T. K. MADHAVA MEMORIAL COLLEGE, NANGIARKULANGARA

Founded 1964

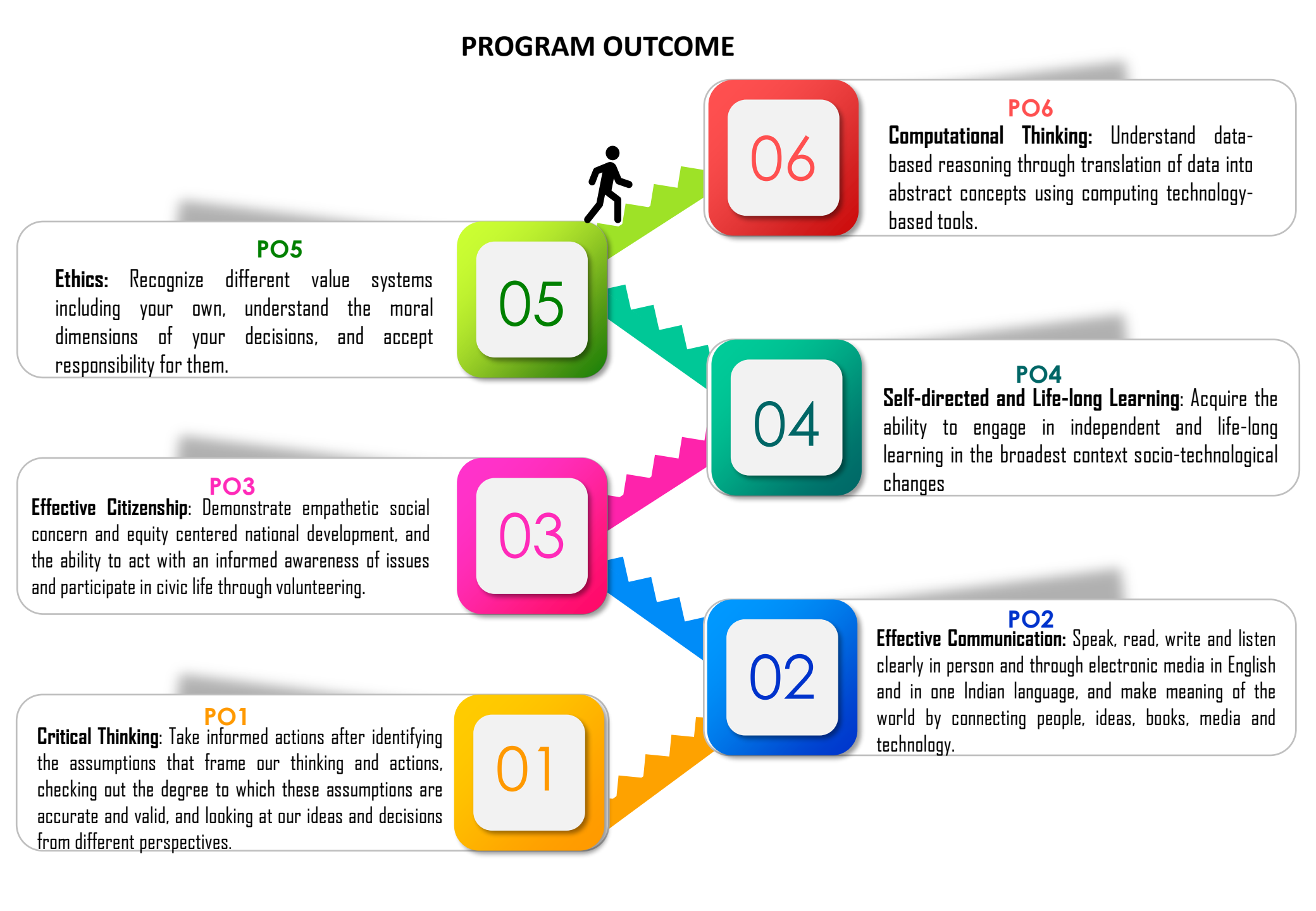
Affiliated to University of Kerala

NAAC Accredited with B Grade

AN OUTCOME BASED EDUCATION INITIATIVE BY THE COLLEGE

(Scheme & Syllabus of UG And PG Courses From 2019 Admission Onwards)

PROGRAM OUTCOME



BSc CHEMISTRY

PROGRAMME SPECIFIC OUTCOMES (PSOs)

PSO 1 Develop scientific outlook scientific attitude and scientific temper
PSO 2 Develop skill in experimenting , analyzing and interpreting data
PSO 3 Develop research attitude and adopt scientific method of identifying, analyzing and solving research problems in an innovative way
PSO 4 Apply physical and mathematical theories and principles in the context of chemical science
PSO 5 Use chemistry related soft wares for drawing structure and plotting graphs
PSO 6 Use instruments- potentiometer, conductometer, pH meter and colorimeter.
PSO 7 Acquire skill in safe handling of chemicals including hazardous materials.
PSO 8 Identify the ingredients in household chemicals, use them in a critical way
PSO 9 Predict analytical procedures, compare experimental, theoretical and graphical methods of analysis
PSO 10 Predict reaction mechanism in organic reactions
PSO 11 Understand the terms, concepts, methods, principles and experimental techniques of physical, organic, inorganic and analytical chemistry
PSO 12 Develop critical thinking and adopt healthier attitudes towards individual, community and culture through the course of Chemistry
PSO 13 Become cautious about environmental aspects and impact of chemicals in soil, water and air and adopt ecofriendly approach in all frontiers of life
PSO 14 Become responsible for the consumption of natural resources and adopt measures for sustainable development.
PSO 15 Visit Chemical factories and industries with scientific curiosity

PSO 16 Develop writing skills and presentation skills using audio visual aids
PSO 17 Compare and share knowledge in an interdisciplinary manner
PSO 18 Inculcate spirit of originality, novelty, and necessity in scientific research
PSO 19 Contribute to the academic and industrial requirements of the society
PSO 20 Get motivated to higher studies - PG Degree in different branches of Chemistry, BEd Degree in Physical Science, and job opportunities in industrial and non industrial sectors

COURSE OUTCOMES (COs)

SEMESTER I

LANGUAGE SKILLS (90 Hours)

Course Code: EN111.1

Instructional hours per week: 5 **Credits:4**

Upon completion of this course, the student will be able to:
CO1. Understand the basic skills of listening, speaking, reading and writing the language proficiently.
CO2. Apply language skills in daily life situations.
CO3. Equip the students with basic language along with improved non- verbal skills thereby improving their employability quotient skills thereby improving their employability quotient
CO4. Analyze and evaluate English literature

Additional Language I (72 Hours)

Course Code: HN1111.1 HINDI KATHA SAHITYA

Instructional hours per week: 4 **Credits :3**

Upon completion of this course, the student will be able to:
CO1. Recollect the main works of the representative fiction writers
CO.2 Understand the craft of the fiction writers
CO3.Analyse and evaluate the works of the fiction writers they studied
CO.4 Understand how the resource language is used as a medium in creative writing. Hours distribution: 2 hours each for each text.

MALAYALA KAVITHA (ADDITIONAL LANGUAGE: I)

Course Code: ML1111.1

CO1. Identify and illustrate the features of Ancient Literature
CO2. Discuss the peculiarities of the Ancient Vocabulary
CO3.Categorize different Poetic Styles

Foundation Course I

WRITINGS ON CONTEMPORARY ISSUES (72 Hours)

Course Code: EN1121

Instructional hours per week: 4 Credits :2

Upon completion of this course, the student will be able to:
CO1. Analyze issues of human rights in the society
CO2. Understand and evaluate grave issues of society
CO3. Analyze and address gender issues.
CO4. Discuss the effects of substance abuse.
CO5. Have an overall understanding of some of the major issues in the contemporary world.
CO6.Respond empathetically to the issues of society.

Core Course I – INORGANIC CHEMISTRY 36 hours

Course Code: CH 1141

Instructional Hrs: 2 **Credits:4**

Upon completion of this course, the student will be able to:
CO 1 Discuss the course of development of the structure of atoms.
CO 2 Apply rules for filling electrons in classifying elements into s, p,d and f blocks
CO 3 Define various scales of electronegativities and their applications
CO 4. Define Effective nuclear charge and Slater's rules
CO 5 Discuss about diagonal relationship and anomalous behaviour of hydrogen and other first element in each group.
CO 6 Correlate and predict general properties of s and p block elements based on their electronic configuration.
CO 7 Realise applications of s and p block elements in sustainable and renewable energy sources.
CO 8 Define various concepts of acids and bases.
CO 9 Understand reactions in non aqueous solvents.
CO 10 Realise various causes, effects and control measures of environmental pollution.
CO 11 Review national movements for environmental protection.

Complementary Course II –

CALCULUS WITH APPLICATIONS IN CHEMISTRY I –

Course Code: MM 1131.2

Instructional Hrs: 4 **Credits:3**

Upon completion of this course, the student will be able to:
CO 1 Apply differentiation and integration in processes related to chemistry.
CO 2 Explain Complex numbers, Hyperbolic functions and their applications.
CO 3 Analyze basics of Vector Algebra.

Course Code: PY1131.2 –

Rotational dynamics and Properties of matter (36 hr)

Instructional Hrs: 2 **Credits:2**

Upon completion of this course, the student will be able to:
CO –1Correlate the knowledge gathered to the immediate experimental curriculum
CO –2Distinguish the dynamics of rigid bodies of different shapes
CO –3Explain the implications of conservation laws
CO –4Interpret the flavour of classical fields from oscillations and waves
CO –5Handle the known problems in elasticity, surface tension and viscosity in a more mathematically rigorous way

SEMESTER II

ABILITY ENHANCEMENT COMPULSORY

COURSE:ENVIRONMENTAL STUDIES AND DISASTER MANAGEMENT (72 Hours)

Course Code EN1211.1

Instructional hours per week: 4 **Credits:3**

Upon completion of this course, the student will be able to:
CO1.Define the scope of Environmental Science and identify the different types of natural resources.
CO2.Define and identify the ecosystems and biodiversity around us.
CO3.Analyze and assess the types of pollution and social issues around us.
CO4.Understand environmental crisis and disaster management situations
CO5. take lead in spreading environmental values and creating awareness among the public
CO6.understand local environmental issues better.

ENGLISH GRAMMAR USAGE AND WRITING (90Hours)

Course Code EN1212.1

Instructional hours per week: 5 **Credits :4**

Upon completion of this course, the student will be able to:
CO1. Define and identity the basics of grammar
CO2. Identify and explain the different types of sentences.
CO3. Apply the rules of grammar in all situations of communication

CO4.Spot language errors and correct them.

Additional Language II (72 Hours)

Course Code: HN/ML1211.1

Course Code: HN1211.1

HINDI NIBANDH AUR ANYAGADYA VIDHAYEN

Instructional hours per week:4 **Credits: 3**

Upon completion of this course, the student will be able to:
CO1.Recollect the main works of the prescribed writers
CO2.Understand the forms of various prose writing in Hindi
CO3.Analyse & evaluate the prose forms prescribed, with respect to the craft and the relevance

GADHYASAHITHYAM

Course Code : ML1211.1

Upon completion of this course, the student will be able to:
CO1. Understand different Phases of Malayalam Prose (short stories, novels and essays)
CO2. Demonstrate critical skills
CO3. Analyze the relation between Heritage and Culture

Foundation course II

CHEMISTRY –ITS ORIGIN, METHODOLOGY AND IMPACTS (36 hrs)

Course Code: CH 1221

Instructional Hrs: 2 **Credits:3**

Upon completion of this course, the student will be able to:
CO 1 Appreciate the development of scientific theories through years with specific examples
CO 2 Develop curiosity and scientific attitude towards the application of chemistry in daily life
CO 3 Outline a procedure for experimentation
CO 4 Appraise the current development in Chemistry
CO 5 Identify the common ingredients of household synthetic products
CO 6 Discriminate and classify chemicals used as drugs,explosives,
CO 7 Get motivated in visiting chemical Industries
CO 8 Adopt safety measures in handling chemicals
CO 9 Draw titration curves and explain theory of volumetric titrations
CO 10 Select suitable indicators for acid base titration knowing the theories of acid base titration and indicators
CO 11 Develop computational skills
CO 12 Discuss separation techniques of filtration and chromatographic techniques

Complementary Course

CALCULUS WITH APPLICATIONS IN CHEMISTRY – II

Course Code: MM 1231.2

Instructional Hrs: 4 **Credits:3**

Upon completion of this course, the student will be able to:
CO 1 Describe partial differentiation, properties and applications.
CO 2 Solve problems related to series, power series and Taylor series.
CO 3 Demonstrate vector differentiation, properties and its applications.
CO 4 Analyze multiple Integrals.

Thermal Physics (36hours)

Course Code: PY1231.2

Instructional Hrs: 2 **Credits:2**

Upon completion of this course, students will be able to
CO –1 Compare thermal conductivity of various types of conductors.
CO –2 Differentiate between various thermodynamic processes.
CO –3 Judge the efficiency of engines by comparing the performance of various vehicles
CO –4 Associate entropy and available energy in various thermodynamic processes
CO –5 Differentiate between various phase transitions

SEMESTER III

Course Code EN 1311.1

ENGLISH FOR CAREER

Instructional hours per week: 5 Credits:4

Upon completion of this course, the student will be able to:
CO1.Acquire the necessary language skills required in the competitive job market
CO2.Acquire the cognitive, logical, analytical and verbal skills necessary to succeed in competitive examinations
CO3.Get sufficient practice in vocabulary, grammar, comprehension and remedial english from the perspective of career oriented tests.
CO4.Be able to prepare for and successful in competitive examinations

Additional Language III (90 Hours)

Course Code: HN/ML311.1

Course Code: HN311.1 HINDI NATAK, VYAKARAN THADHA ANUVAD

Instructional hours per week: 5 Credits:4

Upon completion of this course, the student will be able to:
CO1.Critically appreciates play
CO2.Understands difference between spoken Hindi and written Hindi
CO3.Writes grammatically correct sentences in Hindi
CO4.Defines different parts of speech and identifies them in a given sentence
CO5.Translates simple passages from English to Hindi

BHASHAAVABHODHAVUM SARGATHMAKATHAYUM

CourseCode: ML1311.1

Instructional hours per week: 5 Credits:3

Upon completion of this course, the student will be able to:
CO1.Develop Critical View and Creativity
CO2. Knowledge in grammar and translation
CO3. Develop language skills, writing essays and poems
CO4. Analyze how language becomes a medium of culture

INORGANIC CHEMISTRY II(54 hours)

Course Core course-II

Course Code CH 1341

Instructional Hrs: 3 Credits:3

Upon completion of this course, the student will be able to:
CO 1 Understand various theories of chemical bonding and their limitations.
CO 2 Predict stability of atoms and the nature of bonding between atoms.
CO 3 Discuss various applications of intermolecular interactions
CO 4. Understand chemistry of glass, silicates and silicones
CO 5 Discuss chemistry of Boron compounds, oxyacids and oxides of Phosphorus

CO 6 Understand refractory carbides, nitrides, borides and silicides.
CO 7 Describe various types of halogen compounds.
CO 8 Understand chemistry of noble gas
CO 9 Understand inorganic polymers and their applications.
CO 10 Distinguish between types of nuclear reactions.
CO 11 Describe measurement of radioactivity.
CO 12 Discuss applications of radioactivity in various fields.
CO 13 Understand introductory concepts of nanochemistry
CO 14 Suggest methods of synthesizing nano materials.
CO 15 Appreciate the variety of applications of nanomaterials.

Complementary Course II

LINEAR ALGEBRA, PROBABILITY THEORY AND NUMERICAL METHODS

Course Code: MM 1331.2

Instructional Hrs: 4 **Credits:3**

Upon completion of this course, the student will be able to:
CO 1 Describe basics of Linear Algebra.
CO 2 Explain the laws of Probability and characteristics of various distributions.

CO 3 Use Numerical methods to solve algebraic and transcendental equations.
CO 4 Apply various numerical integration methods to solve difference equations.

Optics, Magnetism and Electricity (54 hours)

PY1331.2

Instructional Hrs: 3 **Credits:3**

Upon completion of this course, the student will be able to:
CO – 1Review the principle of superposition, Explain interference, Produce interference by division of amplitude and division of wavefront, classification of fringes, Determine optical flatness
CO – 2 Distinguish between Fresnel and Fraunhofer diffraction Demonstrate single slit and double slit Diffraction, Identify plane transmission grating and explain resolving power of a grating
CO – 3 Explain Dispersion and Demonstrate Dispersion
CO – 4 Describe Polarization, Classification, Produce and Analyze different types.
CO – 5 Recall the applications of Laser, Describe the conditions to obtain Laser, Analyze different types of Lasers, Define Non Linear Optics and extend the ideas to Second Harmonic Generation
CO – 6 Classify different types of optical fibres, Employ Optical fibre in different Applications, Construct a model of an effective Fibre optic communication system
CO – 7 Underline the basis of Holography, Classify different types of Hologram, Discover its application in modern world

SEMESTER IV

READINGS IN LITERATURE (90 Hours)

Course Code EN1411.1

Instructional hours per week: 5 **Credits:4**

Upon completion of this course, the student will be able to:
CO1. Understand and appreciate literary discourse.
CO2.Understand and demonstrate the dynamics of theater
CO3. Analyze prose pieces in English
CO4. Evaluate literature in the global context.
CO5. Analyse literature as a cultural and interactive phenomenon

Additional Language IV (90 Hours)

Course Code HN/ML411.1

Course Code: HN411.1

HINDI KAVITHA EVAM EKANKI

Instructional hours per week: 5 **Credits:4**

Upon completion of this course, the student will be able to:
CO1.Appreciates ancient and modern Hindi poems.
CO2.Critically evaluates the contribution of Ancient & modern poets to the development of Hindi poetry
CO3.Elucidates key lines of poetry with reference to context
CO4.Appreciates and evaluates one act play with respect to craft and subject.

DRISHYAKALA SAHITHYAM

Course Code: ML1411.1

Instructional hours per week: 5 Credits:4

Upon completion of this course, the student will be able to:
CO1. Develop creative and critical skill
CO2. Develop drama and script writing skills
CO3. Learning the history of malayalam cinema
CO4. Practicing acting, script writing and direction

Course Core course-III

ORGANIC CHEMISTRY – I (54 hours)

Course Code: CH 1441

Instructional Hrs: 3 Credits:3

Upon completion of this course, the student will be able to:
CO 1 Recall the fundamentals of organic chemistry.
CO 2 Apply the electron displacement effects to compare acidity, basicity and stability of organic compounds/intermediates.
CO 3 Judge the reaction mechanism of substitution and elimination on the basis of the structure of alkyl halides.
CO 4 Summarise the chemistry of reaction intermediates.

CO 5 Discuss optical, geometrical and conformational isomerism of organic compounds. U PSO11 6 Use CIP rules to predict the configuration of organic compounds
CO 7 Differentiate photochemical and thermal reactions.
CO 8 Discuss theory of colour and constitution and the method of synthesis of dyes
CO 9 Explain aromaticity, orientation effect and mechanism of aromatic electrophilic substitution. U PSO10
CO 10 Demonstrate the method of determination of reaction mechanism.

LAB COURSES

Course Code: CH1442 (SEMESTER I,III& IV)

Core Course-IV

Lab Course I-Inorganic Qualitative Analysis

Number of Credits:2

Upon completion of this course, the student will be able to:
CO 1 Obey Lab safety instructions, develop qualities of punctuality, regularity and scientific attitude, outlook and scientific temper (GOOD LAB PRACTICES)
CO 2 Develop skill in safe handling of chemicals, take precaution against accidents and follow safety measures
CO 3 Use glass wares ,electric oven, burners and weighing balance
CO 4 Develop skill in observation , prediction and interpretation of reactions
CO 5 Detect solubility, and classify compounds according to their solubility

CO 6 Apply the principle of common ion effect and solubility A PSO1& 79 product in the identification and separation of ions
CO7 Develop skill in preparing and purifying inorganic complex compounds
CO 8 Use filtration and chromatographic techniques, vacuum pump and centrifugal pumps

Complementary Course II

DIFFERENTIAL EQUATIONS, VECTOR CALCULUS AND ABSTRACT ALGEBRA

Course Code: MM 1431.2

Instructional Hrs: 4 **Credits:3**

Upon completion of this course, the student will be able to:
CO 1 Solve ordinary differential equations of first and higher orders.
CO 2 Evaluate line integrals, surface and volume integrals and their applications.
CO 3 Categorize groups and analyze their properties.

Atomic Physics, Quantum Mechanics and Electronics (54 hours)

Course Code:PY1431.2

Instructional Hrs: 3 **Credits:3**

Upon completion of this course, the student will be able to:
CO –1 Recall the basics of atom model and draw the energy level diagram of hydrogen spectrum and correlate Classical and Quantum mechanics through Bohr's correspondence principle
CO –2 Visualize the spin orbit interaction through coupling schemes
CO –3 Predict and explain the atomic configuration of atoms using Pauli's exclusion principle
CO –4 Sketch the allowed optical and hyperfine spectra and understand the effect of external fields on the spectra of atoms
CO –5 Develop ideas regarding production, properties classification and importance of x-rays and explore structure and elemental composition using x-rays
CO – 6 Describe semiconductor properties in different diodes.
CO – 7 Explain the applications of different junction diodes
CO – 8 Distinguish different feedback networks
CO –9 Design single stage transistor amplifiers, oscillators and operational amplifiers.

