: Numerical Methods: Introduction- Straight line fitting (group average and least square methods) - fitting a parabola (least square methods) - successive approximation method - condition for the convergence- order of convergence - Regula- Falsi method - Newton Rapson method -criterion for the convergence - order of convergence - Elimination method - Gauss - Jordan method

UNIT-II

Numerical Differentiation: Numerical Differentiation-forward and backward - Integration: - Trapezoidal - Interpolation - Lagrangian - unequal - Newton's forward interpolation formula (equal intervals)-Matrix: Solving the simultaneous equations - eigen vale of a matrix by power methods.

UNIT-III

Computer & FORTRAN: Computers: Introduction -input & output devices - CPU, Applications - languages & packages (outline only).

Fortran: Constants, variables, operators - mode of expressions - arithmetic to FORTRAN expression - Hierarchy of operators, Statements- conditional and unconditional - i/p & o/p Statements - executable Statements - format and go to Statements - computed go to - arithmetic IF - logical IF, Built-in functions, Do statement - simple Do loop - function sub program Subroutine sub program (Introduction)

UNIT -IV

Programming: Algorithm - Flow Chart - Simple programs using FORTRAN: Area and volume of geometrical structures, sum of series, product of 'n' numbers, Straight line, ellipse, parabola and their slope.

TEXTBOOKS:

1. M.KVenkatraman, Numerical methods in Science & Engineering, (National Pub. Co.)
2. Santosh Kumar, Computer based Numerical and Statistical techniques, (S.Chand & Co, 2008)
3. Rajaraman, Computer Programming in Fortran 90 and 95, (Prentice Hall of India)
4. Kandasamy, Thilagavathy & Gunavathy, Numerical methods, (S.Chand & Co., 2007)

REFERENCE BOOKS:

1. B.S.Grewal, Numerical methods in Engineering & Science with Programes in FORTRAN 77, C & C^{++}, (Khanna Pub. VII edition, 2005)
2. Rajaraman, Computer Programing in FORTRAN 77, (Prentice Hall of India, IV edition, 2002)
3. James B Scarborough, Numerical Mathematical Analysis, (Oxford and IBH, New Delhi, 1971)
4. S.S.Sastry**,** Elementary Numerical Analysis, (PHI).

SYLLABUS FOR B.Sc (PHYSICS)

(*For the student admitted from the academic year 2008-2009 onwards*)

VI-SEMESTER

PHYS 350: PHYSICS PRACTICAL – III

(Choose any 10 experiments from the list given below for semester V and another 10 experiments for Semester VI)

LIST OF EXPERIMENTS:

1. Newton's Rings: determination of refractive index of the material of the lens.
2. Airwedge: Determination of the thickness and insulation of the wire.
3. Spectrometer: Hartmann's Interpolation Formula - Determination of wavelength
4. Spectrometer: i - i' curve and determination of refractive index.
5. Spectrometer: i - i' curve for given angle of deviation.
6. Spectrometer: Small angled prism.
7. Spectrometer: Determination of Cauchy's constants.
8. Spectrometer: Dispersive power of the material of a prism.
9. Spectrometer: Grating - wavelength by normal incidence method.
10. Spectrometer: Dispersive and resolving power of a grating.
11. Young's modulus: Elliptical fringes method.
12. Ultrasonic velocity and compressibility of the liquids - Interferometer method.
13. Field along the axis of a circular coil - Determination of moment of a magnet
14. Field along the axis of a circular coil - Determination of BH using Searl's vibration magnetometer.
15. Temperature co-efficient of a Thermistor.
16. Potentiometer: Verification of laws of resistance and resistivity of the material of a wire.
17. Potentiometer: Resistance of the potentiometer and calibration of low range voltmeter.
18. Potentiometer: Resistance of the potentiometer and measurement of emf of a thermocouple.
19. Potentiometer: Temperature coefficient of resistance of the material of a coil of wire.
20. B.G.: Internal resistance of a cell.
21. B.G: Current and voltage sensitivities.
22. B.G: Quantity or charge sensitivity.
23. B.G: Absolute capacity of a condenser.
24. B.G: Comparison of mutual inductance of two pairs of coils.
25. B.G: Absolute determination of mutual inductance.
26. B.G: High resistance by leakage.
27. Determination of refractive index: Abbe's refractometer.
28. Wien's bridge: Measurement of frequency.
29. Conductivity of electrolytic solutions using digital conductivity bridge.
30. Measurement of e by Milliken's method
31. Determination of Planck's constant
32. Diode laser : characteristic study
33. Study of divergence of a laser beam
34. Obtaining the B-H curve of a ferromagnetic material (any method)
35. Study of plane of polarization using quarter and half wave plates
36. Characteristics of a solar cell
37. Hall probe in magnetic field measurement
38. Computer simulation of Lennard-Jones potential; binding parameters, elastic constants
39. Computer simulation of 1 -D and 2-D lattice vibrations
40. Simulation of 3-D models of a given kind of crystal and their study
41. Computer simulation of nuclear chain reactions and nuclear energy.
42. Computer simulation of Driven LCR Circuit.

43. Computer simulation of Motion of a travelling pulse.
44. Computer simulation of Formation of sanding wave
45. Computer simulation of charging and discharging of a capacitor
46. Computer simulation of growth of current in RL circuit

TEXTBOOKS

1. D P Khandelwal, A Laboratory Manual for Physics for Undergraduate Students (Vani Publications, New Delhi)
2. B Saraf et al, Physics through Expriments, Vol. II., EMF constant and varying (Vikas Publications, New Delhi)
3. Verma, Ahluwalia & Sharma, “Computational Physics, an Introduction” (New Age Int.)

REFERENCE BOOKS

1. Olon, "Experiments in Modern Physics"
2. Adrian C. & Melissinos, Experiments in Modern Physics, (Academic Press).

SYLLABUS FOR B.Sc (PHYSICS)

(*For the student admitted from the academic year 2008-2009 onwards*)

VI-SEMESTER

PHYS 360: PHYSICS PRACTICAL – IV

(Choose any 10 experiments from the list given below for semester V and another 10 experiments for Semester VI)

LIST OF EXPERIMENTS:

1. Junction diode and Zenor diode characteristics.
2. Transistor characteristics - common base & common emitter.
3. Power pack - construction with Bridge rectifier and IC regulator.
4. Single stage RC coupled CE amplifier - Frequency response curve.
5. Tuned collector oscillator- Frequency measurement by CRO and Frequency counter.
6. Tuned base oscillator - Frequency measurement by CRO and Frequency counter.
7. Hartley oscillator - Frequency measurement by CRO and Frequency counter.
8. Colpitt's oscillator- Frequency measurement by CRO and Frequency counter.
9. Astable multi vibrator- Using Transistor and 555 Timer- Frequency measurements
10. Clipping and Clamping circuits using diodes.
11. Emitter follower.
12. Phase shift oscillator - Frequency measurement by CRO and Frequency counter.
13. Basic Logic and Universal gates using diodes and transistors components.
14. Basic and Universal logic gates using ICs
15. JFET characteristics.
16. Two stage RC coupled amplifier and study of its frequency and feed back
17. Transistor Amplitude modulator and measurement of percentage of modulation.
18. OP-AMP characteristics (741 IC) -parameter measurement
19. Basic OP-AMP circuits - Half-wave rectifier, Clipper, Clamper, Comparator,
20. OP-AMP addition, subtraction, multiplication, Integration and differentiation.
21. NAND and NOR as universal gates using ICs
22. Implementation of logic expression and their simplification
23. Arithmetic circuits using gates
24. Half-adder and full-adder
25. IC adder and subtracter
26. Parity generator / checker
27. Multiplexers, Demultiplexers
28. Flip-flop circuits using gates
29. RS, D, JK and Master Slave flip-flops
30. Shift Registers
31. Asynchronous counters using ICs
32. Synchronous counters using ICs
33. Base (AM) modulation using a transistor
34. Diode AM detection
35. Measurement of Radiation by GM counter.
36. Gama ray detection with Nal(Tl) crystal.
37. Assembly language programming - microprocessor - addition
38. Assembly language programming - microprocessor - subtraction
39. Assembly language programming - microprocessor - stepper motor.

TEXTBOOKS

1. Jain R.P, Anand M.M.S, "Digital electronics Practice Using Integrated Circuits" (Tata McGraw-Hill, 1999, New Delhi).
2. Zbar & Malvino, Basic Electronics-A text Lab Manual (Tats McGraw-Hill, 1999)
3. Verma, Ahluwalia, Sharma, “Computational Physics, an Introduction” (New Age International)

REFERENCE BOOKS

1. Malvino, Electronic principles, 6^{th} Ed. (Tata McGraw-Hill, 1999, New Delhi).
2. Takheim, Digital electronics, 3rd Ed (McGraw-Hill International).

FOR B. Sc (MATHS & CHEMISTRY)

(For the students admitted from the academic year 2004 - 2005)

I-SEMESTER
ALLIED PHYSICS-I

UNIT-I:

Moment of inertia - radius of gyration - parallel and perpendicular axis theorem - calculation of moment of inertia of (a) ring (b) disc (c) hollow and solid spheres - angular momentum and torque and relation between them.

Simple harmonic motion, equation of SHM; Composition of two SHM at right angles, Lissajous figures.

UNIT-II:

Young's modulus — bulk modulus — rigidity modulus and Poisson's ratio — derivation of the expression for bending moment of a beam in terms of it curvature of neutral axis - determination of Young's modulus of a rectangular bar — non-uniform bending — pin and microscope method - with theory (mathematical derivation) - expression for couple per unit twist - determination of rigidity modulus - torsion pendulum.

UNIT-III:

Surface tension and surface energy - interfacial surface tension - experimental determination of surface tension by drop weight method - variation of surface tension with temperature — Jaeger's method - streamline and turbulent motion - equation of continuity.

