COURSE OUTCOMES (COs)

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B.SC. MATHEMATICS
COURSE OUTCOMES

CORE COURSE 1: 1B01MAT SET THEORY, DIFFERENTIAL CALCULUS AND NUMERICAL METHODS

CO1: Understand Relations and Functions

CO2: Understand limit of a function, limit laws, continuity, Inverse functions and their derivatives

CO3: Understand successive differentiation and Leibnitz theorem

CO4: Understand functions of several variables, limit and continuity, partial derivatives, chain rule, homogeneous functions and Euler's theorem on homogeneous functions

CO5: Understand bisection method, Regula-falsi method and Newton-Raphson method to solve algebraic and transcendental equations

CORE COURSE 2: 2B02MAT INTEGRAL CALCULUS AND LOGIC

CO1: Understand Hyperbolic functions

CO2: Understand Reduction formulae for trigonometric functions and evaluation of definite integrals $\int_0^{\frac{\pi}{2}} sin^n x dx$, $\int_0^{\frac{\pi}{2}} cos^n x dx$ and $\int_0^{\frac{\pi}{2}} sin^v x cos^q x dx$.

CO3: Understand Polar coordinates

CO4: Understand Double integrals in Cartesian and polar form.

CO5: Understand triple integrals in rectangular, cylindrical and spherical co-ordinates

CO6: Understand Substitution in multiple integrals

CO7: Understand Numerical integration: Trapezoidal rule, Simpson's 1/3rd rule

CO8: Understand Logic and methods of proofs

CO9: Understand Propositional functions, truth set and Negation of quantified statements

CORE COURSE 3: 3B03MAT ANALYTIC GEOMETRY AND APPLICATIONS OF DERIVATIVES

CO1: Understand cartesian equation of conics, eccentricity, polar equations for a conic, lines, circles

CO2: Understand Tangents, Normals and Asymptotes

CO3: Understand Curvature, Radius of curvature ,Centre of Curvature, Circle of curvature and Evolutes of Cartesian and polar curves,

CO4: Understand Rolle's Theorem, Lagrange's Mean Value Theorem, Cauchy's Mean Value Theorem and Taylors Theorem

CO5: Understand extreme values of functions, monotonic functions, first derivative test , concavity and curve sketching

CO6: Understand Indeterminate forms

CORE COURSE 4: 4B04MAT NUMBER THEORY AND APPLICATIONS OF INTEGRALS

CO1: Understand Division algorithm, Greatest common Divisor, Euclidean Algorithm, Diophantine equation ax+by =c.

CO2: Understand Primes and their distribution, fundamental theorem of arithmetic, the sieve of Eratosthenes

CO3: Understand Basic properties of congruence

CO4: Understand Picard's little theorem, Wilson's theorem and Euler's theorem

CO5: Understand Substitution and the area between curves, Arc length, Areas and length in polar co-ordinates

CO6: Understand Volumes using cross sections, volumes using cylindrical shells and areas of surfaces of revolution

CORE COURSE 5: B05MAT SET THEORY, THEORY OF EQUATIONS AND COMPLEX NUMBERS

CO1: Understand finite and infinite sets, Countable and Uncountable sets, Cantor's theorem.

CO2: Understand Roots of equations, Relations connecting the roots and coefficients of an equation, Transformation of equations, The cubic equation, Character and position of roots of an equation.

CO3: Understand Descarte's rule of signs, De Gua's Rule, Limits to the roots of an equation, Rational roots of equations, Newton's method of divisors, Symmetric functions of roots of an equation, Symmetric functions involving only the difference of the roots of f(x)=0, Equations whose roots are symmetric functions of α,β, γ.

CO4: Understand Reciprocal equations.

CO5: Understand Cubic equation, Equation whose roots are the squares of the difference of the roots, Character of the Roots, Cardan's Solution

CO6: Understand Roots of complex numbers, General form of De Moivre's theorem, the nth roots of unity, the nth roots of -1, Factors of xn -1 and xn +1, the imaginary cube roots of unity

CO7: Understand polar form of complex numbers, powers and roots.

CORE COURSE 6: 5B06MAT REAL ANALYSIS I

CO1: Understand Algebraic Properties, Order Properties and Absolute values of $\mathbb{R}$. Understand the Completeness Property of $\mathbb{R}$ and its applications to derive Archimedean Property and Density theorem.
CO2: Understand intervals in the real line.
CO3: Understand Sequences and their Limits, Limit Theorems, Monotone Sequences.
CO4: Understand Subsequences and the Bolzano-Weierstrass Theorem, The Cauchy Criterion.
CO5: Understand Infinite Series, Absolute Convergence.
CO6: Understand Comparison test, Root test, Ratio test, Integral test and Raabe's test for Absolute convergence.
CO7: Understand Alternating series test, Dirichlet's test and Abel's test for Non Absolute convergence.
CO8: Understand Continuous Functions, composition of continuous functions and continuous functions on intervals.

CORE COURSE 7: 5B07MAT ABSTRACT ALGEBRA

CO1: Understand definition and elementary properties of Groups, Subgroups and Cyclic groups
CO2: Understand Groups of Permutations, orbits, Alternating groups and theorem of Lagrange
CO3: Understand group homomorphisms , factor Groups
CO4: Understand Fundamental Homomorphism Theorems
CO5: Understand definition and properties of rings and fields
CO6: Understand Ring homomorphisms and isomorphisms
CO7: Understand zero divisors , integral domains , characteristic of a ring and their properties

CORE COURSE 8: 5B08MAT DIFFERENTIAL EQUATIONS AND LAPLACE TRANSFORMS

CO1: Understand Separable ODEs, Exact ODEs, Linear ODEs, Bernoulli equation and methods to solve these ODEs
CO2: Understand the theorem of Existence and Uniqueness of solutions of first and second order ODEs
CO3: Understand Homogeneous Linear ODEs of Second Order and solve homogeneous linear ODEs of second order with constant coefficients and Euler-Cauchy equation
CO4: Understand Nonhomogeneous ODEs and solve by variation of parameters

CO5: Understand Laplace Transform and inverse Laplace Transformation
CO6: Understand The first and The second shifting theorems and their applications
CO7: Understand the methods to find Laplace transforms of derivatives and integrals of functions
CO8: Understand the method of differentiating and integrating Laplace transform
CO9: Solve ordinary differential equations and integral equations using Laplace transform

CORE COURSE 9: 5B09MAT VECTOR CALCULUS

CO1: Understand lines and planes in space
CO2: Understand curves in space, their tangents, normal, curvature, tangential and normal curvature of acceleration
CO3: Understand Directional derivatives and gradient vectors, tangent planes and differentials. Solve extreme value problems using Lagrange multipliers
CO4: Understand Partial derivatives with constrained variables and Taylor's formula for two variables
CO5: Understand Line integrals. Solve for work, circulation and flux using line integrals
CO6: Understand path independence conservative fields and potential functions
CO7: Understand Green's theorem and solve problems using Green's theorem
CO8: Understand Surface area and surface integrals
CO9: Understand Stoke's theorem and solve problems using Stoke's theorem
CO10: Understand Divergence theorem and solve problems using Divergence theorem

CORE COURSE 10: 6B10MAT REAL ANALYSIS II

CO1: Understand Uniform Continuity, Monotone and Inverse Functions
CO2: Understand Riemann Integral and Riemann-integrable Functions
CO3: Understand Fundamental Theorem of Calculus
CO4: Understand Improper Integrals
CO5: Understand Beta and Gamma Functions and their properties.
CO6: Understand Transformations of Gamma Function and Duplication formula
CO7: Understand Pointwise and Uniform Convergence of sequence of functions and Interchange of Limits
CO8: Understand Series of Functions
CO9: Understand the concept of Metric Spaces

CORE COURSE 11: 6B11MAT COMPLEX ANALYSIS

CO1: Understand Analytic Function, Cauchy–Riemann Equations. Laplace's Equation.

CO2: Understand Exponential Function, Trigonometric Functions, Hyperbolic Functions, Logarithmic functions and General Power of complex numbers
CO3: Understand line integral in the complex plane ,Cauchy's integral theorem , Cauchy's integral formula and derivatives of analytic functions
CO4: Understand convergence of Sequences and Series of complex functions
CO5: Understand power series, functions given by power series, Taylor series, Maclaurin's Series and Laurent Series
CO6: Understand singularities and zeros of complex functions
CO7: Understand residue integration method and integrate real integrals

CORE COURSE 12: 6B12MAT NUMERICAL METHODS, FOURIER SERIES AND PARTIAL DIFFERENTIAL EQUATIONS

CO1: Understand Interpolation techniques: Interpolation with unevenly spaced points, Langrange interpolation, Newton's divided differences interpolation, Finite difference operators and finite differences, Newton's interpolation formulae and Central difference interpolation.
CO2: Understand Numerical differentiation using difference formulae
CO3: Understand Picard's method, Solution by Taylor series method, Euler method and Runge- Kutta methods.
CO4: Understand Fourier Series: Arbitrary period, Even and Odd Functions, Half-Range Expansions and Fourier Integrals.
CO5: Understand Partial Differential eqations, Solution by Separating Variables.
CO6: Understand the use of Fourier Series in solving PDE: D'Alembert's Solution of the Wave Equation. Characteristics and solving Heat Equation by Fourier Series.
CO7: Understand Laplacian in Polar Coordinates

CORE COURSE 13: 6B13MAT LINEAR ALGEBRA

CO1: Understand the concept of Vector spaces, subspaces, linear combinations ad system of equations.
CO2: Understand the concept of Linear Dependence and Linear Independence, Bases and Dimension, Maximal Linearly Independent Subsets and solves problems.
CO3: Understand the concept of Linear Transformations, Null Spaces, and Ranges, The Matrix Representation of a Linear Transformation
CO4: Understand Rank of a matrix, Elementary transformations of a matrix, Invariance of rank through elementary transformations, Normal form, Elementary matrices.
CO5: Understand the concept System of linear homogeneous equations Null space and nullity of matrix, Range of a matrix, Systems of linear non homogeneous equations.
CO6: Understand Eigen values, Eigen vectors, Properties of Eigen values, Cayley-Hamilton theorem.

DISCIPLINE SPECIFIC ELECTIVE COURSE 1: 6B14AMAT GRAPH THEORY

CO1: Understand a graph, subgraph ,different types of graphs and their properties
CO2: Understand and represent graph as matrix
CO3: Understand a path, cycle, trees, bridges and their properties
CO4: Understand cut vertices and connectivity of graphs
CO5: Understand Eulerian graphs, Hamiltonian graphs, The Chinese Postman Problem and The Travelling Salesman Problem
CO6: Understand planar graphs, Euler's formula, The Platonic bodies and Kuratowski's Theorem
CO7: Model real world problems using the concept of graphs
CO8: Solve real world problems using the concept of graphs

DISCIPLINE SPECIFIC ELECTIVE COURSE 2: 6B14BMAT: OPERATIONS RESEARCH

CO1: Understand convex sets, convex functions, their properties, local and global extrema and quadratic forms
CO2: Understand LPP, formulate and solve using graphical method
CO3: Understand General LPP, canonical and standard forms of LPP
CO4: Understand simplex method and solve LPP
CO5: Understand basic solution, degenerate solution, basic feasible solution, optimum basic feasible solution , fundamental properties of solution and simplex method
CO6: Understand primal-dual pair, formulation of dual and duality theorems
CO7: Understand LP formulation of transportation problem and its solution
CO8: Understand Mathematical formulation of Assignment problem and Hungarian Assignment method
CO9: Understand problem of sequencing , Processing 'n' jobs through '2' machines, Processing 'n' jobs through 'k' machines
CO10: Understand basic terms in Game theory, The Maximin-Minimax Principle, Solution of game with saddle point, Solution of 2x2 game without saddle point, Graphic solution of 2xn and mx2 games and Arithmetic method for nxn Games.

DISCIPLINE SPECIFIC ELECTIVE COURSE 3: 6B14CMAT CRYPTOGRAPHY

CO1: Understand Simple Cryptosystems namely, The Shift Cipher, The Substitution Cipher, The Affine Cipher, The Vigenere Cipher, The Hill Cipher, The Permutation Cipher and Stream Ciphers

CO2: Understand basics of Shannon's Theory, Elementary Probability Theory, Perfect Secrecy, Entropy, Huffman Encodings and Entropy, Properties of Entropy, Spurious Keys and unicity Distance, Product Cryptosystems.
CO3: Understand The Euclidean Algorithm, The Chinese Remainder Theorem
CO4: Understand Legendre and Jacobi Symbols and quadratic residues
CO5: Understand The RSA System and Factoring (25 Hours): Introduction to Public-key Cryptography, The RSA Cryptosystem, Implementing RSA, Primality Testing, The Solovay-Strassen Algorithm, The Miller Rabin Algorithm, Square roots modulo n.

DISCIPLINE SPECIFIC ELECTIVE COURSE 4: 6B14DMAT FUZZY MATHEMATICS

CO1: Understand Fuzzy Subsets, L-fuzzy Sets, Visual representation of a Fuzzy Subset, Operations on Fuzzy Subsets, Empty Fuzzy Subset 0
CO2: Understand Universal Fuzzy Subset, Disjoint Fuzzy Subsets, Disjunctive Sum
CO3: Understand α Level Set, Properties of Fuzzy Subsets of a Set, Algebraic Product and Sum of Two Fuzzy Subsets, Properties Satisfied by Addition and Product
CO4: Understand Cartesian Product of Fuzzy Subsets
CO5: Understand Fuzzy Relations, Binary Fuzzy Relations, Binary Relations on a Single Set, Fuzzy Equivalence Relations
CO6: Understand Fuzzy Subgroup, Fuzzy Subgroupoids
CO7: Understand The Lattice of Fuzzy Subgroups, Fuzzy Subgroup, Fuzzy Subrings

DISCIPLINE SPECIFIC ELECTIVE COURSE 5: 6B14EMAT PROGRAMMING IN PYTHON

CO1: Understand the basics of Python Variables, Indentation in Python, Input, Output and Import Functions Operators
CO2: Understand Python programming for numbers, dictionaries and Mathematical functions
CO3: understand Flow control, if, if..else, if,.else , Loops- for loop, range Function, while, Section 3.3 Nested Loop, Break and continue Statements in python.
CO4: Understand Data visualization- The Matplot lib Module, plotting mathematical functions, Famous Curves, 2D plot using colors, Mesh grids, 3D plots using Python
CO5: Understand Python Programming for solving equations using Newton-Raphson's method, bisection Method, Method of false position, Trapezoidal rule of numerical integration Simpson's Three Eighth rule of numerical integration, Euler's modification method to solve first order differential equation, Runge-Kutta method of order 4, Lagrange's Method for Interpolation.