Complimentary Practical Physics
Course outcomes: Semester 1 to 4
Course code: PY1432
Instructional hours per week: 5

Upon completion of this course, the student will be able to:
CO-1: To Study Fly Wheel - Moment of Inertia
CO-2: To study Compound Bar Pendulum – Symmetric
CO 3: To study Bending
CO-4: To study static torsion
CO-5: To Study Torsional oscillations
CO-6: To study Phase transitions
CO-7: To Study Thermal conductivity of Bad conductor
C0-8: To study viscosity
CO-9: To study surface tension
CO-10: To study resistivity
CO-11: To study thermal conductivity

SEMESTER V

PHYSICAL CHEMISTRY I (54 hours)

Course Code CH 1541

Course Core Course V

Instructional Hrs: 3 **Credits:4**

Upon completion of this course, the student will be able to:
CO 1 Identify, compare and explain the properties and behaviour of ideal and real gasses, knowing kinetic theory of gases and different types of molecular velocities and collision properties.
CO 2 Perform numerical problems of gasses under a set of conditions
CO 3 Differentiate between amorphous and crystalline solids, Understandanisotropy, symmetry and types of crystals, X Ray diffraction methods of study of crystal structure, identify the imperfections in crystals understand the physical aspects of surface tension and viscosity of liquids and the basics of liquid crystals and their applications
CO 4 representation of lattice planes and calculation of interplanar spacing, draw the crystal structures of NaCl and CsCl
CO 5 Recalling the basic concepts of solutions, concentration terms, Raoult's law and colligative properties
CO 6 Determination of colligative properties and molecular mass of solute
CO 7 Understand the working principle Electro-Chemical cells
CO 8 Design and Determine the potentials of electrochemical systems
CO 9 Assess the nature of electrolytes in terms of dissociation and ionic conductance of electrolytes in terms of mobility of ions
CO 10 Integrate the theory into practical applications of conductometric titrations

INORGANIC CHEMISTRY III (72 hours)

Course Code: CH 1542

Course Core course-VI

Instructional Hrs: 4 **Credits:4**

Upon completion of this course, the student will be able to:
CO 1 Discuss the electronic configuration and related properties of transition elements and inner transition elements
CO 2 Understand preparation of selected transition metal compounds,lanthanides and actinides U,A
CO 3 Compare lanthanide and actinide contraction and their consequences.
CO 4. Name coordination complexes,organometallics, discuss their properties and bonding
CO 5 Understand stability of complexes and factors affecting stability
CO 6 Describe isomerism in coordination compounds
CO 7 Discuss spectrochemical series, CFSE and their consequences
CO 8 Correlate geometry , stability and Jahn Teller effect and its causes
CO 9 Discuss reaction mechanisms and applications of coordination compounds
CO 10 Name and Classify organometallic compounds
CO 11 Discuss preparation and properties and bonding of carbonyls
CO 12 Identify the role of organometallic compounds in organic synthesis
CO 13 Discuss the role of inorganic ions in biological systems and biochemistry of haemoglobin, myoglobin, cytochromes, iron sulphur proteins

CO 14 Discuss various bioinorganic processes like photosynthesis, working of sodium potassium pump, etc
CO 15 Discribe various aspects of metallurgy,and instrumental methods of analyses viz., spectrophotometric methods, thermal methods and tools available to measure nanomaterials

ORGANIC CHEMISTRY II (72 hours)

Course Code CH 1543

Course Core course-VII

Instructional Hrs: 4

Upon completion of this course, the student will be able to:
CO 1 Describe the preparation of hydroxy, carbonyl & amino compounds, carboxylic acids and organo Mg, Li & Zn compounds.
CO 2 Distinguish primary, secondary & tertiary alcohols and amines.
CO 3 Write reaction steps in ascending & descending of alcohol and aliphatic acid series, interconversion of aldose and ketose, chain lengthening and shortening of aldoses.
CO 4. Explain the structure of glucose, fructose, sucrose, starch and cellulose.
CO 5 Predict the outcome and mechanism of simple organic reactions, using a basic understanding of the reactivity of functional groups
CO 6 Illustrate the use of organic reagents in synthesis.
CO 7 Discuss fundamental principles of supramolecular and green chemistry

Open Course

FUNDAMENTALS OF CHEMISTRY AND ITS APPLICATION TO EVERYDAY LIFE (54 hours)

Course Code CH 1551.2

Instructional Hrs: 3 **Credits:2**

Upon completion of this course, the student will be able to:
CO 1 Appreciate the evolution of Science and Chemistry and the early form of chemistry
CO 2 Understand the development of Chemistry as a discipline and the role of chemistry as a central science
CO 3 Discuss the fundamental properties of atom, structure of atom, classification of elements in to a periodic table
CO 4 Differentiate between simple molecules and giant molecules and the bonding nature
CO 5 Explain different types of bonding and predict stability
CO 6 Compare properties of graphite and diamond and their structural differences
CO 7 Identify household chemicals, their advantages and disadvantages
CO 8 Become aware of chemical hazards and the precautions in handling chemicals
CO 9 Beware of food adulterants

SEMESTER V

LAB COURSES

Course Code: CH1544

Core Course-VIII,

Lab Course II-INORGANIC VOLUMETRIC ANALYSIS

Number of Credits:3

Upon completion of this course, the student will be able to:
CO 1 Develop skill in selecting, primary and secondary standards
CO 2 Develop skill in weight calculation of primary standards weighing by electronic balance, making of solutions of definite strength (standard solutions)
CO 3 Use sophisticated glass wares, calibrate apparatus and develop skill in keen observation , prediction and interpretation of results
CO 4 Perform volumetric titrations under acidimetry alkalimetry, permanganometry, dichrometry, iodometry iodimetry,cerimetry, argentometry and complexometry
CO 5 Compare the advantages and disadvantages of different volumetric techniques
CO 6 Practice Punctuality and regularity in doing experiments and submitting Lab records

Lab Course III-PHYSICAL CHEMISTRY EXPERIMENT

Course Code: CH1545

Core Course-IX

Number of Credits:2

Upon completion of this course, the student will be able to:
CO 1 Develop Scientific outlook and approach in applying principles of physical chemistry in chemical systems/reactions
CO 2 Use computational methods for plotting graph
CO 3 Describe systematic procedures for physical experiments
CO 4 Acquire Instrumentation skill in using conductometer, potentiometer, refractometer, stalagmometer and Ostwald's viscometer.
CO 5 Compare theory with experimental findings
CO 6 Practice Punctuality and regularity in doing experiments and submitting Lab records

SEMESTER VI

Course Core course-X

PHYSICAL CHEMISTRY II (72 hours)

Course Code CH 1641

Instructional Hrs: 3 **Credits:4**

Upon completion of this course, the student will be able to:
CO 1 Understand basic concepts of thermodynamics , spectroscopy and group theory
CO 2 Apply laws of thermodynamics in physical and chemical processes and real system
CO 3 Classify processes, properties and systems on a thermodynamic basis
CO 4 Discuss the second law of thermodynamics and Assess thermodynamic applications using second law of thermodynamics.
CO 5 Discuss basic concepts of statistical thermodynamics
CO 6 Solve numerical problems based on thermodynamics and thermochemistry
CO 7 Understand the basics of spectroscopic techniquesRotational, Vibrational and Raman Spectroscopy
CO 8 Compare NMR and ESR spectroscopy and their applications
CO 9 Evaluate physical and chemical quantities using nonspectroscopic techniques.
CO 10 Identify the elements of symmetry and Determine the point groups of simple molecules
CO 11 Differentiate diamagnetism and paramagnetism, measurement of magnetic susceptibility

CO 12 Correlate dipole moment with geometry of molecules

Course Core course-XI

ORGANIC CHEMISTRY III(72 hours)

Course Code CH 1642

Instructional Hrs: 4 **Credits:4**

Upon completion of this course, the student will be able to:
CO 1 Outline the chemistry of simple heterocyclic compounds
CO 2 Classify amino acids, proteins, nucleic acids, drugs, terpenes, vitamins, lipids and polymers.
CO 3 Discuss the synthesis of amino acids, peptides, drugs and polymers.
CO 4 Describe the isolation and structure of terpenes and alkaloids.
CO 5 Explain the mechanism and techniques of polymerisation.
CO 6 Discuss the principle of UV, IR, NMR and Mass spectroscopy.
CO 7 Interpret spectroscopic data to elucidate the structure of simple organic compounds.
CO 8 Use the simple organic reactions to elucidate the structure of quinoline, piperine and conine.

Course Core course-XII

PHYSICAL CHEMISTRY III (72 hours)

Course Code: CH 1643

Instructional Hrs: 4 **Credits:4**

Upon completion of this course, the student will be able to:
CO 1 Recall the basic physical concepts in quantum mechanics, colloids, adsorption, Chemical Kinetics, catalysis, chemical and ionic equilibria, phase equilibria, binary liquid systems and photochemistry
CO 2 Understand the basic concepts involved in quantum mechanics, colloids, adsorption, Chemical Kinetics, catalysis, chemical and ionic equilibria, phase equilibria, binary liquid systems and photochemistry
CO 3 Derive and Interpret important theories and equations involved in physical chemistry
CO 4 Demonstrate the origin of quantum numbers by correlating the Cartesian and spherical polar coordinates of hydrogen atom.
CO 5 Identify and recognize the applications of various principles, equations and physical processes
CO 6 Perform calculations involving physical concepts and equations
CO 7 Analyze` graphical representations (phase diagrams, two and three components, vapor pressure – composition and boiling point –composition, temperature-composition) present in physical chemistry.
CO 8 Understand terminology
CO 9 Understand the effects of external influence on various chemical processes
CO 10 Understand different laws and principles of physical chemistry

Elective Course

SUPRAMOLECULAR, NANOPARTICLES AND GREEN CHEMISTRY (54 hours)

Course Code CH1651.1

Instructional Hrs: 3 **Credits:2**

Upon completion of this course, the student will be able to:
CO 1 Become aware of pollution caused by industries
CO 2 Recognise the necessity of green approaches to protect nature
CO 3 Discuss about sustainable development and logical use of natural resources
CO 4 Motivated to more eco friendly life style
CO 5 Realizes the importance of microscsale approaches and nano material research

LAB COURSES

Core Course-XIII

Lab Course- IV-ORGANIC CHEMISTRY EXPERIMENTS

Course Code: CH1644

Number of Credits:3

Upon completion of this course, the student will be able to:
CO 1 Develop curiosity in systematically analyzing organic compounds
CO 2 Differentiate and identify organic compounds by their characteristic reactions towards standard reagents
CO 3 Confirm their findings by preparing solid derivatives, and thus understand reliability of experimental results
CO 4 Determine physical constants of organic compounds
CO 5 Separate organic compounds by TLC/paper/column chromatographic techniques
CO 6 Prepare soaps
CO 7 Apply the principles and techniques in organic chemistry, thereby developing skill in designing an experiment to synthesize and purify organic compounds
CO 8 Practice systematic scientific procedure and prepare adequate report of them
CO 9 Understand the chemistry behind organic reactions

Core Course-XIV

Lab Course V -GRAVIMETRIC EXPERIMENTS

Course Code: CH1645 (SEMESTER VI)

Number of Credits:3

Upon completion of this course, the student will be able to:
CO 1 Understand precipitation techniques in quantitative context
CO 2 Appreciate the application of silica crucible and sintered crucible in gravimetry
CO 3 Practice technique of making, diluting solutions on quantitative basis
CO 4 Realize the factors affecting precipitation/crystallisation
CO 5 Take precautionary measures in filtration , drying and incineration of precipitates
CO 6 Understand the principle of colorimetry to estimate Fe3+ and ammonia
CO 7 Practice Punctuality and regularity in doing experiments and submitting Lab records

B.Sc. CHEMISTRY AND INDUSTRIAL CHEMISTRY

PROGRAMME SPECIFIC OUTCOMES (PSOs)
PSO 1: To provide to the students an in-depth understanding of the basic concepts of chemistry and how it is applied in industry for the production of bulk materials.
PSO 2: Enables them with tools needed for the practice of chemistry, which remains a discipline with much stress on experimentation.
PSO 3: It attempts to provide a detailed knowledge of the terms, concepts, methods, principles and experimental techniques of chemistry.
PSO 4: The student learns the steps and the methodology of the introduction of a simple chemical process developed in the laboratory to an industry

COURSE OUTCOMES(Cos)

SEMESTER I

Course Code: EN111.1

Language Course 1 LANGUAGE SKILLS (90 Hours)
Instructional Hours per week: 5 Credits: 4

Upon completion of this course, the student will be able to:
CO 1 Understand the basics of Phonetics
CO 2 Apply language skills in daily life situations.
CO 3 Demonstrate sophisticated writing skills
CO 4 Analyse and evaluate English literature

Course Code HN/ML 111.1
Additional Language I HINDI KADHA SAHITHYA (72 Hours)
Instructional hours per week: 4 Credits :3

Upon completion of this course, the student will be able to:
CO1. Recollect the main works of the representative fiction writers
CO.2 Understand the craft of the fiction writers
CO3.Analyse and evaluate the works of the fiction writers they studied
CO.4 Understand how the resource language is used as a medium in creative writing. Hours distribution: 2 hours each for each text.

Course Code: ML1111.1
ADDITIONAL LANGUAGE I: MALAYALA KAVITHA
Instructional hours per week: 4 Credits :3

Upon completion of this course, the student will be able to:
CO1. Identify and illustrate the features of Ancient Literature
CO2. Discuss the peculiarities of the Ancient Vocabulary
CO3.Categorize different Poetic Styles

Course Code: IC 1121

Foundation Course I Methodology and Informatics (54Hrs)

Instructional hours per week: 2 credits:3

On completion of the course the students will be able
CO1. To understand how Science or in special, Chemistry works.
CO2. They will be able to apply Scientific methods independently.

Course Code: MM 1131.7

Complementary Course – Differential Calculus of One variable and Complex Numbers (90 Hours)

Instructional hours per week: 5 credits:3

After the completion of the course a student should be able to
CO 1: Compute the limits and derivatives.
CO 2: Explain the concept rate of change.
CO 3: Analyze function behavior.
CO 4: Understand basic concepts of complex numbers.

Course Code: IC 1141

Core Course I-Inorganic Chemistry I(54Hrs)

Instructional hours per week: 3 credits:4

Upon completion of this course, the student will be able to
CO1. To understand the structure of atomic nucleus, properties of elements in relation to electronic configuration.
CO2. To learn the principles of chemical analysis.

CO3. To appreciate how the inner structure of elements dictates the chemical properties of elements
CO4. How elements bond together to form compounds.
CO5. Will acquire basic laboratory skills required for chemical analysis and become familiar with data collection, record keeping and data analysis in a chemical laboratory.

SEMESTER II

Course Code EN1212.1

Language Course 4: ENGLISH GRAMMAR USAGE AND WRITING

(90 Hours)

Instructional Hours per week: 5 Credits: 4

Upon completion of this course, the student will be able to
COL. Define and identity the basics of grammar
CO2 Identify and explain the different types of sentences
CO3. Apply the rules of grammar in all situations of communication
CO4 Spot language errors and correct them.

Additional Language II

Course Code HN 1211.1

HINDI NIBANDH AUR ANYAGADYA VIDHAYEN (72Hours)

Instructional hours per week:4 Credits: 3

Upon completion of this course, the student will be able to
CO1.Recollect the main works of the prescribed writers
CO2.Understand the forms of various prose writing in Hindi
CO3.Analyse & evaluate the prose forms prescribed, with respect to the craft and the relevance

Course Code: ML1211.1

GADHYASAHITHYAM

Instructional hours per week:4 Credits: 3

Upon completion of this course, the student will be able to:
CO1. Understand different Phases of Malayalam Prose (short stories, novels and essays)
CO2. Demonstrate critical skills
CO3. Analyze the relation between Heritage and Culture

Course Code: IC 1221
ENVIRONMENTAL STUDIES (72HRS)

Instructional hours per week: 4 **credits:4**

Upon completion of this course, the student will be able to:
CO1 understands the natural resources
CO2 understands the ecosystems
CO3 understands the biodiversity and its conservation.
CO4 understands the environmental pollution
CO5 understands the social issues and environment
CO6 understands the human population and environment

COURSE CODE: MM 1231.7
COMPLEMENTARY COURSE – INTEGRAL CALCULUS OF ONE VARIABLE
Instructional hours per week: 5 **credits:3**

After the completion of the course a student should be able to
CO 1: Explain the relationship between area and integral.
CO 2: Compute integrals.
CO 3: Compute area and volume using integration.
CO 4: Understand basic concepts of coordinate geometry and some special Functions

COURSE CODE IC-1221 –
FOUNDATION COURSE IN INORGANIC CHEMISTRY (36HRS)
Instructional hours per week: 2 **credits:2**

Upon completion of this course, the student will be able to:
CO1 understands the theories of bonding
CO2 understands the nuclear chemistry
CO3 understands nano materials

COURSE CODE IC1142 & IC1242
(LAB COURSE NUMBER 1 AND 2)
Instructional hours per week: 4 **credits:4**

Upon completion of this course, the student will be able to:
CO1Studies of the reactions of the radicals with a view to their identification and confirmation:
CO2 Understand systematic qualitative analysis by semimicro methods of a mixture containing two acidic and two basic radicals
CO3Understands Inorganic Preparations

SEMESTER III

COURSE CODE EN 1311.1
ENGLISH FOR CAREER (90 HOURS)
Instructional Hours per week: 5 Credits: 4

Upon completion of this course, the student will be able to:
CO1Acquire the necessary language skills required in the competitive job market
CO2 Aquire the cognitive logical analytical and verbal skills necessary to succeed in competitive examinations
CO3.Get sufficient practice in vocabulary grammar, comprehension and remedial english from the perspective of career-oriented tests
CO4 Be able to prepare for and successful in competitive examinations

COURSE CODE: MM 1331.7
COMPLEMENTARY COURSE - DIFFERENTIAL EQUATIONS, LINEAR EQUATIONS, FOURIER SERIES AND THEORY OF EQUATIONS
Instructional hours per week: 5 credits:4

After the completion of the course a student should be able to
CO 1 : Describe a first order differential equation and solve it.
CO 2 : Analyse the consistency of system of linear equations and solve it.
CO 3 : Understand linear transformation and eigen values.
CO 4 : Write the fourier series of a periodic function.
CO 5 : Understand the nature of roots for polynomials and apply find
Approximate solutions.

IC 1341 ORGANIC CHEMISTRY – I (54 HRS)
Instructional hours per week: 3 credits:3

Upon completion of this course, the student will be able to:
CO1 learns the behaviour of aliphatic and aromatic compounds like aromatic aldehydes, ketones and halides.
CO2 get an idea of the mechanism of reactions of organic compounds and hybridization.

IC 1342 PHYSICAL CHEMISTRY – I (72 HRS)
Instructional hours per week: 4 credits:3

Upon completion of this course, the student will be able to:
CO1 aware of the different states of matter, liquid crystals
CO2 basics of group theory
CO3 basics of group theory and thermodynamic properties like entropy, enthalpy and free energy.

IC 1371 INDUSTRIAL CHEMISTRY- I(72HRS)
Instructional Hours per week: 5 Credits: 4

Upon completion of this course, the student will be able to:
CO1 Understands Industrial Aspects of Inorganic Chemistry
CO2 Understands Industrially important inorganic materials
CO3 Understands Industrial aspects of Organic Chemistry
CO4 Understands Chemical Industries in Kerala
CO5 Understands Basics of Polymer Industry
CO6 Understands Separation and Purification Techniques

SEMESTER IV

COURSE CODE EN1411.3
READINGS IN LITERATURE (90 HRS)
Instructional Hours per week: 5 Credits: 4

Upon completion of this course, the student will be able to:
CO1. Understand and appreciate literary discourse
CO2 Understand and demonstrate the dynamics of theater
CO3. Analyze prose pieces in English
CO4 Evaluate literature in the global contest
CO5. Analyse literature as a cultural and interactive phenomenon.

COURSE CODE: MM 1431.7
COMPLEMENTARY COURSE – ABSTRACT ALGEBRA, VECTOR ALGEBRA, VECTOR CALCULUS AND LAPLACE TRANSFORMS
Instructional hours per week: 5 credits:4

After the completion of the course a student should be able to
CO 1 : Understand basics of group theory with examples and describeElementary properties of groups.
CO 2 : Understand and apply basic operations among vectors.
CO 3 : Apply vector operators on scalar and vector point functions.
CO 4 : Apply Laplace transform on different functions.

COURSE CODEIC 1441
INORGANIC CHEMISTRY – III (72HRS)
Instructional hours per week: 4 credits:4

After the completion of the course a student should be able to
CO 1 : understand how the transition metals coordinate,
CO2 understands the theories of coordination
CO3 understands how metals combine with organic compounds to form organometallic compounds
CO4 the role of metal ions in biological systems.

COURSE CODE IC 1442
PHYSICAL CHEMISTRY – II (72HRS)
Instructional hours per week : 4 **credits:4**

Upon completion of this course, the student will be able to:
CO1. Understands the basics of the developing fields of spectroscopy
CO2 Understands the basics of the developing fields of quantum mechanics
CO3. Understands the basics of the developing fields of statistical thermodynamics

COURSE CODE IC1471
INDUSTRIAL CHEMISTRYII(72HRS)
Instructional hours per week : 3 **credits:4**

Upon completion of this course, the student will be able to:
CO1. Understand unit process and operators
CO2. Explain the synthesis and manufacture of different type of polymers
CO3. Understand basic chemical composition of soap, detergents and cosmetics
CO4.Identify the common ingredients of house hold synthetic products
CO5. Review the principles underlying the working of sophisticated instruments
CO6. Discuss theory of colour and constitution and the method of synthesis of dye.
CO7. Get motivated in visiting chemical industries
CO8. Appraise the current development in chemistry

SEMESTER V

COURSE CODE IC 1541
ORGANIC CHEMISTRY – II (72 HRS)
Instructional Hours per week: 4 Credits: 4

Upon completion of this course, the student will be able to:
CO1. Get an interesting idea about the stereochemistry of organic compounds and the preparation and properties of organic compound
CO2, Classify amino acids,proteins, nucleic acids,terpenes,vitamins etc
CO3. Describe the isolation and structure of terpene and alkaloids
CO4. Explain the structure of glucose, fructose,sucrose,starch and cellulose

COURSE CODE IC 1571
INDUSTRIAL CHEMISTRY- III (36 HRS)
Instructional Hours per week: 2 Credits: 4

Upon completion of this course, the student will be able to:
CO 1.Get an idea of polymerization and organic spectroscopy.
CO2. Understands organic sulphur compounds
CO3. Get an idea of organic nitrogen compounds

COURSE CODE IC 1572
INDUSTRIAL CHEMISTRY- IV (36 HRS)
Instructional Hours per week: 2 Credits: 4

Upon completion of this course, the student will be able to:
CO1. Outline the chemistry of simple hetero cyclic compounds
CO2.Discuss theory of colour and constitution and the method of synthesis of dye
CO3. Interpret spectroscopic data to elucidate the structure of simple organic compounds
CO4. Discuss the principle of UV,IR,NMR, and mass spectroscopy

COURSE CODE IC 1551.1
ESSENTIALS OF CHEMISTRY(54HRS)
Open course 1. Instructional Hours per week:3 Credit-2

Upon completion of this course, the student will be able to:
CO1. Discuss the fundamental properties of atom,structure of atom,classification of elements into a periodic table
CO2. Understand nuclear chemistry
CO3. Learn about polymer chemistry
CO4. Get an idea about chemistry in biological process

SEMESTER VI

COURSE CODE IC 1641
PHYSICAL CHEMISTRY- III (72 HRS)
Instructional Hours per week: 4 **Credits: 4**

Upon completion of this course, the student will be able to:
CO1. Get a clear idea of conductance, emf,
CO2 Undestand the concept phase equilibria,
CO3.Explain rate of reactions
CO4. Describe about binary liquid mixtures.