UNIT - IV:

Newton's law of cooling - determination of specific heat of liquid - Barton's cooling correction in calorimetric experiments - specific heat capacity of gases - ratio of specific heat capacities — determination of the ratio of specific heats of gases - Clement and Desormes method.

Coefficient of thermal conductivity of a bad conductor - Lee's disc method - determination of thermal conductivity by Forbe's method.

Black body radiation - Stefan's law - determination of Stefan's constant — second law of thermodynamics - Carnot cycle - indicator diagram - derivation of efficiency - Kelvin temperature scale.

UNIT - V:

Interference — method of producing coherent sources - Fresnel's biprism — Newton's rings through transmission and reflection - Interferometers - Michelson's Interferometer - wavelength determination - Jamin's refractometer.

Diffraction - Fresnel's diffraction - Fraunhoffer diffraction - half-period zones - rectilinear propagation of light - diffraction at a straight edge.

Polarization - optical activity - specific rotatory power -Polarimeter - Lawrence half shade - determination of specific rotatory power - double refraction - optic axis.

TEXT BOOKS:

1. Dr.Sabesan and others, A Textbook of Allied Physics Vol-I and Vol-H
2. Ponnusamy and others, Ancillary Physics.
3. Kamalakannan and others, Ancillary Physics.

REFERENCE BOOKS

1. Halliday, Resnik, Walker, Fundamentals of Physics, 5 Ed.(Asian Books Pvt. Ltd., New Delhi)

FOR B. Sc (MATHS & CHEMISTRY)

(For the students admitted from the academic year 2004 — 2005)

II-SEMESTER

ALLIED PHYSICS-II

UNIT-I:

Ultrasonics - magnetostriction - piezoelectric methods - properties of ultrasonic waves and applications.

UNIT -II:

Gauss's law with proof - Electric intensity and potential due to a uniformly charged hollow conductor at a point outside, on the surface and inside a spherical conductor — capacity of a parallel plate condenser with and without a dielectric slab - capacity of a spherical conductor- Biot & Savart's law — field along the axis of a circular coil carrying current - force on current carrying conductor placed in a magnetic field - theory of moving coil galvanometer.

UNIT - III:

Magnetic properties of materials- relation between- the three magnetic vectors - susceptibility and permeability - para, dia and ferro magnetism (qualitative ideas) - magnetic hysterisis - super conductivity - persistent current and Meissner Effect.

UNIT-IV:

Breakdown of classical mechanics — photoelectric effect — Compton effect - Davison- Germer experiment - Matter waves - wave pockets - de Broglie ideas - Heisenberg uncertainty principle.

Radioactive isotopes (production and uses) - particle accelerator - linear accelerator - particle detectors - Wilson cloud chamber - Scintillation counter - nuclear models - Liquid drop model - Fission and Fusion reaction - nuclear reactors.

UNIT-V:

Rectfiers & filters (qualitative ideas)- Transistor characteristics - transistor as a RC coupled amplifier -frequency response (without derivation) - bandwidth - basic principles of ar oscillator - Hartley oscillator - working (without derivation) - elementary ideas about modulatioi - elementary ideas about TV transmission and reception.

TEXT BOOKS:

1. Dr.Sabesan and others, A Textbook of Allied Physics - Vol-I and Vol-II.
2. Ponnusamy and others, Ancillary Physics.
3. Kamaiakannan and others, Ancillary Physics.

REFERENCE BOOKS

1. Halliday, Resnik, Walker, Fundamentals of Physics, 5 th Ed.(Asian Books Pvt. Ltd., New Delhi)

For B. Sc (MATHS & CHEMISTRY)
(For the students admitted from the academic year 2004 - 2005)

I & II -SEMESTER

ALLIED PRACTICAL PHYSICS-I

Choose any 14 experiments from the list given below

LIST OF EXPERIMENTS:

1. Young's modulus - Non-Uniform bending - Pin & Microscope
2. Rigidity modulus - Torsional oscillations without masses.
3. Comparison of coefficient of viscosity.
4. Surface tension of a liquid and interfacial surface tension by drop weight method.
5. Spectrometer - Refractive index of a liquid - Hollow prism.
6. Spectrometer -Grating - N determination by normal incidence method.
7. Spectrometer -Grating - wavelength determination by minimum deviation method.
8. Newton's Rings.
9. Thermal conductivity of a bad conductor - Lee's disc method
10. Post office box - laws of resistance and specific resistance.
11. Melde's apparatus - Determination of frequency.
12. Meter Bridge - Temperature coefficient of the material of a coil of wire
13. Potentiometer - calibration of low range voltmeter (0 - 1.5 V).
14. Potentiometer - calibration of ammeter (0-1.5 amps).
15. Figure of merit of a periodic moving coil galvanometer.
16. Field along the axis of the circular coil carrying current - Determination of B_H.
17. Newton's law of cooling and specific heat determination
18. Frequency measurement by forming Lissajous figures
19. Study of Half wave rectifier.
20. Transistor characteristics - CE mode - only transfer characteristics.

TEXT BOOKS:

1. Ouseph and V.Srinivasan, Practical Physics- Part-I & II.

REFERENCE BOOKS

1. Mathchan, Lazarus and others - Practical Physics.

PONDICHERRY UNIVERSITY

B.Sc. Zoology for affiliated colleges

Course structure & Syllabus

(2009-10)

Sl. No	Course Code	Course Name
	Semester - I	
1		Animal Diversity - I
2		Cell Biology
3		Main Practical - I
	Semester - II	
4		Animal Diversity - II
5		General Physiology
6		Main Practical - II
	Semester - III	
7		Animal diversity - III
8		General Endocrinology
9		Main Practical - III
	Semester - IV	
10		Environmental Biology
11		Genetics
12		Main Practical IV -
	Semester - V	
13		Biochemistry
14		Immunology
15		Molecular biology
16		Evolution and Animal Behaviour
17		Instrumentation and techniques
18		Main Practical V- Biochemistry, Immunology and Instrumentation Techniques
19		Main Practical VI - Molecular Biology, Evolution and Animal Behaviour
	Semester – VI	
20		Developmental Biology
21		Biotechnology
22		Biostatistics and Bioinformatics
23		Aquaculture
24		Applied Zoology
25		Main Practical VII- Developmental Biology, Biotechnology and Applied Zoology
26		Main Practical VIII - Biostatistics and Bioinformatics and Aquaculture

152: CELL BIOLOGY

Total: 45 hrs.

UNIT I

9 hrs.

Introduction to Cell Biology – Historical aspects; Diversity of cell size and shape; Prokaryotic cell organization – bacterial cell structure - *E.Coli*, Cyanobacteria, Viruses, Viriods, Prions; Eukaryotic Cell structure.

UNIT II

9 hrs.

Plasma membrane – Chemical composition and structure – Fluid Mosaic model, membrane asymmetry, fluidity, functions of plasma membrane – Mechanism of transport across the membrane.

UNIT III

9 hrs.

Structure and functions of cell organelles; Endoplasmic reticulum; Golgi bodies, ribosomes, mitochondria, plastids, lysosomes and nucleus.

UNIT IV

9 hrs.

Chromosomes - types of chromosomes, structure and functions of cytoskeleton, centrioles, cilia and flagella. Detailed study of events of mitosis and meiosis; cell cycle; cell–cell communication; Cell signaling; Gap junctions, cell adhesion.

UNIT V

9 hrs.

Cell differentiation and development; Cancer cells and their properties, cell lines (HeLa cells and CHO cells). Stem cells – basic concepts and types.

TEXT BOOKS:

1. De Robertis and De Robertis Cell and Molecular Biology, Lea and Febiger, 2000.

151: ANIMAL DIVERSITY I

Total : 45 hrs.

UNIT I

5 hrs.

Introduction to non-chordates, General characters and classification.

UNIT II

10 hrs.

Protozoa- Salient features and outline classification upto classes- Type study of Paramecium, study of *Amobea, Euglena* and *Monocystis* with reference to locomotion, nutrition and reproduction. Parasitic protozans of man with reference to diagnostic characters, mode of infection and diseases caused by *Entamoeba, Giardia, Trypanosoma* and *Leishmania* - Origin of Metozoa.

UNIT III

10 hrs.

Porifera: Salient features and outline classification upto classes; Type study of Sycon; Study of *Leucosolenia* with reference to structure, reproduction and development. **Cnidaria:** Salient features and outline classification upto classs; Type study of *Aurelia*. A brief account of corals and coral reefs.

UNIT IV

10 hrs.

Ctenophora: Salient Features of a ctenophore and comparison with Cnidarians. **Platyhelminthes:** Salient features and outline classification upto classes; Type Study of Fasciola; Study of *Taenia* with reference to structure, reproduction, life-cycle and parasitic adaptations.

UNIT V

10 hrs.

Nemathelminthes: Salient features and outline classification upto classes; Type Study of *Ascaris* with reference to structure and reproduction. Parasitic nematodes of man with reference to diagnostic characters, mode of infection and diseases caused by *Ancylostoma, Enterobius and Wuchereria.*

TEXT BOOKS:

1. Ekambaranatha Ayyar & Ananthakirshnan J., Manual of Zoology, Vol. I – Part I (Invertebrate), S. Viswanathan (Printers & Publishers Pvt. Ltd.,) Chennai 1992.

2. Kotpal, R.L. Modern Text Book of Zoology – Invertebrate, Rastogi Publications, Meerut, 2006.

K. Ganga (4)

155: GENERAL PHYSIOLOGY

Total: 45 hrs.

UNIT-I 9 hrs.

Homeostasis - Internal environment, Need for Homeostasis, Role of positive and negative feed back mechanisms in maintaining internal environment. Role of liver, pancreas and kidney in homeostasis. Thermoregulation – Poikilo - and Homeotherms - Temperature regulation, behavioural and physiological aestivation, hibernation, encystment and diapause. Nutrition and digestion - Feeding mechanisms, types of digestion, gastrointestinal secretions in human and its regulation, gastric and intestinal digestion, role of microbes in termite and ruminant digestion.