GENERIC ELECTIVE COURSE 1: 5D01MAT - HISTORY OF MATHEMATICS

CO1: Understand the history of Early Number Systems and Symbols.
CO2: Understand the history of Mathematics in Early Civilizations.
CO3: Understand the history of the Beginnings of Greek Mathematics
CO4: Understand the Euclidean Geometry, Euclid's Foundation for Geometry, Euclid's Proof of the Pythagorean Theorem
CO5: Understand Infinity of Primes, Measurement of the Earth , Archimedes, The Ancient World's Genius, contributions of Hardy and Ramanujan, Examination, The Rejuvenation of English Mathematics

GENERIC ELECTIVE COURSE 2: 5D02MAT - QUANTITATIVE ARITHMETIC AND REASONING

CO1: Understand average, Problems on ages, Profit and loss and solves problems
CO2: Understand Profit and loss, Ratio and proportion, Chain rule
CO3: Comprehend Time and work, Time and distance and solves problems
CO4: Comprehend Problems on trains, Boats and streams, Calendar, Clocks

GENERIC ELECTIVE COURSE 3: 5D03MAT - LINEAR PROGRAMMING

CO1: Understand General linear programming problem – canonical and standard forms of L.P.P, Solutions and fundamental properties of solutions of LPP.
CO2: Understand Graphical solution method, Simplex method, Duality in linear programming, Formulating a dual problem.
CO3:Understand General transportation problem, the transportation tables, Loops in transportation table and solves transportation problem
CO4:Understand Degeneracy in transportation problem, Transportation algorithm (MODI method) and solves problems

GENERIC ELECTIVE COURSE 4: 5D04MAT - GRAPH THEORY

CO1: Understand how to transform daily life problems into Graph Theoretical (Mathematical) Models
CO2: Understand the evolution of Graph Theory as a subject
CO3: Understand the representation of Chinese Postman Problem, Marriage Problem, Travelling Salesman Problem and Personnel Assignment Problem
CO4: Understand the concepts of planar graphs and Jordan curve
CO5: Comprehend Problem of colouring maps and Graph Colouring

GENERIC ELECTIVE COURSE 5: 5D05MAT - BUSINESS MATHEMATICS

CO1: Understand the concept of Limit and continuity, methods of finding limits definition, Differentiation- rules of differentiation, Parametric function logarithmic differentiation.
CO2: Understand the Successive differentiation, Local maximum and local minimum and solves problems
CO3: Understand the Rules of integration, Some standard results, Consumer's surplus, Producer's surplus, Consumer's surplus
CO4: Understand rate of interest, Continuous compounding, Compound interest, Present valve, interest and discount, Rate of discount, Equation of value, Depreciation and solves problems

COMPLEMENTARY COURSES

STATISTICS

COMPLEMENTARY ELECTIVE COURSE I: 1C01STA BASIC STATISTICS

CO1: understand the different types of data.
CO2: compute various measures of central tendency, measures of variation.
CO3: analyse the relationship between two variables.
CO4: acquire knowledge in time series data and compute various index numbers.

COMPLEMENTARY ELECTIVE COURSE II: 2C02STA PROBABILITY THEORY AND RANDOM VARIABLES

CO 1: evaluate the probability of events.
CO 2: understand the concept of random variables with examples in real life
CO3: calculate the probability distribution of discrete and continuous random variables.
CO 4: understand the change of variable technique.

COMPLEMENTARY ELECTIVE COURSE III: 3C03STA PROBABILITY DISTRIBUTIONS

CO1: compute mathematical expectation of a random variable.
CO2: familiarize with different discrete probability distribution associated with real life situations.
CO3: understand the characteristics of different continuous distributions.
CO4: identify the appropriate probability model that can be used

COMPLEMENTARY ELECTIVE COURSE IV: 4C04STA STATISTICAL INFERENCE

CO 1: understand the uses of Chebychev's Inequality and Central Limit Theorem.
CO 2: apply various method of estimation

CO 3: understand the concept of testing statistical hypotheses and its importance in real life situation
CO 4: apply ANOVA

COMPLEMENTARY COURSES
COMPUTER SCIENCE

COMPLEMENTARY ELECTIVE COURSE I: 1C01CSC INTRODUCTION TO COMPUTERS AND PROGRAMMING

CO1: Familiarize with the hardware components of a digital computer
CO2: Understand the basic idea of how data is represented in computers
CO3: Familiarize with types of software
CO4: Ability to design algorithmic solutions to problems

COMPLEMENTARY ELECTIVE COURSE II:2C02CSC PROGRAMMING IN C

CO1: Understand the building blocks of C programming language
CO2: Familiarize with program control structures in C
CO3: Learn procedural programming using functions
CO4: Understand user defined data types

COMPLEMENTARY ELECTIVE COURSE III: 3C03CSC WEB TECHNOLOGY WITH DATABASE MANAGEMENT SYSTEM

CO1: Develop skills to design a web page using HTML
CO2: Understand HTML Forms and CSS Styling
CO3: Develop skills to develop database and retrieve data using SQL
CO4: Learn basics of server-side programming with PHP

COMPLEMENTARY ELECTIVE COURSE IV: 4C04CSC COMPUTATION USING PYTHON

CO1: Learn Python for expressing computation
CO2: Familiarize with functions and modules in python
CO3: Understand object-oriented programming concepts
CO4: Learn the techniques for data visualization in python

COMPLEMENTARY ELECTIVE COURSE V: 4C05CSC LAB 1 – PROGRAMMING IN C, WEB PROGRAMMING AND PYTHON PROGRAMMING

CO1: Achieve skills to use C language for problem solving
CO2: Understand SQL and basic web programming
CO3: Achieve skills to use Python for problem solving

B.A. SOCIAL SCIENCE - ECONOMICS

COURSE OUTCOME

CORE COURSE -1: 1B01SSE INTRODUCTION TO SOCIAL SCIENCE

CO1: Get a conceptual understanding of the various approaches in social sciences

CO2: Understand the philosophy of social science as a discipline and its significance in addressing contemporary issues at various levels.

CO3: Understand the philosophy of social science as a discipline and its significance in addressing contemporary issues at various levels.

CO4: Grasp the philosophy of critical perspectives in social sciences.

CORE COURSE -2: 2B02SSE MATHEMATICAL METHODS FOR ECONOMICS

CO1: Equip with the basics of mathematical tools and their application for better

understanding and interpretation of economic theory.

CO2: Understand the mathematical concepts that are used in the study of economics at UG level.

CO3: Acquire skills in applying mathematical concepts that are indispensable for in depth study of theoretical as well as empirical economics.

CORE COURSE -3: 3B03SSE DEVELOPMENT OF ECONOMIC IDEAS

CO1:Conceptualize the economic philosophy in a historical perspective

CO2: Develop heterogeneous and critical thinking in economics

CO3: Identify & evaluate the major ideas associated with each group of thinkers studied, and thereby better comprehend the origins of contemporary theory.

CORE COURSE -4: 3B04SSE QUANTITATIVE TECHNIQUES FOR ECONOMIC ANALYSIS

CO1: Understand the basic quantitative statistical methods used for descriptive and inferential statistics.

CO2: Use statistical tools (correlation & regression) and interpret

CO3: Analyse data and draw inferences and conclusions.

CORE COURSE -5: 4B05SSE MICRO ECONOMIC THEORY

CO1: Understand the conceptual foundations of microeconomics essential for further theoretical exercises and for dealing with real life economic issues

CO2: Understand the basics of demand and analyze how consumers behave in a market setting in the light of theories of consumer behaviour and choice

CO3: Enhance the understanding on production and cost of production.

CO4: Evaluate the dynamics of various commodity and input markets

CORE COURSE -6: 4B06SSE MACRO ECONOMIC THEORY

CO1: Develop an introductory understanding of macroeconomic variables, concepts, topics and their role in addressing macroeconomic problems.

CO2: Ientify and compare diverse thoughts and perspectives on the working of an economy.

CO3: Analyse the role of fiscal and monetary policy for stabilizing the economy, via, controlling inflation, promoting full employment and facilitating economic growth.

CO4: Integrate critical thinking and research inquisitiveness to their learning.

CORE COURSE -7: 5B07SSE INTERNATIONAL ECONOMICS

CO1:Discuss and explain contemporary and day-to-day international economic policy issues based on theory and empirical evidence.

CO2: Understand the models of international trade to undertake advanced studies in international trade theory.

CO3: Understand the institutional framework within which the different countries interact among each other.

CO4: Evaluate the trends in international trade protectionism measures.

CORE COURSE -8: 5B08SSE PUBLIC ECONOMICS

CO1: Understand the economics of government expenditure and taxation

CO2: Describe the effects of taxation on production, distribution and economic stability, and to understand the role of public expenditure in a developing country

CO3: Comprehend project reports and journal articles that make use of the concepts and methods learnt in this course.

CO4: Analyse policy challenges and learn to find solutions to these challenges

CORE COURSE -9: 5B09SSE HETERODOX ECONOMICS

CO1: Familiarise different perspectives of economic thought and to develop a holistic understanding of economic theory and policy.

CO2: Enhance and diversify their knowledge profile and get opportunities to pursue higher studies and research in heterodox economics.

CORE COURSE -10: 5B10SSE RESEARCH METHODOLOGY OF SOCIAL SCIENCES

CO1: Get an initiation to the field of academic research.

CO2: Bridge the gap between theory and empirics and familiarize with the use and importance of data in research

CO3: Imbibe the importance of scientific research in economics based on academic honesty, integrity and ethics

CO4: Acquire skills in handling statistical software.

CORE COURSE -11: 5B11SSE BASIC ECONOMETRICS

CO1: Acquire knowledge regarding the concepts and language of econometrics through a comprehensive introduction to basic econometric concepts, methodology and techniques of analysis.

CO2: Analyse real data with the help of econometric tools.

CO3: Develop analytical skills substantially by undertaking econometric analysis.

CORE COURSE -12: 6B12SSE CENTRAL THEMES IN INDIAN ECONOMY

CO1: Understand the features, basic structure and working of Indian economy

CO2: Identify the strategic drivers in the development of Indian Economy.

CO3: Analyse the qualitative and quantitative data relating to various economic issues and policies.

CO4: Comprehend and critically appraise the current problems and policies relating to Indian economy.

CORE COURSE -13: 6B13SSE DEVELOPMENT ECONOMICS

CO1: Understand the development trajectories and basic concepts of economic development in a multidimensional perspective.

CO2: Acquire knowledge about the dynamics of development.

CO3: Examine the core issues and theories in economic development and growth.

CORE COURSE -14: 6B14SSE ENVIRONMENTAL ECONOMICS

CO1: Understand the concepts of ecosystem, biodiversity, and conservation methods.

CO2: Understand the economic incentives to improve and conserve the environment.

CO3: Examine international environmental problems, disaster management, mitigation, and adaptation measures.

CO4: Evaluate environmental valuation, environmental policy and sustainable development efforts.

CORE COURSE -15: 6B15SSE GENDER AND DEVELOPMENT

CO1: Get conceptual clarity related to the term gender and development.

CO2: Understand gender difference in economic participation in India and Kerala.

CO3: Familiarise international initiatives related to women and development.

CO4: Conceptualize the household production unit in a theoretical framework.

CORE COURSE -16: 6B16SSE PROJECT

CO1: Execute the preliminary steps and processes involved in scientific academic

research

CO2: Develop an attitude towards evidence based social science research

GENERIC ELECTIVE COURSE -1: 5D01SSE BASICS OF ECONOMICS

CO1: understand the basic concepts of economics in everyday life

CO2: evaluate major economic issues in and around them

GENERIC ELECTIVE COURSE II: 5D02SSE DEVELOPMENT ISSUES OF INDIAN ECONOMY

CO1: develop a comprehensive perspective on the development issues confronted by Indian economy.

CO2: apply economic theories and concepts for understanding contemporary development issues.

GENERIC ELECTIVE COURSE III: 5D03SSE KERALA ECONOMY

CO1: understand the structural changes in Kerala Economy.

CO2: evaluate the developmental issues of Kerala Economy.

GENERIC ELECTIVE COURSE IV: 5D04SSE FUNDAMENTALS OF BUDGET

CO1: understand budget and the basic concepts, apart from budgetary procedures

CO2: acquire basic knowledge about the sources of revenue and expenditure of the government.

GENERIC ELECTIVE COURSE V: 5D05SSE INDIAN ECONOMY IN THE POST REFORM PERIOD

CO1: understand the structural changes in the Indian economy during the post reform period.

CO2: evaluate the impact of the New Economic Policies on the various sectors of the economy.

COMPLEMENTARY ELECTIVE COURSE

POLITICAL SCIENCE

COMPLEMENTARY ELECTIVE COURSE 01: 1C01POL - PRINCIPLES OF POLITICAL SCIENCE

CO1: Provide to the students an overview of the nature of politics and government.

CO2: Enable the students to understand the function of institutional structures and how they drive individual and organizational behaviors.

CO3: Students will be able to work with the approaches and theories used by political scientists to understand political phenomena.

CO4: Students will be able to analyze current political situations.

COMPLEMENTARY ELECTIVE COURSE 02: 2C02POL- INTRODUCTION TO INDIAN POLITICAL SYSTEM

CO1: Students will have a thorough understanding of the structure and various provisions of the constitution.

CO2: Enable students to understand the function of different constitutional bodies and Institutions.

CO3: Students will be able to evaluate the working of the political system.

CO4: Empower the students with skills necessary for a good citizen in a democracy.

COMPLEMENTARY ELECTIVE COURSE

HISTORY

COMPLEMENTARY COURSE 03: 3C03 HIS - A ECONOMIC HISTORY OF MODERN INDIA (1793-1947)

CO1: demonstrate comprehensive understanding of colonialism and economic changes that took place under colonial rule

CO2: explain the nature of industrialization in India and how it acted as impetus to national movement

CO3: analyze the impact of British colonialism on Indian economy

CO4: develop a critical approach to discuss the exploitative nature of colonial and capitalist economic policies

COMPLEMENTARY COURSE 04: 4C04HIS - A ENVIRONMENTAL HISTORY OF INDIA

CO1:Understand the concept of environment and importance of environmental history

CO2: Explain human interactions with environment and depletion of natural resources

CO3: Assess the dynamic role of environmental movements in India

CO4: Develop an attitude and awareness to protect the natural environment of the country

B.A. FUNCTIONAL ENGLISH

COURSE OUTCOMES

CORE COURSE I: 1B01FNG ESSENTIAL GRAMMAR FOR FUNCTIONAL ENGLISH

CO1: Understand the function of grammatical items used in spoken / written language

CO2: Understand language rules, structure and usage.

CO3: Understand the relationship between the form and function of grammatical categories

CO4: Acquire the linguistic and communicative competence required in various social, academic& employment situations.

CORE COURSE II: 2B02FNG APPLIED PHONETICS

CO1: Understand the functioning of the English sound system

CO2: Develop the ability to adjust their ways of articulation to suit the sound system of English and overcome the influence of the native language on their English pronunciation.

CO3: Understand the differences in pronunciation between different varieties of English

CO4: Improve listening skills for better understanding and production of speech sounds

CO5: Develop a neutral accent to speak English with national and international intelligibility

CO6: Know the basics of oral communication and develop pronunciation for performing some of the most common communicative functions.

CO7: Understand the telephone as a mode of communication and to prepare them to handle telephone calls.

CORE COURSE III:3B03FNG INTRODUCTION TO ENGLISH LITERATURE I

CO1: Develop an understanding of the English literary history till the Neo Classical Age.