COURSE CODE IC 1671 -
INDUSTRIAL CHEMISTRY-V (36 HRS)
Instructional Hours per week: 2 **Credits: 4**

Upon completion of this course, the student will be able to:
CO1 Processes in organic Chemical manufacture-I
CO2. Realise various causes, effects and control measures of environmental pollution

COURSE CODE IC 1672
INDUSTRIAL CHEMISTRY VI (36 HRS)
Instructional Hours per week: 2 **Credits: 4**

Upon completion of this course, the student will be able to:
CO1.Understand various sampling and analytical methods of gaseous pollutants
CO2. Get an idea about water quality parameter
CO3.Explain the detection of fluoride, chloride, sulphate, nitrate, phosphate, acidity and alkalinity of water.
CO4 Get an idea about Industrial waste water treatment
CO5. Understand other forms of pollutions

COURSE CODE IC 1651.1 -
SUPRAMOLECULAR, NANO, AND GREEN CHEMISTRY (54hrs)
Elective course 1. Instructional Hours per week:3 Credit-2

Upon completion of this course, the student will be able to:
CO1.Become aware of pollution caused by industries
CO2. Recognise the necessity of green approaches to protect nature
CO3. Discuss about sustainable development and logical use of natural resourses
CO4. Motivated to more ecofriendly life style
CO5. Realises the importance of microscsale approaches and nano material research

B.Sc. Mathematics

PROGRAMME SPECIFIC OUTCOMES(PSOs)
PSO 1- Develop values and critical thinking.
PSO 2- Apply mathematical skills to develop computing and programming skills.
PSO 3 - Analyse physical problems using mathematical tools.
PSO 4- Use R built in functions to solve numerical problems.
PSO 5 - Describe basic theories and applications of Physics aided by mathematical tools.

COURSE OUTCOMES

SEMESTER I

Course Code: EN111.1

Language Course 1LANGUAGE SKILLS (90 Hours)

Instructional Hours per week: 5 **No: of Credits: 4**

Upon completion of this course, the student will be able to:
CO 1 Understand the basics of Phonetics
CO 2 Apply language skills in daily life situations.
CO 3 Demonstrate sophisticated writing skills
CO 4 Analyze and evaluate English literature

Course Code: EN1121

Foundation Course 1:WRITINGS ON CONTEMPORARY ISSUES (72 Hours)

Instructional Hours per week: 4 **No: of Credits:2**

Upon completion of this course, the student will be able to:
CO1. Analyze issues of human rights in the society
CO2. Understand and evaluate grave issues of society
CO3. Analyze and address gender issues
CO4. Discuss the effects of substance abuse.
CO5. Have an overall understanding of some of the major issues in the contemporary world.
CO6. Respond empathetically to the issues of society.

Course Code HN/ML 111.1

Additional Language I HINDI KADHA SAHITHYA (72 Hours)

Instructional hours per week: 4 **No: of Credits :3**

Upon completion of this course, the student will be able to:
CO1. Recollect the main works of the representative fiction writers
CO.2 Understand the craft of the fiction writers
CO3.Analyse and evaluate the works of the fiction writers they studied
CO.4 Understand how the resource language is used as a medium in creative writing. Hours distribution: 2 hours each for each text.

Course Code: ML1111.1

ADDITIONAL LANGUAGE I: MALAYALA KAVITHA

Instructional hours per week: 4 **No: of Credits :3**

Upon completion of this course, the student will be able to:
CO1. Identify and illustrate the features of Ancient Literature
CO2. Discuss the peculiarities of the Ancient Vocabulary
CO3.Categorize different Poetic Styles

Course Code: MM 1141

Core Course I – METHODS OF MATHEMATICS (72 Hours)

Instructional hours per week: 4 No: of credits:4

After the completion of the course the students will be able to:
CO1 Define maxima, minima, critical points and points of inflection.
CO2 Apply the concept of differentiation in real life situation.
CO3 Understand logic and various proof techniques.
CO4 Learn decomposition of an integer into prime factors.

Course Code: ST 1131.1

Complementary Course I – Descriptive Statistics and Bivariate Analysis (72 Hours)

Instructional hours per week: 4 No: of credits:2

On completion of the course, students will be able to:
CO.1: Explain the concepts of statistical surveys, sampling, census and various sampling methods like simple random sampling, systematic sampling, and stratified sampling.
CO.2: Design questionnaires and carry out surveys.
CO.3: Collect and present raw data using frequency tables as well as appropriate graphs.
CO.4: Summarise data using various measures of central tendency, dispersion, skewness and kurtoisis
CO.5: Explain the concepts of scatter diagram, correlation and calculate the correlation between two variables.
CO.6: Explain the concept of regression, fit various regression equations to given data sets and predict values of dependent variables.

CO.7: Explain various concepts associated with the two regression lines and identify the regression lines for given data sets.
CO.8: Practicals: Use R built in functions to solve numerical problems associated with topics covered in various modules

Course Code: PY1131.1

Complementary Course II – Mechanics and Properties of matter (72 Hours)

Instructional hours per week: 4 **No: of credits:2**

Upon completion of this course, the student will be able to:
CO –1Correlate the knowledge gathered to the immediate experimental curriculum
CO –2Distinguish the dynamics of rigid bodies of different shapes
CO –3Explain the implications of conservation laws
CO –4Interpret the flavour of classical fields from oscillations and waves
CO –5Handle the known problems in elasticity, surface tension and viscosity in a more mathematically rigorous way

SEMESTER II

Course Code EN1211.1

Language Course 3 ABILITY ENHANCEMENT COMPULSORY COURSE(90 Hours)

ENVIRONMENTALSTUDIESAND DISASTERMANAGEMENT

Instructional Hours per week: 5 **No: of Credits: 4**

Upon completion of this course, the student will be able to
CO1 Define the scope of Environmental Science and identify the different types ofnatural resources.
CO2 Define and identify the ecosystems and biodiversity around us
CO3 Analyze and assess the types of pollutions and social issues around us. CO4 Understand environmental crisis and disaster management situations
COS. take lead in spreading environmental values and creating awareness amongthe public
CO6 understand local environmental issues better

Course Code EN1212.1

Language Course 4:ENGLISH GRAMMAR USAGE AND WRITING (90 Hours)

Instructional Hours per week: 5 **No: of Credits: 4**

Upon completion of this course, the student will be able to:
COL. Define and identity the basics of grammar
CO2 Identify and explain the different types of sentences
CO3. Apply the rules of grammar in all situations of communication
CO4 Spot language errors and correct them.

Additional Language II

Course Code HN 1211.1

HINDI NIBANDH AUR ANYAGADYA VIDHAYEN (72Hours)

Instructional hours per week:4 **No: of Credits: 3**

Upon completion of this course, the student will be able to
CO1.Recollect the main works of the prescribed writers
CO2.Understand the forms of various prose writing in Hindi
CO3.Analyse & evaluate the prose forms prescribed, with respect to the craft and the relevance

Course Code : ML1211.1

GADHYASAHITHYAM

Instructional hours per week:4 **No: of Credits: 3**

Upon completion of this course, the student will be able to:
CO1. Understand different Phases of Malayalam Prose (short stories, novels and essays)
CO2. Demonstrate critical skills
CO3. Analyze the relation between Heritage and Culture

Course Code: MM 1221

Foundation Course II – FOUNDATIONS OF MATHEMATICS (72 Hours)

Instructional hours per week: 4 **No: of credits:3**

Course outcome After the completion of the course the students will be able to:
CO1 Understand the integration of a function and learn its physical interpretation through various examples.
CO2 Learn various applications of integration.
CO3 Find tangent lines to polar curves, arc length and area.
CO4 Sketch conic sections such as parabola, ellipse and Hyperbola.
CO5 Understand the cylindrical and spherical coordinate systems

Course Code: ST 1231.1

Complementary Course I – Probability and Random Variables (72 Hours)

Instructional hours per week: 4 **No: of credits:2**

On completion of the course, the students should be able to:
CO.1: Distinguish between random and non-random experiments.
CO.2: Evaluate the probabilities of events using classical, frequentist and axiomatic approaches.
CO.3: Identify independent events, calculate conditional probability and application of Baye's theorem.
CO.4:Distinguish between discrete and continuous random variables with its probability distributions.
CO.5: Identify the independency of random variables.
CO.6: Calculate moment generating function and characteristic function.
CO.7: Determine the conditional mean and variance of a random variable.
CO.8: Evaluate the correlation between two random variables.

CO.9: Practical: Use R built in functions to solve numerical problems associated with topics covered in various modules

Course Code: PY1231.1

Complementary Course II– Thermal Physics and statistical mechanics (72 Hours)

Instructional hours per week: 4 **Number of credits:2**

Upon completion of this course, students will be able to
CO –1Compare thermal conductivity of various types ofconductors.
CO –2Differentiate between various thermodynamicprocesses.
CO –3judge the efficiency of engines by comparing the performance of various vehicles
CO –4Associate entropy and available energy in various thermodynamic processes
CO –5Differentiate between various phase transitions

SEMESTER III

Course Code EN 1311.1

Language Course 6: ENGLISH FOR CAREER (90 Hours)

Instructional Hours per week: 5 Credits: 4

Upon completion of this course, the student will be able to:
CO1Acquire the necessary language skills required in the competitive job market
CO2 Aquire the cognitive logical analytical and verbal skills necessary to succeed
in competitive examinations
CO3.Get sufficient practice in vocabulary grammar, comprehension and remedial english from the perspective of career oriented tests
CO4 Be able to prepare for and successful in competitive examinations

Additional Language III:

Course Code HN 1311.1

HINDI NATAK, VYAKARAN THADHA ANUVAD (90 Hours)

Instructional hours per week: 5 Credits:4

Upon completion of this course, the student will be able to:
CO1.Critically appreciates play
CO2.Understands difference between spoken Hindi and written Hindi
CO3.Writes grammatically correct sentences in Hindi
CO4.Defines different parts of speech and identifies them in a given sentence.
CO5.Translates simple passages from English to Hindi

Course Code: ML1311.1

BHASHAAVABHODHAVUM SARGATHMAKATHAYUM

Instructional hours per week: 5 **Credits:4**

Upon completion of this course, the student will be able to:
CO1.Develop Critical View and Creativity
CO2. Knowledge in grammar and translation
CO3. Develop language skills, writing essays and poems
CO4. Analyze how language becomes a medium of culture

Course Code: MM 1341

Core Course II – Elementary Number Theory and Calculus(90 Hours)

Instructional hours per week: 5 **Number of credits:4**

After the completion of the course the students will be able to
CO1 Understand the concept of congruence
CO2 Analyse linear system of congruence equations
CO3 Define the concept of limit, continuity, derivative of vector valuedfunctions
CO4 Understand various applications of multivariable calculus.

Course Code: ST 1331.1

Complementary Course I – Statistical Distributions(90 Hours)

Instructional hours per week: 5 **Number of credits:3**

On completion of the course, students will be able to:
CO.1: Define various discrete and continuous standard distributions and explain their theoretical properties.
CO.2: Solve numerical problems associated with discrete and continuous standard distributions.
CO.3: Fit Binomial, Poisson and Normal distributions to data sets and calculate theoretical frequencies.
CO.4: Explain the laws of large numbers and apply them to solve numerical problems
CO.5: Define sampling distributions (Normal, Chi-square, Students t and F) and solve elementary numerical problems.
CO.6: Practicals: Use built in functions of R to solve numerical problems associate with the portions specified in the modules

Course Code: PY1331.1

Complementary Course II–Optics, Magnetism and Electricity(90 Hours)

Instructional hours per week: 5 **Number of credits:3**

Upon completion of this course, students will be able to
CO – 1Review the principle of superposition, Explain interference, Produce interference by division of amplitude and division of wavefront, classification of fringes, Determine optical flatness
CO – 2Distinguish between Fresnel and Fraunhofer diffraction. Demonstrate single slit and double slit Diffraction, Identify plane transmission grating and explain resolving power of a grating
CO – 3Explain Dispersion and Demonstrate Dispersion
CO – 4Describe Polarization, Classification, Produce and Analyze different types.
CO – 5Recall the applications of Laser, Describe the conditions to obtain Laser, Analyze different types of Lasers, Define Non Linear Optics and extend the ideas to Second Harmonic Generation

CO – 6Classify different types of optical fibres, Employ Optical fibre in different Applications, Construct a model of an effective Fibre optic communication system
CO – 7Underline the basis of Holography, Classify different types of Hologram, Discover its application in modern world.

SEMESTER IV

Course Code EN1411.1

language Course 8:READINGS IN LITERATURE (90 Hours)

Instructional Hours per week: 5 Credits: 4

Upon completion of this course, the student will be able to:
COL. Understand and appreciate literary discourse
CO2 Understand and demonstrate the dynamics of theater
CO3. Analyze prose pieces in English
CO4 Evaluate literature in the global contest
COS. Analyse literature as a cultural and interactive phenomenon.

Course Code HN/ML411.1

Additional Language IV : HINDI KAVITHA EVAM EKANKI (90 Hours)

Instructional hours per week: 5 Credits:4

Upon completion of this course, the student will be able to:
CO1.Appreciates ancient and modern Hindi poems.
CO2.Critically evaluates the contribution of Ancient & modern poets to the development of Hindi poetry
CO3.Elucidates key lines of poetry with reference to context
CO4.Appreciates and evaluates one act play with respect to craft and subject.

Course Code: ML1411.1

Additional Language IV :DRISHYAKALA SAHITHYAM (90 Hours)

Instructional hours per week: 5 Credits:4

Upon completion of this course, the student will be able to:
CO1. Develop creative and critical skill
CO2. Develop drama and script writing skills
CO3. Learning the history of malayalam cinema
CO4. Practicing acting, script writing and direction

Course Code: MM 1441

Core Course – Theory of Matrices and Calculus (90 Hours)

Instructional hours per week: 5 Number of credits:4

After the completion of the course the students will be able to
CO1 Understand the concepts of Matrix operations their algebraic properties,
System of linear operations and their Matrix representation, Gauss-Jordan Elimination
CO2 Understand the concepts of Multiple integrals.
CO3 Apply double and triple integrals to solve real life problems.
CO4 Define the concepts potential functions, line integrals and surfaceintegrals.

Course Code: ST 1431.1

Complementary Course VII – Statistical Inference (90 Hours)

Instructional hours per week: 5 **Number of credits:3**

On completion of the course, the students should be able to:
CO.1: Analyse a sample to draw valid inferences about the parameters of a statistical population
CO.2: Explain the properties of estimators and solve numerical problems for the point and interval estimators of the parameters
CO.3: Explain the concept of testing statistical hypotheses.
CO.4: Identify two types of errors, Compute level of significance and power of a test.
CO.5: Conduct tests for hypothesis about the population mean and proportion using large samples
CO.6: Conduct tests for hypothesis about the homogeneity and independence using chi-square statistics.
CO.7: Conduct tests for hypothesis about the mean and variance for normal population using small samples
CO.8: Interpret an ANOVA table.
CO.9: Practical: Use R built in functions to solve numerical problems associated with topics covered in various modules.

Course Code: PY1431.1

Complementary Course II –Modern Physics and Electronics (90 Hours)

Instructional hours per week: 5 **Number of credits:3**

Upon completion of this course, students will be able to
CO –1Recall the basics of atom model and draw the energy level diagram of hydrogen spectrum and correlate Classical and Quantum mechanics through Bohr's correspondanceprinciple

CO –2Visualise the spin orbit interaction through coupling schemes
CO –3Predict and explain the atomic configuration of atoms using Pauli's exclusion principle
CO –4Sketch the allowed optical and hyperfine spectra and understand the effect of external fields on the spectra of atoms
CO –5Develope ideas regarding production, properties classification and importance of x-rays and explore structure and elemental composition using x-rays
CO – 6Describe semiconductor properties in different diodes.
CO – 7Explain the applications of different junction diodes
CO – 8Distinguish different feedback networks
CO –9 Design single stage transistor amplifiers, oscillators and operational amplifiers.

SEMESTER V

Course Code: MM 1541

Core Course – REAL ANALYSIS - I (90 Hours)

Instructional hours per week: 5 **Number of credits:4**

After the completion of the course the student will be able to
CO 1: understand the fundamental properties of Real Numbers that corroborate the formal development of Real Analysis.
CO 2: demonstrate and understand the theory of real sequences and series.
CO 3: ability to check the convergence or divergence of different sequences and series.
CO 4: understand and perform simple proofs.
CO 5: understand the concepts related to limit of functions.

Course Code: MM 1542

Core Course – COMPLEX ANALYSIS - I (72 Hours)

Instructional hours per week: 4 **Number of credits:3**

At the end of the course, the student will be able to
CO-1 : Understand the algebraic operations of complex numbers, complex functions
CO-2 : Understand the limits, continuity and differentiablilty of complex functions
CO-3 : Analyze analytic functions and other elementary functions
CO-4 : Apply contour integration, Cauchy's theorem and Cauchy's integral formula

Course Code: MM 1543

Core Course – ABSTRACT ALGEBRA – GROUP THEORY (72 Hours)

Instructional hours per week: 4 **Number of credits:4**

Upon Completion of this Course, studentswill be able to
CO-1: apply algebraic ways of thinking.
CO-2: examine abstractly about algebraic structures.
CO-3: analyse a given structure in detail.
CO-4: compare structures.

Course Code: MM 1544

Core Course – DIFFERENTIAL EQUATIONS (54 Hours)

Instructional hours per week: 3 **Number of credits:3**

Upon completion of this course, the student will be able to:
CO 1 Understand how differential equations arise in various physical problems.
CO 2 Methods to solve first order differential equations and second orderlinear equations.

Course Code: MM 1644

Core Course –Mathematics Software-LaTeX and SageMath (72 Hours)

Laboratory hours per week: 4 Number of credits:3

After the completion of the course the student will be able to:
CO1: know the basics of typesetting an article for a scientific publication.
CO2: typeset mathematical expressions in a LaTeX document.
CO3: acquainted with writing and executing programmes in SageMath.
CO4: Able to use SageMath for basic math computing and visualizing data

Course Code: MM 1551.1

Open Course – OPERATIONS RESEARCH (Open Course) (54 Hours)

Instructional hours per week: 3 Number of credits:2

Upon completion of this course, the student will be able to:
CO 1 :Find the solutions of LPP using graphical method.
CO 2 :Solve transportation network problems and assignment problems.
CO 3 :Able to solve two person games.
CO 4 :Acquire clear cut knowledge in both theory and application.

SEMESTER VI

Course Code: MM 1641

Core Course – REAL ANALYSIS - II (90 Hours)

Instructional hours per week: 5 **Number of credits:4**

After the completion of the course the student will be able to
CO 1: understand the concepts of continuity, differentiability and integrability, more rigorously than what we done in the previous calculus course.
CO 2: understand the fundamental properties of continuous functions on intervals.
CO 3: understand the basic theory of derivatives.
CO 4: get an exposure to the theory behind the integration.

Course Code: MM 1642

Core Course – COMPLEX ANALYSIS - II (72Hours)

Instructional hours per week: 4 **Number of credits:3**

At the end of the course, the student will be able to
CO-1 : Understand Sequence, Series and Power Series Representation of Complex Functions
CO-2 : Understand Singular Points, Zeros and Residue of Complex Functions
CO-3 : Apply Tayor's Series, Laurent Series and Residue Theorem
CO-4 :Understant Conformal Mapping, Linear Fractional Transformation and Cross-ratio.

Course Code: MM 1643

Core Course – ABSTRACT ALGEBRA – RING THEORY (72Hours)

Instructional hours per week: 4 **Number of credits:3**

Upon Completion of this Course, studentswill be able to
CO-1: construct substructures
CO-2: understand and prove fundamental results and solve algebraic problemsusing appropriate techniques.
CO-3: demonstrate insight into abstract algebra with focus on algebraic theories.
CO-4: develop new structures based on given structures.

Course Code: MM 1644

Core Course – LINEAR ALGEBRA (72Hours)

Instructional hours per week: 4 **Number of credits:4**

After the completion of the course the students will be able to
CO-1: Understand elementary concepts in vector space, subspace, linear transformation,
eigenvalues and eigenvectors.
CO-2: Find the bases and dimension of a vector space.
CO-3: Diagonalize various types of matrices.

Course Code: MM 1645

Core Course-INTEGRAL EQUATIONS (72Hours)

Instructional hours per week: 4 **Number of credits:3**

Upon completion of this course, the student will be able to:
CO-1 Categorise and solve di_erent integral equations using various techniques.
CO-2 Enable to apply Laplace Transforms to various industry related and appliedproblems.
CO-3 Analyse the properties of certain functions using Fourier series.

Course Code: MM 1661.1

ELECTIVE COURSE – GRAPH THEORY (54 Hours)

Instructional hours per week: 3 **Number of credits:2**

Upon completion of this course, the student will be able to:
CO-1: To define and understand the fundamental concepts of graph theory
CO-2: To apply the concepts and theorems that are treated in the course forproblem-solving and proofs
CO-3: To write combinatorial proofs, including those using basic graph theoryproof techniques such as minimal counterexamples, double counting, andMathematical induction.

Course Code: MM 1646

PROJECT

Instructional hours per week: 1 **Number of credits:4**

Upon completion of this course, the student will be able to:
CO 1 Choose topics on their own and chalk out a project.
CO 2 Foster spirit of harmony and team work.
CO 3 Make good presentations, prepare reports, develop mind set for pursuing research.

BA ECONOMICS

PROGRAMME SPECIFIC OUTCOMES (PSOs)

PSO1 Develop linguistic skills and literary sensibility, and demonstrate an awareness on environment, disaster management and its associated problems
PS02 Develop language proficiency, literary sensibility, values and critical thinking. PS03 Understand basic economic concepts and theoretical expositions.
PS04 Critically evaluate national/state policies using economic theory. PS05 Apply quantitative or logical reasoning/research for problem solving.
PS06 Communicate effectively through oral, written and graphical forms. PS07 Appraise political and administrative Values.
PSO8 Evaluate national scenario against historical background and contribute towards nation building and social causes.

COURSE OUTCOMES(Cos)

SEMESTER I

Course Code EN1111.1

English I LANGUAGE SKILLS (90 Hours)

Instructional hours per 5 week credits 4

Upon completion of this course, the student will be able to:
CO1. Understand the basics of Phonetics
CO2. Apply language skills in daily life situations.
CO3. Demonstrate sophisticated writing skills
CO4. Analyze and evaluate English literature

Course Code HN/ML 1111.1

Additional Language I: PROSE AND ONE ACT PLAYS (72 Hours)

Instructional hours 4 per week credits 3

Upon completion of this course, the student will be able to:
CO1.Acquire knowledge about various forms of prose genres
CO2.Develop an awareness of theatre and stagecraft
CO3.Understand social values and social relationships

Course Code: ML 1111.1

ADDITIONAL LANGUAGE I:MALAYALA KAVITHA

Instructional hours 4 per week credits: 3

Upon completion of this course, the student will be able to:
CO1. Identify and illustrate the features of Ancient Literature
CO2.Understand Ancient Vocabulary
CO3.Categorize different Poetic Styles

Course Code EN1121

Foundation Course I WRITINGS ON CONTEMPORARY ISSUES (72 Hours)

Instructional hours 4 per week credits 2

Upon completion of this course, the student will be able to:
CO1. Analyze issues of human rights in the society
CO2. Understand and evaluate grave issues of society
CO3. Analyze and address gender issues.
CO4. Discuss the effects of substance abuse.