UNIT II 9 hrs.

Circulation - Types of heart, neurological and humoral control of systemic blood pressure, blood volume and blood flow, cardiac muscle contraction, coronary circulation, composition of blood and blood clotting; Cardiac rhythm and its control, origin and conduction of heart beat, pulse. Respiration – Types - External and Internal respiration, respiratory movements and lung volume, respiratory pigments. carbon-di-oxide and oxygen transport, chloride shift, Haldane and Bohr's effects, Dissociation curves, Interference of CO_2, respiratory quotient, regulation of respiration.

UNIT III 9 hrs.

Excretion: Ammono-, ureo-and uricotelic animals. Formation and composition of urine and its regulation in man. Osmoregulation and water balance – Definition, osmoregulators and conformers; Stenohaline and euryhaline forms- osmoregulation in marine and freshwater teleosts, Elasmobranchs and Migratory forms.

UNIT IV 9 hrs.

Muscle Physiology - Ultrastructure and chemical composition of skeletal muscle, sliding filment theory, physico-chemical changes during muscle contraction. Nerve Physiology - Concept of nerves and nerve cells, invertebrate nerve net, ganglia - withdrawal reflex, role of glial cells and astrocytes, cholinergic and adrenergic receptors, nerve conduction, graded and action potential, saltatory conduction and synaptic conduction, neurotransmitters, Neuromuscular synapse and acetylcholine.

UNIT V

Sensory perceptions in brief -Lateral line system in fishes; Hearing - Weberean apparatus fish, mammalian organ of corti and physiology of hearing, ultrasonic and infrasonic echo location – bats; Balancing - structure of vestibular apparatus, physiology of static and dynamic equilibrium; olfaction, structure of olfactory membrance and physiology of olfaction gustation, structure and position of taste buds, physiology of gustation. Vision structure and function of eye, vision physiology, depth perception, eye spots-ocelli, insect vision, human eye vision perception.

TEXT BOOKS:

1. Ganong, W.E., Review of Medical Physiology, Mc Graw Hill, 2003.
2. Verma P.S., Tyagi B.S., and Agarwal V.K. Animal Physiology, S. Chand & Co. Ltd., 1999.
3. Sobti R.C., Animal Physiology, Narosa Publishing House Pvt. Ltd., New Delhi.

353: MOLECULAR BIOLOGY

Total : 45 h

UNIT – I

8 hou

Introduction - Scope – Genes & Chromosomes. Discovery and nature of genetic material. Direct evidences – Transformation experiment, Bacteriophage infection, Transduction, Bacterial conjugation. Indirect evidences – Localization, Amount of DNA. stability, effects of mutagens.

UNIT – II

10 hours

Organisation of DNA, Base composition of DNA, the double helix, A, B & Z forms of DNA, Supercoiled DNA; RNA: tRNA, rRNA, mRNA, micro RNA; Ribozymes.

UNIT – III

7 hours

Viral, Bacterial and Eukaryotic DNA, alleles, split genes, and transposons, Genomes and mapping, Central Dogma, Ribozymes.

UNIT – IV

10 hours

DNA and RNA replication – General principles Enzymes and inhibitors, mutagenesis and DNA repair; Transcription – Translation- protein synthesis – Co - and Post- translational modification – inhibitors- signal transduction, Blobel's hypothesis.

UNIT – V

10 hours

RNA processing – Regulation of Gene expression. General Principles, Gene transfer – General Concepts, methods; Recombinant DNA, molecular cloning, polymerase chain reaction, Genetic disorders Gene therapy.

TEXT BOOKS:

1. Weaver, R.F. Molecular Biology, Mc Graw Hill Publications, 2005
2. Lodish, H., Scott, M.P., Matsudaira, P., Darnell, J., Zipursky, L., Kaiser, C.A., Berk, A. and Krieger, M. (2003) "Molecular Cell Biology"; Fifth Edition, W.H. Freeman and Co., New York.

72 - 94, 136 - 143, 144 - 151, 229 - 231, 238 - 240, 241 - 242, 243 - 245, 246 - 247, 248 - 260, 309 - 342, 343 - 348, 349 - 354, 355 - 367, 378 - 391, 392 - 397, 398 - 403, 404 - 413, 414 - 431, 432 - 448, 464 - 469, 368 - 377

355: INSTRUMENTATION AND TECHNIQUES

Total : 45 hrs

UNIT – I 8 hours

Principles and uses of Analytical Instruments, Balances, pH scale and pH meter, Dissociation Constant of Water.

UNIT – 2 9 hours

Colorimetry & Spectrophotometry- Principles- Description and Applications-UV- Visible Spectrophotometry - Flame photometry.

Centrifugation; Types – Principle, description and applications.

UNIT – 3 10 hours

Microscopy, Principles of light Microscopy, phase contrast, Fluorescence, Electron Microscopy (SEM, TEM), Microphotography.

UNIT – 4 9 hours

Separation Techniques – Types, Principles and Applications of Chromatography, paper, TLC, liquid chromatography, GLC, HPLC

UNIT – 5 9 hours

Electrophoresis – Principles and applications (SDS PAGE and AGE)

Radioisotope techniques – Geiger Muller counter, Scintillation counter, Imaging Techniques.

TEXT BOOKS:

1. Wilson & Walker. Principle and Techniques in Practical Biochemistry. Cambridge Univ. Press, 2000
2. Freifelder, D.M. Physical Biochemistry- Application to Biochemistry and Molecular Biology, W.H. Freeman, 1982
3. Murphy, D.B. Fundamentals of Light Microscopy & Electron Imaging. Wiley –Liss, 2001

354: EVOLUTION AND ANIMAL BEHAVIOUR

Total : 45

UNIT – I

9 hours

Origin of life. Origin of basic molecules. Origin of Species: speciation and extinction. Patterns and mechanisms of speciation. Tree of life. Fossil record: evolution of horses, elephant and humans.

UNIT – II

8 hours

Genetic variation, natural selection and adaptation. Malthus and population growth. Malthus. Introductory population genetics. Hardy-Weinberg equilibrium. Mendelian genetics and heredity.

UNIT – III

8 hours

Introduction to behaviour. Behaviour as an adaptation. Instinctive and Learning behaviour. Fixed action patterns, imprinting, classical and operant conditioning. Evolution of intelligent in humans and great apes.

UNIT – IV

10 hours

Physiology and behaviour: Circadian rhythms. Animal migration: orientation and navigation. Roles of hormones and pheromones. Foraging behaviour: searching and handling.

UNIT – V

10 hours

Social behaviour. Social insects, superorganism, division of labour, haplodiploidy and castes. Altruistic behaviour: kin selection and reciprocal altruism. Language and communication.

TEXT BOOKS:

1. Bolhuis, J.J. and Giraldeau, L-A. (eds). 2005. The Behavior of Animals: Mechanisms, Function And Evolution. Blackwell Publishing Ltd. USA.
2. Evolution. 2000. Monroe. Strickberger, Jones and Bartlett, Publishers.

352: IMMUNOLOGY

Total : 45 hrs

UNIT – I

9 hours

Introduction – scope of immunology- origin of immune system in invertebrate and vertebrate- cells of the immune system-organs of the immune system – primary and secondary – structure and function.

UNIT – II

8 hours

Immunity – Innate immunity – Physical factors – Chemical factors – Cellular factor s– Acquired Immunity types – Active Acquired Immunity, Artificial Acquired Immunity – Natural Acquired immunity – Humoral Immunity – Cell Mediated Immunity.

UNIT – III

8 hours

Antigen- definition, types (Tumour Antigen – Auto antigen – Blood group antigen) properties- Antigenic determinant – Haptens; Antibodies – Monoclonal and Polyclonal – Immunoglobulins- Types and structures (Ig G, A, M, D and E); Antigen – Antibody Interactions (Precipitation, agglutination, neutralization).

UNIT – IV

10 hours

Human immune response (primary and secondary), complement system- components- pathway & functions- deficiencies- Cytokines – Interleukins – types and role in diseases.

UNIT – V

10 hours

Immune System disorder – Infection and immunity – Hyper sensitivity (Immediate and delayed hypersensitivity) – HLA and MHC – Transplantation Immunology – Graft versus host reaction – Immune Tolerance – Auto Immunity.

TEXT BOOKS:

1. Roit, I. Essential Immunology. Blackwell Science, 2005

ADDITIONAL READING:

2. Richard, A. Goldsby, Thomas, J.K.Barbara, A. Kuby Immunology, W.H. Freeman & company, 2000
3. Eli Benjamini, Richard, C, Sunshine, G. Immunology- A Short Course, Wiley's Publication, 2000

FIFTH SEMESTER

351: BIOCHEMISTRY

Total : 45 hrs.

UNIT – I 10 hours

Chemical Organization of the cell: Inorganic components– Organic Components of Cell; **Amino acids:** structure, amphoteric properties and classification; Proteins- structures, classification and biological significance.

UNIT – II 7 hours

Carbohydrates: Classification – Monosaccharides– Disaccharides – Polysaccharides; muco polysaccharides, Glycoprotein; Biological significance of carbohydrates.

UNIT – III 8 hours

Enzymes: Classification- Mechanism of action- inhibition – coenzymes-cofactors. **Hormones:** Types and function. **Vitamins:** Discovery, structure and types.

UNIT – IV 10 hours

Lipids: Classification; Fatty acids (Saturated, Unsaturated and Poly unsaturated) – Saponification; Phospholipids, Glycolipids and steroids.

Nucleic acids – molecular organization; DNA– Important postulates of Watson & Crick – DNA Replication. RNA –Types and functions.