CO2: Understand the key terms and movements associated with English literature.

CO3: Acquire a basic idea about the various genres and sub-genres in Literature.

CO4: Acquire an in-depth understanding of a few of the major works written by the writers till the Neo-classical age.

CORE COURSE IV: 3B04FNG WRITING SKILLS

CO1: understand and effectively apply the steps in the writing process.

CO2: construct unified, coherent and adequately developed paragraphs

CO3: identify various writing styles

CO4: apply various techniques of writing

CO5: Learn to edit and proofread

CORE COURSE V: 4B05FNG INTRODUCTION TO ENGLISH LITERATURE II

CO1: Develop an understanding of English literary history from the Romantic Age to the Contemporary Age

CO2: Understand the key terms associated with English literature.

CO3: Understand the major movements, periods and writers.

CO4: Acquire an in-depth understanding of a few of the major works written from the romantic Age till the Contemporary Age.

CORE COURSE VI: 4B06FNG ORAL COMMUNICATION PRACTICE

CO1: Develop confidence to respond in English in situations where English is important

CO2: Develop listening and comprehension skills in the English language.

CO3: Acquire speech skills necessary for confident and intelligent participation in Group Discussions and extempore speeches

CO4: Learn skills related to teamwork and take up team leader roles in society as well as in future workplaces.

CORE COURSE VII: 5B07FNG INTRODUCTION TO LINGUISTICS

CO1: Develop an awareness of the structural organization of language a different levels of expression

CO2: Understand the basic concepts of Linguistics and the relationship between the structure and functions of language items

CO3: Understand the various levels of linguistic analysis (Phonology, morphology,Syntax and Semantics)

CO4: Acquire a historical perspective of the development of language

CO5: Apply linguistics to different areas of activities like discourse analysis, media, ELT, NLP and literary criticism etc.

CORE COURSE VIII: 5B08FNG INTRODUCTION TO LITERARY THEORY AND CRITICISM

CO1: Evaluate literary subjects from divergent critical stances, of both traditional and advanced thinkers and theorists to get a view of the stages of evolution in the field of criticism.

CO2: Understand the historical, socio-cultural, psychological and philosophical concerns that infuse critical thought and to broaden their academic view of the subject.

CO3: Acquire foundational analytic knowledge and skills for handling literary works.

CO4: Understand the connections between literature and theory have with the human condition, thereby affirming their impact on students as social beings.

CORE COURSE IX: 5B09FNG INDIAN WRITING IN ENGLISH

CO1: Trace the development of Indian Writing in English

CO2: Explain the Indianness in Indian Literature

CO3: Read and appreciate Indian Literature

CO4: Analyze the strengths and constraints of Indian English as a literary medium

CORE COURSE X: 5B10FNG INTRODUCTION TO THEATER STUDIES

CO1: Develop knowledge of theater history and dramatic literature

CO2: Acquire the ability of appreciation and aesthetic sense for theater arts and different genres of drama

CO3: Analyze, interpret and evaluate dramatic literature and theatrical productions

CO4: Understand the terms connected to theater/drama

CORE COURSE XI: 5B11FNG METHODOLOGY OF LANGUAGE AND LITERATURE

CO1: Develop the ability to distinguish between humanities and other fields of study and understand the specific nature and purpose of studies in humanities.

CO2: Learn the nature and functions of language in human understanding, literature and culture.

CO3: Comprehend the role of literature in representing human reality, and understand the processes of cultural formation and cultural practices.

CO4: Acquire the taste, knowledge and skills for finding research problems and solutions, and learn the craft of academic writing and research.

CORE COURSE XII: 6B12FNG INTRODUCTION TO MEDIA STUDIES

CO1: Analyze and evaluate media content critically

CO2: Understand the dialectical/dialogical relationship between society and media

CO3: Understand media functions and operations in the socio-historical contexts

CO4: Acquire skills related to mass-media, social media, advertising and communication.

CORE COURSE XIII: 6B13FNG TRANSLATION STUDIES

CO1: Understand the basic theories and functions of translation

CO2: Develop skills in translating literary and non-literary texts with a special focus on the functional aspects of translation

CO3: Understand translation skills to render texts from Malayalam/Hindi into English and vice versa

CO4: Analyze different approaches to translation and grasp its importance in the literary

field

CORE COURSE XIV: 6B14FNG ENGLISH LANGUAGE TEACHING

CO1: Understand the nature of language and the theories language acquisition and learning.

CO2: Develop an insight of the methods and approaches of teaching English.

CO3: Develop the skills of teaching language and literary discourses.

CO4: understand the importance and application of instructional materials and evaluation

CORE COURSE XV: 6B15FNG FILM STUDIES

CO1: Appreciate film as an art form.

CO2: Understand the nature of representation on screen and how class, race, ethnicity and sexuality are represented.

CO3: Analyze films and produce informed and thorough close readings of films.

CO4: Understand how film connects with history, politics, technology, psychology and performance.

CORE COURSE XVI: 6B16FNG PROJECT

CO1: Identify themes and ideas and document them in appropriate text formats.

CO2: Apply the knowledge and skills acquired during the course of study in organizing ideas and documenting them using accepted writing conventions.

CO3: Explore areas and subjects of choice across disciplines maintaining the inter-Disciplinary / multifocal character of Functional English.

CO4: Write a paper that conforms to accepted standards of grammar, spelling, punctuation etc., with appropriate selection of fonts and correct use of MLA style

COMPLEMENTARY ELECTIVE COURSE: 3C01FNG INTRODUCTION TO WORLD LITERATURE– PART I

CO1: Develop a general understanding of literary works across various cultural, national and linguistic boundaries

CO2: Develop an insight into the complex inter relationship among different literary and

cultural traditions

CO3: Acquire the literary sensibility and critical acumen to read and appreciate literary texts of different genres

CO4: Demonstrate the ability to write reviews, write ups and critical comments on literary texts

COMPLEMENTARY ELECTIVE COURSE II: 4C02FNG INTRODUCTION TO WORLD LITERATURE-PART II

CO 1: Develop a general understanding of literary works across various cultural, national and linguistic boundaries

CO2: Develop an insight into the complex inter relationship among different literary and cultural traditions

CO3: Acquire the literary sensibility and critical acumen to read and appreciate literary texts of different genres

CO4: Demonstrate the ability to write reviews, write ups and critical comments on literary texts

GENERIC ELECTIVE COURSE 1:5D 01FNG BASIC ENGLISH USE

CO 1: Develop Listening, Speaking, Reading and Writing skills

CO2: Acquire overall communication efficiency.

CO3: Comprehend all kinds of English Language discourses.

CO4: Learn to use English Language effectively

GENERIC ELECTIVE COURSE II: 5D02FNG BASICS OF ADVERTISING

CO1: Identify the role of advertising within the marketing communication mix

CO2: Analyze advertisements in terms of creativity and execution

CO3: Develop knowledge of advertising its scope and opportunities

CO4: Create advertising objectives and put together a plan to meet these objectives

GENERIC ELECTIVE COURSE III: 5D03FNG ENGLISH FOR CAREERS

CO 1: Make the students competent in their job-seeking, job-getting, and job-holding needs.

CO2: Develop communicative skills, which will enable the students to prepare for a career.

CO3: Equip the students in oral and written communication to enhance their academic and professional use of language.

CO4: Train them in making effective presentations.

GENERIC ELECTIVE COURSE IV: 5D04FNG ENGLISH FOR COMPETITIVE EXAMINATIONS

CO1: Detect confusing words and spellings in English

CO2: Identify various vocabulary types in English

CO3: Construct correct and meaningful sentences

CO4: Produce coherent and cohesive paragraphs

CO5: Improve reading comprehension skills of the students

GENERIC ELECTIVE COURSE V: 5D05FNG FILM STUDIES

CO1: Appreciate film as an art form.

CO2: Understand how film connects with history and politics,

CO3: Understand the major movements and masters in film history.

CO4: Produce informed and thorough close readings of films

COMPLEMENTARY COURSES

JOURNALISM

COMPLEMENTARY ELECTIVE COURSE I: 1C01JNL INTRODUCTION TO MASS COMMUNICATION

CO1: Understanding the basic idea of Communication Theories, Models and their History.

CO2:Attain the capacity of identifying the suitable media platform for the transaction of ideas.

CO3:Creatively engage with innovative trends and traditional trajectories simultaneously.

COMPLEMENTARY ELECTIVE COURSE II: 2C02JNL PRINT MEDIA PRACTICES

CO1: Introduction to the world of news and Journalism and understanding of basic concepts

CO2: Learning the art of reporting and editing through theoretical and practical engagement

CO3: Objective understanding of the way in which world affairs are presented and to inculcate creative thinking in content making

CO4: Building avenues to think laterally about print media journalism in the digital age.

COMPLEMENTARY COURSES

POLITICAL SCIENCE

COMPLEMENTARY ELECTIVE COURSE III: 3C05 POL INTRODUCTION TO POLITICAL SCIENCE

CO1: Provide to the students an overview of the nature of politics and government
CO2:Enable the students to understand the function of institutional structures and how they drive individual and organizational behaviors

CO3: Students will be able to work with the approaches and theories used by political scientists to understand political phenomena

CO4: Students will be able to analyze current political situations

COMPLEMENTARY ELECTIVE COURSE IV: 4C06 POL FOUNDATIONS OF INDIAN POLITICAL SYSTEM

CO1:Students will have a thorough understanding of the structure and various provisions of the constitution

CO2:Enable students to understand the function of different constitutional bodies and institutions

CO3:Students will be able to evaluate the working of the political system **CO4**:Empower the students with skills necessary for a good citizen in a democracy

B.COM

COURSE OUTCOMES

CORE COURSE I: 1B01 COM - MANAGEMENT CONCEPTS AND PRINCIPLES

CO1:- Understand the evolution of management thoughts, concept of management, scope and its functions.

CO2:- Familiarize with current management practices.

CO3:- Understand the importance of ethics in business.

CO4:- Acquire knowledge and capability to develop ethical practices for effective management.

CO5:- Describe the emerging trends in management.

CORE COURSE II : 2B02 COM - FUNCTIONAL APPLICATIONS OF MANAGEMENT

CO1: Describe nature and scope of financial management and the elements in the management of finance

CO2: Enumerate marketing management and its different aspects

CO3: Explain Human Resources Management and the activities involved in it

CO4: Understand the modern global marketing trends and its challenges

CORE COURSE III : 3B03 COM - ADVANCED ACCOUNTING

CO1. Understand the theoretical and practical knowledge of the basics of accounting.

CO2. Acquire the knowledge of accounting for royalty, Consignment and Hire Purchase

CO3. Imbibe the accounting concepts of Inland Branch Business.

CO4. Comprehend the procedure for determining profit and financial position from incomplete records.

CORE COURSE V : 4B05 COM - CORPORATE ACCOUNTING

CO1: Understand the mode of presentation and understanding of financial reporting .

CO2: Learn the accounting procedure for recording transaction relating to the issue and redemption of shares and debentures.

CO3: Imbibe the techniques of recording transactions in respect of amalgamation, reconstruction and liquidation of companies..

CO4: Understand the concept of IFRS and Ind AS

CORE COURSE VI1: 5B07 COM - BUSINESS RESEARCH METHODOLOGY

CO1: Understand the fundamental aspects of research in business

CO2: Identify and define research problem

CO3: Formulate research plan

CO4: Understand various methods of collecting data

CO5: Prepare research report themselves

CORE COURSE VIII : 5B08 COM - INCOME TAX LAW AND PRACTICE

CO1: Define the basic concepts in Income tax, explain its evolution

CO2: Determine the residence and incidence of Tax

CO3: Understand the incomes exempt from tax of an individual

CO4: Compute income under different heads of income

CORE COURSE IX: 5B09 COM - COST ACCOUNTING

CO1: Explain the nature, scope, objectives and limitations of costing

CO2: Identify the elements of cost and describe the methods of their ascertainment and control

CO3: Explain the various methods of costing and their suitability for different industries

CO4: Ascertain the cost of production of products and jobs

CORE COURSE X : 5B10 COM - BANKING PRINCIPLES AND OPERATIONS

CO1: Explain banking and describe the different types of banks and the functions of

commercial bank

CO2: Narrate the role of RBI in the credit control, promotion and regulation of monitory System

CO3: Describe the relationship between banker and customer and the procedure for opening and operating the account

CO4 : Understand the modern trends and technology used in banking

CORE COURSE XII : 6B12 COM - FINANCIAL MARKETS AND SERVICES

CO1: Understand the financial system and its constituents

CO2: Familiarise with the activities taking place in the financial markets

CO3: Appraise the various financial services available in the financial markets

CO4: acquire knowledge about financial derivatives and their features

CORE COURSE XIII : 6B13 COM - MANAGEMENT ACCOUNTING

CO1. Understand the fundamental concepts of management accounting.

CO2. Acquire analytical skills associated with the interpretation of accounting reports

CO3. Apply management accounting concepts in real life situations.

CO4. Develop judgmental skills associated with the use of accounting information in decision making.

CO5. Understand the use of marginal costing and budgetary control to plan and control cost and profit.

CORE COURSE XIV: 6B14 COM - AUDITING AND CORPORATE GOVERNANCE

CO1: Understand the term auditing, its concept, principles, procedures and requirements needed for Auditing in accordance with current legal requirements and professional Standards.

CO2: Familiarize with the various aspects of audit consisting of internal check, vouching,

verification and valuation of assets and liabilities

CO3: Understand the appointment, rights, duties and the liabilities of an auditor.

CO4: Explain the concept of Corporate Governance and its aspects

CORE COURSE XV: 6B15 COM - INCOME TAX AND GST

CO1: Compute total income and determine the tax liability of an individual and partnership firm, company and cooperative society

CO2: Describe the income tax authorities, their powers and assessment procedure

CO3: Explain the procedure regarding deduction of tax at source, advance tax, refund, penalties and prosecution

CO4: Describe Goods and Service Tax, its levy and collection

CORE COURSE XVII: 6B17 COM - PROJECT

CO1: Understand the method of carrying out a project

CO2: Undertake project work independently

CORE COURSES IN THE ELECTIVE STREAM

ELECTIVE STREAM II – COMPUTER APPLICATION

CORE COURSE IV : COMPUTER APPLICATION I – 3B04 COM - INTRODUCTION TO COMPUTERS AND NETWORKS

CO1: Understand about computer, peripherals, software and operating system

CO2: Understand the importance of IT in the modern world and recent development in IT

CO3: Develop WebPages for business

CORE COURSE VI : 4B06 COM - COMPUTER APPLICATION II – DATABASE MANAGEMENT SYSTEM

CO1: Familiarize with the concepts of database management

CO2: Handle the database for business firms.

CO3: Develop knowledge in Access and SOL

CORE COURSE XI : COMPUTER APPLICATION III – 5B11 COM - INFORMATION TECHNOLOGY FOR BUSINESS

CO1: Understand the role of information technology in business

CO2: Acquire knowledge in E-Commerce and its application

CO3: Acquire knowledge in information systems and Enterprise Resource Planning

CO4: Manage the office activities with the help of spreadsheet software

CORE COURSE XVI : COMPUTER APPLICATION IV – 6B16 COM - ACCOUNTING PACKAGES - TALLY

CO1: Acquire knowledge in the accounting package Tally

CO2: Understand the method of creating accounts and vouchers in tally.