Course Code: EC1141

Core Course INTRODUCTORY MICRO ECONOMICS (108 Hours)

Instructional hours 6 per week credit 4

Upon completion of this course, the student will be able to:
CO1. Understand microeconomic concepts.
CO2. Understand and use microeconomic theories.
CO3. Develop a conceptualfoundationand analyticalmethods used inMicroeconomics

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Course Code PS1131

Complementary Course I INTRODUCTION TO POLITICAL SCIENCES (54 Hours)

Instructional hours 3 per week credits 2

Upon completion of this course, the student will be able to:
CO1.Understand the basic concepts of political science
CO2.Analyse Political ideologies meaningfully
CO3.Evaluate contemporary political science

Course Code HY1131

Complementary Course II HISTORY OF MODERN INDIA (1857-1900) (54 Hours)

Instructional hours 3 per week credits 2

Upon completion of this course, the student will be able to:
CO1. Understand the nature and important concepts of Modern India. CO2. Understand the background, nature, character and the impact of 1857 revolt.
CO3. Interpret the role played by the socio reformers in the socioreligious reform movements.
CO4. Illustrate the contributions of early national leaders and their political organizations.

SEMESTER II

Course Code EN1211

English II ENVIRONMENTAL STUDIES (72 Hours)

Instructional hours 4 per week credits 3

Upon completion of this course, the student will be able to:
CO1.Define the scope of Environmental Science and identify the different types of natural resources.
CO2.Define and identify the ecosystems and biodiversity around us. CO3.Analyze and assess the types of pollutions and social issues around us.
CO4.Understand the impact of population on environment.

Course Code EN1212.1

English III ENGLISH GRAMMAR AND COMPOSITION (90Hours)

Instructional hours 5 per week credits 4

Upon completion of this course, the student will be able to:
CO1. Define and identity the parts of speech
CO2. Identify and explain the different types of sentences.
CO3. Apply the rules of grammar in all situations of communication
CO4. Design written discourse.

Course Code HN/ML1211.1

Additional LanguageIIFICTION, SHORT STORY & NOVEL(72Hours)

Instructional hours 4 per week credits 3

Upon completion of this course, the student will be able to:
CO1. Recognise various trends in Hindi Novel & Short Stories like Nationalistic outlook, Women empowerment, Dalit Chetana etc…

CO2. Develop essential skills of vocabulary enhancement & sentence structure
CO3. Identify the nature & character of person. Realise human values

ML 1211.1 GADHYAM : RACHANAYUM PADAVUM

Upon completion of this course, the student will be able to:
CO1. Understand different Phases of Malayalam Prose
CO2. Demonstrate critical skills
CO3. Analyze the relation between Heritage and Culture

Course Code EC1241

Core Course II INTERMEDIATE MICRO ECONOMICS (90 Hours)

Instructional hours 6 per week credits 4

Upon completion of this course, the student will be able to:
CO1. Understand basicsof MicroEconomics.
CO2. Interpret different market structures of the modern world.
CO3. Apply theoretical framework.
CO4. Identify and demonstrate risk and uncertainties of present day business.

Course Code PS1231

Complementary Course III INDIAN GOVERNMENT AND POLITICS (54 Hours)

Instructional hours 3 per week credits 3

Upon completion of this course, the student will be able to:
CO1. Understand the working of Indian Political System

CO2.Understand the fundamentals of Constitution of India
CO3.Create political consciousness
CO4. Demonstrate responsible behaviour as conscientious citizens

Course Code HY1231

Complementary Course IV HISTORY OFMODERN INDIA (1901-1920) (54 Hours)

Instructional hours 3 per week credits 3

Upon completion of this course, the student will be able to:
CO1.Understand the contributions of extreme nationalists.
CO2.Evaluate the constitutional effects.
CO3.Identify the impact of World War I on Indian nationalism.
CO4. Analyse the contributions of Gandhiji

SEMESTER III

Course Code EN1311.1

English IV READINGS IN LITERATURE I (90 Hours)

Instructional hours 5 per week credits 4

Upon completion of this course, the student will be able to:
CO1.Understand the various forms of Literature.
CO2. Analyze the prose writings of Indian authors.
CO3. Evaluate the poems by Indian authors.
CO4. Appraisal of short stories in English by Indian authors.

Additional Language III

Course Code HN1311.1

POETRY AND GRAMMAR (90 Hours)

Instructional hours 5 per week+ credits 3

Upon completion of this course, the student will be able to:
CO1.Interpret the ideology of different Poets
CO2.Demonstrate positive approach towards nature & society
CO3.Analyse the features of Ancient, Medieval & Modern Poems
CO4. Apply the rules of grammar in all situations of communication

Course Code: ML1311.1

BHASHAAVABHODHAVUMSARGATHMAKATHAYUM

Instructional hours 5 per week credits 3

Upon completion of this course, the student will be able to:
CO1.Develop Critical View and Creativity
CO2. Understand Racial, Gender, Environmental Issues
CO3. Analyze how language becomes a medium of culture

Foundation Course II INFORMATICS FOR APPLIEDECONOMETRICS (72 Hours)

Instructional Hours 4 Credits 3

Upon completion of this course, the student will be able to:
CO1. Understand the basic concepts econometrics.
CO2. Illustrate the estimation and use of simple regression models.
CO3. Demonstrate the use of ICT in higher education.

Course Code EC1341

Core Course III INTRODUCTORY MACRO ECONOMICS (90 Hours)

Instructional hours 5 per week credits 4

Upon completion of this course, the student will be able to:
CO1. Understand basics of Macroeconomics
CO2. Interpret the impact of inflation in an economy
CO3. Assess the Central Bank's policy rate on income and spending
CO4. Critically evaluate the impact of fiscal policy
CO5. Banks, Money, and the Credit Market

Course Code PS1331

Complementary Course V PUBLICADMINISTRATION (54 Hours)

Instructional hours 3 per week credits 3

Upon completion of this course, the student will be able to:
CO1.Understand the essence of public Administration
CO2.Evaluate different theories of Public administration
CO3.Validate administrative values

Course Code HY1331

Complementary Course VI HISTORY OF MODERN INDIA (1921-1947) (54 Hours)

Instructional hours 3 per week credits 3

Upon completion of this course, the student will be able to:
CO1. Understand the significance of national movement in Gandhian era.
CO2. Assess the significance of the advent of Gandhi on the political scene of India
CO3. Evaluate the revolutionary movement
CO4. Analyse the contributions of Gandhi towards Indian independence

SEMESTER IV

Course Code EN1411.1

English V READINGS IN LITERATURE II (90 Hours)

Instructional hours 5 per week credits 4

Upon completion of this course, the student will be able to:
CO1. Critically analyse poetry in English
CO2.Understand and demonstrate the dynamics of theatre
CO3. Analyze prose pieces in English
CO4. Evaluate literature in the global context.

Course Code HNL1411.1

Additional Language IV (90 Hours)

Instructional hours 5 per week credits 4

HN1411.1 DRAMA, TRANSLATION & COMMUNICATIVE HINDI

Upon completion of this course, the student will be able to
CO1. Evaluate literary texts against the corresponding social backgrounds
CO2. Understand theory & practice of Translation
CO3. Develop skills of writing letters in official language Hindi
CO4. Develop communication skills in Hindi

Course Code: ML1411.1

DRISHYAKALA SAHITHYAM- BHAGAM

Instructional hours 5 per week credits 4

Upon completion of this course, the student will be able to:
CO1. Develop creative and critical skill
CO2.Analyze Racial, Gender and Environmental Issues

CO3.Analyze Language as a medium of culture

Course Code EC1441

Core Course IV: MATHEMATICAL METHODS FOR ECONOMICS (90 Hours)

Instructional hours 5 per week credits 4

Upon completion of this course, the student will be able to:
CO1. Understand the importanceof mathematical methodsin Economics
CO2. Illustrate the uses of calculus in economics
CO3. Demonstrate the use of matrix in economic applications
CO4. Understand the different functions used in economics

Course Code EC1442

Core Course V INTERMEDIATEMACROECONOMICS (72 Hours)

Instructional hours 4 per week credits 3

Upon completion of this course, the student will be able to:
CO1. Understand the basic macroeconomic concepts.
CO2. Illustrate aggregate demand and supply functions.
CO3. Demonstrate the relationship between inflation and unemployment
CO4. Interpret the microeconomic foundations of macroeconomic theories.
CO5. Evaluate the role of macroeconomic policies in an open economy.

Course Code PS1431

Complementary Course VII INTERNATIONAL POLITICS (54 Hours)

Instructional hours 3 per week **credits 3**

Upon completion of this course, the student will be able to:
CO1.Understand the fundamentals of International Relations
CO2.Understand theories and approaches of International politics
CO3.Review the operations of International and Regional organizations CO4.Critically evaluate the national and international political issues.

Course Code HY1431

Complementary Course VIIIHISTORY OF CONTEMPORARY INDIA (After 1947) (54 Hours)

Instructional hours 3 per week **credits 3**

Upon completion of this course, the student will be able to:
CO1. Understand the achievements of India in the post independent period.
CO2.Assess the role of Patel and VP Menon in the process of Indian integration
CO3.Analyze the role of India in the world affairs
CO4.Evaluate the socioeconomic, educational and cultural changes of India in the post Nehruvian period.

SEMESTER V

Course Code EC1541

Core Course VI METHODOLOGY & PERSPECTIVES OFSOCIAL SCIENCE (72 Hours)

Instructional hours 4 per week credits 4

Upon completion of this course, the student will be able to:
CO1. Understand the scope of Social Science.
CO2. Evaluate the importance of Social Science disciplines.
CO3. Understand the organization of the economy.
CO4. Interpret the issues pertaining to different economic systems.

Course Code EC1542

Core Course VII STATISTICALMETHODS FOR ECONOMICS (72 Hours)

Instructional hours 4 per week credits 4

Upon completion of this course, the student will be able to:
CO1. Describe, Analyse and Interpret Statistical Data
CO2. Apply Measures of Central Tendency and Dispersion.
CO3. Analyse and Interpret Correlation and Regression
CO4. Demonstrate the Trend of Economic Variables over Time and
CO5. Apply Probability Distributions to Various Economic Problems.

Course Code EC1543

Core Course VIII READINGS IN POLITICAL ECONOMY (72 Hours)

Instructional hours 4 per week **credits 4**

Upon completion of this course, the student will be able to:
CO1.Understand the basic concepts of Classical Economics.
CO2. Interpret the different Perspectives of Political economy
CO3. Assess CMC and MCM models of Karl Marx.
CO4. Illustrate Marx's Theory of Accumulation.
CO5. Identify the Issues in Political Economy and Development Thinking.

Course Code EC 1544

Core Course IX ECONOMIC GROWTH AND DEVELOPMENT (54 Hours)

Instructional hours 3 per week **credits 3**

Upon completion of this course, the student will be able to:
CO1. Understand the difference between economic growth and development.
CO2. Appraise the features of underdevelopment.
CO3. Critically evaluate various growth theories and models.
CO4. Analyse how the state can promote economic development.

Course Code EC 1545

Core Course X INTERNATIONAL ECONOMICS (72 Hours)

Instructional hours 4 per week credits 3

Upon completion of this course, the student will be able to:
CO1. Understand the basic concepts related to international trade
CO2. Identify the basis and gains from international trade
CO3. Analyse disequilibrium in BOP and identify the measures to correct it.
CO4. Demonstrate the determination of exchange rate.
CO5. Evaluate the various tariff and non-tariff barriers of foreign trade.
CO6. Assess the role of international institutions on World trade.

SEMESTER VI

Course Code EC1641

Core Course XI

INDIAN ECONOMY (90 Hours)

Instructional hours 5 per week **credits 4**

Upon completion of this course, the student will be able to:
CO1. Understand the growth process in the Indian economy.
CO2. Compile data on national income, savings and investment
CO3. Assess the trends in poverty, inequality, and unemployment
CO4. Critically evaluate the sectoral dynamics
CO5. Interpret the impact of Policy reforms on Indian economy
CO6. Illustrate the impact of global crisis in Indian economy

Course Code EC1642

Core Course XII BANKING AND FINANCE (90 Hours)

Instructional hours 5 per week **credits 4**

Upon completion of this course, the student will be able to:
CO1. Understand the nature and role of Indian financial system
CO2. Evaluate the operations in the stock market.
CO3. Critically evaluate the performance money and capital markets.
C04. Identify the new challenges faced by the Indian banking system.
CO5. Interpret the rationality of financial reforms and policies.

Course Code EC1643

Core Course XIII PUBLIC ECONOMICS (90 Hours)

Instructional hours 5 per week **credits 4**

Upon completion of this course, the student will be able to:
CO1. Identify the functions of Government in the modern society
CO2. Critically evaluate the basic theories of Public expenditure.
CO3. Demonstrate the application of the fiscal instruments
CO4. Evaluate the fiscal issues of India.

Course Code EC1644

Core Course XIV ENVIRONMENTAL ECONOMICS &DISASTER MANAGEMENT (72 hours)

Instructional hours 4 per week **credits 3**

Upon completion of this course, the student will be able to:
CO1. Understand the basic concepts of Environmental economics
CO2. Recognize the important linkage between environment and economics
CO3. Evaluate the basic theories of environmental issues
CO4. Identify and interpret the basic environmental issues
CO5. Use economic valuation of environment through cost benefit analysis

Course Code EC1661

Elective Course KERALA ECONOMY (54 Hours)

Instructional 3 hours per week **Credits 2**

Upon completion of this course, the student will be able to:
CO1. Assess Kerala Economy meaningfully
CO2. Appraise the emerging issues of Kerala Economy
CO3. Review the changes in the structural aspects of Kerala Economy
CO4. Identify major Environmental Problems of Kerala.
CO5. Critically evaluate the Trends and Implications of State Finances

Project: Course Code EC1645

Instructional Hours: 6 per week **Credits 4**

(3 Hours each in V and VI Semester)

Upon completion of this course, the student will be able to:
CO1. Understand the basic framework of Social Science Research
CO2. Analyse and interpret statistical data
CO3. Design a research project

B.Sc. ZOOLOGY

PROGRAMME SPECIFIC OUTCOMES (PSOs)

PSO 1: Develop linguistic skills and literary sensibility, and demonstrate an awareness on environment, disaster management and its associated problems.
PSO 2: Develop language proficiency, literary sensibility, values and critical thinking. Create a sense of inquiry and a quest for higher learning.
PSO 3: Understand the diversity, systematic, evolution, general characters, development, and biological process, economical, ethological and medical aspects of organisms.
PSO 4: Understand and apply scientific methods in experiments and technology for the welfare of the organism and to develop environmental consciousness to preserve earth's resources to make the world a better place to live in
PSO 5: Apply appropriate technique by using modern techniques and tools
PSO 6: Understand the fundamental aspects of Chemistry through qualitative and quantitative investigations.
PSO 7: Identify the different forms and diversity of plant life, from microscopic algae to terrestrial tree forms, and do scientific experiments.

COURSE OUTCOMES (COs)

SEMESTER I

Course Code EN111.1

LANGUAGE SKILLS (90 Hours)

Instructional hours per week: 5 Credits: 4

Upon completion of this course, the student will be able to:
CO1. Understand the basic skills of listening, speaking, reading and writing the language proficiently.
CO2. Apply language skills in daily life situations.
CO3. Equip the students with basic language along with improved non- verbal skills thereby improving their employability quotient
CO4. Analyze and evaluate English literature

Course Code HN/ML 111.1

Additional Language I (72 Hours)

Instructional hours per week: 4 Credits: 3

Course Code: HN1111.1 HINDI KADHA SAHITHYA (72Hours)

Upon completion of this course, the student will be able to:
CO1. Recollect the main works of the representative fiction writers
CO.2 Understand the craft of the fiction writers
CO3.Analyse and evaluate the works of the fiction writers they studied
CO.4 Understand how the resource language is used as a medium in creative writing.

Course Code: ML1111.1

MALAYALA KAVITHA (ADDITIONAL LANGUAGE: I) (72Hours)

Upon completion of this course, the student will be able to:
CO1. Identify and illustrate the features of Ancient Literature
CO2. Discuss the peculiarities of the Ancient Vocabulary
CO3.Categorize different Poetic Styles

Course Code: EN1121

Foundation Course I WRITINGS ON CONTEMPORARY ISSUES

(72 Hours)

Instructional hours per week: 4 **Credits**: 2

Upon completion of this course, the student will be able to:
CO1. Analyze issues of human rights in the society
CO2. Understand and evaluate grave issues of society
CO3. Analyze and address gender issues.
CO4. Discuss the effects of substance abuse.
CO5. Have an overall understanding of some of the major issues in the contemporary world.
CO6. Respond empathetically to the issues of society.

Course Code - ZO1141

Core Course I - ANIMAL DIVERSITY – I (54 Hours)

Instructional hours per week: 4 Credits: 3

Upon completion of this course, the student will be able:
CO 1: To provide the students with an in-depth knowledge of the diversity in form, structure and habits of Non-Chordates.
CO 2: To learn the basics of systematic and understand the hierarchy of different Categories.
CO 3: To learn the diagnostic characters of different phyla through brief studies of Examples
CO4: To obtain an overview of economically important invertebrate fauna.

Course Code CH1131.4

Complementary Course I- THEORETICAL CHEMISTRY (36 Hours)

Instructional hours per week: 4 Credits: 2

Upon completion of this course, the student will be able to:
CO1: Differentiate particle nature and wave nature of matter.
CO2: Associate wave concept with microscopic matter.
CO3: Understand the relevance of periodic classification of elements
CO4: Describe the various types of chemical bonds
CO5: Apply the VSEPR theory to explain the geometry of molecules
CO6: Comprehend different segments of titrations

CO7: Apply the principles of colorimetric to estimate ions and elements
CO8: Recognize the factors affecting environment and solutions for it

COURSE CODE: BO1131

Complementary Course II - MICROTECHNIQUE ANGIOSPERM ANATOMY, AND REPRODUCTIVE BOTANY (72 Hours)

Instructional hours per week: 4 **Credits: 2**

Upon completion of this course, the student will be able to:
CO1: Distinguish dicot and monocot root, stem, leaf based on internal structure.
CO2: Learn the theories and methods of reproduction in angiosperms.
CO3: Understand staining and preservation techniques of plant parts

SEMESTER II

Course Code : EN1211.1
ABILITY ENHANCEMENT COMPULSORY COURSE:
ENVIRONMENTAL STUDIES AND DISASTER MANAGEMENT
(72 Hours)
Instructional hours per week: 4 **Credits: 3**

Upon completion of this course, the student will be able to:
CO1.Define the scope of Environmental Science and identify the different types of natural resources.
CO2.Define and identify the ecosystems and biodiversity around us.
CO3.Analyze and assess the types of pollution and social issues around us.
CO4.Understand environmental crisis and disaster management situations
CO5. Take lead in spreading environmental values and creating awareness among the public
CO6.understand local environmental issues better.

Course Code : EN1212.1 ENGLISH GRAMMAR USAGE AND WRITING
(90 Hours)
Instructional hours per week: 5 **Credits: 4**

Upon completion of this course, the student will be able to:
CO1. Define and identity the basics of grammar
CO2. Identify and explain the different types of sentences.
CO3. Apply the rules of grammar in all situations of communication
CO4.Spot language errors and correct them.

Additional Language II (72Hours)

Instructional hours per week:4 **Credits: 3**

Course Code: HN1211.1

HINDI NIBANDH AUR ANYAGADYA VIDHAYEN (72Hours)

Upon completion of this course, the student will be able to:
CO1. Recollect the main works of the prescribed writers
CO2. Understand the forms of various prose writing in Hindi
CO3. Analyse & evaluate the prose forms prescribed, with respect to the craft and the relevance

Course Code: ML1211.1

GADHYASAHITHYAM (72Hours)

Upon completion of this course, the student will be able to:
CO1. Understand different Phases of Malayalam Prose (short stories, novels and essays)
CO2. Demonstrate critical skills
CO3. Analyze the relation between Heritage and Culture

Course Code - ZO1241

ANIMAL DIVERSITY II (54 Hours)

Instructional hours per week: 4 Credits: 3

Upon completion of this course, the student will be able :
CO 1: To provide the students with an in-depth knowledge of the diversity in form, structure and habits of Chordata.
CO 2: To learn the general characteristics and classification of different classes of
Vertebrates.
CO3: To understand the vertebrate evolutionary tree.
CO4: To understand general aspects of applied interest in relation to vertebrates

Course Code: CH1231.4

Complementary Course III - INORGANIC CHEMISTRY
(36 Hours)

Instructional hours per week: 4 Credits: 2

Upon completion of this course, the student will be able to:
CO1: Understand the biological and environmental aspects of organic compounds CO2: Comprehend the meaning of stability of nucleus
CO3: Summaries the applications of radioactivity
CO4: Predict the properties of transition metal complexes
CO5; Understand the applications of metal complexes
CO6: Learn to appreciate biological processes like photosynthesis, respiration etc
CO7: Discuss the biochemistry of trace element

Course Code: BO1231

Complementary Course IV - PHYCOLOGY, MYCOLOGY, BRYOLOGY, PTERIDOLOGY, GYMNOSPERMS & PLANT PATHOLOGY (72 Hours)

Instructional hours per week: 4 **Credits: 2**

Upon completion of this course, the student will be able to:
CO1: Elaborate the structure and developmental stages of lower groups.
CO2: Identify the economical importance of lower plants.
CO3: Learn common plant diseases, associated symptoms and control measures.

SEMESTER III

Course Code: EN 1311.1

ENGLISH FOR CAREER (90 Hours)

Instructional hours per week: 5 **Credits: 4**

Upon completion of this course, the student will be able to:
CO1.Acquire the necessary language skills required in the competitive job market
CO2.Acquire the cognitive, logical, analytical and verbal skills necessary to succeed in competitive examinations
CO3.Get sufficient practice in vocabulary, grammar, comprehension and remedial English from the perspective of career oriented tests.
CO4.Be able to prepare for and successful in competitive examinations

Additional Language III (90 Hours)

Course Code: HN311.1

HINDI NATAK, VYAKARAN THADHA ANUVAD (90 Hours)

Instructional hours per week: 5 **Credits: 4**

Upon completion of this course, the student will be able to:
CO1.Critically appreciates play
CO2.Understands difference between spoken Hindi and written Hindi
CO3.Writes grammatically correct sentences in Hindi
CO4.Defines different parts of speech and identifies them in a given sentence
CO5.Translates simple passages from English to Hindi

Course Code: ML1311.1

BHASHAAVABHODHAVUM SARGATHMAKATHAYUM (90 Hours)

Instructional hours per week: 5 **Credits: 4**

Upon completion of this course, the student will be able to:
CO1.Develop Critical View and Creativity
CO2. Knowledge in grammar and translation
CO3. Develop language skills, writing essays and poems
CO4. Analyze how language becomes a medium of culture

Course Code: ZO. 1341

Foundation Course II - Experimental Zoology, Instrumentation, Biostatistics and Bioinformatics (Hours)

Instructional hours per week: 5 **Credits: 3**

Upon completion of this course, the student will be able:
CO 1: To introduce the methodology and perspectives of Science in general so as to enable the students to systematically pursue Zoology in relation to other disciplines that come under the different branches of science.
CO2: To learn the fundamental characteristics of science as a human enterprise
CO3: To understand how science works
CO 4: To study to apply scientific methods independently

Course Code: CH1331.4

Complementary Course V: ORGANIC CHEMISTRY (54 Hours)

Instructional hours per week: 5 Credits: 3

Upon completion of this course, the student will be able to:
CO1. Classifies carbohydrates, amino acids, proteins, nucleic acids, lipids, polymers and drugs.
CO2. Summarize optical, geometrical and conformational isomerism Draw the structure of simple carbohydrates
CO3. Discuss the structure of proteins
CO4. Explain the synthesis of amino acids, peptide, and drugs
CO5 Predict absolute configuration of stereo centers.