UNIT – V 10 hours

Energy metabolism: Thermodynamic laws- energy transformations- ATP- AMP and their structures, properties and roles- oxidation reduction reactions – Generation of energy from carbohydrates, protein and fats- glycolysis, Kreb's cycle- oxidative phosphorylation- energy conservation.

TEXT BOOKS:

1. Murray. R.K. Granner, D.K. Mayes, P.A. Rodwell, V.W. Harper's Biochemistry. McGraw Hill, 2006

ADDITIONAL READING:

2. Nelson, D.L. Cox, M.M. Lehninger's Principle of Biochemistry, Freedman, 2004
3. Berg, J.M. Tymoczko, J.L. Stryer, L. Biochemistry, Freedman, 2006

MT 18(2)
B 565 NR

362: APPLIED ZOOLOGY

Total : 45 hrs.

UNIT – I

11 hours

Pest: types of pest management – pest control methods – Integrated pest managements; Life cycle, damages and control of Sugarcane (*Pyrillá perpusiella*), Rice weevil (*Srtophilus orysae*), Coconut (*Orycles rhinoceros*), Furniture (*Furniture bulb – Dinoderm*), Cotton (*Heliothis armigera*) pests.

UNIT – II

8 hours

Culture: Vermiculture, Apiculture, Sericulture, pisciculture (Carp), Lac Culture, Poultry managements – poultry breeds – poultry disease and control measure.

UNIT – III

8 hours

Livestock management: common disease of cattle and their control measures – breeds of cattle – milk breeds, draught breeds – Dairy and Dairy products.

UNIT – IV

10 hours

Infections and Communicable diseases: Leptospirosis, Chickungunya, Plague, malaria, cholera, tuberculosis, filariasis, AIDS, vaccination and inoculation; Vector Control methods.

UNIT – V

8 hours

Fisheries: Fish culture in India with reference to major and exotic carps, Integrated Fish Farming, Fish Preservation, Fish products and Bye products, Fish food poisoning.

TEXT BOOKS

1. Shukla, G.S. Upadhy, V.B. Economic Zoology . Rastogi Publications, 2006
2. Manju Yadav, Economic Zoology, Discovery Publishing House, 2003
3. Tomar, B.S. Bhatnagar, M. C. Textbook of Applied Zoology, Emkay Publications, 2004

MT 14 (2)

B 561 NR

SIXTH SEMESTER

358: DEVELOPMENTAL BIOLOGY

Total: 45 hr

UNIT – I

7 hours

Theories in developmental Biology – Vonbaer's law- Biogenetic law- Germplasm theory, mosaic& regulative theory, Gradient theory; Gametogenesis- Spermatogenesis and oogenesis.

UNIT – II

10 hours

Types of animal eggs- Egg membranes; Fertilization- sperm –egg interactions- Biochemical changes- post fertilization changes; Parthogenesis— Morphogenesis and Morphogen Cleavage – types and pattern of cleavage; Role of yolk in cleavage; Process of blastulation; Gastrulation, Fate maps of frog and chick.

UNIT – III

9 hours

Cell lineage- Extra embryonic membrane- Organogenesis of eye, heart, kidney and brain in chick embyo; placentation in mammals; Organizer concept, induction process; concept of competence, determination and differentiation.

UNIT – IV

10 hours

Genetic control of development; causation of metamorphosis in frog and insects (Post embryonic development) – Paedogenesis and neotony; growth and differentiation- Blastogenesis- regeneration.

UNIT – V

9 hours

Stem cells – Types - teratogenesis- neoplasia- ageing- in vitro fertilization, embryo transfer and soma cloning.

TEXT BOOKS

1. Balinsky, B.I. An Introduction to Embryology, W. B.Saunders Publishing Company,2004.
2. Scott F. Gilbert. Developmental Biology, Sinaver Associates, INC Publishers, Sunderland. 2000.
3. Jonathan, M.W. Essential Developmental Biology. Wiley Blackwell Publishers, 1991.

MT-15(2)
B 562 NR

359: BIOTECHNOLOGY

Total : 45 hrs.

UNIT – I

8 hours

Introduction to Biotechnology: scope and importance – Basic concepts in Genetic Engineering. Tools and techniques of Genetic engineering. Restriction enzymes, DNA ligase, polymerase. Cloning vehicles: plasmids – PBR 322, cosmids, lambda phage, shuttle vectors.

UNIT – II

8 hours

Recombinant DNA technology: Transfection - transformation, transduction, particle gun bombardement, liposome mediated transfer.

UNIT – III

9 hours

Analysis and expression of cloned genes in host cells: Restriction enzyme analysis, southern blotting – Northern blotting, Insitu – Hybridization, DNA sequencing methods: Polymerase chain reaction – Principles and Applications of PCR.

UNIT – IV

10 hours

DNA fingerprinting: RFLP, RAPD. Application of DNA finger printing. cDNA libraries – construction and analysis of cDNA, mRNA, isolation and cDNA synthesis, cloning and amplification of gene libraries, Intellectual property rights.

UNIT – V

10 hours

Application of Genetic Engineering: Transferring genes into animal oocytes, embryos and specific animal tissues- transgenic animals, genetically modified organisms in agriculture, transgenic plants, genetically engineered microorganisms, Gene delivery and pollution control.

TEXT BOOKS:

1. Old, R.W. Primrose, S.B. Principles of genome analysis. Blackwell 2003
2. Introduction to Biotechnology – William J. Thieman, Michael A. Pallavino, 2008
3. Gene Cloning and DNA analysis – An Introduction – Brown, T.A. 4th Edition, Blackwell, 2002.

Ane UMA

360: BIOSTATISTICS AND BIOINFORMATICS

MT 1621

Total : 45 hrs

B573 NR

UNIT – 1 9 hours

Introduction – variables in Biology – collection – classification and Tabulation of Data – Diagrams (line, pie, bar) and Graphs (Histogram, frequency polygon, frequency curve).

UNIT – 2 9 hours

Frequency Distribution, Measures of central tendency (Mean, median, mode) – Designing of Experiments – Hypothesis testing – Probability.

UNIT – 3 11 hours

Correlation – Regression – Chi square test – students't' test, F – test, ANOVA (One way and two way) sampling methods.

UNIT – 4 8 hours

Bioinformatics – Definition and scope – Databases – classification- sequence Analysis of Nucleic Acids, Proteins, DNA databases Basic knowledge of computer applications in Biology, operating system.

UNIT – 5 8 hours

Proteomics- definition, identification, analysis; Genomics, Genome Projects - Human genome project, Basic concepts of micro arrays and its applications.

TEXT BOOKS:

1. Thomas, G. Mitchell, K. Introduction to Biostatistics. Mc Graw- Hill Science, 2001
2. Jerrold, H. Zar. Biostatistical Analysis, Pearson Education, 2006
3. Gurumani, N. An Introduction to Biostatistics, MJP Publishers, 2004
4. Attwood, T.K. & Parry-Smith, D.J. Introduction to Bioinformatics, Pearson Education, 2004
5. Claverie, J.M. Notredame, C. Bioinformatics for Dummies, Wiley Publishing Inc. 2003.
6. Dan, B.K. Michael, L.R. Fundemental Concepts in Bioinformatics. Pearson Education, 2006

361: AQUACULTURE

Total : 45 hrs

UNIT – I

8 hours

Introduction – Status of aquaculture in India –Fresh water, Brackish Water aquaculture – Importance - Aims and objective of Aqua culture – a National scenario.

UNIT – II

8 hours

Marine Fishes of India, Pelagic, Demersal – Fishery resources and their exploitation – Edible Estuarine fishes and their characteristics, Brackish water fishes and their characteristics.

UNIT – III

9 hours

Fishing crafts and Gears – Finfish culture – culture of *Catla catla*, Culture of *Chanos chanos* – Crusta cean culture – Mariculture - Marine prawn culture, Fresh water prawn culture – Molluscan culture – culture of oyster, culture of Green Mussel.

UNIT – IV

10 hours

Types of Fish Culture – Running water – recycled water, cage culture – construction and management of a fish farm –Nutrition- Sources of food, feed composition and energetics of food conversion; Fish diseases and their control – Bacterial & Viral diseases – Diagnostic PCR techniques.

UNIT – V

10 hours

Culture Technology – Biotechnology – Using chromosomal and Gene Manipulation – Androgenesis, Gynogenesis, Polyploidy – Transgenic fish – Artificial Insemination – Cryopreservation of Gametes; Transportation of fishes.

TEXT BOOKS:

1. Jhinghran. Fish and Fisheries of India, Hindustan Publishing Corporation, 2002
2. Tucker, J.Marine Fish culture, Kluwer Aca, 2004
3. Srinivasulu Reddy, M. Sambasiva Rao, K.R.S. A Text Book of Aquaculture, Vedams e Book (P) Ltd, 2006

Dr. S.R.K. Govt. Arts College, Yanam
DEPARTMENT OF ECONOMICS
M.A Branch- Economics

SEMESTER I			
Sl.No.	**Year**	**Subject Code**	**Subject Name**
1.	First	11(3)	Micro Economic Analysis -1
2.		12(3)	Macro Economic Analysis- 1
3.		13 (3)	Mathematical Economics
4.		14 (3)	Econometric Theory
5.		15(3)	Economics of Growth & Development
SEMESTER II			
Sl.No.	**Year**	**Subject Code**	**Subject Name**
1.	First	21(3)	Micro Economic Analysis -II
2.		22(3)	Macro Economic Analysis -II
3.		23(3)	Statistical Methods in Economics
4.		24(3)	Applied Econometrics
5.		25(3)	Public Economics
SEMESTER III			
S.No.	**Year**	**Subject Code**	**Subject Name**
1.	Second	31(3)	International Trade & Finance
2.		32(3)	Contributions By Noble Laureates - I
3.		33(3)	Computer Applications in Economic Analysis
4.		34(3)	Research Methodology
5.		35(3)	Indian Economy : Issues & Policies – I
SEMESTER IV			
S.No.	**Year**	**Subject Code**	**Subject Name**
1.	Second	41(3)	Indian Economy : Issues & Policies – II
2.		42(3)	Financial Economics
3.		43(3)	Contributions by Noble Laureates - II
4.			Project Work

MICROECONOMIC ANALYSIS-I

Module 1: Advances in Demand Theory

Modern utility analysis of Choices involving risk or uncertainty- Bernouli, Neumann Morgenstern, Friedman savage and Markowitz Hypotheses-Revealed Preference Theory andderivation of demand and indifference curve-Revision of Demand theory by Hicks-Logical Ordering-Recent developments in demand theory-Pragmatic Approach (The Constant Elasticity of Demand function, The Dynamic Demand function, The Empirical Demand Function) The Linear Expenditure systems, the Indirect utility function, the Expenditure function, Lancaster's Demand theory-Bandwagon effect-veblen efffect – Cobweb theorem, Lagged Adjustment in interrelated markets.