CO3: Able to prepare financial statements by using Tally

CO4: Help students develop skill in preparing financial statements in Tally.

CO5: Perform treatment of GST and TDS by using Tally

GENERAL AWARENESS COURSES

GENERAL AWARENESS COURSE I : 1AI1 COM - BUSINESS STATISTICS AND BASIC

NUMERICAL SKILLS

CO1: Define statistics and explain its importance, scope, applications and limitations

CO2: Understand the basic knowledge of statistical techniques, which are applicable to business.

CO3: understand basic concepts in mathematics, which are applied in the managerial decision making.

CO4: Develop the basic mathematical skill needed for analyzing numeric problems related to business

GENERAL AWARENESS COURSE II : 3A12 COM - ENTREPRENEURSHIP DEVELOPMENT

CO1: Identify the characteristics of an entrepreneur

CO2: describe the importance of entrepreneurs in the economic development of a nation

CO3: identify the different types of entrepreneurs

CO4: to strengthen their skill and quality as an entrepreneur

GENERAL AWARENESS COURSE III : 4A13 COM - GENERAL INFORMATICS SKILLS

CO1: Explain the Fundamentals of Computers the use of computers in day to day application

CO2: Up to date and expand the basic informatics skills necessary in the emerging knowledge society

CO3: Effectively utilize the digital knowledge resources for their studies

CO4: State the areas where IT can be used effectively

CO5: Perform accounting by using the appropriate accounting packages

GENERAL AWARENESS COURSE IV : 4A14 COM - ENVIRONMENTAL STUDIES AND DISASTER MANAGEMENT

CO1: Understand the components of environment and need for the protection of environment

CO2: Understand the effect of pollution on environment and the ways of protecting the environment

CO3: Explain the social issues relating to environmental pollution

CO4: Clearly understand the various environmental hazards and the ways of managing disaster.

COMPLEMENTARY ELECTIVE COURSES

COMPLEMENTARY COURSE I: 2C01 COM - QUANTITATIVE TECHNIQUE FOR BUSINESS DECISIONS

CO1:- Acquaint with the basic statistical tools, which can be applied in business and economic situations.

CO2:- Develop knowledge in quantitative techniques, which help in tackling various

problems for modern business.

CO3:- Understand and solve problems in probability, correlation and regression.

CO4:- Understand the effect of trend and seasonal variations on business.

CO5:- Familiarize with the testing of hypotheses.

COMPLEMENTARY COURSE II: 3C02 COM - BUSINESS REGULATORY FRAMEWORK

CO1: Understand the nature of contracts and the essential elements of a valid contract

CO2: Explain the difference between a valid contract and a void contract

CO3: Understand the breach of contract and remedies available for a breach of contract

CO4: Understand various kinds of special contracts like indemnity, guarantee, bailment and agency contract

COMPLEMENTARY COURSE III: 3C03 COM - BUSINESS ECONOMICS

CO1: Understand the concept of economics and its use in business

CO2: Understand the concept of demand, elasticity and demand forecasting

CO3: Understand production function and law of production

CO4: Understand the methods of determining price of a product

CO5: Explain the methods of computing national income.

CO6: Conceive the developmental issues of Indian economy and Kerala economy

COMPLEMENTARY COURSE IV: 4C04 COM - CORPORATE LAW AND BUSINESS REGULATIONS

CO1: Understand the provisions of Companies Act 2013

CO2: Describe the procedure for the formation, registration and winding up of the company

CO3: Explain various kinds of companies and the authorities of companies in India

CO4: Understand the management and administration of Companies

B.SC. CHEMISTRY
COURSE OUTCOMES

CORE COURSE 1: 1B01CHE - THEORETICAL AND INORGANIC CHEMISTRY

CO1: Correlate the structure and behavior of atom
CO2: Differentiate the various chemical interactions in molecules through bonding concepts
CO3: Analyze and interpret the gradation in the properties of elements in the periodic table
CO4: Predict the nuclear transmutations
CO5: identify the role of radioactive materials in different applications

CORE COURSE 3: 2B03CHE - ANALYTICAL AND INORGANIC CHEMISTRY – I

CO1: Determine the error, standard deviation and relative standard deviation of analytical data.
CO2: Understand statistical treatment of analytical data and the principles underlying volumetric titrations.
CO3: Understand basic principles behind selective precipitation of cation.
CO4: Summarize the characteristics of s- and p- block elements
CO5: Compare the various concepts of acids and bases

CORE COURSE 4: 3B04CHE/PCH - ORGANIC CHEMISTRY – I

CO1: Explain the types of electron displacement in organic molecules and predict the properties of molecules based on electron displacement effect
CO2: Distinguish aromatic , anti aromatic and nonaromatic compounds and ions and analyse the mechanistic details of aromatic electrophilic substitution
CO3: Classify stereo isomers, understand the property of chirality , apply CIP rules to recognize the configuration and explain the stability of conformations drawing energy profile diagram
CO4: Explain the mechanism of polymerization, synthesis and application of industrially important Polymers
CO5: Explain the classification and the methods of preparation of important dyes
CO6: Illustrate the preparative methods and synthetic applications of important synthetic reagents

CORE COURSE 6: 4B06CHE/PCH - ORGANIC CHEMISTRY – II

CO1: Describe mechanisms for substitution and elimination reactions, and predict the effect of nucleophile, leaving group, and solvent on the relative rates of SN1 versus SN2 reactions, and E1 versus E2 reactions, as well as on the relative rates of substitution versus elimination.
CO2: Explain Chugaev and Cope eliminations and E1CB mechanism
CO3: Illustrate the preparative methods and important properties of Hydrocarbons,halogen
compounds , Hydroxy compounds and Carbonyl Compounds
CO4: Explain the mechanism of important name reactions including rearrangements involving hydroxyl and Carbonyl functional groups

CORE COURSE 7: 5B07CHE/PCH - ANALYTICAL AND INORGANIC CHEMISTRY-II

CO1: Understand the qualitative and quantitative aspects of analysis and separation techniques
CO2: Explain instrumentation and working principle of different analytical techniques – TGA, DTA and radio chemical method of analysis.
CO3: Familiarize with the preparation, properties and uses of some inorganic compounds like hydrides of boron, sulphur and silicon based inorganic polymers and understand their importance
CO4: Explain the classification of refractories.
CO5: Knowthe position, electronic configuration and physical properties of noble gases and explain hybridization and geometry of different xenon compounds
CO6: Explain various steps involved in metallurgical operations and power metallurgy and understand Corrosion, theories of Corrosion and factors affecting Corrosion

CORE COURSE 8: 5B08CHE/PCH - INORGANIC CHEMISTRY

CO1: Understand the behavior of transition and inner transition elements and explain the separation of lanthanides by ion exchange method and lanthanide contraction
CO2: Understand key features of co-ordination compounds and illustrate the theories of coordination complexes, stability of complexes and explain factors affecting crystal field splitting.
CO3: Explain biological functions of metal ions.
CO4: Familiarize new elements in periodic table and Understand recent developments in inorganic chemistry.

CORE COURSE 9: 5B09CHE/PCH - PHYSICAL CHEMISTRY I

CO1: Recognize and relate the properties of ideal and real gases
CO2: Describe the properties of liquids.

CO3: Identify and distinguish the types of solutions
CO4: Explain colligative properties of dilute solution and determine the molecular weight of a solute
CO5: Identify Different crystallographic systems and various types of crystal defects
CO6: Describe X ray diffraction to explain internal structure of solids

CORE COURSE 10: 5B10CHE/PCH - PHYSICAL CHEMISTRY II

CO1: Understand the concept of temperature ,the thermodynamic state and equilibrium.
CO2: Explain the first law of thermodynamics through work and heat and its Mathematical Formulation.
CO3: Understand the ideal gas equation and kinetic theory of gases.
CO4: Understand the second law of thermodynamics and thermodynamic temperature scale.
CO5: Define entropy and thermodynamic potentials.
CO6: Understand the basic concepts of Statistical mechanics.

CORE COURSE 14: 6B14CHE/PCH- ORGANIC CHEMISTRY - III

CO1: Acquaint with the classification, structures and properties of carbohydrates,explain the configuration of glucose and fructose, their inter conversion , illustrate Killiani-Fischer synthesis and Ruff degradation
CO2: Illustrate the preparative methods and the properties of different classes of organic acids, nitrogen containing compounds and heterocyclic compounds .
CO3: Classify amino acids and peptides and explain the synthesis of simple peptides by N-protection (t-butyloxycarbonyl and phthaloyl) &C-activating groups and Merrifield solid phase synthesis.Explain the methods of determination of primary structure of peptides
CO4: Distinguish the components of nucleic acids and lipids and their roles in biological system and the biological importance of various natural products .Familiarise with important drugs and their therapeutic applications
CO5: Recognise The types and characteristics of pericyclic reactions and analyse the pericyclic reactions by FMO methods. Understand the photochemistry of carbonyl compounds
CO6: Understand the principles of Green Chemistry and the importance of green synthesis and recognize the impact of green chemistry on human health and the environment

CORE COURSE 15: 6B15CHE/PCH - PHYSICAL CHEMISTRY - III

CO1: Understand the mechanism of electrical conductance, theories of electrical conductance, and conductometric titrations

CO2: Understand the basic principle of ionic equilibrium and its application in laboratories
CO3: Design different types of electrochemical cell and able to calculate its potential.
CO4: Familiarise with electro analytical methods
CO5: Acquaint with kinetics of simple,complex, enzymatic and surface reactions
CO6: Understand basic principles of photochemistry and its application in spectrophotometry

CORE COURSE 16: 6B16CHE/PCH - PHYSICAL METHODS IN CHEMISTRY

CO1: i) Explain the important principles of spectroscopy
ii) Apply spectroscopic techniques in analyzing the structure of simple organic molecules
CO2: Acquainting the working principles of various instruments and their functions
CO3: Understand the basic principles of symmetry and group theory and its applications in chemistry
CO4: Study the basic principles of nanochemistry and understand the various nanofabrication methods
CO5: Explain the important principles for quantum chemical and molecular mechanic methods of computing the geometry and energy of molecules

CORE COURSE 17: DISCIPLINE SPECIFIC ELECTIVE COURSES

6B17CHE/PCH- A - ENVIRONMENTAL CHEMISTRY

CO1: Know the importance of environmental studies and methods of conservation of natural resources.
CO2: Describe the structure and function of an ecosystem and explain the values and Conservation of bio-diversity.
CO3: Explain the sources, environmental effects and control measures of various types of pollutions.
CO4: Identify the toxic chemicals in environment and understand the sources, effects and treatment of heavy metal poisoning
CO5: Understand the methods of domestic water treatment , Sewage analysis and Sewage treatment

6B17CHE/PCH- B - APPLIED CHEMISTRY

CO1: Explain the origin of coal,coal products ,petroleum products and their applications.
CO2: Explain the manufacture of fertilizers , pesticides and their applications
CO3: Understand the manufacture of glasses, cement ,ceramics and the formulations of paints and varnishes

CO4: Familiarize with the chemistry of fats and oils and explain the production of soaps and detergents.
CO5: Understand the chemistry of food additives and explain the manufacture and refining of pulp.
CO6: Understand importance of industrial safety and industrial pollution control.

6B17CHE/PCH- C - POLYMER CHEMISTRY

CO1: Classify polymers and explain the configuration of polymers and properties like glass
transition temperature and melting point of polymers
CO2: Illustrate the preparation, properties and applications of polymers
CO3: Interpret the mechanism of polymerization
CO4: Acquaint various polymer processing technologies and explain thermal methods of analysis of polymers
CO5: Know the recent advances in polymer chemistry

6B17CHE/PCH - D - NANOCHEMISTRY

CO1: Understand the basic concepts and classification of nanomaterials.
CO2: Analyze different nano systems and their properties.
CO3 :Understand the various techniques adopted for the synthesis and characterization of nanomaterials.
CO4 : Characterize the nanomaterials using various microscopic techniques.
CO5: Understand the application of nanomaterials in various fields including catalysis, photonics, and medicine

CORE COURSE 2 PRACTICAL I: (1B02CHE/PCH& 2B02CHE/PCH) - VOLUMETRIC ANALYSIS

CO1: Apply the theoretical concepts while performing experiments.
CO2: Acquire practical skill to estimate acid, base, oxidizing agents etc by volumetric titration method
CO3: Estimate the metallic ions by complexometric titration method
CO4: Acknowledge experimental errors and their possible sources.
CO5: Able to prepare inorganic complexes
CO6: Design, carry out, record and analyze the results of chemical experiments

CORE COURSE 5 PRACTICAL II: (3B05CHE/PCH& 4B05CHE/PCH) - INORGANIC QUALITATIVE ANALYSIS

CO1: Apply the theoretical concepts while performing experiments.
CO2: Acquire practical skill to analyse the anions and cations qualitatively present in a

mixture of inorganic salts

CO3: Able to design, carry out, record and analyze the results of chemical experiments

CO4: Learns the effective usage of chemicals

CORE COURSE 11 PRACTICAL III: 5B11 CHE /PCH & 6B11 CHE/PCH - GRAVIMETRIC ANALYSIS

CO1: Make use of standardised procedures for the Gravimetric analysis

CO2: learn the skills of Precipitation process, digestion, filtration, incineration etc.

CO3: Aquire practical Knowledge of co-precipitation

CO4: Handle sintered glass vessels

CO5: Acknowledge experimental errors and their possible sources.

CO6: Able to design, carry out, record and analyze the results of chemical experiments

CORE COURSE 12 PRACTICAL IV: 5B12 CHE/PCH& 6B12 CHE/PCH - ORGANIC CHEMISTRY

CO1: Apply the theoretical concepts while performing experiments.

CO2: Acquire practical skill in qualitative analysis of organic compounds

CO3: Acquire practical skill in preparing organic compounds and in their purification by crystallisation

CO4: Separate organic compounds in a mixture –by steam distillation, TLC and Column Chromatography

CO5: Acquire the habit of working safely with the chemicals and handling of equipments

CORE COURSE 18 PRACTICAL V: 6B18CHE/PCH - PHYSICAL CHEMISTRY

CO1: Acquire practical skill in physical chemistry experiments such as Cryoscopy, Transition Experiments ,Phase Rule Experiments, Conductometric titrations, Potentiometric titrations , colorimetry and Chemical Kinetics

CO2: Learn statistical approach for evaluating data

CO3: Able to carry out and record these experiments in a skilful manner

CO4: Acquire the habit of working safely with the chemicals and handling of equipments

CORE COURSE 13 PROJECT/INDUSTRIAL VISIT: 5B13CHE/PCH 6B13CHE/PCH - PROJECT

CO1: Able to enhance the skills of managing the resources, time and team work.

CO2: Students will be able to function as a member of an interdisciplinary problem solving team.