Course Code: BO1331

Complementary Course VI- SYSTEMATIC BOTANY, ECONOMIC BOTANY, ETHNOBOTANY AND PLANT BREEDING (90 Hours)

Instructional hours per week: 5 Credits: 3

Upon completion of this course, the student will be able to:
CO1: Grasp the plant diversity around and terminology in plant morphology.
CO2: Identify flowering plants using systematic keys
CO3: Learn theories and practices of plant breeding.
CO4: Approach economically valuable plants in botanical view
CO5: Learn scientific aspects of ethno botanical plants

SEMESTER IV

Course Code: EN1411.1

READINGS IN LITERATURE (90 Hours)

Instructional hours per week: 5 **Credits: 4**

Upon completion of this course, the student will be able to:
CO1. Understand and appreciate literary discourse.
CO2.Understand and demonstrate the dynamics of theater
CO3. Analyze prose pieces in English
CO4. Evaluate literature in the global context.
CO5. Analyze literature as a cultural and interactive phenomenon

Additional Language IV (90 Hours)

Course Code: HN411.1 HINDI KAVITHA EVAM EKANKI (90 Hours)

Instructional hours per week: 5 **Credits: 4**

Upon completion of this course, the student will be able to:
CO1.Appreciates ancient and modern Hindi poems.
CO2.Critically evaluates the contribution of Ancient & modern poets to the development of Hindi poetry
CO3.Elucidates key lines of poetry with reference to context
CO4.Appreciates and evaluates one act play with respect to craft and subject.

Course Code: ML1411.1 DRISHYAKALA SAHITHYAM

Instructional hours per week: 5 **Credits: 4**

Upon completion of this course, the student will be able to:
CO1. Develop creative and critical skill

CO2. Develop drama and script writing skills
CO3. Learning the history of Malayalam cinema
CO4. Practicing acting, script writing and direction

Course code: ZO 1441

Core Course III: ECOLOGY, HABITAT DESTRUCTION AND DISASTER MANAGEMENT (54 Hours)

Instructional hours per week: 3 **Credits: 3**

Upon completion of this course, the student will be able to:
CO1: Acquire general awareness on pollution and their impacts.
CO2: Imparts basic knowledge on ecosystems and their functioning.
CO3: Learn about various types of anthropogenic pressures on ecosystem,
Related degradation and management measures.
CO4: Get awareness of toxicants, their impacts on human health and
Environment and remedial measures.
CO5: Create awareness about disasters, prevention and mitigation measures.

Course Code– ZO 1442

Core Course IV Practical I – INSTRUMENTATION, ANIMAL DIVERSITY I AND ANIMAL DIVERSITY II (Hours)

Instructional hours per week: 2 **Credits: 4**

Upon completion of this course, the student will be able:
CO1: Students learn anatomy by dipping through simple dissections and mountings on permitted species.

CO2: Students get familiarized with various organ systems by examining approved animals.
CO3: Emphasize the adage that 'seeing is believing' by observing typical examples and economically important specimens.
CO4: Students learn the working principle of different scientific instruments.
CO5: Students become familiar with economically important species.
CO6: Strengthen what students studied in theory by giving them an opportunity to have first-hand experience in lab as well as outside.

COURSE CODE: BO1431

COMPLEMENTARY COURSE-VIII – PLANT PHYSIOLOGY, ECOLOGY, PLANT BIOTECHNOLOGY AND HORTICULTURE (90 Hours)

Instructional hours per week: 3 **Credits: 3**

Upon completion of this course, the student will be able to:
CO1 Understand the water relations and translocation of nutrients in plants.
CO2 Incline them into an environmentally benign approach.
CO3 Develop an aesthetic sense in gardening
CO4 Realize how modern Plant Biotechnology transformed the world

Course Code: BO1432

Complementary Course: BOTANY PRACTICAL (Hours)

Instructional hours per week: 2 **Credits: 4**

Upon completion of this course, the student will be able to:
CO1 Handle microscope and learn to take thin sections
CO2 Understand the internal structure of lower plant forms

CO3 Identify and distinguish Angiosperms

CO4 Identifies plant diseases caused by lower plant forms.
CO5 Understand Physiological and Horticultural techniques

COURSE CODE: CH1431.4

COMPLEMENTARY COURSE- PHYSICAL CHEMISTRY (54 Hours)

Instructional hours per week: 3 **Credits: 3**

Upon completion of this course, the student will be able to:
CO1 Classify reactions on the basis of order and molecularity
CO2 Discuss different concepts of acids and bases
CO3 Understand different techniques used for the study of colloids
CO4 Calculate rate and order of reactions
CO5 Review the principles underlying the working of sophisticated instruments

COURSE CODE: CH 1432.4

COMPLEMENTARY COURSE-LABS COURSE FOR ZOOLOGY (Hours)

Instructional hours per week: 2 **Credits: 4**

Upon completion of this course, the student will be able to:
CO1 Obey Lab safety instructions, develop qualities of punctuality, regularity and scientific attitude, outlook and scientific temper (GOOD LAB PRACTICES)
CO2 Develop skill in safe handling of chemicals, take precaution against accidents and follow safety measures
CO3 Develop skill in observation, prediction and interpretation of reactions

CO3 Prepare organic compounds, Purify and recrystallise
CO4 Develop skill in weight calculation for preparing standard solutions
CO5 Perform volumetric titrations under acidimetry-alkalimetry, permanganometry, dichrometry, iodimetryiodometry, cerimetry, argentometry and complexometry
CO6 Conduct chromatographic separation of mixtures

SEMESTER V

Course code – ZO 1541

CELL BIOLOGY AND MOLECULAR BIOLOGY (90 Hours)

Instructional hours per week: 5 **Credits: 4**

Upon completion of this course, the student will be able to:
CO1: Acquire sufficient knowledge on the fundamental structure, function and
Biochemistry of the cell.
CO2: Understand the principles of molecular biology and gene manipulation.
CO3: Learn ultra structure of prokaryotic and eukaryotic cells.
CO4: Understand the fundamental differences between prokaryotic and eukaryotic cells.
CO5: Learn the structure, replication and modification of the genetic material of
Eukaryotes.
CO6: Understands the mechanism of gene expression and gene regulation.
CO7: Gets an awareness of bacterial recombination.
CO8: Acquire scientific knowledge on cancer and ageing.

Course Code – ZO. 1542

GENETICS AND BIOTECHNOLOGY (72 Hours)

Instructional hours per week: 4 **Credits: 4**

Upon completion of this course, the student will be able to:
CO1: Learn the: Structure of gene
CO2: Get educated on the underlying genetic mechanism operating in human
And state of the art of bio-techniques

CO3: Develop a proper understanding on the relation between heredity and
Variation.
CO4: Learn the mechanism of crossing over and inheritance patterns in human.
CO5: Become aware of different genetic syndromes and the possible ways to
Reduce its occurrence.
CO6: Understand the principles and techniques involved in DNA technology
And get an overview of modern techniques like PCR, Hybridoma technology, gene
Therapy and human cloning

Course Code – ZO 1543: Microbiology and Immunology (72 Hours)

Instructional hours per week: 4 **Credits: 4**

Upon completion of this course, the student will be able to:
CO1: Understand the scope and importance of clinical immunology.
CO2: Understand the principles and mechanisms of immunology.
CO3: Learn the malfunctioning and disorders of the immune system
CO4: Acquire knowledge on immunodeficiency diseases.
CO5: Learn Transplantation and mechanism of Graft retention and rejection are learned.
CO6: Get a brief history of microbiology.
CO7: Develop a broad understanding of the positive as well as negative aspects
Of microbes.
CO8: Study the economic importance (applied aspects) of microbes in industry

Zoology Core course Code: — ZO1644

Practical II - CELL BIOLOGY, GENETICS, BIOINFORMATICS BIOTECHNOLOGY, IMMUNOLOGY AND MICROBIOLOGY (Hour)

Instructional hours per week: 6 **Credits: 4**

Upon completion of this course, the student will be able ;
CO1: To expertise the student to carry out routine hematological and microbiological
Techniques.
CO2:To prepare and observe chromosomal arrangements during cell division
CO3: To study chromosomal aberrations in man
CO4: To gain broad knowledge on conventional biotechnological- procedures
CO5: To perform routine blood analysis.

Zoology Open Course I

Course Code : Z01551.1

PUBLIC HEALTH AND HYGIENE (54 Hours)

Instructional hours per week: 3 **Credits: 2**

Upon completion of this course, the student will be able:
CO1: To make the student aware of the essentials of public health and sanitation thereby warding off diseases and uplifting the living standards of the community
CO2: To learn the principles of nutrition and dietetics
CO3: To understand the ill effects of modern lifestyle
CO4: To study the advantages of personal hygiene and sanitation.

SEMESTER VI

Core Course VIII

Course Code – ZO1641

PHYSIOLOGY AND BIOCHEMISTRY (90 Hours)

Instructional hours per week: 5 **Credits: 4**

Upon completion of this course, the student will be able to:
CO1: Develop a clear understanding of the correlation and coordination between the structure and function of different organs and organ systems of the body.
CO2: Study on the physiology help students understand the physiology of
Different organ systems of the body.
CO3: Learn the correlation between diseases and the abnormal structure or
Improper functions of organs.
CO4: Understand the possible causes of abnormal physiology and the resultant
Diseases.
CO5: Understand the structure and functions of bio-molecules and their role in
Metabolism.
CO6: Opens new areas of research to students.

Core Course IX

Course code: ZO - 1642

DEVELOPMENTAL BIOLOGY AND EXPERIMENTAL EMBRYOLOGY (72Hours)

Instructional hours per week: 4 **Credits: 4**

Upon completion of this course, the student will be able to:
CO1: Get a brief idea about the history of developmental biology.
CO2: Provide the students a bird's eye view of sophisticated embryological techniques
CO3: Study on the various stages involved in the development of organisms.
CO4: Study the initial developmental procedures involved in Amphioxus, Frog and
Chick,
CO5: Procure information on state- of- the art experimental procedures in embryology.
CO6: Different control mechanisms of development including gene action are studied.

Zoology Core Course X

Course Code: ZO1643

ETHOLOGY, EVOLUTION AND ZOOGEOGRAPHY (72 Hours)

Instructional hours per week: 4 **Credits: 3**

Upon completion of this course, the student will be able:
CO1: To enhance the student's concept on organic evolution and appreciate the different modes of energy efficient communication systems existing in the animal world.

CO2:.To study the physiological basis of behavior.
. CO3: Study the different types of communication systems among animals.
CO4: To get a concept on organic evolution.
CO5: To get knowledge on the distribution of animals in the biosphere

Zoology Core Course XII

Course Code: ZO1645

Practical III - PHYSIOLOGY AND BIOLOGICAL CHEMISTRY, MOLECULAR BIOLOGY AND BIOSTATISTICS

Instructional hours per week: 2 **Credits: 3**

Upon completion of this course, the student will be able :
CO1: To demonstrate basic principle in physiology
CO2: To learn clinical procedures for blood & urine analysis
CO3: To make the student skillful in simple biochemical laboratory procedures

Zoology Core Course XIII

Course **Code — ZO1646**

Practical IV - DEVELOPMENTAL BIOLOGY, ECOLOGY, ETHOLOGY, EVOLUTION AND ZOOGEOGRAPHY

Instructional hours per week: 2 **Credits: 3**

Upon completion of this course, the student will be able to:
CO1 Identify the different embryological stages in Vertebrates
CO2 Analyze placental types of mammals

CO3 Evaluate hydro biological parameters
CO4 Appraise the ecosystem dynamics

Zoology Elective Subject II

Course Code: ZO 1651.2

ORNAMENTAL FRESH WATER FISH PRODUCTION (54 Hours)

Instructional hours per week: 3 **Credits: 2**

Upon completion of this course, the student will be able :
CO1: To make the student aware of the vast potentials involved in ornamental fish farming and trading.
CO 2: To learn the scientific method of setting an aquarium.
CO 3: To learn the culture breeding and marketing techniques of common indigenous Ornamental fish.

Zoology Project and Field study

Course Code: ZO1647
Instructional hours per week: 6 **Credits: 4**

Upon completion of this course, the student will be able :
CO1: To develop an aptitude for research in Zoology
CO2: To inculcate proficiency to identify appropriate research topic-and presentation

BA English Language and Literature

COURSE OUTCOMES

SEMESTER I

Course Code: EN111.1

Language Course 1 LANGUAGE SKILLS (90 Hours)
Instructional Hours per week: 5
Credits: 4

Upon completion of this course, the student will be able to:
CO 1 Understand the basics of Phonetics
CO 2 Apply language skills in daily life situations.
CO 3 Demonstrate sophisticated writing skills
CO 4 Analyze and evaluate English literature

Course Code: EN1121
Foundation Course 1:WRITINGS ON CONTEMPORARY ISSUES (72 Hours)
Instructional Hours per week: 4 Credits:2

Course Code: EN1121

Upon completion of this course, the student will be able to:
CO1. Analyze issues of human rights in the society
CO2. Understand and evaluate grave issues of society
CO3. Analyze and address gender issues
CO4. Discuss the effects of substance abuse.
CO5 Have an overall understanding of some of the major issues in the contemporary world.
CO6 Respond empathetically to the issues of society

Course Code HN/ML 111.1
Additional Language I HINDI KADHA SAHITHYA (72 Hours)
Instructional hours per week: 4 Credits :3

Upon completion of this course, the student will be able to:
CO1. Recollect the main works of the representative fiction writers
CO.2 Understand the craft of the fiction writers
CO3.Analyse and evaluate the works of the fiction writers they studied
CO.4 Understand how the resource language is used as a medium in creative writing. Hours distribution: 2 hours each for each text.

Course Code: ML1111.1
ADDITIONAL LANGUAGE I: MALAYALA KAVITHA
Instructional hours per week: 4 Credits :3

Upon completion of this course, the student will be able to:
CO1. Identify and illustrate the features of Ancient Literature
CO2. Discuss the peculiarities of the Ancient Vocabulary
CO3.Categorize different Poetic Styles

Course Code: EN 1141

Core Course 1: Introduction to Literary Studies I (108 Hours)

Instructional Hours per week: 6 Credits:4

Upon completion of this course, the student will be able to:
CO 1: Introduce varied literary representations.
CO 2: Familiarize students with the nature and characteristics of literature.
CO 3: Discuss the nature and characteristics of literature
CO 4: Introduce two key genres of literature, poetry and drama.
CO 5: Possess a foundational understanding of poetry and drama.

Course Code: EN 1131
Complementary Course 1: Popular Literature and Culture (54 Hours)
Instructional Hours per week: 3 Credits:3

Upon completion of this course, the student will be able to:
CO 1: Encourage the student to think critically about popular literature.
CO 2: Understand the categories of the ―popular‖ and the ―canonical
CO 3: Identify the conventions, formulas, themes and styles of popular genres such as detective fiction, the science fiction and fantasy, and children‘s literature.
CO 4: An assessment of the literary and cultural value of popular texts

C O 5: Sensitize students to the ways in which popular fiction reflects and engages with questions of gender, identity, ethics and education.

Course Code CJ1131

Complementary Course 2: Introduction to Mass Communication (54 hours)

Instructional Hours per week: 3 Credits:2

Upon completion of this course, the student will be able to
CO1 Understanding Mass communication
CO2 Understanding types of Media
CO3 Understanding laws related to Press.

SEMESTER II

Course Code EN1211.1

Language Course 3 ABILITY ENHANCEMENT COMPULSORY COURSE(90 Hours)

Instructional Hours per week: 5 Credits: 4

Upon completion of this course, the student will be able to
COL Define the scope of Environmental Science and identify the different types of natural resources.
CO2 Define and identify the ecosystems and biodiversity around us
CO3 Analyze and assess the types of pollutions and social issues around us. CO4 Understand environmental crisis and disaster management situations
CO5. take lead in spreading environmental values and creating awareness among the public
CO6 understand local environmental issues better

Course Code EN1212.1

Language Course 4: ENGLISH GRAMMAR USAGE AND WRITING (90 Hours)

Instructional Hours per week: 5 Credits: 4

Upon completion of this course, the student will be able to
COL. Define and identity the basics of grammar
CO2 Identify and explain the different types of sentences
CO3. Apply the rules of grammar in all situations of communication
CO4 Spot language errors and correct them.

Additional Language II

Course Code HN 1211.1

HINDI NIBANDH AUR ANYAGADYA VIDHAYEN (72Hours)

Instructional hours per week:4 Credits: 3

Upon completion of this course, the student will be able to
CO1.Recollect the main works of the prescribed writers
CO2.Understand the forms of various prose writing in Hindi
CO3.Analyse & evaluate the prose forms prescribed, with respect to the craft and the relevance

Course Code : ML1211.1

GADHYASAHITHYAM

Instructional hours per week:4 **Credits: 3**

Upon completion of this course, the student will be able to:
CO1. Understand different Phases of Malayalam Prose (short stories, novels and essays)
CO2. Demonstrate critical skills
CO3. Analyze the relation between Heritage and Culture

Course Code EN 1241

Core Course 2: Introduction to Literary Studies II (108 Hours)

Instructional Hours per week: 6 **Credits: 4**

Upon completion of this course, the student will be able to:
CO 1: Cherish a taste for the literary among students
CO 2: Comprehend the nature and characteristics of different genres of literature.
CO 3: Detailed awareness of the two key genres of literature- fiction and non-fiction.
CO 4: Imbibe the representational possibilities of the respective genres.
CO 5: Instill a creative and critical aptitude

Course Code EN 1231

Complementary Course 3:Art and Literary Aesthetics (54 Hours)

Instructional Hours per week: 3 **Credits: 3**

Upon completion of this course, the student will be able to:
CO 1: The student will be able to engage with literature in a broader, educated perspective.
CO 2: The student will be able to think with greater originality and independence about the complex interrelationship between different art forms.
CO 3: The student will be trained to engage sensitively and intelligently in new readings of literature.

CO 4:The course develops an understanding of the co-relation between literature, film, music and painting and encourages ways of reading and seeing which deliver insights into literary texts.
CO 5: Initiate students to implement the multidisciplinary scope of art and literary studies.

Course Code CJ1231

Complementary Course 4: History of Indian Media (54 Hours)

Instructional Hours per week: 3 Credits: 2

Upon completion of this course, the student will be able to
CO1 Pioneers of Indian Journalism
CO2 Understand history of malayalam press
CO3 Get familiarised with luminaries of Malayalam journalism
CO4 Understand history of Indian TV and radio broadcast

SEMESTER III

Course Code EN 1311.1

Language Course 6: ENGLISH FOR CAREER (90 Hours)

Instructional Hours per week: 5 Credits: 4

Upon completion of this course, the student will be able to:
CO1Acquire the necessary language skills required in the competitive job market
CO2 Aquire the cognitive logical analytical and verbal skills necessary to succeed
in competitive examinations
CO3.Get sufficient practice in vocabulary grammar, comprehension and remedial english from the perspective of career oriented tests
CO4 Be able to prepare for and successful in competitive examinations

Additional Language III:

Course Code HN 1311.1

HINDI NATAK, VYAKARAN THADHA ANUVAD (90 Hours)

Instructional hours per week: 5 Credits:4

Upon completion of this course, the student will be able to:
CO1.Critically appreciates play
CO2.Understands difference between spoken Hindi and written Hindi
CO3.Writes grammatically correct sentences in Hindi
CO4.Defines different parts of speech and identifies them in a given sentence.
CO5.Translates simple passages from English to Hindi

Course Code: ML1311.1

BHASHAAVABHODHAVUM SARGATHMAKATHAYUM

Instructional hours per week: 5 Credits:4

Upon completion of this course, the student will be able to:
CO1.Develop Critical View and Creativity
CO2. Knowledge in grammar and translation
CO3. Develop language skills, writing essays and poems
CO4. Analyze how language becomes a medium of culture

Course Code: EN 1341

Core Course 3: British Literature I (90 Hours)

Instructional Hours per week: 5 Credits: 3

Upon completion of this course, the student will be able to:
CO 1: Comprehend the origins of English literature
CO 2: Understand the specific features of the particular periods
CO 3: Understand themes, structure and style adopted by early British writers
CO 4: Gain knowledge of growth and development of British Literature in relation to the historical developments
CO 5: Understand how writers use language and creativity to capture human experience through different literary forms

Course Code: EN 1321

Foundation Course 2: Evolution of the English Language (72 Hours)

Instructional Hours per week: 4 Credits: 3

Upon completion of this course, the student will be able to:
CO 1: Knowledge of the paradigm shifts in the development of English.
CO 2: Well aware of the historical paradigm shifts in the history of English Language
CO 3: Imbibe the plural socio cultural factors that went in to the shaping of the English Language.
CO 4: Place English language in a global context.
CO 5: Recognize the politics of many 'Englishes'

Additional Language IV:

Course Code HN 1411.1

HINDI KAVITHA EVAM EKANKI (90 Hours)

Instructional hours per week: 5 Credits:4

Upon completion of this course, the student will be able to:
CO1.Appreciates ancient and modern Hindi poems.
CO2.Critically evaluates the contribution of Ancient & modern poets to the development of Hindi poetry
CO3.Elucidates key lines of poetry with reference to context
CO4.Appreciates and evaluates one act play with respect to craft and subject.

Course Code: ML1411.1

DRISHYAKALA SAHITHYAM (90 Hours)

Instructional hours per week: 5 Credits:4

Upon completion of this course, the student will be able to:
CO1. Develop creative and critical skill
CO2. Develop drama and script writing skills
CO3. Learning the history of malayalam cinema
CO4. Practicing acting, script writing and direction

Course Code: EN 1331

Complementary Course 5: Narratives of Resistance (54 Hours)

Instructional Hours per week: 3 Credits: 3

Upon completion of this course, the student will be able to:
CO 1: Be able to identify themes of resistance in different forms and genres of literature.
CO 2: Have a sense of the various kinds of injustice related to race, ethnicity, gender etc. prevalent in society.
CO 3: Develop an idea of literature as a form of resistance to all forms of totalitarian authority.
CO 4: Understand the inter connection between various genres in manifesting resistance
CO 5: How resistance is an undeniable presence in the everyday narratives of literary and other artistic expressions.