Module 2: Advances in Production Theory

Relation between returns to scale and returns to a factor- multi product firm- production function: Cobb Douglas, CES, VES and Translog production function- Production function Vs production process-Technical progress and production function

Module 3: Advances in Theory of Costs and Optimisation

Traditional and modern theories of Costs-Empirical evidence- Derivation of Long run total cost curve from production function-Economies of Scale and Long Run Average Cost Curves

Module 4: Price and Output Determination

Marginal analysis as an approach to price and output determination: Perfect competition- short run and long run equilibrium of the firm and industry-price and output determination short run and long run-supply curve of the industry under perfect competition – Joint Demand and joint Supply – Composite demand and composite supply, Monopoly –short run and long run equilibrium, price discrimination – Degree of monopoly power- welfare aspects- monopoly control and regulation; Resource allocation under monopoly-Monopsony and Bilateral monopoly; Monopolistic competition-General and chamberlain approaches to equilibrium, equilibrium of the firm and group with product differentiation and selling costs, excess capacity under monopolistic and imperfect competition; Oligopoly-non collusive (cournot, Bertrand, Edgeworth, chamberlin, Kinked demand curve and Stackelberg's solution)and collusive (cartels and mergers, price leadership and basic point price system) models; workable competition – Structure, conduct and performance norms.

Module 5: Alternative methods of Pricing and Optimisation

Pricing principle – Average or full cost pricing- Mark up pricing- Limit pricing theory- Bains's version- silos – Labini model of limit pricing- Public Utility Pricing- Game theory and price determination- Input output analysis – Linear Programming

Readings:

1. Koutsoyiannis, A. (2000) Modern Microeconomics, (2nd Edition), Macmillan press,London
2. Layard, P.R.G. and Walters, A.W. (1978), Microeconomic Theory, McGraw Hill, London.
3. Sen A. (1999), Microeconomics: Theory and Application, Oxford University Press, NewDelhi
4. Stigler,G. (1996), Theory of Price, PHI, New Delhi
5. Varian, H.R. (2000), Microeconomic Analysis, W.W.Norton, NewYork
6. Mankiw, N.G. (2009), Economics: Principles and Applications, Cengage Learning, Indiaedition

MACROECONOMICS I

Module 1: Measuring Key Macroeconomic Variables

Various Concepts and Measurements of Aggregate Income – Income, Expenditure and the Circular Flow – Rules for Computing GDP – Real vs. Nominal GDP – Measuring the Cost of Living (consumer and whole sale price indices) – Measuring the Unemployment Rate – Unemployment, GDP and the Okun's Law.

Module 2: Theories of Consumption

The Classical Views on Consumption – The Psychological Law of Consumption – Kuznets's Consumption Puzzle – Fisher's Inter-temporal Choice Model – Permanent Income Hypothesis – Life Cycle Hypothesis – The Random Walk Hypothesis and consumption.

Module 3: Theories of Investment

The Neoclassical Theory of Investment – Capital Theory and Theory of the Firm – Finance and the Cost of Capital – The Accelerator Theory of Investment – The Stock Market and Tobin's Q Theory – Inflation and Investment – Policies affecting Investment.

Module 4: Theories of Money Demand

Inventory Theoretic Approach (William Baumol) – Liquidity Preference as Behavior Towards Risk (James Tobin) – A Restatement of Quantity Theory of Money (Milton Friedman) – The Buffer Stock Notion (David Laidler) – Partial Adjustment Mechanism – Empirical Issues in Money Demand Estimations.

Module 5: Theories of Money Supply

The Concept and Measurement of High Powered Money – Sources of Variation in High Powered Money – The Money Multiplier Model – Factors affecting Money Multiplier – Behavioural Model of Money Supply – The Portfolio Model of Money Supply.

Module 6: The IS – LM Model

The Neoclassical and Keynesian Macroeconomic Models – The Interaction of Real and Monetary Sector – The Neoclassical and Keynesian version of IS-LM Model – Fiscal and Monetary Policy Analysis in IS-LM Model – Fiscal Policy and Crowding out – Ricardian Equivalence – The Relative Efficacy of Fiscal and Monetary Policy – The Aggregate Supply in the Short and Long Run – Aggregate Demand and Price Determination – Pigou Effect and Real Balance Effect in the IS-LM Model – Aggregate Demand in the Open Economy – The Mundell-Flemming Model – The Fiscal and Monetary Policy Operation under Fixed and Floating Exchange Rate Regime – Trade Policy in IS-LM Models.

Readings:

1. Rosalind Levacic and Alexander Rebmann (1982), Macroeconomics: An Introduction to Keynesian – Neoclassical Controversies, Macmillan.
2. Errol D'Souza (2008), Macroeconomics, Pearson.
3. David Romer (1996), Advanced Macroeconomics, McGraw-Hill.
4. David, G Pierce and Peter J Tysome (1985), Monetary Economics: theories, evidence and policy, Butter worths.
5. Laidler, D.E.W. (1984), The Buffer Stock Notion in Monetary Economics, Economic Journal 94, 17-34.

MATHEMATICAL ECONOMICS

Module 1: Basic Calculus

Concept of function and types of functions – limit, continuity and derivative – Rules of differentiation – Rules of partial differentiation and interpretation of partial derivatives – Problems of maxima and minima in single and multivariable functions – Unconstrained and constrained optimization – Applications of differentiation in economics – Concept of integration – Simple rules of integration and its application to consumer's surplus and producer's surplus – Growth rates and simple properties of time path of continuous variables.

Module 2: Linear Algebra

Determinants and their basic properties – Solution of simultaneous equations through Cramer's rule – Concept of matrix – their types, simple operations on matrices, matrix inversion and rank of a matrix – Concept of vector – its properties – Matrices and vectors – Concept of quadratic forms – Eigen roots and Eigen vectors – Introduction to input-output analysis.

Module 3: Differential equations

Exponential growth – Separable equations – linear differential equations and integrating factors – Second-order differential equations – Coupled equations, including the use of matrix diagonalisation – Economic applications of differential equations.

Module 3: Difference equations

Solving first-order difference equations – Application of first-order difference equations to financial problems – The cobweb model – Second-order difference equations – Coupled first – order difference equations, including the use of matrix diagonalisation – Economic applications of second – order difference equations – Applications in trade cycle models – Growth models and lagged market equilibrium models.

Module 5: Linear programming

Basic concept, formulation of a linear programming problem Its structure and variables – Nature of feasible, basic and optimal solution – Solution of linear programming through graphical and simplex method – Statement of basic theorems of linear programming – Formulation of the dual of a programme and its interpretation – Shadow prices and their uses – Concept of duality and statement of duality theorems – Concept of a game – Strategies – simple and mixed – Value of a game – Saddle point solution – Simple applications.

Readings:

1 Sydsaeter, Knut and Peter Hammond (2006), Essential Mathematics for Economic Analysis, 2nd Ed. Financial Times, Prentice Hall: Harlow, England.
2 Yamane, Taro (1975), Mathematics for Economists, PHI, New Delhi.
3 Allen, R.G.D. (1974), Mathematical Analysis for Economists, Macmillan Press, New Delhi.
4 Gupta, S.C. (1993), Fundamentals of Applied Statistics., S.Chand, NewDelhi.
5 Chiang, A.C. (1986), Fundamental Methods of Mathematical Economics, McGraw Hill, New York.
6 Handry, A.T. (1999), Operations Research, PHI, New Delhi.

ECONOMETRIC THEORY

Module 1: Regression Analysis

Nature and Scope of Econometrics-The basic two Variable Regression model: Estimation, Statistical Inference and Prediction. Extensions of two variable regression model – regression through origin, Scaling and units of measurement, Functional forms of regression model- Multiple Regression: The problem of Estimation- Notation and assumptions, meaning of partial regression coefficients the multiple coefficient of determination R^2 and the multiple coefficient of correlation R, R^2 and adjusted R^2, partial correlation coefficients, Interpretation of Multiple Regression Equation. Properties of MLE and Estimation.

Module 2: The Problem of Inference

The normality assumption, Hypothesis testing about Individual Partial Regression coefficients, testing the overall significance of the sample regression, testing the equality of two regression coefficients, restricted least squares, testing for structural stability of regression models, testing the functional form of regression.

Module 3: Relaxing the assumptions of the Classical Linear Regression Model

Multicollinearity, Heteroscedasticity and Autocorrelation- Nature, Consequences, Detection and Remedial Measures. Model selection criteria, types of specification errors, tests of specification errors, Errors of measurement.

Module 4: Regression on Dummy Variables

The nature of Dummy variables, regression on one quantitative variable and one qualitative variable, regression on one quantitative variable and one qualitative variable with more than two classes, regression on one quantitative variable and two qualitative variables, testing for structural stability regression models, Interaction effects, piece wise linear regression, the use of dummy variables- Binary choice model – LPM, problems in LPM, Probit and Logit Model

Module 5: Dynamic Econometric Models:

Autoregressive and Distributed Lag models: role of lag in economics, estimation of distributed lag models-Koyck, Rationalisation of the Koyck Model and Almon approach to distributed lag models. Nature and Preliminary analysis of economic time series, Integration, Tests of Stationarity, unit root test, Non-stationarity and the problem of spurious regression.