GENERIC ELECTIVE COURSE 1: 5D01CHE/PCH - CHEMISTRY IN SERVICE TO MAN

CO1: i) Understandthe classification, structure, function and applications of polymers
ii) Understand the importance of biodegradable polymers

CO2: Acquaint with different types of fertilizers and pesticides and understand the effect of fertilizers and pesticides on the environment

CO3: Explain the classification of fuels and composition of petroleum and familiarise the fuel cells and batteries and Understand their applications in modern life

CO4: Explain different types of glasses ,their applications and the composition of Portland cement

CO5: Identify the harmful chemicals present in cosmetics and understand their effects in human body

GENERIC ELECTIVE COURSE 2: 5D02CHE/PCH - DRUGS - USE & ABUSE

CO1: Familiarise the classes of drugs and their examples

CO2: Distinguish prescription drugs and over the counter drugs

CO3: Understand the roots of administration of drugs and their importance

CO4: Familiarise various synthetic drugs and their uses

CO5: Understand the consequences of misuse of antibiotic

CO6: Recognise the drugs of abuse and understand the consequences of drug abuse

GENERIC ELECTIVE COURSE 3: 5D03CHE/PCH - ENVIRONMENTAL STUDIES

CO1: Differentiate the environmental segments and understand the importance of environmental segments

CO2: Identify the types of environmental pollution and the various sources of the pollution

CO3: Understand the consequences of environmental pollutions

CO4: Explain the measures of control of environmental pollution

CO5: Recognise various sustainable energy sources

GENERIC ELECTIVE COURSE 4: 5D04CHE/PCH - NANOMATERIALS

CO1: Understand the basic concepts of nanoscale science and technology.

CO2: Inculcate the enquiry based learning and increase the level of interest in nanoscience.

CO3: Understand the societal implications and the scope of nanotechnology.

GENERIC ELECTIVE COURSE 5: 5D05CHE/PCH - CHEMISTRY IN EVERYDAY LIFE

CO1: Identify the harmful ingredients and their effects of cleansing agent and cosmetics

CO2: Familiarise adulterants in food, food additives and food preservatives

CO3: Explain the harmful effects of modern food habits
CO4: Classify the drugs and familiarize the applications of various drugs
CO5: Understand the consequences of misuse of antibiotics
CO6: Prepare toilet soap using vegetable oil.

COMPLEMENTARY COURSES
PHYSICS

COMPLEMENTARY ELECTIVE COURSE I: 1C01PHY - MECHANICS

CO1: Understand the basic concepts of Properties of matter
CO2: Explain the dynamics of rigid bodies.
CO3: Understand the basic concepts of wave motion and oscillations

COMPLEMENTARY ELECTIVE COURSE II: 2CO2PHY - ELECTRICITY, MAGNETISM AND THERMODYNAMICS

CO1: Understand the basic concepts of Magnetism & electricity
CO2: Explain the magnetic effects of electric currents
CO3: Understand the basic principles of Thermodynamics

COMPLEMENTARY ELECTIVE COURSE III: 3C03PHY - OPTICS AND PHOTONICS

CO1: Understand the basic concepts of Interference
CO2: Understand the basic concepts of Diffraction
CO3: Understand the basic concepts of Polarization
CO4: Understand the basic concepts of Photonics and Fibre Optics

COMPLEMENTARY ELECTIVE COURSE IV: 4C04PHY - ELECTRONICS AND MODERN PHYSICS

CO1: Understand the basic concepts of Basic electronics
CO2: Understand the basic concepts of Digital electronics
CO3: Understand the basic concepts of Nuclear Physics
CO4: Understand the basic concepts of Particle physics and Astrophysics

COMPLEMENTARY ELECTIVE COURSE V: 4C05PHY - PHYSICS PRACTICAL

CO1: Familiarise with apparatus for experiments in mechanics, optics, electricity and magnetism and electronics and electronics experiments.
CO2: Develop skill in setting up of apparatus for accurate measurement of physical quantities.
CO3: Understand multiple experimental techniques for determining physical quantities.

CO4: Develop skill in systematic way of measurements by minimizing possible errors.

COMPLEMENTARY COURSES
MATHEMATICS

COMPLEMENTARY ELECTIVE COURSE I: 1C01MAT-CH - MATHEMATICS FOR CHEMISTRY I

CO1: Understand Successive differentiation and Leibnitz's theorem for the nth derivative of the product of two functions
CO2: Understand Fundamental theorem – Rolle's theorem, Lagrange's mean-value theorem and Cauchy's mean value theorem.
CO3: Understand Taylor's theorem, expansions of functions – Maclaurin's series, expansion by use of known series and Taylor's series.
CO4: Understand the method of finding limits of Indeterminate forms.
CO5: Understand Polar, Cylindrical and Spherical co-ordinates.
CO6: Understand Rank of a matrix, elementary transformation of a matrix, equivalent matrices, elementary matrices, Gauss-Jordan method of finding the inverse, normal form of a matrix and partition method of finding the inverse.
CO7: Understand solution of linear system of equations – method of determinants – Cramer's rule, matrix inversion method, consistency of linear system of equations, Rouche's theorem, procedure to test the consistency of a system of equations in n unknowns, system of linear homogeneous equations.
CO8: Understand Linear transformations, orthogonal transformation and linear dependence of vectors.
CO9: Understand methods of curve fitting, graphical method, laws reducible to the linear law, principles of least squares, method of least squares and apply the principle of least squares to fit the straight line $y=a+bx$, to fit the parabola $y=a+bx+cx^2$, to fit $y=ax^b$, $y=ae^{bx}$ and $xy^n=b$

COMPLEMENTARY ELECTIVE COURSE II: 2C02MAT-CH - MATHEMATICS FOR CHEMISTRY II

CO1: Understand Functions of two or more variables, limits and continuity.
CO2: Understand partial derivatives, homogeneous functions, Euler's theorem on homogeneous functions, total derivative, differentiation of implicit functions and change of variables.
CO3: **CO2**: Understand Reduction formulae for trigonometric functions and evaluation of definite integrals $\int_0^{\frac{\pi}{2}} sin^n x dx$, $\int_0^{\frac{\pi}{2}} cos^n x dx$ and $\int_0^{\frac{\pi}{2}} sin^v x cos^q x dx$
CO4: Understand Substitutions and the area between curves, arc length, areas and length

in polar coordinates.

CO5: Understand Double and Iterated Integrals over rectangles, double integrals over general regions, area by double integration, double integrals in polar form and triple integrals in rectangular co-ordinates.

CO6: Understand Eigen values, Eigen vectors, properties of Eigen values, Cayley-Hamilton theorem, reduction to diagonal form, similarity of matrices, powers of a matrix, reduction of quadratic form to canonical form and nature of a quadratic form

COMPLEMENTARY ELECTIVE COURSE III: 3C03MAT-CH - MATHEMATICS FOR CHEMISTRY III

CO1: Understand Ordinary differential equations, Geometrical meaning of y'=f (x, y) and Direction Fields.

CO2: Understand Methods of solving Differential Equations: Separable ODEs, Exact ODEs, Integrating Factors, Linear ODEs and Bernoulli Equation.

CO3: Understand Orthogonal Trajectories, Existence and Uniqueness of Solutions.

CO4: Understand Second order ODEs, Homogeneous Linear ODEs of second order, Homogeneous Linear ODEs with constant coefficients, Differential Operators, Euler-Cauchy Equation, Existence and Uniqueness of Solutions – Wronskian, Nonhomogeneous ODEs and Solution by variation of Parameters

CO5: Understand Laplace Transform, Linearity, first shifting theorem, Transforms of Derivatives and Integrals, ODEs, Unit step Function, second shifting theorem, Convolution, Integral Equations, Differentiation and integration of Transforms and to solve special linear ODE's with variable coefficients and Systems of ODEs

CO6: Understand Fourier series, arbitrary period, Even and Odd functions, Half-range Expansions.

COMPLEMENTARY ELECTIVE COURSE IV: 4C04MAT-CH - MATHEMATICS FOR CHEMISTRY IV

CO1: Understand Partial Differential Equations, Modeling, Vibrating String, Wave Equation.

CO2: Solve PDE by Separating Variables, by use of Fourier Series, D-Alembert's solution of the wave equation and Heat Equation.

CO3: Understand Numerical Integration, Trapezoidal Rule, Simpson's 1/3-Rule

CO4: Understand Numerical methods to find Solutions of Ordinary Differential Equations: Solution by Taylor's series, Euler's method, Modified Euler's method, Runge-Kutta methods.

CO5: Understand volumes of solid using cross sections and areas of surfaces of revolution

B.SC. COMPUTER SCIENCE

COURSE OUTCOMES

CORE COURSE I: 1B01CSC INTRODUCTION TO C PROGRAMMING

CO1: Aware about basics of programming.

CO2: Capable to analyze the problem and design algorithm and flowchart.

CO3: Familiar the basics of high-level language – C.

CO4: Able to develop efficient and error free programs in C.

CORE COURSE II: 2B02CSC ADVANCED C PROGRAMMING

CO1: Familiar with advanced concepts of C program.

CO2: Capable to work with user defined as well as library functions.

CO3: Skilled to solve more complex problems.

CO4: Able to develop C programs using structure, union, pointers and files.

CORE COURSE III: 2B03CSC ADVANCED C PROGRAMMING - LAB

GENERAL AWARENESS COURSE I: 3A11CSC PROGRAMMING IN C++

CO1: Describe the Object-Oriented Paradigm

CO2: Understand dynamic memory management techniques

CO3: Analyze a problem and construct a C++ program that solves it

CO4: Discover errors in a C++ program and describe how to fix them

GENERAL AWARENESS COURSE II: 3A12CSC DATABASE MANAGEMENT

CO1: Familiar with organized data collection.

CO2: Able to design data bases.

CO3: Skilled to normalize the data bases.

CO4: Capable to frame queries for various purposes

CORE COURSE IV: 3B04CSC DATA STRUCTURES

CO1: Able to analyze the complexity of algorithm.

CO2: Familiar with linear and nonlinear data structures.

CO3: Acquire the ability to select appropriate data structure for a given problem.

CO4: Obtain skill for systematic approach to programming.

GENERAL AWARENESS COURSE III: 4A13CSC DIGITAL ELECTRONICS

CO1: Introduce the basic and important concepts of Digital Principles and Applications.

CO2: Familiarize with basic building blocks of Digital systems, Digital Logic and Digital Circuits.

CO3: Design simple combinational digital systems.

CO4: Familiarize different number systems, codes and data representation.

GENERAL AWARENESS COURSE IV: 4A14CSC OPERATING SYSTEMS

CO1: Familiarize with basics of design of operating systems.

CO2: Introduce basic working process of operating systems.

CO3: To understand the importance process and scheduling.

CO4: To understand the issues in memory management.

CORE COURSE V: 4B05CSC SOFTWARE ENGINEERING

CO1: To understand the Software Development Life Cycle Models.

CO2: To familiarize with Software Requirement Analysis and Specification.

CO3: To familiarize with Classical Software Design Techniques.

CO4: To familiarize with various Software Testing Techniques and Tools.

CORE COURSE VI: 4B06CSC LAB 2 – DATA STRUCTURES USING C++

CORE COURSE VII: 4B07CSC LAB 3 – DATABASE MANAGEMENT SYSTEM

CORE COURSE VIII: 5B08CSC WEB TECHNOLOGY

CO1: Understand different components in web technology and WWW.

CO2: Learn to develop interactive Web pages.

CO3: Present a web document with server-side scripting using PHP.

CO4: Know the basics of AJAX.

CORE COURSE IX: 5B09CSC JAVA PROGRAMMING

CO1: Know the overall structure and concept of logic building activity of Java programming language

CO2. Identify the real-world things as well as the relationship between them and understand transforming them into their corresponding computer representations.

CO3. Realize how to achieve code reusability using inheritance, interfaces and packages and expedite application development activities.

CO4. Familiarize simple and robust way of handling multitasking and runtime error as well as such kind of abnormal situations within a program.

CO5. Design GUI based applications and applications that can be transmitted over Internet.

CORE COURSE X: 5B10CSC COMPUTATION USING PYTHON

CO1: Learn Python for expressing computation

CO2: Familiarize with functions and modules in python

CO3: Understand object-oriented programming concepts

CO4: Learn the techniques for database connectivity and GUI programming in Python

CORE COURSE XI: 5B11CSC-A ALGORITHM DESIGNING

CO1: Capable to select suitable algorithm design technique.

CO2: Able to design optimum algorithms for problems.

CO3: Skilled to design solutions for real problems.

CORE COURSE XI: 5B11CSC-B LINUX ADMINISTRATION

CO1: To learn basic Linux commands and understand the file system structure

CO2: To understand the Boot loaders and the configuration files

CO3: To learn different system services, maintenance and configuring these

CO4: To experience Shell Scripting

CORE COURSE XI: 5B11CSC-C COMPUTER GRAPHICS

CO1: Understand basic concepts of graphics input and display devices.

CO2: Learn line and circle drawing algorithms.

CO3: Familiarization with 2D and 3D transformations and projections.

CO4: Understand fundamentals of image processing.

CORE COURSE XII: 6B12CSC DATA COMMUNICATION AND COMPUTER NETWORKING

CO1: Understand state-of-the-art in network protocols, architectures and application.

CO2: To acquire knowledge about different computer networks

CO3: To understand the use of layer architecture for networking systems.

CORE COURSE XIII: 6B13CSC COMPILER DESIGN

CO1: Learn the basic principles of compiler.

CO2: Get an idea about the related programs.

CO3: Understand different components of a compiler.

CO4: Understand the phases of a compiler.

CORE COURSE XIV: 6B14CSC COMPUTER ORGANIZATION

CO1: Understand the basic terminology of computer system.

CO2: Understand the functional units of a computer system.

CO3: Understand the basic operations of a computer system.

CO4: Understand the memory organization in a computer system.

CORE COURSE XIV: 6B15CSC-A INFORMATION SECURITY

CO1: To understand the need of information security and to master information security Concepts, mechanisms and services as well as issues related to information Security.

CO2: To be familiar with cryptography and its categories.

CO3: Distinguish public and private key crypto systems and familiarize the rsa crypto System.

CO4: To attain the knowledge of digital signature and its security services.

CORE COURSE XIV: 6B15CSC-B DATA MINING

CO1: To Introduce the Concepts of Data Mining and its Applications.

CO2: To Understand Investigation of Data using practical Data Mining Tools.

CO3: To Introduce Association Rules Mining.

CO4: To Introduce Clustering and Classification.

CORE COURSE XIV: 6B15CSC-C BIOINFORMATICS

CO1: Understand Bioinformatics and biological databases.

CO2: Understand Concept of Biology.

CO3: Understand Sequence alignment and Similarity search tools.

CO4: Structural bioinformatics and Bioinformatic tools.