Course Code CJ1331

Complementary Course 6: Basics of Reporting (54 Hours)

Instructional Hours per week: 3 Credits: 3

Upon completion of this course, the student will be able to
CO1 Defining NEWS
CO2 Understand Sources of News reporting
CO3 Analyse structure of news writing
CO4 Understand qualities of good reporter.

SEMESTER IV

Course Code EN1411.1

language Course 8:READINGS IN LITERATURE (90 Hours)

Instructional Hours per week: 5 Credits: 4

Upon completion of this course, the student will be able to:
COL. Understand and appreciate literary discourse
CO2 Understand and demonstrate the dynamics of theater
CO3. Analyze prose pieces in English
CO4 Evaluate literature in the global contest
COS. Analyse literature as a cultural and interactive phenomenon.

Course Code HN/ML411.1

Additional Language IV : HINDI KAVITHA EVAM EKANKI (90 Hours)

Instructional hours per week: 5 Credits:4

Upon completion of this course, the student will be able to:
CO1.Appreciates ancient and modern Hindi poems.
CO2.Critically evaluates the contribution of Ancient & modern poets to the development of Hindi poetry
CO3.Elucidates key lines of poetry with reference to context
CO4.Appreciates and evaluates one act play with respect to craft and subject.

Course Code: ML1411.1

Additional Language IV :DRISHYAKALA SAHITHYAM (90 Hours)

Instructional hours per week: 5 Credits:4

Upon completion of this course, the student will be able to:
CO1. Develop creative and critical skill
CO2. Develop drama and script writing skills
CO3. Learning the history of malayalam cinema
CO4. Practicing acting, script writing and direction

Course Code: EN 1441

Core Course 4: British Literature II (90 Hours)

Instructional Hours per week: 5 Credits: 4

Upon completion of this course, the student will be able to:
CO 1: Sensitize students to the changing trends in English literature in the 18th and 19th centuries and connect it with the sociocultural and political developments.
CO 2: Develop the critical thinking necessary to discern literary merit
CO 3: Be able to recognize paradigm shifts in literature
CO 4: Be able to identify techniques, themes and concerns
CO 5: Connect literature to the historical developments that shaped the English history.

Course Code: EN 1442

Core Course 5: Literature of the 20th Century (72 Hours)

Instructional Hours per week: 4 Credits: 3

Upon completion of this course, the student will be able to:
CO 1: Understand social, political, aesthetic and cultural transformations of early twentieth century in relation to literary texts with their specific formal features.
CO 2**:** Know the stylistic features of Modernism and its various literary and aesthetic movements
CO 3: Critically engage the ideas that characterise the period, especially the crisis of modernity
CO 4: Understand contemporary responses to the historical incidents that mark the period
CO 5: Understand and use critical strategies that emerged in the early twentieth century.

Course Code: EN1431

Complementary Course 7: Philosophy for Literature (54 Hours)

Instructional Hours per week: 3 Credits: 2

Upon completion of this course, the student will be able to:
CO 1: Have a diachronic understanding of the evolution of philosophy from the time of Greek masters to 20th century
CO 2: Have an awareness of the major schools of thought in western philosophy.
CO 3: Have a healthy epistemological foundation at undergraduate level that ensures scholarship at advanced levels of learning.
CO 4: Talk about some of the key figures in Philosophy.
CO 5: Analyze and appreciate texts critically, from different philosophical perspectives

Course Code:CJ1431

Complementary Course 8: Basics of Reporting (54 Hours)

Instructional Hours per week: 3 Credits: 2

Upon completion of this course, the student will be able to
CO1 Understand contents of news paper
CO2 Comprehend the role of sub editor
CO3 Learn the principles of editing
CO4 Learn the principles of design

SEMESTER V

Course Code: EN 1541

Core Course 6: Literature of Late 20th Century and 21st Century (90 Hours)

Instructional Hours per week: 5 Credits: 4

Upon completion of this course, the student will be able to:
CO 1:Identify the various socio-cultural changes that evolved in the late modernist period
CO 2: Relate to the diverse currents of postmodern literature and its reflections in the contemporary ethos
CO 3: Assimilate the inherent multiplicities and fluidity of societal perspectives
CO 4: Develop an innate sympathy for the tragedies of Holocaust and an awareness regarding the environmental impasses threatening the modern world
CO 5: Empathise with the marginalised and comprehend their predicament.

Course Code:EN 1542

Core Course 7: Postcolonial Literatures (72 hours)

Instructional Hours per week: 4 Credits: 4

Upon completion of this course, the student will be able to:
CO 1: Ability to critique colonial history
CO 2: Awareness of the socio-political contexts of colonialism and postcolonialism
CO 3: Understanding of the effects of colonialism in various nations
CO 4: Knowledge of the key terms in post-colonial thought
CO 5: Study of the race and gender dynamics in postcolonial literature

Course Code: EN 1543

Core Course 8: 20th Century Malayalam Literature in Translation (72 Hours)

Instructional Hours per week: 4 Credits: 3

Upon completion of this course, the student will be able to:
CO 1: Generate knowledge about the varied milieu of the development and growth of Malayalam literature and be sensitive to its socio cultural and political implications.
CO 2: Get a basic knowledge of the literary and the non-literary works produced inMalayalam
CO 3: Discern the vibrancy of Malayalam literature
CO 4: Sense the distinctness of the socio-cultural arena in which Malayalam literature isproduced
CO 5: Know the value of literature produced in regional languages and key role oftranslation in the growth of language and literature.

Course Code: EN 1544

Core Course 9 :Linguistics and Structure of the English Language

(72 Hours)

Instructional Hours per week: 4 Credits: 4

Upon completion of this course, the student will be able to:
CO 1: Understand the phonological and grammatical structure of English Language
CO 2: Be able to analyse actual speech in terms of the principle of linguistics
CO 3: Improve the accent and pronunciation of the language
CO 4: Introduce the students to internationally accepted forms of speech and writing in English.
CO 5: Explore the ancient linguistic tradition of India

Course Code: EN 1545

Core Course 10: EN 1545 Criticism and Theory (90 Hours)

Instructional Hours per week: 5 Credits: 4

Upon completion of this course, the student will be able to:
CO 1: Analyze and appreciate texts critically, from different perspectives.
CO 2: Appreciate Indian Aesthetics and find linkages between Western thought and Indian critical tradition.
CO 3: Show an appreciation of the relevance and value of multidisciplinary theoretical models in literary study.
CO 4: Demonstrate an understanding of important theoretical methodologies and develop an aptitude for critical analysis of literary works.
CO 5: Gain a critical and pluralistic understanding and perspective of life .

Course Code: EN 1551.1

Open Course 1: Communicative Applications in English [54 Hours]

Instructional Hours per week: 3 Credits: 2

Upon completion of this course, the student will be able to:
CO 1: Learners majoring in some subject other than English will have a working knowledge of the type of English that is required in real life situations, especially the globalized workplace.
CO 2: Well trained to write clear, well-framed, polite but concise formal letters and e-mails for a variety of purposes
CO 3: Acquire some of the soft-skills that go hand in hand with English – namely, the ability to prepare for an interview and face it confidently, the ability to participate boldly a group discussion and contribute meaningfully to it, the ability to make a simple and interesting presentation of 5-10 minutes before a mixed audience on anything that they have learnt in the previous semesters of the UG programme

SEMESTER VI

Course Code: EN 1641

Core Course 11: Gender Studies **(90 Hours)**

Instructional Hours per week: 5 **Credits: 4**

Upon completion of this course, the student will be able to:
CO 1: Recognize the patriarchal bias in the formation of history and knowledge.
CO 2: Analyse the ways in which gender, race, ethnicity class, caste and sexuality construct the social, cultural and biological experience of both men and women in all societies.
CO 3: Recognize and use the major theoretical frames of analysis in gender studies
CO 4: CO 5: Interrogate the social constructions of gender and the limiting of the same in to the male-female binary in its intersections with culture, power, sexualities and nationalities
CO 5: Examine gender issues in relation to the sustainable goals of development .

Course Code: EN 1642

Core Course 12: Indian Writing in English **(90 Hours)**

Instructional Hours per week: 5 **Credits: 4**

Upon completion of this course, the student will be able to:
CO 1: Make students aware of different aspects of colonization like cultural colonization.
CO 2: Trace the historical and literary genesis and development of Indian Writing in English
CO 3:Acquaint them with the major movements in Indian Writing in English across varied period and genres
CO 4: Address the plurality of literary and socio-cultural representations within Indian life as well as letters.
CO 5:Enhance the literary and linguistic competence of students by making them aware of how language works through literature written in the subcontinent.

Course Code: EN 1643

Core Course 13: Film Studies **(90 Hours)**

Instructional Hours per week: 5 **Credits: 4**

Upon completion of this course, the student will be able to:
CO 1: Recognize the language of films and use it creatively**.**
CO 2: Analyze films from both technical and non-technical perspectives
CO 3: Engage questions of social justice and gender justice by critiquing representations of culture.
CO 4: Use film as a medium of communication
CO 5: Derive an interest in various careers related to film

Course Code: EN 1644

Core Course 14: World Classics **(72 Hours)**

Instructional Hours per week: 4 **Credits: 3**

Upon completion of this course, the student will be able to:
CO 1: Understand the study of Classics as a means of discovery and enquiry into the formations of great literary works and how the rich imagery of these classical works continues beyond the twentieth century.
CO 2: Recognize the diversity of cultures and the commonalities of human experience reflected in the literature of the world.
CO 3: Imbibe a fair knowledge in the various Classical works from different parts of the world, at different time periods, across cultures.
CO 4: Examine oneself and one‘s culture through multiple frames of reference, including the perception of others from around the world.
CO 5: Develop and aesthetic sense to appreciate and understand the various literary works with a strong foundation in the World Classics.

Course Code: EN 1661.3

Elective Course 3 : Creative Writing (54 Hours)

Instructional Hours per week: 3 Credits: 2

Upon completion of this course, the student will be able to:
CO 1: Create a body of original creative works which exhibit basic elements of literary writing.
CO 2: Generate the ability to apply the creative as well as critical approaches to the reading and writing of literary genres.
CO 3: Critique and support the creative writing of peers in a guided workshop environment.
CO 4: Engage in literary output by identifying, analyzing and expressing socially sensitive and personally abstract themes and ideas.
CO 5: Gain expertize in providing critical readings of works of literary expressions.

Course Code: EN 1645

Project/Dissertation [Total: 54 hours]

Total Instructional hours: 3 per week Credits: 4

CO 1: Comprehended the current modes of writings – that which encompasses the issues related to race, gender, ethnicity, climate change etc. and realize the role of literature in inculcating social sensitiveness
CO 2:The competence to identify the literary voices of dissent from diverse parts of the globe and to reflect on the popular culture and literature.
CO 3: A basic knowledge of research methodology and other areas related to the faculty of research.
CO 4: Imbibe a research oriented approach to the study of humanities in connection with the basic understanding of social sciences to initiate a multidisciplinary approach of study.
CO 5: Contribute to the realm of knowledge production with an increased intellectual, creative, critical and multidisciplinary capability.

B.COM Travel and Tourism

COURSE OUTCOME (COs)

SEMESTER 1

Course Code: EN111.2 Language Course 1 (90 Hours)

LANGUAGE SKILLS

Instructional Hours per week: 5 **Credits: 4**

Upon completion of this course, the student will be able to:
CO 1 Understand the basics of Phonetics
CO 2 Apply language skills in daily life situations.
CO 3 Demonstrate sophisticated writing skills
CO 4 Analyze and evaluate English literature

Additional Language I (72 Hours)

Course Code: HN1111.1

HINDI KADHA SAHITHYA

Instructional hours per week: 4 **Credits :3**

Upon completion of this course, the student will be able to:
CO1. Recollect the main works of the representative fiction writers
CO.2 Understand the craft of the fiction writers
CO3.Analyse and evaluate the works of the fiction writers they studied
CO.4 Understand how the resource language is used as a medium in creative writing. Hours distribution: 2 hours each for each text.

Course Code: ML1111.1

MALAYALA KAVITHA (ADDITIONAL LANGUAGE: I)

Instructional hours per week: 4 **Credits :3**

Upon completion of this course, the student will be able to:
CO1. Identify and illustrate the features of Ancient Literatur
CO2. Discuss the peculiarities of the Ancient Vocabulary
CO3.Categorize different Poetic Styles

Foundation Course I: CO 1121

METHODOLOGY AND PERSPECTIVES OF BUSINESS EDUCATION

No of instructional hours per week: 4 **No of credits: 2**

Upon completion of this course, the student will be able to:
CO 1.To create a basic awareness about the business environment and the role of business in economic development.
CO 2.To provide a holistic, comprehensive and integrated perspective to business

Course I: CO 1141

ENVIRONMENTAL STUDIES

No. of instructional hours per week: 4 **No. of Credits: 3**

Upon completion of this course, the student will be able to:
CO 1: enable the students to acquire basic ideas about environment and emerging issues about environmental problems.
CO 2: give awareness about the need and importance of environmental protection

Core Course II: CO 1142

MANAGEMENT CONCEPTS AND THOUGHT

No: of instructional hours per week: 4 **No: of credits: 3**

Upon completion of this course, the student will be able to:
CO 1:To equip learners with knowledge of management concepts and their application in contemporary organizations
CO 2:To facilitate overall understanding of the different dimensions of the management process.

Complementary Course I: CO 1131

MANAGERIAL ECONOMICS

No. of instructional hours per week: 4 **No. of credits: 3**

Upon completion of this course, the student will be able to:
CO 1: To familiarise students with the economic principles and theories underlying various business decisions.
CO 2: To equip the students to apply the economic theories in different business situations.

SEMESTER II

Course Code EN1212.2 Language Course 3 (90 Hours)

ENGLISH GRAMMAR USAGE AND WRITING

Instructional Hours per week: 5 **Credits: 4**

Upon completion of this course, the student will be able to:
COL. Define and identity the basics of grammar
CO2 Identify and explain the different types of sentences
CO3. Apply the rules of grammar in all situations of communication
CO4 Spot language errors and correct them.

Additional Language II (72Hours)

Course Code: HN1211.1

HINDI NIBANDH AUR ANYAGADYA VIDHAYEN

Instructional hours per week:4 **Credits: 3**

Upon completion of this course, the student will be able to:
CO1.Recollect the main works of the prescribed writers
CO2.Understand the forms of various prose writing in Hindi
CO3.Analyse & evaluate the prose forms prescribed, with respect to the craft and the relevance

Course Code : ML1211.1

GADHYASAHITHYAM

Instructional hours per week:4 **Credits: 3**

Upon completion of this course, the student will be able to:
CO1. Understand different Phases of Malayalam Prose (short stories, novels and essays)
CO2. Demonstrate critical skills
CO3. Analyze the relation between Heritage and Culture

Foundation Course II: CO 1221

INFORMATICS AND CYBER LAWS

No. of instructional hours per week: 4 **No. of credits: 3**

Upon completion of this course, the student will be able to:
CO 1: To review the basic concepts and fundamental knowledge in the field of informatics and to createan awareness about the nature of the emerging digital knowledge society and the impact of informatics on business decisions.
CO 2: create an awareness about the cyber world and cyber regulations.

Core Course III: CO 1241

FINANCIAL ACCOUNTING

No. of instructional hours per week: 4 **No. of credits: 3**

Upon completion of this course, the student will be able to:
CO 1: To familiarize the students with different methods of depreciation.
CO 2: To equip the students to prepare the accounts of specialised business enterprises.

CORE COURSE IV: CO1242

BUSINESS REGULATORY FRAMEWORK

No. of instructional hours per week: 4 **No. of credits: 3**

Upon completion of this course, the student will be able to:
Upon completion of this course, the student will be able to:CO 1To provide a brief idea about the framework of Indian business Laws
CO 2: enable the students to apply the provisions of business laws in business activities

Complementary Course II: CO 1231
BUSINESS MATHEMATICS
No. of instructional hours per week: 4 **No. of Credits: 3**

Upon completion of this course, the student will be able to:
CO 1: To familiarise the students with the basic mathematical tools.
CO 2: impart skills in applying mathematical tools in business practice

SEMESTER III

Language Course 4 (90 Hours)

Course Code EN 1311.2

BUSINESS ENGLISH

Instructional Hours per week: 5 **Credits: 4**

Upon completion of this course, the student will be able to:
CO1: Understand the basic concepts of business communication
CO2: Employ the English language in everyday situations and business transactions
CO3: Communicate fluently and to reach across boundaries of personal and cultural difference

CORE COURSE V: CO 1341

ENTREPRENEURSHIP DEVELOPMENT

No of instructional hours per week: 4 **No. of credits: 3**

Up on completion of this course, the student will be able to:
CO 1: To familiarize the students with the latest programmes of Government in promoting small and medium industries.
CO 2: To impart knowledge regarding starting of new ventures.

Core Course VI: CO 1342

ADVANCED FINANCIAL ACCOUNTING

No. of instructional hours per week: 5 **No. of credits: 4**

Up On completion of this course, the student will be able to:
CO 1: create awareness of accounts related to dissolution of partnership firms.
CO 2: To acquaint students with the system of accounting for different branches and departments.
CO 3: enable students to prepare accounts of consignments.

Core Course VII CO 1343

COMPANY ADMINISTRATION

No: of Instructional Hrs per week – 4 **No: of credits: 3**

Up on completion of this course, the student will be able to:
CO 1: To familiarize the students about the salient provisions of Indian Companies Act 2013.
CO 2: acquaint the students with Management and Administration of Companies, Compliance requirements, investigation into the affairs of the company and Winding up procedure.

Complementary Course III: CO 1331

E-Business

No of instructional Hours per week: 4 **No.of credits: 3**

Up on completion of this course, the student will be able to:
CO 1: provide students a clear-cut idea of e-commerce and e-business and their types and models.
CO 2: acquaint students with some innovative e-business systems.

Elective Course I: Stream 3: Travel and Tourism
CO 1361.3 TOURISM: PRINCIPLES AND PRACTICES

No of instructional hours: 5 No. of Credits : 4

Up on completion of this course, the student will be able to:
CO 1: To introduce the basic concepts of tourism
CO 2: To give an insight into the impact of tourism.
CO 3: To create an awareness about the role of various organizations of tourism in tourism promotion.

SEMESTER – IV

language Course 4 (90 Hours)

Course Code EN1411.2

READINGS IN LITERATURE

Instructional Hours per week: 5 **Credits: 4**

Upon completion of this course, the student will be able to:
COL. Understand and appreciate literary discourse
CO2 Understand and demonstrate the dynamics of theater
CO3. Analyze prose pieces in English
CO4 Evaluate literature in the global contest
COS. Analyse literature as a cultural and interactive phenomenon.

Core Course VIII CO 1441

INDIAN FINANCIAL MARKET

No. of instructional hours per week 4 **No. of credits: 3**

Upon completion of this course, the student will be able to:
CO 1: provide a clear-cut ideaabout the functioning of Indian Financial Market in general and Capital market operations in particular.

Core Course IX:CO1442

BANKING AND INSURANCE

Number of instructional hours per week: 4 **Number of Credits: 3**

Upon completion of this course, the student will be able to:
CO 1. To provide a basic knowledge about the theory and practice of banking 2. To provide a basic understanding of Insurance business.
CO 2:To familiarize the students with the changing scenario of Indian Banking and Insurance.

Core Course X: CO 1443

CORPORATE ACCOUNTING

No of instructional hours per week: 5 **No of credits: 4**

Upon completion of this course, the student will be able to:
CO 1: To create awareness about corporate accounting in conformity with the provisions of Companies Act, IAS and IFRS.
CO 2: help the students in preparation of accounts of banking and insurance companies.
CO 3:To enable the students to prepare and interpret financial statements of joint stock companies.

Elective Course II: Stream 3: Travel and Tourism
CO 1461.3
TOURISM PRODUCTS
No of instructional hours: 5 hrs **No of Credits: 4**

Upon completion of this course, the student will be able to:
CO1. To give a description about the natural products and manmade products
CO2.To give an insight into the natural resources of India

Complementary Course IV: CO 1431

BUSINESS STATISTICS

No. of instructional hours per week: 4 **No. of credits: 3**

Upon completion of this course, the student will be able to:
CO 1:To enable the students to gain understanding of statistical techniques those are applicable to business.
CO 2:To enable the students to apply statistical techniques in business.

SEMESTER V

Core Course XI: CO – 1541

FUNDAMENTALS OF INCOME TAX

No. of Instructional Hours per Week: 5 No. of Credits: 4

Upon completion of this course, the student will be able to:
CO 1 : To familiarize the students about the fundamental concepts of Income Tax.
CO 2 : To enable the students to acquire the basic skills required to compute the tax liability of individual assessee with more emphasis on Income from Salaries and Income from House property.

Core Course XII: CO 1542

COST ACCOUNTING

No of instructional hours per week: 5 No of Credits: 4

Upon completion of this course, the student will be able to:
CO 1:To familiarize the students with cost and cost accounting concepts
CO 2: To make the students learn cost accounting as a distinct stream of accounting

Core Course XIII CO 1543

MARKETING MANAGEMENT

No: of instructional hours per week: 4 No: of credits: 3

Upon completion of this course, the student will be able to:
CO 1: To provide an understanding of the contemporary marketing process in the emerging business scenario.
CO 2: To study various aspects of application of modern marketing techniques for obtaining a competitive advantage in business organizations.

Open Course: 1 - CO 1551.2

PRINCIPLES OF MANAGEMENT

No. of instructional Hrs per week: 3 **No. of Credits: 2**

Upon completion of this course, the student will be able to:
CO 1: To provide knowledge on the fundamentals of management principles and functions.

Elective Course III: Stream 3: Travel and Tourism

CO 1561.3

HOSPITALITY MANAGEMENT

Instructional Hours: 5 **No of Credits: 4**

Upon completion of this course, the student will be able to:
CO 1. To familiarize the students with various types of accommodation
CO 2.To familiarize the students with various business activities in the accommodation segment

SEMESTER VI

Core Course XIV: CO 1641

AUDITING

No of instructional hours per week:4 **No. of credits:4**

Upon completion of this course, the student will be able to:
CO 1:To provide students the knowledge of auditing principles, procedures and techniques in accordance with current legal requirements and professional standards.
CO 2:To familiarize students with the audit of Companies and the liabilities of the auditor.

Core Course XV:CO 1642

APPLIED COSTING

No of instructional hours per week: 5 **No of credits:4**

Upon completion of this course, the student will be able to:
CO 1:To acquaint the students with different methods and techniques of costing.
CO 2: To enable the students to apply the costing methods and techniques in different types of industries.

Core course XVI: CO 1643

MANAGEMENT ACCOUNTING

No. of instructional hours per week: 5 **No. of credits: 4**

Upon completion of this course, the student will be able to:
CO 1:To enable students to acquire sound knowledge of concepts, methods and techniques of management accounting
CO 2: To make the students develop competence with management accounting usage in managerial decision making and control.

Open Course II: CO 1651.3

MANAGEMENT OF FOREIGN TRADE

No. of instructional hours per week: 3 **No. of credits: 2**

Upon completion of this course, the student will be able to:
CO 1:To acquaint the students with India's foreign trade.
CO 2: To familiarise the students with international trade and services.