Readings:

1. Gujarathi, D (2003) Basic Econometrics, 4th Edition, New York: McGraw Hill
2. Greene, W. (2003), 'Econometric Analysis', 5th edition, Prentice Hall
3. Johnston, J. (1984) Econometric methods, 3rd edition, New York: McGraw Hill.
4. Maddala, G (1992) Introduction to Econometrics, 2nd ed., New York: MacMillan.

ECONOMICS OF GROWTH AND DEVELOPMENT

Module 1:

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

Module 2:

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

Module 3:

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

Module 4:

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

Module 5:

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

Readings:

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

MICROECONOMIC ANALYSIS: II

Module 1: Alternative Theories of the firm

Critical evaluation of marginal analysis; Baumol's sales revenue maximization model; Williamson's model of managerial discretion; Marris model of managerial enterprise; Behavioral model of Cyert and March

Module 2: Advances in Distribution Theory

Macro theories of distribution-Ricardian, Marxian, Kalecki and Kaldor's -Staffa model-Neo-classical approach- Marginal productivity theory; Product exhaustion theorem; Elasticity of technical substitution, technical progress and factor shares; Theory of distribution in imperfect product and factor markets; Determination of rent, wages, interest and profit;

Module 3: Welfare Economics

Pigovian welfare economics; Pareto optimal conditions; value judgement; social welfare Function; Compensation principle; Inability to obtain optimum welfare – Imperfections, market failure, decreasing costs, uncertainty and non-existent and incomplete markets; Theory of Second Best- Arrow's impossibility theorem; Rawl's theory of justice, equity-efficiency trade off

Module 4: General Equilibrium Theories

Partial and general equilibrium; Walrasian excess demand and input-output approaches to general equilibrium existence- stability and uniqueness of equilibrium – general equilibrium, coalitions and monopolies; production without consumption- One sector model, homogeneous functions, income distribution; production without consumption-Two sector model, relationship between relative commodity and factor prices (Stopler Samuelson theorem), relationship between output mix and real factor prices, effect of changes in factor supply in closed economy (Rybczynski theorem), production and consumption.

Module5: Economics of Uncertainty

Individual behaviour towards risk, expected utility and certainty equivalence approaches, risk and risk aversion- sensitivity analysis, gambling and insurance, the economics of insurance, cost and risk, risk pooling and risk spreading, mean-variance analysis and portfolio selection, optimal consumption under uncertainty, competitive firm under uncertainty, factor demand underprice uncertainty. The economics of search- different models, the efficient market hypothesis, stochastic models of inventory demand; market with incomplete information, search and transaction cost. The economics of information

Readings:

1. Koutsoyiannis, A. (2005) - Modern Microeconomics, Macmillan press, London
2. Layard, P.R.G. and Walters, A.W. (2001) - Microeconomic Theory, McGraw Hill, London.
3. Sen A(2005). - Microeconomics: Theory and Application, Oxford University Press, New Delhi
4. Stigler,G (2008). - Theory of Price, PHI, New Delhi
5. Varian, H.R.(2005) - Microeconomic Analysis, W.W.Norton, NewYork
6. Baumol,W.J (1998). - Economic Theory and Operations Analysis, Prentice Hall, New York
7. Pindyck and D. Rubinfield (2005) - Microeconomics, East West Press, London
8. Nicholson Walter (2007)- Microeconomic Theory, The Drydon Press, London
9. E.K .Browning and J.M. Browning (2003) - Microeconomics; Theory and Applications, Kalyani Publisher, New Delhi.

MACROECONOMIC ANALYSIS II

Module 1: The Labour Market

Profit Maximization and Labour Demand – Utility and Labour Supply – Aggregate Supply with/without Money Illusion – Neoclassical Labour Market Equilibrium – Introducing Unemployment – Principles of Effective Demand - The Keynesian Underemployment Equilibrium.

Module 2: Inflation and Unemployment

The Phillip's Relationship – Theoretical Underpinnings of Phillip's Curve –Natural Rate Hypothesis – Theory of Adaptive Expectation – Expectation Augmented Phillip's Curve – The Rational Expectation and Luca's Supply function – Policy Ineffective Theorem – The Lucas Critique – Rational Expectation and Implications of Monetary Policy.

Module 3: Theories of Business Cycles

Multiplier-Accelerator Interaction Model – Monetarists Interpretation of Business Cycles – Real Business Cycle Theory – Political Business Cycle Model.

Module 4: The Post Keynesian Macroeconomics

Walrasian and Keynesian Adjustment mechanism – Reinterpretation of Keynes – Dual Decision Hypothesis – Neo-Keynesian Quantity Constraint Models – Micro Theoretic foundations for Wage and Price Rigidity – Small Menu Cost – Efficient Wage Theory – Staggered Wage Setting – Insider-Outsider Model – Models of Coordination Failure.

Module 5: Recent Advancements in Macroeconomic Policies

The Debate over Rules vs. Discretion – Taylor's Rule and Monetary Policy – Inflation Targeting – Issues Relating to Inflation Targeting – Country Experiences with Inflation Targeting.

Readings:

1. Rosalind Levacic and Alexander Rebmann (1982), Macroeconomics: An Introduction to Keynesian – Neoclassical Controversies, Macmillan.
2. Errol D'Souza (2008), Macroeconomics, Pearson.
3. David Romer (1996), Advanced Macroeconomics, McGraw-Hill.
4. David, G Pierce and Peter J Tysome (1985), Monetary Economics: theories, evidence and policy, Butter worths.
5. Laidler, D.E.W. (1984), The Buffer Stock Notion in Monetary Economics, Economic Journal 94, 17-34.

STATISTICAL METHODS IN ECONOMICS

Module 1: Sampling Theory

Population and sample- Parameter and statistic-(Census method and sampling method of Data collection); Objects of Sampling- Methods of Sampling- Random and Non- Random; Techniques of sampling under each method- Sampling error and Non-Sampling error-Sampling distribution of a Statistic-Law of Statistical Regularity-Law of Inertia of Large Numbers-Central limit theorem

Module 2: Mathematical Expectation

Random variable-Discrete and continuous- Probability function of discrete Random Variable (Probability Mass Function)- Probability function of Continuous Random Variable (Probability Density Function)- Cumulative Distribution function; Mathematical Expectation-Theorems on Mathematical Expectation-Variance- Theorems on Variance

Module 3: Theory of Estimation

Meaning and concept of an Estimation-Concept of Estimator-Types of Estimation-Point and Interval Estimation- Desirable properties of an Estimator-Standard error of Estimator-Confidence limits for a population parameter

Module 4: Theoretical Distribution

Definition-types of theoretical distribution-Discrete theoretical distribution-Binomial Distribution-Poisson distribution; Continuous theoretical Distribution-Normal Distribution-Standard Normal Variate -Z distribution; Other Theoretical Distribution-Students "t" Dostribution-Chi-Square (χ^2) Distribution- F-Distribution

Module 5: Statistical Inference

Formulation of Statistical Hypothesis; Testing of Hypothesis-Null Hypothesis and Alternative Hypothesis-Stages in Hypothesis testing-Types of Error in Hypothesis testing-Type I error and Type II error-Level of Significance and confidence coefficient-Critical region or rejection region; Two tailed test and one-Tailed Test; Computation of Test statistic and significance Test-small sample test-'t' Test- χ^2 test- F test; Large sample test- Z test; Test of Significance concerning correlation coefficient; Power of Test; Analysis of Variance

Readings:

1. Speigal.M. R. (1992), Theory and problems of Statistics, McGraw Hill, London.
2. Monga,G.S. (1972), Mathematics and Statistics for Economists, Vikas Publications, New Delhi.
3. Gupta.S.C. (1993) Fundamentals of Applied Statistics, S.Chand, New Delhi.

APPLIED ECONOMETRICS

Module 1: Applied Consumption Demand Analysis

Engel curves, complete demand models; general and particular restrictions on demand functions, specification, estimation and applications of complete demand systems; Measures of economic inequality.

Module 2: Production Analysis

Relationship among production, cost and profit functions, specification, estimation and applications; frontier production functions, measurement of multifactor productivity.

Module 3: Dynamic Economic Models

Role of lags in economics – Estimation of Distributed Lag models – Adaptive Expectation models – Partial adjustment model – Method of instrumental Variable – Autoregressive model – Durbin h test – Almon approach to Distributed lag models – Casualty in Economics. Difference and trend stationary processes; unit roots; co integration; Granger causality; macro econometric models and critical review of existing Indian macro econometric models after 1990.

Module 4: Applications of Qualitative and Limited Dependent Variable Models

The nature of Qualitative response model - Logit and Probit models, Tobit model, Multinomial Logit, Nested Multinomial Logit Model

Module 5: Panel Data Models

Introduction – Estimation of panel data models – Fixed effects model – random effect model.

Readings:

1. D. N Gujarati (2003), Basic Econometric Methods, McGraw Hill, New York, 2004
2. Greene, W. (2003), 'Econometric Analysis', 5th edition, Prentice Hall
3. Nachane D.M (2006), Econometrics: Theoretical Foundation and Empirical Perspective

PUBLIC ECONOMICS

Module 1: Public Choice

Problems of preference revelation and aggregation of preferences; Voting systems; Arrow impossibility theorem; An economic theory of democracy; Politico-eco-bureaucracy; Rent seeking and directly unproductive profit seeking (DUP) activities.