CORE COURSE XVI: 6B16CSC LAB 4 – JAVA PROGRAMMING

CORE COURSE XVII: 6B17CSC LAB 5 – WEB TECHNOLOGY AND PYTHON PROGRAMMING

CORE COURSE XVIII: 6B18CSC PROJECT

GENERIC ELECTIVE COURSE 1: 5D01CSC - PROGRAMMING IN C

CO1: To understand the basic knowledge of programming

CO2: To develop C programs

CO3: To develop skill in advanced program constructs

CO4: To develop skill in programming

GENERIC ELECTIVE COURSE 2: 5D02CSC - WEB TECHNOLOGY

CO1: To understand the knowledge of HTML

CO2: To understand the knowledge of various HTML tags

CO3: To enable students to program for the World Wide Web using HTML

CO4: To understand the basic knowledge of Javascript

GENERIC ELECTIVE COURSE 3: 5D03CSC - DATABASE MANAGEMENT SYSTEM

CO1: To understand the fundamentals of database management system

CO2: To develop Skill in designing database

CO3: To understand the concept of SQL commands

CO4: To develop Skill in writing queries

GENERIC ELECTIVE COURSE 4: 5D04CSC - FUNDAMENTALS OF COMPUTERS AND PROGRAMMING

CO1: To know the working principle of a computer

CO2: To understand the concept of number system

CO3: To understand the basics of computer network

CO4: To understand the basics of programming

GENERIC ELECTIVE COURSE 5: 5D05CSC - INTRODUCTION TO PYTHON PROGRAMMING

CO1: Learn Python for expressing computation

CO2: Learn about program control statements in python

CO3: Familiarize with functions and modules in python

CO4: Learn the techniques for data visualization in python

COMPLEMENTARY COURSES

MATHEMATICS

COMPLEMENTARY ELECTIVE COURSE 1: 1C01 MAT-CS - MATHEMATICS FOR COMPUTER SCIENCE I

CO1: Understand Successive differentiation and Leibnitz's theorem for the nth derivative of the product of two functions

CO2: Understand Fundamental theorem – Rolle's theorem, Lagrange's mean-value theorem and Cauchy's mean value theorem.

CO3: Understand Taylor's theorem, expansions of functions – Maclaurin's series, expansion by use of known series and Taylor's series.

CO4: Understand the method of finding limits of Indeterminate forms.

CO5: Understand Polar, Cylindrical and Spherical co-ordinates.

CO6: Understand Rank of a matrix, elementary transformation of a matrix, equivalent matrices, elementary matrices, Gauss-Jordan method of

finding the inverse, normal form of a matrix and partition method of finding the inverse.

CO7: Understand solution of linear system of equations – method of determinants – Cramer's rule, matrix inversion method, consistency

of linear system of equations, Rouche's theorem, procedure to test the consistency of a system of equations in n unknowns, system of linear homogeneous equations.

CO8: Understand Linear transformations, orthogonal transformation and linear dependence of vectors.

CO9: Understand methods of curve fitting, graphical method, laws reducible to the linear law, principles of least squares, method of least squares and apply the principle of least squares to fit the straight line y = a+bx, to fit the parabola y=a+bx+cx2, to fit y = axb, y =aebx and xyn=b

COMPLEMENTARY ELECTIVE COURSE 2: 2C02 MAT-CS - MATHEMATICS FOR COMPUTER SCIENCE II

CO1: Understand Functions of two or more variables, limits and continuity.

CO2: Understand partial derivatives, homogeneous functions, Euler's theorem on homogeneous functions, total derivative, differentiation of implicit functions and change of variables.

CO3: Understand Reduction formulae for trigonometric functions and evaluation of definite integrals $\int_0^{\frac{\pi}{2}} sin^n x dx$, $\int_0^{\frac{\pi}{2}} cos^n x dx$ and $\int_0^{\frac{\pi}{2}} sin^v x cos^q x dx$.

CO4: Understand Substitutions and the area between curves, arc length, areas and length in polar coordinates.

CO5: Understand Double and Iterated Integrals over rectangles, double integrals over general regions, area by double integration, double integrals in polar form and triple integrals in rectangular coordinates.

CO6: Understand Eigen values, Eigen vectors, properties of Eigen values, Cayley-Hamilton theorem, reduction to diagonal form, similarity of matrices, powers of a matrix, reduction of quadratic form to canonical form and nature of a quadratic form

COMPLEMENTARY ELECTIVE COURSE 3: 3C03 MAT-CS - MATHEMATICS FOR COMPUTER SCIENCE III

CO1: Understand Ordinary differential equations, Geometrical meaning of y'=f (x, y) and Direction Fields.

CO2: Understand Methods of solving Differential Equations: Separable ODEs, Exact ODEs, Integrating Factors, Linear ODEs and Bernoulli Equation.

CO3: Understand Orthogonal Trajectories, Existence and Uniqueness of Solutions.

CO4: Understand Second order ODEs, Homogeneous Linear ODEs of second order, Homogeneous Linear ODEs with constant coefficients, Differential Operators, Euler-Cauchy Equation, Existence and Uniqueness of Solutions – Wronskian, Non homogeneous ODEs and Solution by variation of Parameters

CO5: Understand Laplace Transform, Linearity, first shifting theorem, Transforms of Derivatives and Integrals, ODEs, Unit step Function, second shifting theorem, Convolution, Integral Equations, Differentiation and integration of Transforms and to solve special linear ODE's with variable coefficients and Systems of ODEs

CO6: Understand Fourier series, arbitrary period, Even and Odd functions, Half-range Expansions.

CO7: Understand Partial Differential Equations and to solve PDEs by separation of variables and by use of Fourier series.

COMPLEMENTARY COURSE 4: 4C04 MAT-CS - MATHEMATICS FOR COMPUTER SCIENCE IV

CO1: Understand the concept of a graph, graphs as models, vertex degrees, sub graphs, paths and cycles, matrix representation of graphs, trees and connectivity – definition and simple properties.

CO2: Understand Linear Programming Problems, their canonical and standard forms.

CO3: Understand Methods to solve LPP : Graphical solution method and

Simplex method

CO4: Understand Transportation problems, transportation table, loops. Solve a Transportation Problem by finding an initial basic feasible solution and then by using the transportation algorithm known as MODI method.

CO5: Understand Numerical Integration, Trapezoidal Rule, Simpson's 1/3- Rule

CO6: Understand Numerical methods to find Solutions of Ordinary Differential Equations: Solution by Taylor's series, Euler's method, Modified Euler's method, Runge-Kutta methods.

COMPLEMENTARY COURSES

STATISTICS

COMPLEMENTARY ELECTIVE COURSE I: 1C01 STA - BASIC STATISTICS

CO1: Understand the different types of data.

CO2: Compute various measures of central tendency, measures of variation.

CO3: Analyse the relationship between two variables.

CO4: Acquire knowledge in time series data and compute various index numbers.

COMPLEMENTARY ELECTIVE COURSE II: 2C02STA - PROBABILITY THEORY

AND RANDOM VARIABLES

CO1: Evaluate the probability of events.

CO2: Understand the concept of random variables with examples in real life

CO3: Calculate the probability distribution of discrete and continuous random variables.

CO4: Understand the change of variable technique.

COMPLEMENTARY ELECTIVE COURSE III: 3C03 STA - PROBABILITY DISTRIBUTIONS

CO1: compute mathematical expectation of a random variable.

CO2: familiarize with different discrete probability distribution associated with real life situations.

CO3: understand the characteristics of different continuous distributions.

CO4: identify the appropriate probability model that can be used.

COMPLEMENTARY ELECTIVE COURSE IV: 4C04 STA - STATISTICAL INFERENCE

CO1: Understand the uses of Chebychev's Inequality and Central Limit Theorem.

CO2: Apply various method of estimation

CO3: Understand the concept of testing statistical hypotheses and its importance in real life situation

CO4: Apply ANOVA

B.SC. PHYSICS
COURSE OUTCOMES

CORE COURSE 1: 1B01PHY - MECHANICS I

CO1: Understand Newton's laws of motion, the concepts of linear and angular momentum and torque
CO2: Determine the centre mass of a given configuration
CO3: Understand the principle of work, energy and power
CO4: Determine angular momentum of a body about any given axis

CORE COURSE 2: 2B02PHY - MATHEMATICAL PHYSICS AND ERROR ANALYSIS

CO1: Understand vector operations and vector algebra
CO2: Determine derivative and integral of various functions **CO3**: State fundamental theorems of calculus
CO4: Compare differential operators in various coordinate systems
CO5: Understand the basic concepts of modeling
CO6: Solve first order and second order ODEs
CO7: Estimate uncertainties in measured values

CORE COURSE 3: 3B03PHY - MECHANICS II

CO1: Understand the concept of Galilean transformations and uniformly accelerating systems
CO2: Determine the trajectory of a body in central force problem using Newton's laws
CO3: Understand Kepler's laws of planetary motion
CO4: Formulate the mathematical equation of waves
CO5: Understand the concept and consequences of special theory of relativity

CORE COURSE 4: 4B04PHY - ELECTRONICS I

CO1: Understand the basics of PN junction diode, Zener diode and their applications
CO2: Understand the structure, operations and characteristics of BJT and FET
CO3: Understand the biasing methods and design of BJT and FET circuits
CO4: Understand the different number systems, conversions and binary arithmetic operations
CO5: Understand the basic combinational logic gates
CO6: Understand the Boolean algebra & logic simplification using Boolean algebra

CORE COURSE 5: 4B05PHY - GENERAL PHYSICS PRACTICAL I BASIC EXPERIMENTS IN PROPERTIES OF MATTER, OPTICS, ELECTRICITY & MAGNETISM

CO1: Familiarize with apparatus for mechanical, electrical, magnetic and optical experiments.
CO2: Develop skill in setting up apparatus for accurate measurement of physical quantities.
CO3: Understand multiple experimental techniques for determining physical quantities.
CO4: Develop skill in systematic way of measurements by minimizing possible errors.
CO5: Develop skill to analyze by plotting graphs using software.
CO6: Develop skill for systematic troubleshooting.
CO7: Perform error analysis for experiments.

CORE COURSE 6: 5B06PHY - QUANTUM MECHANICS

CO1: Understand the limitations of classical mechanics
CO2: Explain Blackbody radiation problem, Photoelectric effect and Compton Effect using quantum theory of radiation
CO3: Understand Rutherford,Bohr atom models and concept of energy and angular momentum quantisation
C04: Understand de-Broglie hypothesis,concept of wave nature of matter and Heisenberg uncertainty principle
CO5: Determine probability of finding a particle and expectation values of variable using its wave function
C06: Write and solve Schrodinger equation for simple quantum mechanical systems
CO7: State and explain Pauli's exclusion principle

CORE COURSE 7: 5B07PHY - ELECTROSTATICS AND MAGNETOSTATICS

CO1: Understand the concept of Electric field, electric potential, magnetic field and magnetic potentials
CO2: Use the principle of superposition and law of Gauss to calculate electric field Intensity
CO3: Determine Electric potential of charge distributions and hence specify electric field intensity
CO4: Understand the basic properties of conductors and capacitors
CO5: Calculate the magnetic fields due to currents using Biot-Savart and Ampere laws.
C06: Compare Magnetostatics and Electrostatics.
CO7: Understand Diamagnets, Paramagnets and Ferromagnets.

CORE COURSE 8: 5B08PHY - THERMODYNAMICS AND STATISTICAL MECHANICS

CO1: Understand the concept of temperature, the thermodynamic state and equilibrium.

CO2: Explain the first law of thermodynamics through work and heat and its Mathematical Formulation.
CO3: Understand the ideal gas equation and kinetic theory of gases.
CO4: Understand the second law of thermodynamics and thermodynamic temperature scale.
CO5: Define entropy and thermodynamic potentials.
CO6: Understand the basic concepts of Statistical mechanics.

CORE COURSE 9: 5B09PHY - ELECTRONICS II

CO1: Understand the AC analysis of BJT circuits and CE amplifiers 4
CO2: Understand the feedback circuits, oscillators and power amplifiers
CO3: Understand OPAMP basics and different OPAMP circuits
CO4: Understand the standard forms Boolean Expressions, Functions of Combinational Logic and K map simplifications.

CORE COURSE 10: 6B10PHY - SOLID STATE PHYSICS & SPECTROSCOPY

CO1: Understand basic crystal structure and compare various crystal systems
CO2: State and prove Bragg's law
CO3: Explain X-ray diffraction and various methods to obtain diffraction pattern
CO4: Understand basic properties of semiconductors and band structure of solids
CO5: Discuss Hall Effect and list its applications
CO6: Describe various regions of EM spectrum
CO7: Distinguish between microwave and infrared spectroscopy
CO8: Define Raman Effect and explain its quantum theory

CORE COURSE 11: 6B11PHY - OPTICS &PHOTONICS

CO1: Understand the concept of interference and diffraction
CO2: Distinguish between Fresnel and Fraunhoffer diffraction
CO3: Analyse mathematically diffraction pattern due to slits and apertures
CO4: Understand the concept of polarization and double refraction
CO5: Understand the basic principle and working of lasers
CO6: Explain different types of lasers
CO7: Understand the principle of holography and its applications
CO8: Understand the principle of total internal reflection and propagation of light through optical fibres
CO9:Compare different types of optical fibres and their applications Optics and Photonics

CORE COURSE 12: 6B12PHY - NUCLEAR, PARTICLE & ASTROPHYSICS
SEMESTER

CO1: Understand the structure nucleus and nuclear constituents
CO2: Define nuclear forces and nuclear reactions
CO3: Familiarize elementary particles and their properties
CO4: Understand stellar classifications
CO5: Understand basic concepts of birth of the star
CO6: Identify different stars in HR diagram
CO7: Understand the theory of death of the star
CO8: Define white dwarf, neutron star and black hole

CORE COURSE 13: 6B13PHY - ELECTRODYNAMICS AND CIRCUIT THEORY

CO1: Understand the basic concepts of Electrodynamics
CO2 : Explain the mathematical theory of Electromagnetic waves
CO3 : Understand different Network theorems
CO4 : Understand the basic concepts of Transient currents

CORE COURSE 14: DISCIPLINE SPECIFIC ELECTIVE

6B14PHY(1) - PYTHON PROGRAMMING

CO1: Develop skills in creating program sketches of scientific problems
CO2: Develop basic skills in logical thinking and programming
CO3: To make real-life scientific problems easier on a computer with user interaction and graphics

6B14PHY(2) - NANOSCIENCE

CO1: Understand the basic concepts of Nanoscience
CO2: Understand the properties of materials in the nano range
CO3: Identify different techniques for the production of nanomaterials
CO4: Understand characterization techniques & applications of nanomaterial.

6B14PHY(3) - MATERIAL SCIENCE

CO1: Understand the basic concepts of material science

CO2: Understand the properties of materials
CO3: Identify different engineering materials & their properties
CO4: Understand the properties & characteristics of semiconducting,insulating & magnetic materials

6B14PHY(4) - COSMOLOGY

CO1: Understand history of cosmology at different era
CO2: Explain general theory of relativity and curvature of space
CO3: Understand cosmological principle and Friedmann model

CO4: Explain expansion of universe based on Hubble's law and to state big bang theory

6B14PHY(5) - PLASMA PHYSICS

CO1: Define plasma and plasma parameters
CO2: Understand applications of plasma
CO3: Determine the behavior of plasma in various E and B Fields
CO4: Determine the nature of plasma as a fluid

CORE COURSE 15: 6B15PHY - PRACTICAL II GENERAL PHYSICS II

CO1 : Familiarise with apparatus for mechanical, electrical, magnetic and optical experiments.
CO2: Develop skill in setting up apparatus for accurate measurement of physical quantities.
CO3: Understand multiple experimental techniques for determining physical quantities.
CO4: Develop skill in systematic way of measurements by minimising possible errors.
CO5: Develop skill to analyse by plotting graphs using software.
CO6: Develop skill for systematic troubleshooting.
CO7: Perform error analysis for experiments.