Elective Course IV: Stream 3: Travel and Tourism

CO 1661.3

TRAVEL AGENCY, TOUR OPERATION AND AIRLINE MANAGEMENT

No. of hours: 5 hours per week **No. of credits – 4**

Upon completion of this course, the student will be able to:
CO 1: To provide a comprehensive knowledge of the inner working mechanism of the travel agency.
CO 2 :To impart knowledge on the skills necessary for tour operation business.

B.COM Computer Applications

PROGRAMME SPECIFIC OUTCOMES (PSO)

PSO 1: To impart knowledge and skills on the applications of the concepts learnt in a given context.
PSO 2: learn by experiencing and observing
PSO 3: To document and reflect upon learnings
PSO 4: To develop exhibits of case studies undertaken, analysis made, exercises done and fact- finding missions.

COURSE OUTCOME(COs)

SEMESTER I

Course Code: EN111.2 Language Course 1 (90 Hours)

LANGUAGE SKILLS

Instructional Hours per week: 5 **Credits: 4**

Upon completion of this course, the student will be able to:
CO 1 Understand the basics of Phonetics
CO 2 Apply language skills in daily life situations.
CO 3 Demonstrate sophisticated writing skills
CO 4 Analyze and evaluate English literature

Additional Language I (72 Hours)

Course Code:HN1111.1

HINDI KADHA SAHITHYA

Instructional hours per week: 4 **Credits :3**

Upon completion of this course, the student will be able to:
CO1. Recollect the main works of the representative fiction writers
CO.2 Understand the craft of the fiction writers
CO3.Analyse and evaluate the works of the fiction writers they studied
CO.4 Understand how the resource language is used as a medium in creative writing. Hours distribution: 2 hours each for each text.

Course Code: ML1111.1

MALAYALA KAVITHA (ADDITIONAL LANGUAGE: I)

Instructional hours per week: 4 **Credits :3**

Upon completion of this course, the student will be able to:
CO1. Identify and illustrate the features of Ancient Literatur
CO2. Discuss the peculiarities of the Ancient Vocabulary
CO3.Categorize different Poetic Styles

Foundation Course I: CO 1121

METHODOLOGY AND PERSPECTIVES OF BUSINESS EDUCATION

No of instructional hours per week: 4 **No of credits: 2**

Upon completion of this course, the student will be able to:
CO 1: To provide the methodology for pursuing the teaching learning processwith a perspective of higher learning in business education.
CO 2 :To create a basic awareness about the business environment and the role of business in economic development.
CO 3:To provide a holistic, comprehensive and integrated perspective to business

Course I: CO 1141

ENVIRONMENTAL STUDIES

No. of instructional hours per week: 4 **No. of Credits: 3**

Upon completion of this course, the student will be able to:
CO 1: enable the students to acquire basic ideas about environment and emerging issues about environmental problems.
CO 2: give awareness about the need and importance of environmental protection

Core Course II: CO 1142
MANAGEMENT CONCEPTS AND THOUGHT
No: of instructional hours per week: 4 **No: of credits: 3**

Upon completion of this course, the student will able to:
CO 1:To equip learners with knowledge of Upon completion of this course, the student will able to:
management concepts and their application in contemporary organizations
CO 2:To facilitate overall understanding of the different dimensions of the management process.

Complementary Course I: CO 1131

MANAGERIAL ECONOMICS

No. of instructional hours per week: 4 **No. of credits: 3**

Upon completion of this course, the student will able to:
CO 1: To familiarise students with the economic principles and theories underlying various business decisions.
CO 2: To equip the students to apply the economic theories in different business situations.

SEMESTER II

Course Code EN1212.2

ENGLISH GRAMMAR USAGE AND WRITING

Language Course 3 (90 Hours)

Instructional Hours per week: 5 **Credits: 4**

Upon completion of this course, the student will be able to:
COL. Define and identity the basics of grammar
CO2 Identify and explain the different types of sentences
CO3. Apply the rules of grammar in all situations of communication
CO4 Spot language errors and correct them.

Additional Language II (72Hours)

Course Code: HN1211.1

HINDI NIBANDH AUR ANYAGADYA VIDHAYEN

Instructional hours per week:4 **Credits: 3**

Upon completion of this course ,the students will able to:
CO1.Recollect the main works of the prescribed writers
CO2.Understand the forms of various prose writing in Hindi
CO3.Analyse & evaluate the prose forms prescribed, with respect to the craft and the relevance

Course Code : ML1211.1

GADHYASAHITHYAM

Instructional hours per week:4 **Credits: 3**

Upon completion of this course, the student will be able to:
CO1. Understand different Phases of Malayalam Prose (short stories, novels and essays)
CO2. Demonstrate critical skills
CO3. Analyze the relation between Heritage and Culture

Foundation Course II: CO 1221

INFORMATICS AND CYBER LAWS

No. of instructional hours per week: 4 **No. of credits: 3**

Upon completion of this course ,the students will able to:
CO 1: To review the basic concepts and fundamental knowledge in the field of informatics and to createan awareness about the nature of the emerging digital knowledge society and the impact of informatics on business decisions.
CO 2: create an awareness about the cyber world and cyber regulations.

Core Course III: CO 1241

FINANCIAL ACCOUNTING

No. of instructional hours per week: 4 **No. of credits: 3**

Upon completion of this course, the student will be able to:
CO 1: To familiarize the students with different methods of depreciation.
CO 2: To equip the students to prepare the accounts of specialised business enterprises.

Core course IV: CO1242

BUSINESS REGULATORY FRAMEWORK

No. of instructional hours per week: 4 **No. of credits: 3**

Upon completion of this course, the student will be able to:
CO 1To provide a brief idea about the framework of Indian business Laws
CO 2: enable the students to apply the provisions of business laws in business activities

Complementary Course II: CO 1231
BUSINESS MATHEMATICS
No. of instructional hours per week: 4 **No. of Credits: 3**

Upon completion of this course, the student will be able to:
CO 1: To familiarise the students with the basic mathematical tools.
CO 2: impart skills in applying mathematical tools in business practice

SEMESTER III

Course Code EN 1311.2

BUSINESS ENGLISH

Language Course 4 (90 Hours)

Instructional Hours per week: 5 **Credits: 4**

Upon completion of the course, the students should be able to:
CO1: Understand the basic concepts of business communication
CO2: Employ the English language in everyday situations and business transactions
CO3: Communicate fluently and to reach across boundaries of personal and cultural difference

CORE COURSE V: CO 1341

ENTREPRENEURSHIP DEVELOPMENT

No of instructional hours per week: 4 **No. of credits: 3**

Upon completion of this course, the student will be able to:
CO 1: To familiarize the students with the latest programmes of Government in promoting small and medium industries.
CO 2: To impart knowledge regarding starting of new ventures.

Core Course VI: CO 1342

ADVANCED FINANCIAL ACCOUNTING

No. of instructional hours per week: 5 **No. of credits: 4**

Upon completion of this course, the student will be able to:
CO 1: create awareness of accounts related to dissolution of partnership firms.
CO 2: To acquaint students with the system of accounting for different branches and departments.
CO 3: enable students to prepare accounts of consignments.

Core Course VII CO 1343

COMPANY ADMINISTRATION

No: of Instructional Hrs per week – 4 **No: of credits: 3**

Upon completion of this course, the student will be able to:
CO 1: To familiarize the students about the salient provisions of Indian Companies Act 2013.
CO 2: acquaint the students with Management and Administration of Companies, Compliance requirements, investigation into the affairs of the company and Winding up procedure.

Complementary Course III: CO 1331

E-Business

No of instructional Hours per week: 4 **No. of credits:3**

Upon completion of this course, the student will be able to:
CO 1: provide students a clear-cut idea of e-commerce and e-business and their types and models.
CO 2: acquaint students with some innovative e-business systems.

Elective Course I: Stream 5 Computer Application
CO 1361.5 - COMPUTER APPLICATION FOR PUBLICATIONS

No. of instructional hours per week: 5 (1 hour theory and 4 hrs practical)

No. of credits: 4

Upon completion of this course, the student will be able to:
CO 1: give functional knowledge in the field of free software.
CO 2: develop practical skills in document preparation, publishing and business presentation.

SEMESTER –IV

Course Code EN1411.2

READINGS IN LITERATURE

language Course 4 (90 Hours)

Instructional Hours per week: 5 **Credits: 4**

Upon completion of this course, the student will be able to:
COL. Understand and appreciate literary discourse
CO2 Understand and demonstrate the dynamics of theater
CO3. Analyze prose pieces in English
CO4 Evaluate literature in the global contest
COS. Analyse literature as a cultural and interactive phenomenon.

Core Course VIII CO 1441

INDIAN FINANCIAL MARKET

No. of instructional hours per week 4 **No. of credits: 3**

Upon completion of this course, the student will be able to:
CO 1: provide a clear-cut idea about the functioning of India Financial Market in general and Capital market operations in particular.

Core Course IX:CO1442

BANKING AND INSURANCE

No of instructional hours per week: 5 **No of credits: 4**

Upon completion of this course, the student will be able to:
CO 1. To provide a basic knowledge about the theory and practice of banking 2. To provide a basic understanding of Insurance business.
CO 2:To familiarize the students with the changing scenario of Indian Banking and Insurance.

Core Course X: CO 1443

CORPORATE ACCOUNTING

No of instructional hours per week: 5 **No of credits: 4**

Upon completion of this course, the student will be able to:
CO 1: To create awareness about corporate accounting in conformity with the provisions of Companies Act, IAS and IFRS.
CO 2: help the students in preparation of accounts of banking and insurance companies.
CO 3:To enable the students to prepare and interpret financial statements of joint stock companies.

CO 1461.5

SOFTWARE FOR DATA MANAGEMENT

No. of instructional hours per week: 5 (1 hour theory and 4 hours practical)
No. of credits: 4

Upon completion of this course, the student will be able to:
CO 1:To familiarise the students with the basics of Software for data management.
CO 2:To equip the students to meet the demands of the industry.
CO 3: develop practical skills in spread sheet application, statistical software and database application.

Complementary Course IV: CO 1431

BUSINESS STATISTICS

No. of instructional hours per week: 4 **No. of credits: 3**

Upon completion of this course, the student will be able to:
CO 1:To enable the students to gain understanding of statistical techniques those are applicable to business.
CO 2:To enable the students to apply statistical techniques in business.

SEMESTER V

ore Course XI: CO – 1541
FUNDAMENTALS OF INCOME TAX
No. of Instructional Hours per Week: 5 **No. of Credits: 4**

Upon completion of this course, the student will be able to:
CO 1 : To familiarize the students about the fundamental concepts of Income Tax.
CO 2 : To enable the students to acquire the basic skills required to compute the tax liability of individual assessee with more emphasis on Income from Salaries and Income from House property.

Core Course XII: CO 1542

COST ACCOUNTING

No of instructional hours per week: 5 **No of Credits: 4**

Upon completion of this course, the student will be able to:
CO 1:To familiarize the students with cost and cost accounting concepts
CO 2: To make the students learn cost accounting as a distinct stream of accounting

Core Course XIII CO 1543

MARKETING MANAGEMENT

No: of instructional hours per week: 4 **No: of credits: 3**

Upon completion of this course, the student will be able to:
CO 1: To provide an understanding of the contemporary marketing process in the emerging business scenario.
CO 2: To study various aspects of application of modern marketing techniques for obtaining a competitive advantage in business organizations.

Open Course: 1 - CO 1551.2

PRINCIPLES OF MANAGEMENT

No. of instructional Hrs per week: 3 **No. of Credits: 2**

Upon completion of this course, the student will be able to:
CO 1: To provide knowledge on the fundamentals of management principles and functions.

Elective Course II: Stream 5 - Computer Application

CO 1561.5 -WEB DESIGNING AND PRODUCTION FOR BUSINESS

No. of instructional hours per week: 5 (1 hour theory and 4 hour practical

No. of credits: 4

Upon completion of this course, the student will be able to:
CO 1: To impart functional knowledge in the field of Web design
CO 2: To develop practical skills in Web deigning and production for business organisations.

SEMESTER VI

Core Course XIV: CO 1641

AUDITING

No of instructional hours per week:4 **No. of credits:4**

Upon completion of this course, the student will be able to:
CO 1:To provide students the knowledge of auditing principles, procedures and techniques in accordance with current legal requirements and professional standards.
CO 2:To familiarize students with the audit of Companies and the liabilities of the auditor.

Core Course XV:CO 1642

APPLIED COSTING

No of instructional hours per week: 5 **No of credits:4**

Upon completion of this course, the student will be able to:
CO 1:To acquaint the students with different methods and techniques of costing.
CO 2: To enable the students to apply the costing methods and techniques in different types of industries.

Core course XVI: CO 1643

MANAGEMENT ACCOUNTING

No. of instructional hours per week: 5 **No. of credits: 4**

Upon completion of this course, the student will be able to:
CO 1:To enable students to acquire sound knowledge of concepts, methods and techniques of management accounting
CO 2: To make the students develop competence with management accounting usage in managerial decision making and control.

Open Course II: CO 1651.3

MANAGEMENT OF FOREIGN TRADE

No. of instructional hours per week: 3 **No. of credits: 2**

Upon completion of this course, the student will be able to:
CO 1:To acquaint the students with India's foreign trade.
CO 2: To familiarise the students with international trade and services.

Elective Course IV: Stream 3: Travel and Tourism CO 1661.3

TRAVEL AGENCY, TOUR OPERATION AND AIRLINE MANAGEMENT

No. of hours: 5 hours per week **No. of credits – 4**

Upon completion of this course, the student will be able to:
CO 1: To provide a comprehensive knowledge of the inner working mechanism of the travel agency.
CO 2 :To impart knowledge on the skills necessary for tour operation business.

Elective Course IV: Stream 5 -Computer Application

CO 1661.5 - COMPUTERISED ACCOUNTING

No. of instructional hours per week: 5 (1 hour theory and 4 hours practical)
No. of credits: 4

Upon completion of this course, the student will be able to:
CO 1:To expose the students to computer application in the field of accounting.

BSc Physics

(FIRST DEGREE PROGRAMME IN PHYSICS UNDER CBCSS)

COURSE OUTCOMES

Programme Specific Outcomes

PSO No.	Upon completion of B.Sc. Physics Degree programme, the graduates will be able to
PSO - 1	Conceptual understanding of Physics and its practical applications and scope in the present world.
PSO – 2	Analysing the theory part with practical experiments, interpretation of experimental results, finding out errors, suggestions to improve the errors.
PSO – 3	Develop and construct practical model systems from their conceptual knowledge.
PSO - 4	Distinguish Microscopic and Macroscopic Systems.
PSO - 5	Acquire conceptual understanding of Physics to General real-world situations.
PSO - 6	Integrate the Quantum Mechanics to understand the fundamentals of other branches of physics such as Vibrational Spectroscopy
PSO - 7	Understand possible atomic and molecular energy levels and transitions and predict the existence of new elements
PSO - 8	Develop an idea regarding x-rays resonance spectroscopic techniques
PSO - 9	Students will use the knowledge of electronics and communication to analyze the contemporary communication systems and to design the system.
PSO - 10	Apply the Langrangian and Hamiltonian formalisms to solve various dynamical problems which involve constraints.
PSO - 11	Students will use the knowledge of Mechanics to describe the motion of objects in different force fields.

SEMESTER I

Course Code: EN111.1

Language Course 1 LANGUAGE SKILLS (90 Hours)
Instructional Hours per week: 5 Credits: 4

Upon completion of this course, the student will be able to:
CO 1 Understand the basics of Phonetics
CO 2 Apply language skills in daily life situations.
CO 3 Demonstrate sophisticated writing skills
CO 4 Analyze and evaluate English literature

Course Code: EN1121
Foundation Course 1:WRITINGS ON CONTEMPORARY ISSUES (72 Hours)
Instructional Hours per week: 4 Credits:2

Course Code: EN1121

Upon completion of this course, the student will be able to:
CO1. Analyze issues of human rights in the society
CO2. Understand and evaluate grave issues of society
CO3. Analyze and address gender issues
CO4. Discuss the effects of substance abuse.
CO5 Have an overall understanding of some of the major issues in the contemporary world.
CO6 Respond empathetically to the issues of society

Course Code HN/ML 111.1
Additional Language I HINDI KADHA SAHITHYA (72 Hours)
Instructional hours per week: 4 Credits :3

Upon completion of this course, the student will be able to:
CO1. Recollect the main works of the representative fiction writers
CO.2 Understand the craft of the fiction writers
CO3.Analyse and evaluate the works of the fiction writers they studied
CO.4 Understand how the resource language is used as a medium in creative writing. Hours distribution: 2 hours each for each text.

Course Code: ML1111.1
ADDITIONAL LANGUAGE I: MALAYALA KAVITHA
Instructional hours per week: 4 Credits :3

Upon completion of this course, the student will be able to:
CO1. Identify and illustrate the features of Ancient Literature
CO2. Discuss the peculiarities of the Ancient Vocabulary
CO3.Categorize different Poetic Styles

Core course

Course code & Name: PY1141: BASIC MECHANICS & PROPERTIES OF MATTER (36 HOURS-2 CREDITS)

CO.No.	**Upon completion of this course, students will be able to**	**PSO addressed**	**CL**
CO –1	Correlate the knowledge gathered to the immediate experimental curriculum	PSO-1	Apply
CO –2	Distinguish the dynamics of rigid bodies of different shapes	PSO-1	Understand
CO –3	Explain the implications of conservation laws	PSO-1	Understand
CO –4	Interpret the flavour of classical fields from oscillations and waves	PSO-1	Understand
CO –5	Handle the known problems in elasticity, surface tension and viscosity in a more mathematically rigorous way	PSO - 2	Apply

Complementary Courses

CHEMISTRY

COURSE CODE &NAME: CH1131.1 THEORETICAL AND ANALYTICAL CHEMISTRY

CO No. Upon completion of this course, students, Cognitive Level

CO-1: Discuss the rules for filling electrons in atomic orbitals
CO-2: Correlate stability of atom with electronic configuration U
CO-3: Discuss theories of chemical bonding and their limitations
CO-4: Predict geometry of molecules from the type of hybridisation
CO-5: Recognize fundamentals of thermodynamics and the predict spontaneity of reactions
CO-6: Derive thermodynamic properties of systems in equilibrium
CO-7: Critically select suitable indicators for acid base and redox titrations
CO-8: Appreciate the application of common ion effect and solubility product in precipitation and intergroup separation of cations A

CO-9: Discuss the basic principles of paper chromatography and thin layer chromatography U
CO-10: Solve numerical problems on bond order, molarity, normality and Lattice energy A

MATHEMATICS

Course Code & Name: MM 1131.1CALCULUS WITH APPLICATIONS IN PHYSICS – I (3 Credits)

Upon completion of this course, the student will be able to:

CO-1: Apply differentiation and integration in processes related to Physics.
CO-2: Solve problems related to series, power series and Taylor series.
CO-3: Analyze basics of Vector Algebra.

SEMESTER II

Course Code EN1211.1

Language Course 3 ABILITY ENHANCEMENT COMPULSORY COURSE(90 Hours)

Instructional Hours per week: 5 Credits: 4

Upon completion of this course, the student will be able to
COL Define the scope of Environmental Science and identify the different types of natural resources.
CO2 Define and identify the ecosystems and biodiversity around us
CO3 Analyze and assess the types of pollutions and social issues around us. CO4 Understand environmental crisis and disaster management situations
CO5. take lead in spreading environmental values and creating awareness among the public
CO6 understand local environmental issues better

Course Code EN1212.1

Language Course 4: ENGLISH GRAMMAR USAGE AND WRITING

(90 Hours)

Instructional Hours per week: 5 Credits: 4

Upon completion of this course, the student will be able to
COL. Define and identity the basics of grammar
CO2 Identify and explain the different types of sentences
CO3. Apply the rules of grammar in all situations of communication
CO4 Spot language errors and correct them.

Additional Language II

Course Code HN 1211.1

HINDI NIBANDH AUR ANYAGADYA VIDHAYEN (72Hours)

Instructional hours per week:4 Credits: 3

Upon completion of this course, the student will be able to
CO1.Recollect the main works of the prescribed writers
CO2.Understand the forms of various prose writing in Hindi
CO3.Analyse & evaluate the prose forms prescribed, with respect to the craft and the relevance

Course Code : ML1211.1

GADHYASAHITHYAM

Instructional hours per week:4 **Credits: 3**

Upon completion of this course, the student will be able to:
CO1. Understand different Phases of Malayalam Prose (short stories, novels and essays)
CO2. Demonstrate critical skills
CO3. Analyze the relation between Heritage and Culture

Core course

Course code & name: PY1241 –HEAT AND THERMODYNAMICS
(36HRS-2 CREDITS)

CO.No.	Upon completion of this course, students will be able to	PSO addressed	CL
CO –1	Compare thermal conductivity of various types of conductors.	PSO - 1,2	Analyse
CO –2	Differentiate between various thermodynamic processes.	PSO - 1	Analyse
CO –3	Judge the efficiency of engines by comparing the performance of various vehicles	PSO - 1	Evaluate
CO –4	Associate entropy and available energy in various thermodynamic processes	PSO - 1	Understand
CO –5	Differentiate between various phase transitions	PSO - 1,2	Analyse

Complementary course

COURSE CODE & NAME: CH1231.1 PHYSICAL AND INDUSTRIAL CHEMISTRY

Upon completion of this course, students will,

CO-1: Define enthalpies of formation, combustion, neutralization, solution and hydration reactions
CO-2: Apply Hess's law for thermo chemical calculations
CO-3: Predict the effect of temperature pressure and concentration on a system in equilibrium based on Le
Chatelier principle
CO-4: Classify acidic and basic compounds in accordance with different concepts.
CO-5: Suggest method for determination of pH
CO-6: Discuss petrochemicals and their applications
CO-7: Realise the depletion of petroleum products and the need for alternate sources of energy.
CO-8: Recognise the necessity of sustainable development
CO-9: Appreciate the role of solar energy in photosynthesis and discuss methods of solar energy

harvesting

CO-10: Become responsible in the consumption of natural resourses and avoid factors affecting the harmony of nature from the equilibrium concept.

CO-11: Discuss and the Illustrate general methods and techniques in metallurgy

CO-12: Predict methods of concentration, extraction metals from their ores

CO-13: Discuss the applications of Van Arkel method and zone refining in metallurgy

Mathematics

Course Code & Name: MM 1231.1 CALCULUS WITH APPLICATIONS IN PHYSICS – II (3 Credits)

Upon completion of this course, the student will be able to:

CO-1: Describe partial differentiation, properties and applications.

CO-2: Explain Complex numbers, Hyperbolic functions and their applications.

CO-3: Demonstrate vector differentiation, properties and its applications.

CO-4: Analyze multiple Integrals.