Module 2: Rationale for Public Policy

Demand revealing schemes for public goods — Contributions of Clarks, Groves and Leyard, Tiebout model, theory of club goods; Stabilization Policy — Keynesian case for stabilization policy; Uncertainty and expectations; Failure of inter-temporal markets; Liquidity preference; Social goals; Poverty alleviation; Provision of infrastructural facilities, removing distributional inequalities and regional imbalances.

Module 3: Taxation and Public Debt

Trade off between equity and efficiency in Taxation ; Theory of measurement of dead weight losses; The problem of double taxation. Classical view of public debt; Compensatory aspect of debt policy; Burden of public debt; Sources of public debt;

Module 4: Fiscal Policy

Objectives of fiscal policy — full employment, anti-inflation, economic growth, redistribution of income and wealth; Interdependence of fiscal and monetary policies; Budgetary deficits and its implications; Fiscal policy for stabilization — automatic vs. discretionary stabilization; Alternative measures of resource mobilization and their impact on growth, distribution and prices; Balanced budget multiplier.

Module 5: Indian Public Finances

Lack of flexibility in Central and State budgets, shrinking size of development finance through budgets; Trends in public expenditure and public debt; Fiscal crisis and fiscal sector reforms in India; Reports of Finance Commissions in India.

Readings:

1. Goode, R. (1986), Government Finance in Developing Countries, TMH, New Delhi
2. Jha. R. (1998), Modern Public Economics, Routledge, London.
3. Musgrave, R.A. and P.B. Musgrave (1976), Public Finance in Theory and Practice, McGraw Hill, Kogakusha, Tokyo
4. Atkinson, A.B. and J.E. Stiglitz (1980), Lectures on Public Economics, TMH, New York.
5. Herber, B.P. (1967), Modern Public Finance, Richard D. Irwin, Homewood.
6. Stiglitz, J.E (2000), Economics of the Public Sector.

INTERNATIONAL TRADE AND FINANCE

Module 1: Foreign Exchange Rate

Foreign Exchange; Foreign Exchange Rate; Foreign Exchange market and exchange rate determination; functions of foreign exchange markets, uses of the foreign exchange Market; Theories of Foreign Exchange rate-the Mint parity theory; the Purchasing power parity Theory; The Balance of payment Theory; Monetary approach to the purchasing parity Theory

Module 2: Foreign Exchange market

Introduction; Structure and Functions of foreign Exchange market; Methods of Foreign payments; Concepts of Spot and Forward exchange Rate; Determinants of Exchange Rate under Fixed and Flexible Exchange Rate; Regime and Role of hedging in the determination of exchange rate; Theory of Interest Rate parity

Module 3:.Open Economy Macro-Economics

Determination of output, interest rates and exchange rates in the long and short runs; Macro-economic policy in an open economy and international policy coordination: fixed and Flexible exchange rates.

Module 4: International Monetary Institutions and Issues

Rise and Fall of Gold Standard; Bretten woods system, International Liquidity; Need, Objectives of IMF, The Subsequent Reforms of IMF; Currency crises, stabilization and other contemporary issues.

Module 5: Trade Situations in 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 BOP; Employment and growth; Trade policy and Welfare with special reference to Developing countries; Instruments of Export Promotion and Recent Import and Export policies and Agenda for Future.

Readings:

1. Paul Krugman and Maurice Obstfeld (2006), International Economics: Theory and policy, latest edition
2. Salvatore D (1997), International Economics, PHI, New York
3. Dana ,M.S (2000), International Economics ,Routledge Publications ,London
4. Carbough ,R.J (1999), International Economics
5. Bhagwati.j (1981), International Trade, Cambridge University Press, London

COMPUTER APPLICATIONS IN ECONOMIC ANALYSIS

Module 1: Overview of Computer & Dealing with data

Basic operating instructions – Describing the data to RATS and E-views software packages – SPSS – Reading the data – Computing statistics – Displaying the data – Data transformations and creating new series – Graphing the data – Using SRC file in the RATS package - The tools – Where are your data now? Missing data – RATS format – Error messages – Familiarity with different data base such as: PROWESS, Capital online, HBS, National Sample Survey Organization reports, Census data – National Health and Family Welfare reports - Displaying graphs on the screen – Saving and operating graphs – Printing graphs – Labeling graphs – Overlay (two scale) graphs – Multiple graphs on a page.

Module 2: Scalars, Matrices and Functions

Working with scalars – Getting information from RATS – The RATS Data types – Basic Data types – The Aggregate Data types – Matrix calculations.

Module 3: Linear Regression & Hypothesis Testing

Annotated regression output – Extensions to linear regression; A framework – Heteroscedasticity – Serial correlation – Example 5.1 – Instrumental variables – Example 5.2. Polynomial distributed lags – Example 5.3. Choosing lag length information criteria – Example 5.4. Grunfeld's investment equations; Use of SUR - Example 6.1. - Testing for Heteroscedasticity – Serial correlation – Granger – Sims casuality/Exogeneity tests – Chow or structural stability tests.

Module 4: Non Linear Estimation

General principles and problems – Newton-Raphson and related methods – Setting up your model; Non-linear least squares/Two stage least squares; Example 7.1. Generalized instrumental variables.

Module 5: Introduction to Forecasting

Introduction – Forecast performance – Univariate forecasting – Box-Jenkins models – ARIMA procedures.

Readings:

1. Applied Econometric Time Series (1995), John Wiley & Sons, New York.
2. Box,G.E.R. and Jenkins,G.M.(1976), Time Series Analysis, Forecasting and Control, Holden Day, San Francisco.
3. Hamilton. J. (1994), Time Series Analysis, Princeton University, Princeston.

RESEARCH METHODOLOGY

Module 1:

Meaning of research- objectives of research - Approach to research- Significance of research - Types of research- Research in social science - Facts, theories and concepts in social science research - Research Design - features of a good research design.

Module 2:

Research problem – Identifying the research problem – formulation of research problem, concept of hypothesis- role and formulation of hypothesis- scientific methods of research- nature of scientific research- stages of scientific methods.

Module 3:

Logic and Scientific method- deductive and inductive methods- the case study methods- merits and demerits of case study methods- survey methods- merits and demerits of survey methods- type of survey- selecting the survey method – sample survey different types – merits and demerits.

Module 4:

Schedule and questionnaire – principle underlying the construction of questionnaire- measurement and scaling techniques- processing and analysis of data

Module 5:

Interpretation and report writing- steps- bibliography quality of a good research report.

Readings:

1. C.R. Kothari (1985),- Research Methodology, Wiley Eastern Ltd., New Delhi.
2. W. G. Cochran (1977)- Sampling Technique, John wiley, New York.
3. W.J. Goode and P.K. Hatt (1952) - Methods in Social Research, McGraw Hill, New York.
4. T.S. Wilkinson and P.L. Bhandarkar (1994) Methodology and Techniques of social Research, Himalaya Publishing
5. Earl Babies (2006), The practice of Social research, Wadsworth Publishing

INDIAN ECONOMY: ISSUES AND POLICIES – I

Module I: Resource Development in India

Resource profile of India-policies relating to the development of land, forest, water, fisheries and mineral resources of India- Economic development and Environmental degradation- Land degradation and soil erosion- Deforestation – Faulty utilization of water resources – Mining effects- Atmospheric pollution – Measures taken -Global climate change and India-various Global summits and their implications to India

Module II: Profile of Human Resources of India

Characteristics of Indian Population - qualitative and quantitative aspects – Population as a factor of development- Population policy –National population Policy (2000), Demographic dividend- Human Development during the plan period- Appraisal of Government measures – Human Development Index of States and India – India's Human Development record in global perspective.

Module III: Infrastructure Development in India

Infrastructure and Economic development -Economic Infrastructure –Energy, Power, Transport, communication, science and technology-policies pertaining to Economic Infrastructure Development –Financing of infrastructure development –PPP model-Financing institutions-international collaborations -Social Infrastructure-Education, Health – Achievements and failures of Education and Health systems of India –outlook for future development of social Infrastructure

Module IV: Planning Economic Development

Alternative development strategies- goal of self reliance based on import substitution and the post 1991 globalization strategies based on stabilization and structural adjustment packages – Indicative planning – Decentralized planning – District planning- Local planning- Panchayat Experience -73rd and 74th constitutional Amendments- critical Evaluation of Plan performance in India.

Module V: Agriculture and Rural Development

Current issues in Indian Agriculture-New thrust Areas in agriculture and future prospects of Green Revolution- Commercialization and diversification -Food security issues-Pricing of agricultural inputs and outputs-subsides in Agriculture-Economic Reforms and Agriculture-Impact of WTO on Indian Agriculture – Food processing- Agricultural policies- Public Distribution System- Agricultural finance -, Agriculture inputs - marketing and warehousing – policies for sustainable Agriculture- Impact of public Expenditure on Agricultural Growth – Rural Development programmes including poverty alleviation programmes- Bharat Nirman, Mahatma Gandhi National Rural Employment Guarantee programme – Water Supply, Sanitation, Public Health Programmes.