CORE COURSE 16: 6B16PHY - PRACTICAL III ELECTRONICS

CO1: Familiarise active and passive electronic components.
CO2: Familiarise multimeter, power supply, signal generator and cathode ray oscilloscope.
CO3: Develop skill in soldering and use of breadboard.
CO4: Develop skill in construction of rectifiers, voltage regulators, amplifiers and oscillators.
CO5: Observe, measure and analyse electrical signals.
CO6: Develop skill for troubleshooting circuits and components.
CO7: Develop skill to analyse by plotting graphs using software.

GENERIC ELECTIVE COURSE 1: 5D01PHY - INTRODUCTION TO CLIMATE AND CLIMATE CHANGE SCIENCE

CO1: Understand the basic concepts of climate change science
CO2: Understand some of the potentially serious consequences of climate change
CO3: Analyse linkages between climate change adaptation and development planning.
CO4: Describe relevant policy approaches and strategic frameworks for climate change mitigation
CO5: Identify international initiatives which support countries to plan for climate change

GENERIC ELECTIVE COURSE 2: 5D02PHY - RENEWABLE ENERGY SOURCES

CO1: Understand the sources of renewable energy
CO2: Understand the solar energy measurements & its applications
CO3: Understand the wind energy production & applications
CO4: Identify the energy from biomass,geothermal & ocean

GENERIC ELECTIVE COURSE 3: 5D03PHY - BIOPHYSICS

CO1: Understand the application of Physics in Biology and Medical fields
CO2: Understand the principles behind the movement of snakes, swimming of fishes and flying of birds
CO3: Understand about bioelectricity
CO4: Understand the principles behind EEG and ECG
CO5: Understand the sources of radiation and effects of radiation
CO6: Understand the basic principles of radiation protection and apply it in daily life.

GENERIC ELECTIVE COURSE 4: 5D04PHY - JOY OF STAR WATCHING

CO1: Understand Our Universe and its origin
CO2: Understand simple constellations
CO3: Explain the stars in Kerala culture
CO4: Understand the techniques of star watching

GENERIC ELECTIVE COURSE 5: 5D05PHY - ELECTRICITY IN DAILY LIFE ELECTRONICS

CO1: Understand the sources of Electricity
CO2: Explain the production of Electricity
CO3: Understand the basic concepts of electricity auditing

GENERIC ELECTIVE COURSE 6: 5D06PHY - INTRODUCTION TO BASIC ELECTRONICS

CO1: Understand the concepts of Basic electronics.
CO2: Explain the Semiconductor diode
CO3: Understand the basic electronic measurements and the instruments.

COMPLEMENTARY COURSES

MATHEMATICS

COMPLEMENTARY ELECTIVE COURSE I: 1C01MAT-PH - MATHEMATICS FOR PHYSICS I

CO1: Understand the concept of Differentiation and successive differentiation.
CO2: Understand Fundamental theorem - Rolle's theorem, Lagrange's mean-value theorem, Cauchy's mean-value theorem,
CO3: Understand the Taylor's theorem , expansions of functions - Maclaurin's series, expansion by use of known series
CO4: Understand the Matrices and System of Equations, Linear Transformations
CO5: Understand Rank of a matrix, elementary transformations, normal form of a matrix, inverse of a matrix, solution of linear system of equations.
CO6: Understand Linear transformations, orthogonal transformation, vectors - linear dependence
CO7: Understand Derivative of are, curvature, Polar coordinates, Cylindrical and Spherical co-ordinates

COMPLEMENTARY ELECTIVE COURSE II: 2C02MAT-PH - MATHEMATICS FOR PHYSICS II

CO1: Understand partial derivatives, homogeneous functions, Euler's theorem, total derivative, differentiation of implicit functions, change of variables
CO2: Understand Integration and Integration by Successive Reduction, Integration of Trigonometric Functions
CO3: Comprehend Applications of Integration
CO4: Comprehend Eigen values, Eigen vectors, properties of Eigen values,
CO5: Understand Cayley- Hamilton theorem, Diagonal form, similarity of matrices, powers of a matrix, canonical form, nature of a quadratic form

COMPLEMENTARY ELECTIVE COURSE III: 3C03MAT-PH - MATHEMATICS FOR PHYSICS III

CO1: Understand the concept of Multiple Integrals and solves problems
CO2: Understand Vector Differentiation
CO3: Understand Laplace Transforms and its Applications
CO4: Understand Fourier Series and Half range expansions

COMPLEMENTARY ELECTIVE COURSE IV: 4C04MAT-PH - MATHEMATICS FOR PHYSICS IV

CO1: Understand Wave Equation, Solution by Separating Variables, D-Alembert's solution of the wave equation.
CO2: Understand Heat Equation and Solution by Fourier Series
CO3: Understand Line integrals , path independence, conservative fields and potential

functions, Green's theorem in the plane

CO4: Understand Surface area, surface integrals, Stoke's theorem, Divergence theorem

CO5: Understand Numerical Integration, Trapezoidal Rule, Simpson's 1/3-Rule

CO6: Understand Numerical Solutions of Ordinary Differential Equations by Taylor's series, Euler's method, Modified Euler's method, Runge-Kutta methods.

COMPLEMENTARY COURSES

CHEMISTRY

COMPLEMENTARY ELECTIVE COURSE I: 1C01CHE/PCH - CHEMISTRY FOR PHYSICAL & BIOLOGICAL SCIENCES

CO1: Understand the atomic structure, basics of quantum chemistry and its applications.

CO2: Explain theories of chemical bonding and molecular structure.

CO3: Classify environmental pollution and recognise the causes of pollution

CO4: Understand the basic concept of Chemical equilibrium and theories of acids and bases

CO5: Calculate pH values

CO6: Explain common ion effect and solubility product

COMPLEMENTARY ELECTIVE COURSE II: 2C02CHE/PCH - CHEMISTRY FOR PHYSICAL & BIOLOGICAL SCIENCES

CO1: Understand the basic concept of classification, IUPAC nomenclature, bonding and structure of Organic compounds

CO2: Explain the concept of aromaticity and non-benzenoid aromatics

CO3: Understand the basic concepts of chemical equilibrium . Explain colloids, their properties and applications

CO4: Illustrate the laws of photochemistry and Explain the photochemical phenomena such as Photosensitization, quenching, Fluorescence, Phosphorescence, Chemiluminescence and bioluminescence.

CO5: Familiarise different types of analytical methods in chemistry and explain the principle of colorimetry

CO6: Explain the principles underlying the qualitative and quantitative analysis

COMPLEMENTARY ELECTIVE COURSE III: 3C03CHE/PCH(PS) - CHEMISTRY FOR PHYSICAL SCIENCES

CO1: Understand the basic principle underlying various spectroscopy

CO2: Understand the basic concepts of thermodynamics and laws of thermodynamics

CO3: Explain the formation , nomenclature and applications of coordination complexes,

Illustrate the valance bond theory of coordination complexes and explain the factors affecting the stability of complexes

CO4: Understand the basic concepts of chemical kinetics and Calculate the value of Ea from the values of k at two temperatures .Illustrate the types of Catalysis and understand the Characteristics of catalytic reactions

CO5: Understand the basic concept of nuclear chemistry, and explain the detection of isotopes using Aston's mass spectrograph and separation of isotopes by diffusion methods

CO6: Explain the principle and applications of different types of Chromatography

COMPLEMENTARY ELECTIVE COURSE IV: 4C04CHE/PCH (PS) - CHEMISTRY FOR PHYSICAL SCIENCES

CO1: Understand the basic concept in gaseous state Explain the deviation of real gases from ideal behavior and Maxwell distribution of velocities and its use in calculating molecular velocities. Distinguish average velocity, RMS velocity and most probable velocity

CO2: Understand the basic concepts of internal structure of Crystals (crystallography) and explain X-ray analysis of crystals

CO3: Understand the basic concepts in liquid state and solutions .Illustrate Henry's law and explain its applications. Identify colligative properties and apply colligative properties to determine molecular mass

CO4: Distinguish Specific conductance – molar conductance and equivalent conductance and explain laws of electrolysis , conductometric titrations and its applications

CO5: Explain electrochemical cell ,electrode potential , types of electrodes ,EMF Nernst equation and potentiometric titration

CO6: Acquaint with various instrumental methods in chemistry and Understand basic concepts of nanochemistry

COMPLEMENTARY ELECTIVE COURSE V: 4C05CHE/PCH - COMPLEMENTARY ELECTIVE - CHEMISTRY PRACTICAL

CO1: Apply the theoretical concepts while performing experiments.

CO2: Acquire practical skill to estimate acid, base, oxidizing agents etc by volumetric titration method

CO3: Acknowledge experimental errors and their possible sources.

CO4: Design, carry out, record and analyze the results of chemical experiments

CO5: Acquire practical skill to analyse the anions and cations qualitatively present in a mixture of inorganic salts

CO6: Learns the effective usage of chemicals

B.SC. ZOOLOGY
COURSE OUTCOMES

CORE COURSE 1: 1B01ZLG - PROTISTA AND NON CHORDATA - I

CO1: To understand the basic methods in zoology and animal classification.
CO2. Able to appreciate the process of evolution (unicellular cells to complex, multicellular organisms)
CO3: Familiar with the protist and non-chordate world (from Phylum Porifera to Mesozoa)
that surrounds us.
CO4: Able to identify the invertebrates (from Phylum Porifera to Mesozoa) and classify them up to the class level with the basis of systematics
CO5: Understand the basis of life processes in the non-chordates (from Phylum Porifera to
Mesozoa) and recognize the economically important invertebrate fauna.

CORE COURSE 2: 2B02ZLG - NON CHORDATA - II

CO1: Familiar with the non-chordate world (Coelomates - from Phylum Annelida to Hemichordata) that surrounds us.
CO2: Able to identify the invertebrates (Coelomates - from Phylum Annelida to Hemichordata) and classify them up to the class level with the basis of systematics
CO3: Understand the basis of life processes in the non-chordates (from Coelomates - from
Phylum Annelida to Hemichordata) and recognize the economically important invertebrate fauna.

CORE COURSE 3: 3B03ZLG - CHORDATA – I

CO1: Understand the origin and evolutionary relationship in different subphyla of chordates.
CO2: To understand the diversity of chordates (from urochordates to reptiles).
CO3: Understand the unique characters of urochordates, cephalochordates and vertebrates
CO4: Recognize life functions of chordates (from urochordates to reptiles.

CORE COURSE 4: 4B04ZLG - CHORDATA – II AND COMPARATIVE ANATOMY

CO1: Understand the general and unique characteristics and classification of Aves and Mammals

CO2: Understand the diversity and relation in form and structure of chordates.

CORE COURSE 5: 5B05ZLG - EVOLUTION, ETHOLOGY AND RESEARCH METHODOLOGY

CO1: Realise that the whole living system has a common ancestry and so all are related
CO2: Realise the fundamental characteristics of science as a human enterprise
CO3: Apply scientific methods in day to day life
CO4: Able to design a research work on a topic

CORE COURSE 6: 5B06ZLG - ANIMAL PHYSIOLOGY

CO1: Understand the function of various systems at cellular and system levels
CO2: Understand the mechanisms that work to keep the body alive and functioning
CO3: Apply the knowledge to lead a healthy life

CORE COURSE 7: 5B07ZLG - BIOCHEMISTRY AND BIOPHYSICS

CO1: Understand the importance of Biomolecules
CO2: Familiar with various biochemical pathways
CO3: Develop knowledge about equipment like microscopes, spectrophotometers, centrifuges etc

CORE COURSE 8: 5B08ZLG - GENETICS

CO1: Comprehensive and detailed understanding of the chemical basis of heredity.
CO2: Understanding about the role of genetics in evolution.
CO3: The ability to evaluate conclusions that are based on genetic data.
CO4: The ability to understand results of genetic experimentation in animals.

CORE COURSE 9: 6B09ZLG - CELL BIOLOGY, IMMUNOLOGY AND MICROBIOLOGY

CO1: Structural and functional aspects of basic unit of life i.e. cell concepts
CO2: Gather basic concepts of Cell Biology along with various cellular functions
CO3: Understand the basic concepts of immunity
CO3: Understand the diversity of microbes and their use and harm

CORE COURSE 10: 6B10ZLG - MOLECULAR BIOLOGY & BIOINFORMATICS

CO1: Understand the importance of Biomolecules
CO2: Familiar with various tools and applications of Bioinformatics

CORE COURSE 11: 6B11ZLG - ENVIRONMENTAL SCIENCE

CO1: Able to describe the relation between abiotic and biotic factors.

CO2: Students are able to describe various biological interactions.

CO3: Students are able to understand how change in population affect the ecosystem

CORE COURSE 12: 6B12ZLG - DEVELOPMENTAL BIOLOGY

CO 1: Understand the major steps in embryological development .

CO2: Understand the intricate mechanisms involved in the development of animals.

GENERIC ELECTIVE COURSE 1: 5D01ZLG - WILDLIFE CONSERVATION AND MANAGEMENT

CO1: Develop interest in conservation of nature

CO2: Acquire knowledge in in wildlife conservation strategies

GENERIC ELECTIVE COURSE 2: 5D02ZLG - APICULTURE

CO1: Develop self-employment capabilities.

CO2: Acquires scientific knowledge of profitable farming.

GENERIC ELECTIVE COURSE 3: 5D03ZLG - SERICULTURE

CO1: Develop self-employment capabilities.

CO2: Acquires scientific knowledge of sericulture

GENERIC ELECTIVE COURSE 4: 5D04ZLG - NUTRITION AND DIETETICS

CO1: Acquire a general awareness regarding the realsense of health.

CO2: Understand the role of a balanced diet in maintaining health.

GENERIC ELECTIVE COURSE 5: 5D05ZLG - FIRST AID

CO1: Acquire basic knowledge in first aid

CO2: Develop service mentality

COMPLEMENTARY COURSES
BIOLOGICAL TECHNIQUES

COMPLEMENTARY ELECTIVE COURSE I: 1C01BGT - GENERAL LABORATORY TECHNIQUES

CO1: Understand the basic laboratory techniques

CO2: Develop an understanding of the methods used in routine lab work.

COMPLEMENTARY ELECTIVE COURSE II: 2C02BGT - LABORATORY EQUIPMENTS AND TECHNIQUES

CO1: Acquire sound knowledge on the basic principles of common equipment used in

biological laboratories

COMPLEMENTARY ELECTIVE COURSE III: 3C03BGT - PREPARATION OF BIOLOGICAL SPECIMENS

CO1: Acquires basic knowledge on preparation of lab specimens for display in biology museums and also for other laboratory purposes

COMPLEMENTARY ELECTIVE COURSE IV: 4C04BGT - ADVANCED BIOLOGICAL TECHNIQUES

CO1: Get exposed to some of the advance techniques in biology
CO2: Familiarize the student with the modern innovative techniques and terminologies currently used.