Readings:

1. Ahluwalia. I.J. and I.M.D Little (Eds) (1999), India's Economic Reforms and Development, Oxford University Press (OUP), New Delhi.
2. Bardhan, P.K. (1999), The Political Economy of Development in India, OUP, New Delhi.
3. Bawa,R.S. and P.S. Raikhy,(1997), Structural Changes in Indian Economy, Gurunanak Dev University press, Amritsar.
4. Chakravarty, S. (1987), Development planning: The Indian Experience, OUP, New Delhi.
5. Datt.R. (2001), Second Generation Economic Reforms in India, Deep & Deep Publications.
6. Ruddar Datt and K.P.M. Sundaram. (2008), Indian Economy, Sultan Chand and Co, New Delhi

CONTRIBUTIONS BY NOBLE LAUREATES I

Module 1: Welfare Economics

John Hicks; Kenneth Arrow; James Buchanan; Amertya K Sen; Leonid Kantorovich; Tjalling Koopmans

Module 2: Open Economy Macroeconomics, Theory of General Equilibrium and Development of National Accounts

Bertin Ohlin; James Meade; Robert Mundell; Paul Krugman; Gerard Debreu; Richard Stone

Module 3: Theory of Money, Economic Fluctuations and Policy

Gunner Myrdal; Friedrich Hayek; Milton Friedman; Lawrence Klein; Robert Lucas; Finn E Kydland; Edward C Prescott; Edmund Phelps

Module 4: Economic Organizations, Game Theory and Decision Making

Herbert Simon; John Harsanyi; John Forbes Nash; Reinhard Selten; Robert Aumann; Thomas Shelling

Module 5: Tools in Economics and Mechanism Design Theory

Ragnar Frisch; John Tinbergen; Paul Samuelson; Wassily Leontief; Trygve Haavelmo; James Heckman; Robert Engle; Clive Granger; Leonid Hurwicz; Eric Maskin; Roger Myerson

Readings:

1. Lindbeck, Assar (ed.) (1992), Nobel lectures in economic sciences 1969-1980, World Scientific,London.
2. Maler,Karl-Goram (ed.) (1992), Nobel lectures in economic sciences 1981-1990, World Scientific, London.
3. Puttaswamaiah (1995), Nobel Economists, Vol.2 1975-85, Indus Publishing Company, New Delhi.

INDIAN ECONOMY: ISSUES AND POLICIES - II

Module 1: Industrial Development

Critique of industrial policies-industrial reforms-Sources of Industrial finances- Banks, share market, Insurance companies, Pension funds, Non-banking sources and Foreign Direct Investment (FDI) – Role of Foreign Capital for direct investment and portfolio investment-Mulitnationals – reform of public sector enterprises-privatization and disinvestment debate-globalization and its impact on industrial development- regional disparities in industrial and structural growth -issues facing small scale sector-unorganized sector- Reservation policy relating to small scale Industries- Industrial relations and Labour welfare-National commission on labour- issues in labour market reforms.

Module 2: India's External Sector

Foreign Trade: Salient features of India's Foreign trade- composition, direction and Organisation of Trade – New Economic policy and trade: Intellectual Property Rights, Implications of TRIPS, TRIMS, GATS and New EXIM policy- Impact of WTO on various aspects of Indian Economy- Balance of Payments, tariff policy- New Exchange Rate Regime: Partial and full convertibility, Capital Account convertibility, Exchange rate and WTO requirements

Module 3: Indian Public Finance

Finances of central and state governments-an overview of central budgets-trends-public debt of India-deficit financing in India-fiscal reforms – Fiscal Responsibility Act-recommendations of tax and expenditure commissions-centre-state financial relations- Constitutional provisions relating to fiscal and financial powers of the states – financial aspects of Sarkaria Commission –The Finance commission awards-thirteenth finance commission award-centre-state conflict on finances

Module 4: Financial System in India

Money and capital markets- Changing role of RBI -financial sector reforms-monetary policy of RBI and interest rate polices- issues of commercial banks-stock exchange-working of SEBI and capital market reforms- Development finance Institutions, foreign banks and non banking financial institutions-Analysis of price behavior in India-policies of price control

Module 5: Current Indian Economic Issues

Adverse impact of Economic Reforms (privatization, liberalization and globalization)- impact of global financial crisis on the Indian economy-response of India to global crisis-Decelerating agricultural growth- Causes of environmental degradation-jobless growth and unemployment –inequality and economic power- poverty and deprivation-parallel economy-Growing regional inequalities- Rural urban disparities- problems of urbanization and migration- Balance of payments crisis -Growing fiscal deficit

Readings:

1. Ahluwalia. I.J. and I.M.D Little (Eds) (1999), India's Economic Reforms and Development, Oxford University Press (OUP), New Delhi.
2. Bardhan, P.K. (1999), The Political Economy of Development in India, OUP, New Delhi.
3. Bawa,R.S. and P.S. Raikhy,(1997), Structural Changes in Indian Economy, Gurunanak Dev University press, Amritsar.
4. Chakravarty, S. (1987), Development planning: The Indian Experience, OUP, New Delhi.
5. Datt.R. (2001), Second Generation Economic Reforms in India, Deep & Deep Publications.
6. Ruddar Datt and K.P.M. Sundaram. (2008), Indian Economy, Sultan Chand & Co, New Delhi

ECONOMICS OF EDUCATION

Module 1: Theory of Human Capital Formation

Concept of human capital forms of human capital – human capital and economics growth – measures of human capital – limitations of human capital approach

Module 2: Education and Human Capital Formation

Education as an economic good. consumption and investment aspects of education- private and social benefit of education – contribution of education to economic development – the methods of schults and education and human values.

Module 3: Demand For Education

Education and productivity – private and social demand for education- investment in education – rate of return analysis – private and social rates of return – limitations of rate of return approach – rate of return and earnings distribution – equity aspects.

Module 4: Supply of Educational Facilities

Components of educational supply – private and public facilities – pattern of organization and operation of education industry – organization and operation of different limitations of production function analysis.

Module 5: Financing of Education

Private resources in education and their limitations – rationale behind public involvement in education – forms of public financing subsidization, secondary, and post – secondary education in india – trends and issues – The New Education Policy.

Module 6: Education and Manpower Planning

Importance of educational and manpower planning in development and less – development countries – the operation of markets for unskilled and skilled labour – approaches to educational and manpower planning cost benefit approach – O.E.C,D. approach – M.R.P. approach – educational planning in E.D.C's – educational planning in India.

Module 7: Migration and On-the-Job Training

Migration and human capital formation – labour market and migration in India – on-the-job training and skill formation.

Readings

1. Mark Blaug,(2000) Economics of Education
2. K.Venkatasubramanian,(1998) Education and Economic Development of Tn.
3. G.S.Parnes, Planning Education for Economic Social Development.
4. Cohn,(2005) Economics of Education.
5. Tilak(2006), Economics of Inequality in Education
6. Sudha V.Rao (2003), Education and Rural Development
7. Theodore W. Schultz (1999) , Investment in Human Capital
8. Nalla Gounden A.M.(1998), Education And Economic Development

FINANCIAL ECONOMICS

Module 1: Expected Utility Theory and Choice under Uncertainty

The Economic properties of utility functions – concept & measures to model attitudes towards risk – Expected utility maximization – Risk aversion – Motivation – First order stochastic dominance – Second order stochastic dominance - stochastic dominance Vs dominance – risk: Risk versus return: Mean – variance analysis.

Module 2: Risk , Asset Pricing Models and term Structure of Interest Rate

Trade- off between risk and return (the Markowitz model) – Efficient frontier of risky assets – Value at risk of a portfolio – computing VAR – Definition of VAR - Security market line – standard and Zero Beta CAPM – Empirical evidence on CAPM – Deriving APT- Measuring performance using APT - Drawing the term structure – Methods of computing the yield to maturity – Market expectations theory of the term structure – yield curve analysis – Liquidity preference theory of the term structure – Market segmentations theory of the term structure – Estimating the expected return of a bond for portfolio analysis.

Module 3: Models of Securities Prices in Financial Markets

Single period models – Asset dynamics – Portfolio and Wealth process – Multi-period models – General model specifications – Cox-Ross Rubinstein Binomial model – Continuous time models – Simple facts about the Merton Black-Scholes model – Brownian Motion process – Diffusion process – Stochastic Integrals – it's rule.

Module 4: Efficiency & Volatility in Financial Markets

Three forms of EMH and their implications for financial markets – Random walk – Martingales - Causes of Volatility – volatility testing.

Module 5: Option: Features and Price Bounds

Basic taxonomy of option analysis – Payoff structure of an option – Price Bounds for Options (depending on their type, the time left to expiry and their strike price) – put – call parity relationship - Risk Neutral pricing – basic notions of Binomial – Multinomial – Black-Scholes Pricing – What the hedge ratio ('Delta') – Gamma – Vega Theta – Rho means.

Readings:

1. D.G. Luenberger (1998), Investment Science, Oxford University Press, New York.
2. J. Cvitanic and Zapatero F (2004), Introduction to Economics and Mathematics of Financial Markets, MIT Press, Cambridge, London.
3. E. J. Elton and M.J. Gruber (2005), Morden Portfolio Theory and Investment Analysis, Wiley,
4. Z. Bodie, A. Kane and A.J. Marcus (2004), Investments, Irwin McGraw – Hill, London.
5. R. A. Haugen (2001), Morden Investment Theory, Fifth Edition, Prentice Hall,
6. J. C. Hull (2004), Futures and Option Markets, Prentice- Hall, New Jersey

CONTRIBUTIONS BY NOBEL LAUREATES II

Module 1: Institutional Change, Development and Growth

Simon Kuznets; Theodore Schultz; Arthur Lewis; Robert Solow; Robert Fogel; DouglassNorth

Module 2: Markets with Asymmetric Information; Markets and Efficient Utilization of Resources

George Akerlof; Michael Spence; Joseph E Stiglitz; James Mirrlees; William Vickrey; Maurice Allais

Module 3: Financial Markets and Instruments

James Tobin; Franco Modigliani; Harry Markowitz; Merton Miller; William Forsyth Sharpe; Robert C Merton; Myron Schools

Module IV: Behavioural Economics

Daniel Kahneman; Gary Becker; Daniel Mc Fadden; Vernon L Smith

Module V: Economics of Governance; Common Property Rights and Public Regulations

Elinor Ostrom; Oliver Williamson; George Stigler; Ronald Coase

Readings:

1. Lindbeck, Assar (ed.) (1992), Nobel lectures in economic sciences 1969-1980, World Scientific,London.
2. Maler,Karl-Goram (ed.) (1992), Nobel lectures in economic sciences 1981-1990, World Scientific, London.
3. Puttaswamaiah (1995), Nobel Economists, Vol. 2 1975-85, Indus Publishing Company, New Delhi.