COMPLEMENTARY COURSES
CHEMISTRY

COMPLEMENTARY ELECTIVE COURSE I: 1C01CHE/PCH - CHEMISTRY FOR PHYSICAL & BIOLOGICAL SCIENCES

CO1: Understand the atomic structure, basics of quantum chemistry and its applications.
CO2: Explain theories of chemical bonding and molecular structure.
CO3: Classify environmental pollution and recognise the causes of pollution
CO4: Understand the basic concept of Chemical equilibrium and theories of acids and bases
CO5: Calculate pH values
CO6: Explain common ion effect and solubility product

COMPLEMENTARY ELECTIVE COURSE II: 2C02CHE/PCH - CHEMISTRY FOR PHYSICAL & BIOLOGICAL SCIENCES

CO1: Understand the basic concept of classification, IUPAC nomenclature, bonding and structure of Organic compounds
CO2: Explain the concept of aromaticity and non-benzenoid aromatics
CO3: Understand the basic concepts of chemical equilibrium . Explain colloids, their properties and applications
CO4: Illustrate the laws of photochemistry and Explain the photochemical phenomena such as Photosensitization, quenching, Fluorescence, Phosphorescence, Chemiluminescence and bioluminescence.
CO5: Familiarise different types of analytical methods in chemistry and explain the principle of colorimetry
CO6: Explain the principles underlying the qualitative and quantitative analysis

COMPLEMENTARY ELECTIVE COURSE III: 3C03CHE/PCH (BS) - CHEMISTRY FOR BIOLOGICAL SCIENCES

CO1: i) Understand the basic concept of Coordination Chemistry, nomenclature, Werner's coordination theory and Valance bond theory of coordination complexes
ii) Write the name of Coordination compounds
iii) Explain Werner's coordination theory and Valance bond theory of coordination complexes
iv) Explain the application of coordination complexes

CO2: i) Understand the electron displacement effects in organic molecules
ii) Explain the mechanism of nucleophilic substitutions and eliminations in alkyl halides
iii)Explain the mechanism of aromatic electrophilic substitution reactions

CO3: i) Classify the isomerism in organic molecules
ii) Distinguish the geometrical isomers and explain their stability
iii) Explain the characteristics of chiral compound
iv) Explain the conformational isomers in alkanes and cycloalkanes

CO4: i) Explain the important types of polymerization, thermoplastics and thermosetting plastics
ii) Understand the characteristics of biodegradable plastics

CO5: Understand the basic concept of thermodynamics and laws of thermodynamics

CO6: i) Understand the basic concept of chemical kinetics
ii)Calculate Ea from the values of k at two temperatures
iii) Explain homogeneous catalysis, heterogeneous catalysis and Characteristics of catalysis reactions

COMPLEMENTARY ELECTIVE COURSE IV: 4C04CHE/PCH (BS) - CHEMISTRY FOR BIOLOGICAL SCIENCES

CO1: Illustrate the preparatory methods of glucose and fructose and explain their configurations Familiarize the structure and properties of sucrose and poly sachrides

CO2: Know the structure of important five membered and six membered heterocyclic compounds and explain their reactivity and important reactions .Explain the preparation and properties of Quinoline and iso quinoline

CO3: Understand the structure and functions of nucleic acids , Classify amino acids and explain the structure of protein and its importance

CO4: Understand the mechanism of enzyme action , enzyme catalysis
CO5: Know the structure of Vitamin A, B and C. and hormones progesterone Testosterone,
cortisone, adrenaline and Thyroxin
CO6: Understand the importance of metal ions in biological systems and Mechanism of O_2 and **CO2** transportation – Nitrogen Fixation Na-K pump

COMPLEMENTARY ELECTIVE COURSE V: 4C05CHE/PCH - COMPLEMENTARY ELECTIVE - CHEMISTRY PRACTICAL

CO1: Apply the theoretical concepts while performing experiments.
CO2: Acquire practical skill to estimate acid, base, oxidizing agents etc by volumetric titration method
CO3: Acknowledge experimental errors and their possible sources.
CO4: Design, carry out, record and analyze the results of chemical experiments
CO5: Acquire practical skill to analyse the anions and cations qualitatively present in a mixture of inorganic salts
CO6: Learns the effective usage of chemicals

COMMON COURSES

ENGLISH

COMMON COURSE 1: 1A01 ENG - Communicative English

CO1. Understand and apply the rubrics of English grammar

CO2. Recognize and apply the basic patterns in English vocabulary

CO3. Read and elicit data, information, inferences and interpretations based on a given material in English

CO4. Develop the ability to speak in English in real life situations

CO5. Elicit necessary information after listening to an audio material in English

CO6. Compose academic and non-academic writings including letters, paragraphs and essays

on a given topic and CV's for specific purposes

COMMON COURSE 2: 1A02 ENG - Readings on Kerala

CO1. Understand the basic facts and patterns regarding the cultural evolution of Kerala through articles, poems, stories, life writings and historical narratives.

CO2. Acquaint with the life and works of the illustrious leaders of Kerala Renaissance and the major events.

CO3. Assimilate the notion of Kerala as an emerging society and critically examine the salient features of its evolution.

CO4. Understand the evolution and contemporary state of the concept of "gender" with reference to Kerala

CO5. Understand the form and content of Kerala's struggle against "casteism" and for "secularism"

CO6. Develop an awareness about the ecological problems and issues in Kerala

COMMON COURSE 3: 2A03 ENG - Readings on Life and Nature

CO1. Understand the basic themes and issues related to ecology through articles, poems, stories, life writings and historical narratives.

CO2. Assume ecologically friendly attitudes in events related to everyday life.

CO3. Identify the specific ecological problems related to Kerala.

CO4. Identify the major ecological movements around the world and within the country.

CO5. Ability to express specific opinions when confronted with ecology/development binary.

CO6. Identify the major or minor ecological issues happening around the student's native place.

COMMON COURSE 4: 2A04 ENG - Readings on Gender

CO1. Understand the basic themes and issues related to gender through articles, poems, stories, life writings and historical narratives.

CO2. Understand the basic topics related to gender studies.

CO3. Understand gender as a social construct and also as a site of struggle.

CO4. Critically engage with certain seminal topics that have become a part of gender studies.

CO5. Understand the basic gender issues faced by Kerala.

CO6. Appreciate and use gender sensitive and politically right terms and usages in everyday life.

COMMON COURSE 5: 3A05 ENG - Readings on Democracy and Secularism

CO1. Understand the relationship between higher education and nation building.

CO2. Understand the basic Constitutional values and themes through articles, poems, stories,life writings and historical narratives.

CO3. Evolve a deeper understanding and appreciation of the meaning of the words sovereignty, socialism, secularism and democracy in the Indian context.

CO4. Appreciate the relationship between higher education and the Constitutional directives regarding "scientific temper" and "the spirit of enquiry".

CO5. Appreciate the prevalence of "human rights" as a prerequisite for democratic living.

COMMON COURSE 6: 4A06 ENG - Readings on Philosophy of Knowledge

CO1. Understand the basic issues related to construction and acquisition of knowledge through articles, poems, stories, life writings and historical narratives.

CO2. Understand the relationship between higher education and nation building.

CO3. Evolve a deeper understanding of disciplines, multi-disciplinary approaches, interdisciplinary approaches and the various systems of knowledge.

CO4. Understand knowledge as a social construct and the dynamics of paradigm shifts.

CO5. Understand the epistemological and ontological factors within higher education.

CO6.Understand logical fallacies and apply critical thinking.

COMMON COURSES

MALAYALAM

ADDITIONAL COMMON COURSE I: 1A07 MAL - കഥാമാത്യകകൾ

CO1. ചെറുകഥ, നോവൽ എന്നീ സാഹിത്യരൂപങ്ങളെ സാമാന്യമായി പരിച യപ്പെടുക, വായനാഭിരുചിയും ആസ്വാദനശേഷിയും വളർത്തിയെടുക്കുക.

CO2. ചെറുകഥയുടെയും നോവലിന്റെയും ഉദയവികാസങ്ങളെക്കുറിച്ചുള്ള അവ ബോധമുണ്ടാക്കുക.

CO3. ഘടന, പ്രമേയം, ആഖ്യാനം തുടങ്ങിയവ വിലയിരുത്തുകയും രചനകളുടെ രാഷ്ട്രീയം അപഗ്രഥിക്കുകയും ചെയ്യുക.

CO4. ജീവിതാവസ്ഥകളുടെ സങ്കീർണ്ണതകളും അനുഭൂതികളും ബോധ്യപ്പെടുത്തു കയും വിദ്യാർത്ഥികൾക്ക് മൗലികരചനകൾ നടത്തുന്നതിന് വഴിയൊരുക്കുകയും ചെയ്യുക.

ADDITIONAL COMMON COURSE II: 2A08 MAL - കവിതമാത്യകകൾ

CO1. ജീവിതാവസ്ഥകൾ, സങ്കീർണ്ണതകൾ, അനുഭൂതികൾ എന്നിവ ആവിഷ്ക്കരി ക്കുന്ന ഭാഷയുടെ സാന്ദ്രീകൃത രൂപമായ കവിത എന്ന സാഹിത്യരൂപത്തെ സാമാ ന്യമായി പരിചയപ്പെടുകയും കാവ്യാസ്വാദനശേഷി രൂപപ്പെടുത്തിയെടുക്കുകയും ചെയ്യുക.

CO2. മലയാളകവിതയുടെ വളർച്ചയിലും വികാസത്തിലും നിർണ്ണായക സ്വാധീനം ചെലുത്തിയ കവികളെയും കാവ്യമാതൃകകളെയും കുറിച്ച് അവബോധമുണ്ടാക്കു ക.

CO3. പ്രാചീനം, മധ്യകാലം, നവോത്ഥാനം, ആധുനികം , ആധുനികാനന്തരം എന്നീ കാലഘട്ടങ്ങളിൽ മലയാളകവിതയിലുണ്ടായ രൂപ-ഭാവ പരിണതികളെ പരിചയപ്പെടുക.

CO4. ഭാഷയുടെ സവിശേഷപ്രയോഗത്തിലൂടെ കവിത സാധ്യമാക്കുന്ന സാമൂഹ്യ സാംസ്കാരിക പരിതോവസ്ഥകളുടെ ആവിഷ്ക്കരണവും അവയുടെ രാഷ്ട്രീ യവും തിരിച്ചറിഞ്ഞ് നിരൂപണ ബുദ്ധ്യാ വിലയിരുത്താനുള്ള പരിശീലനം നൽകു ക.

ADDITIONAL COMMON COURSE III: 3A09 MAL - ഗദ്യസാഹിത്യം

CO1. ആത്മകഥ/ സ്മരണ, ജീവചരിത്രം/കേട്ടെഴുത്ത്, സഞ്ചാരസാഹിത്യം, നിരൂപണം തുടങ്ങിയ ഗദ്യരൂപങ്ങളുടെ ഉദ്ഭവം,വളർച്ച,പരിണാമവഴികൾ എന്നിവയെ പറ്റി സാമാന്യാവബോധമുണ്ടാക്കുക

CO2.ഗദ്യസാഹിത്യകൃതികൾവായിക്കുന്നതിനും നിരൂപണ മനോഭാവത്തോടെ ആസ്വദിക്കുന്നതിനും പ്രേരിപ്പിക്കുക.

CO3. ഗൗരവപൂർണ്ണമായ ഒരു സിനിമാസ്വാദനസംസ്കാരം വളർത്തിയെടുക്കുക,

CO4. വിവിധങ്ങളായ ഗദ്യരചനാ ശൈലികൾ പരിചയപ്പെടുക.

CO5. ഗദ്യഭാഷയുടെ പ്രയോഗശേഷി വികസിപ്പിക്കുക.

ADDITIONAL COMMON COURSE IV: 4A 10 MAL - ദൃശ്യകലാസാഹിത്യം

CO1. കേരളത്തിന്റെ തനതായ ദൃശ്യകലാപാരമ്പര്യങ്ങളെക്കുറിച്ചും സമ്പന്നതയെക്കുറിച്ചും വിദ്യാർത്ഥികൾക്ക് അിറവ് പകരുക

CO2. കഥകളി, തുള്ളൽ, നാടകം, സിനിമ പോലുള്ള ദൃശ്യകലകളെയും അവയ്ക്കാധാരമായ സാഹിത്യപാഠങ്ങളെയും പരിചയപ്പെടുത്തുക.

CO3. കലാപരവും സാഹിത്യപരവുമായ പുതിയ അനുഭവങ്ങളെ ഉൾക്കൊള്ളൽ, കാവ്യാനുഭൂതികൾക്കൊപ്പം ജീവിതാവബോധത്തിന്റെ സ്വാംശീകരണം എന്നിവ ലക്ഷ്യം.

CO4. സാമൂഹിക പരിഷ്ക്കരണത്തിന്റെയും മന:സംസ്കരണത്തിന്റെയും ചാലകശക്തികളായി നാടകം പോലെയുള്ള കലാസൃഷ്ടികൾ വർത്തിക്കുന്നതിനെ വിശകലനം ചെയ്യുക.

CO5. സിനിമ എന്ന ജനകീയകലയുടെ കേവലാസ്വാദനത്തിനപ്പുറമുള്ള സൈദ്ധാന്തിക തലങ്ങളിലേക്കും സാമൂഹിക-സാംസ്കാരിക വായനകളിലേക്കും വിദ്യാർത്ഥികളം സജ്ജരാക്കുക.

COMMON COURSES

HINDI

ADDITIONAL COMMON COURSE: I: 1A07HIN - HINDI KAVITHA

CO1: Understanding the role played by the poets of bhakthikal in literature and society.

CO2: Understanding the philosophy of life as well as poems of chayavad.

CO3: Understanding the poems of Modern poets in context with their experience of life.

CO4: Understanding the contemporary spirit of the poets.

ADDITIONAL COMMON COURSE : II: 2AO8HIN - RACHANA THATHA PRAYOG

CO1: Understanding Fundamental principles of Hindi Grammar.

CO2: Understanding the correct usage of Hindi grammar.

CO3: Developing significant increase in word knowledge.

CO4: Develop communicative skills in Hindi.

ADDITIONAL COMMON COURSE : III: 3AO9HIN - KATHA SAHITHYA

CO1: Analyze a variety of short stories in the cultural and historical context.

CO2: Analyze novels in the modern context.

CO3: Understand the story content and structure in depth.

CO4: Collaborate with peers of role playing story analysis and presentations

ADDITIONAL COMMON COURSE: IV: 4A10HIN - NATAK AUR EKANKI

CO1: Understand the social and artistic movements that have shaped theatre.

CO2: Analyze and interpret texts and performances both in writing and orally.

CO3: Develop and apply process skills in rehearsal production and classroom settings.

CO4: Demonstrate problem solving skills in various theatrical contexts.