SEMESTER III

Course Code EN 1311.1

Language Course 6: ENGLISH FOR CAREER (90 Hours)

Instructional Hours per week: 5 Credits: 4

Upon completion of this course, the student will be able to:
CO1Acquire the necessary language skills required in the competitive job market
CO2 Aquire the cognitive logical analytical and verbal skills necessary to succeed in competitive examinations
CO3.Get sufficient practice in vocabulary grammar, comprehension and remedial english from the perspective of career oriented tests
CO4 Be able to prepare for and successful in competitive examinations

Additional Language III:

Course Code HN 1311.1

HINDI NATAK, VYAKARAN THADHA ANUVAD (90 Hours)

Instructional hours per week: 5 Credits:4

Upon completion of this course, the student will be able to:
CO1.Critically appreciates play
CO2.Understands difference between spoken Hindi and written Hindi
CO3.Writes grammatically correct sentences in Hindi
CO4.Defines different parts of speech and identifies them in a given sentence.
CO5.Translates simple passages from English to Hindi

Course Code: ML1311.1

BHASHAAVABHODHAVUM SARGATHMAKATHAYUM

Instructional hours per week: 5 Credits:4

Upon completion of this course, the student will be able to:
CO1.Develop Critical View and Creativity
CO2. Knowledge in grammar and translation
CO3. Develop language skills, writing essays and poems
CO4. Analyze how language becomes a medium of culture

Core Course
Course code & Name: PY 1341 ELECTRODYNAMICS (54 Hours-3Credits).

CO.No.	Upon completion of this course, students will be able to	PSO addressed	CL
CO –1	Coulombs law, Application of Gauss law, Work and energy in electrostatics.	PSO-1	Apply
CO –2	have a unified surveillance of electromagnetic phenomena and be engaged to draw qualitative conclusions about them by managing a small number of physical concepts and laws	PSO-1	Understand
CO –3	Apply the principles of electrostatics to the solutions of problems relating to electric field and electric potential, boundary conditions and electric energy density.	PSO-1	Understand
CO –4	To impart knowledge on the concepts of Faraday 's law, induced emf and Maxwell 's equation	PSO-1	Understand

Complimentary courses
CHEMISTRY
COURSE CODE & NAME: CH1331.1 PHYSICAL CHEMISTRY 2

Upon completion of this course, the students will:

CO-1: Discuss on electrochemical cells and emf measurements U
CO-2: Apply the principles of physical Chemistry in Catalysis and photochemistry
CO-3: Draw unit cells and structure of crystals
CO-4: Understand the effect of temperature on molecular velocities of gases
CO-5: Calculate cell emf and electrode potentials A 6 Construct electrochemical cells
CO-6: Classify between Photochemical reactions
CO-7: Relate electrolyte concentration with emf E

MATHEMATICS
Course Code & Name: MM 1331.1 CALCULUS AND LINEAR ALGEBRA
(4 Credits)

Upon completion of this course, the student will be able to:

CO-1: Describe basics of Linear Algebra.
CO-2: Solve ordinary differential equations of first and higher orders.
CO-3: Evaluate line integrals, surface and volume integrals and their applications.
CO-4: To understand the basics of Fourier series and Fourier Transforms.

SEMESTER IV

Course Code EN1411.1

language Course 8:READINGS IN LITERATURE (90 Hours)

Instructional Hours per week: 5 Credits: 4

Upon completion of this course, the student will be able to:
COL. Understand and appreciate literary discourse
CO2 Understand and demonstrate the dynamics of theater
CO3. Analyze prose pieces in English
CO4 Evaluate literature in the global contest
COS. Analyse literature as a cultural and interactive phenomenon.

Course Code HN/ML411.1

Additional Language IV : HINDI KAVITHA EVAM EKANKI (90 Hours)

Instructional hours per week: 5 Credits:4

Upon completion of this course, the student will be able to:
CO1.Appreciates ancient and modern Hindi poems.
CO2.Critically evaluates the contribution of Ancient & modern poets to the development of Hindi poetry
CO3.Elucidates key lines of poetry with reference to context
CO4.Appreciates and evaluates one act play with respect to craft and subject.

Course Code: ML1411.1

Additional Language IV :DRISHYAKALA SAHITHYAM (90 Hours)

Instructional hours per week: 5 Credits:4

Upon completion of this course, the student will be able to:
CO1. Develop creative and critical skill
CO2. Develop drama and script writing skills
CO3. Learning the history of malayalam cinema
CO4. Practicing acting, script writing and direction

Core course

Course Code & Name: PY1441CLASSICAL AND RELATIVISTICMECHANICS (54 Hours-3Credits)

CO.No.	Upon completion of this course, students will be able to	PSO addressed	CL
CO –1	Handle the mechanics of a single and a system ofparticles (both charged and uncharged) under different force fields	PSO -10	Understand
CO –2	Explain the importance of symmetry transformationand conservation of momentum and energy.	PSO -11	Apply
CO –3	Describe the motion of particles in central force fieldincluding planetary motion	PSO -1	Remember
CO –4	Solve different mechanical problems in classicalmechanics using Lagrangian formalism	PSO -10	Apply
CO –5	Generalize Hamiltonian mechanics to solve variousproblems in classical mechanics	PSO -10	Apply

Complementary courses
Chemistry

COURSE CODE & NAME: CH 1431.1 SPECTROSCOPY AND ADVANCED MATERIALS

Upon completion of this course, the students will:

CO-1: Discuss the principle and applications of rotational, vibrational, electronic and NMR spectroscopy. CO-2: Illustrate isomerism, geometry and bonding in co ordination complexes
CO-3: Appreciate the use of co ordination compounds in qualitative and quantitative analysis
CO-4: Solve numerical problems relating to nuclear chemistry
CO-5: Appreciate the use of biodegradable polymers
CO-6: Apply the importance energy and environment conservation
CO-7: Get insight to the emerging area of nano and advanced materials

Mathematics

Course Code & Name: MM 1431.1 COMPLEX ANALYSIS, SPECIAL FUNCTIONS, AND PROBABILITY THEORY
(4 Credits)

Upon completion of this course, the student will be able to:

CO-1: Evaluate definite integrals using residue theorem.
CO-2: Describe various special functions.
CO-3: Explain the laws of Probability and characteristics of various distributions.

SEMESTER V

Core courses

Course code & Name: PY1541-QUANTUM MECHANICS (72 HRS-4 CREDITS)

CO.No.	Upon completion of this course, students will be ableto	PSO addressed	CL
CO –1	Review and compare the concepts of ClassicalMechanics and Quantum Mechanics	PSO 1 PSO2	Knowledgee Remember
CO –2	Discriminate between Particle and Wave nature	PSO - 4 PSO - 5	Knowledgee Remember
CO –3	Underline the postulates of QuantumMechanics	PSO - 4 PSO - 5	Knowledgee Remember
CO –4	Verify the concepts of Quantum Mechanics withexamples and introduce Schrodinger equation	PSO - 2	Applicationn
CO –5	Visualize the wave function	PSO - 2	Application
CO –6	Mathematical formulation of observables andwavefunctions	PSO - 2	Synthesis
CO –7	Apply Schrodinger equation in various physicalsystems (LHO, Particle in a box etc)	PSO -2 PSO- 6	Analysis
CO-8	Justify the phenomena of Specific Heat of Solids, Tunneling Effect, Photoelectric Effect	PSO- 2 PSO- 6	Creation

Course Code & Name: PY1542: STATISTICAL PHYSICS, RESEARCH METHODOLOGY AND DISASTER MANAGEMENT(72 HRS- 4 CREDITS)

CO. No.	Upon completion of this course, students will be ableto	PSO addressed	CL
CO-1	Able to define phase space, microstate, microstate and ensemble Learn to distinguish different statistical distributionsand judge which distribution applies to a given system	PSO 2 PSO 7	Define Distinguish Judge
CO –2	Able to solve problems based on the principles of statistical mechanics	PSO8	Solve
CO –3	Understand the objectives, motivation andsignificance of research	PSO2	Understand

CO–4	Identify the key elements and prepare a research design	PSO1	Identify
CO- 5	Able to write a review of literature	PSO1	Identify
CO-6	Understand the ideas of error measurement	PSO 2	Understand
CO-7	Understand the primary steps in pre disaster and post disaster activity	PSO2	Understand

Course code & Name:PY1543-ELECTRONICS(72 HOURS-4 CREDITS)

CO.No	Upon completion of this course, students will be able to	PSO addressed	CL
CO –1	Describe semiconductor properties in different diodes.	PSO - 9	Remember
CO –2	Explain the applications of different junction diodes	PSO –2,9	Apply
CO –3	Distinguish different feedback networks	PSO - 9	Understand
CO –4	Design single stage transistor amplifiers, oscillators andoperational amplifiers.	PSO –2,9	Analyze
CO –5	Explain the working of special devices, FET, MOSFET,UJT	PSO - 9	Understand
CO –6	Understand the concept of modulation	PSO - 9	Understand

Course Code & Name: PY1544: ATOMIC & MOLECULAR PHYSICS(72 HOURS-4 CREDITS)

CO.No.	Upon completion of this course, students will be ableto	PSO addressed	CL
CO –1	Recall the basics of atom model and draw the energy level diagram of hydrogen spectrum and correlate Classical and Quantum mechanics throughBohr's correspondence principle	PSO - 7	Know, Remember
CO –2	Visualise the spin orbit interaction through coupling schemes	PSO - 7	Apply
CO –3	Predict and explain the atomic configuration of atoms using Pauli's exclusion principle	PSO - 7	Analysis /synthesis /creation
CO –4	Sketch the allowed optical and hyperfine spectra and understand the effect of external fields on the spectra of atoms	PSO - 7	Apply
CO –5	Develope ideas regarding production, properties classification and importance of x-rays and explore structure and elemental composition using x-rays	PSO - 8	Analysis /synthesis /creation

Course Code & Name: PY1551.5. ENERGY PHYSICS(54 HOURS, 2 credits)

CO.No.	Upon completion of this course, students will be ableto	PSO addressed	CL
CO –1	Know about basic energy sources	PSO - 7	Know, Remember
CO –2	Explore Energy conversion techniques	PSO - 7	Apply
CO –3	Realize Non-conventional energy resources	PSO - 7	Analysis /Synthesis /Creation

SEMESTER VI

Course code & Name: PY 1641 SOLID STATE PHYSICS (72 HOURS -4 CREDITS)

CO.No	Upon completion of this course, students will be able to	PSO addressed	CL
CO –1	Able to distinguish types of crystals according to their structure	PSO 7	Distinguish
CO –2	Able to illustrate the concepts of unit cell and lattice of crystals	PSO 7	Illustrate
CO –3	Able to discuss diffraction of X rays by crystals and to demonstrate its experimental techniques	PSO 8	Discuss, Demonstrate
CO –4	Learn to explain crystal bonding	PSO7	Explain
CO –5	Able to describe and evaluate mechanical, electrical and magnetic properties of metals	PSO8	Describe, Evaluate

Course code & Name: PY 1642 NUCLEAR AND PARTICLE PHYSICS (72HOURS-4 CREDITS)

CO.No.	Upon completion of this course, students will be ableto	PSO addressed
CO –1	General properties of nucleus and concept of binding energy and nuclear forces.	PSO7
CO –2	Various nuclear models	PSO 8
CO –3	Natural radioactivity, alpha decay, beta decay, positron emission, electron capture etc.	PSO 7
CO –4	Nuclear reactions, its types, Q –value of a nuclear reaction	PSO 8
CO –5	Particle accelerators, nuclear fission, nuclear fusion and the source of stellar energy	PSO 8
CO –6	Fundamental particles and their properties.	PSO 7

Course code & Name: PY1643- CLASSICAL AND MODERN OPTICS (72 HRS-4 CREDITS)

CO.No	Upon completion of this course, students will be able to	PSO addressed	CL
CO –1	Review the principle of superposition, Explain interference, Produce interference by division of amplitude and division of wavefront, classification of fringes, Determine optical flatness	PSO - 1 PSO - 2 PSO - 3	Knowledge Remember Application Analysis
CO –2	Distinguish between Fresnel and Fraunhofer diffraction Demonstrate single slit and double slit Diffraction, identify plane transmission grating and explain resolving power of a grating	PSO - 1 PSO - 2	Knowledge Remember Application
CO –3	Explain Dispersion and Demonstrate Dispersion	PSO - 1 PSO - 2	Knowledge Remember Application
CO –4	Describe Polarization, Classification, Produce and Analyze different types.	PSO - 1 PSO - 2 PSO - 3	Knowledge Remember Application Analysis

Course code & Name: PY1644-DIGITAL ELECTRONICS AND COMPUTER SCIENCE (72HRS-4 CREDITS)

CO.No.	Upon completion of this course, students will be able to	PSO addressed	CL
CO –1	Understand the different number system and their mathematical operations.	PSO 1	Knowledge Remember Application
CO –2	Understand boolean algebra and logic gates	PSO 1 PSO2	
CO-3	Analyze Karnaugh's map Analyze the arithmetic and sequential circuits.	PSO2 PSO7	Knowledge Remember Application
CO –4	Differentiate between software and hardware	PSO1 PSO2	Knowledge Remember Analysis
CO -5	Get a deep knowledge of various memories used in computer.	PSO7 PSO8	Knowledge Remember

			Analysis Creation
CO –6	Be trained in programming C++ language	PSO1 PSO2	Knowledge Remember Analysis
CO –7	Attain the basic knowledge about the internal architecture and addressing modes of intel 8085 microprocessor.	PSO1 PSO2	Knowledge Remember Application Knowledge Remember Application

Course code & Name: PY 1661.4: NANO SCIENCE AND

TECHNOLOGY (54 HOURS-2CREDITS)

CO.No.	**Upon completion of this course, students will be able to**	**PSO addressed**	**CL**
CO –1	Know about nano dimensional materials	PSO - 7	Know, Remember
CO –2	Explore the synthesis techniques	PSO - 7	Apply
CO –3	Realize the characterization techniques and applications of nanomaterials	PSO - 7	Analysis /Synthesis /Creation

PRACTICAL COURSES

Semester 1 to 4

Core
Course code & Name: PY1442- Basic Physics Lab 1

CO-1: To Study Fly Wheel - Moment of Inertia

CO-2: To study Compound Bar Pendulum – Symmetric

CO 3: To study Bending

CO-4: To study static torsion

CO-5: To Study Torsional oscillations

CO-6: To study Phase transitions

CO-7: To Study Thermal conductivity of Bad conductor

C0-8: To study viscosity

CO-9: To study surface tension

CO-10: To study resistivity

CO-11: To study thermal conductivity

Complementary Chemistry
COURSE CODE & NAME: CH 1432. LAB COURSE FOR PHYSICS

Upon completion of this course, the students will:

CO-1: Obey Lab safety instructions, develop qualities of punctuality, regularity and scientific attitude, out look and scientific temper (GOOD LAB PRACTICES)

CO-2: Develop skill in safe handling of chemicals, take precaution against accidents and follow safety measures

CO-3: Develop skill in observation, prediction and interpretation of reactions

CO-4: Apply the principle of common ion effect and solubility product in the identification and separation of ions

CO-5: Develop skill in weight calculation for preparing standard solutions

CO-6: Perform volumetric titrations under acidimetry-alkalimetry, permanganometry, dichrometry, iodimetryiodometry,cerimetry, argentometry and complexometry

CO-7: Determine physical constants A

Semester 5 & 6

Core
Course code & Name: PY1645-Advanced Physics Lab 2

CO-1: To study spectrometer

CO-2: To study grating

CO-3: To study liquid lens

CO-4: To study calibrations

CO-5: To study circuit theorems

CO-6: To study the conversions of basic measuring devices
CO-7: To study earth's magnetic field.

Course code & Name: PY1646—Advanced Physics Lab 3

CO-1: To study the characteristics of pn junction diodes and Zener diodes
CO-2: To construct rectifier circuits
CO-3: To study transistor configurations, biasing techniques and characteristics
CO-4: To study OP-AMP circuits using IC741
CO-5: To construct Oscillator circuits
CO-6: To construct logic gate circuits
CO-7: To construct filter circuits
CO-8: To study circuit theorems
CO-9: To execute Application-level programs written in C++ languag

MSc Chemistry
with Specialization in
Drug Design and Development

PROGRAMME SPECIFIC OUTCOMES (PSOs)
PSO 1: Develop a better understanding of the current chemical principles, methods and theories with the ability to critically analyse at an advanced level.
PSO 2: Acquire solid knowledge of classical and modern experimental techniques and interpretation of results; thereby acquire the ability to plan and carry out independent projects
PSO 3: Develop the qualities of time management and organization, planning and executing experiments.
PSO 4: Have a good level of awareness of the problems associated with health, safety and environment
PSO 5: Understand how chemistry relates to the real world and be able to communicate their understanding of chemical principles to a lay audience and as well apply the knowledge when situation warrants
PSO 6: Learn to search scientific literature and databases, extract and retrieve the required information and apply it in an appropriate manner
PSO 7: Demonstrate proficiency in undertaking individual and/or team-based laboratory investigations using appropriate apparatus and safe laboratory practices.
PSO 8: Develop analytical solutions to a variety of chemical problems identified from application contexts; critically analyse and interpret qualitative & quantitative chemical information's.
PSO 9: Set the scene to make use of the wide range of career options open to chemistry graduates in the field of drug development.
PSO 10: Achieve an understanding and appreciation of the crucial role of chemistry in the development of drugs and the to employ the principles in the design of new drugs

COURSE OUTCOMES(COs)

SEMESTER I

Course Code: CD 211 INORGANIC CHEMISTRY I (90 Hours)

Instructional hours per week: 5

Upon completion of this course, the student will be able to:
CO1. Employ crystal field theory in analysing the splitting of d orbitals in octahedral, tetragonal, square planar, tetrahedral, trigonal bipyramidal and square pyramidal fields, calculate Crystal Field Stabilization Energy and Interpret Octahedral Site Stabilization Energy.
CO2. Apply Jahn-Teller theorem and demonstrate evidence for JT effect, static and dynamic JT effect.
CO3. Illustrate MOT for octahedral and tetrahedral complexes with and without pi bonds and construct MO diagrams.
CO4. Critically evaluate data from a variety of analytical chemistry techniques and apply knowledge of the statistical analysis of data.
CO5. Interpret complexometric titrations, redox titrations, gravimetric titrimetry and titrations in non-aqueous solvents.
CO6. Apply TG, DTA and DSC in the study of metal complexes.
CO7. Explain the functioning of the frontier materials in inorganic chemistry like Solid Electrolytes, Solid oxide fuel cells, Rechargeable battery materials, Molecular materials and fullerides.
CO8. Explain the preparation, properties and structure of isopoly acids of Mo, W and V and heteropoly acids of Mo and W.
CO9. Explain preparation and properties of xenon fluorides, and noble gas compounds, aluminosilicates, zeolites and silicones and identify the importance of shape selectivity.
CO10.Identify the chemical processes occurring naturally in earth's atmospheric, aquatic and soil environments and evaluates the impacts of human perturbations to these processes.

Course CodeCD 212 ORGANIC CHEMISTRY I (90 Hours)
Instructional hours per week: 5

Upon completion of this course, the student will be able to:
CO1. Write down the IUPAC name of polycyclic, spirocyclic and heterocyclic compounds and draw the structures from the IUPAC name of these compounds.

CO2. Determine R and S, P and M, E and Z configuration of compounds with chiral centres, biphenyls, allenes, spiranes and draw the configurations in dash and wedge formula, or zig –zag configurations.
CO3. Detect prochirality in a compound and explain relevance of prochirality .
CO4. Explain chiral centre, chiral axis and chiral plane with examples, stability of conformations, stereoselective and stereospecific reactions.
CO5. Calculate Cotton effect of a compound from its structure and configuration.
CO6. Explain different methods for generation of free radical and different types of free radical reactions- Predict the products in a free radical reaction.
CO7. Describe different types mechanism of substitution, elimination, hydrolysis and addition reactions
CO8. Differentiate the rate, mechanism and stereochemistry influenced by solvent, substrate structure, intermediate stability
CO9.Predict the products or reactants or reagents in selected types of reactions.
CO10. Design the mechanism of selected reactions.

Course Code CD 213 PHYSICAL CHEMISTRY I (90 Hours)
Instructional hours per week: 5

Upon completion of this course, the student will be able to:
CO1. Outline the development of quantum mechanics and its tools and apply them in determining the wave functions and energies of moving particles.
CO2. Recognize the nature of adsorption and propose theories and choose theoretical and instrumental methods of measurements of surface property.
CO3. Understand theory and mechanism of catalytic action.
CO4. Correlate thermodynamic properties and apply them in systems.
CO5. Understand theories, mechanism and, kinetics of reactions and solve numerical problems
CO6. Identify point groups and construct character table and predict hybridisation and spectral properties of molecules.

Course Code: CD 214 INORGANIC CHEMISTRY PRACTICALS – I (125 Hours)
Instructional hours per week: 3

Upon completion of this course, the student will be able to:
CO1. Interpret data from an experiment, including the construction of appropriate graphs and the evaluation of errors.

CO2. Estimate volumetrically the concentration of Zn, Mg and Ni using EDTA and the volumetric estimation of Fe.
CO3. Estimate volumetrically the hardness of water and concentration of Ca in water samples using EDTA.
CO4. Estimate colorimetrically the concentration of Chromium – (using Diphenyl carbazide), Iron (using thioglycollic acid), Iron (using thiocyanate), Manganese (using potassium periodate), Nickel (using dimethyl glyoxime).
CO5. Carry out the preparation of the metal complexes Potassium trioxalatochromate (III), Tetraammoniumcopper (II) sulphate, Hexamminecobalt (III) chloride.
CO6.Record the UV spectra, IR spectra, magnetic susceptibility, TG, DTA and XRD of the complexes prepared.

Course Code: CD 215 ORGANIC CHEMISTRY PRACTICALS – I (125 Hours)
Instructional hours per week: 3

Upon completion of this course, the student will be able to:
CO1. Interpret data from an experiment, including the construction of appropriate graphs and the evaluation of errors.
CO2. Determine the correct method for separation of a binary mixture and make the separated compounds in pure form.
CO3. Develop thin layer chromatogram of a compound and determine its purity.
CO4. Separate two compounds by column chromatography.
CO5. Utilize the synthetic procedures and reagents to convert a compound into another. Differentiate the products by spectroscopic methods.
CO6. Use green chemical principles in the synthesis.
CO7. Solve GC MS and LC MS of a compound to ascertain purity and identity, apply the basic principles learned through a practical example

Course Code CD 216 PHYSICAL CHEMISTRY PRACTICALS – I (125 Hours)
Instructional hours per week: 4

Upon completion of this course, the student will be able to:
CO1. Interpret data from an experiment, including the construction of appropriate graphs and the evaluation of errors.
CO2. Construct the Freundlich and Langmuir isotherms for adsorption of acetic/oxalic acid on active charcoal/ alumina and determine the concentration of acetic/ oxalic acid
CO3. Determine the rate constant, Arrhenius parameters, rate constant and concentration using kinetics
CO4. Construct the phase diagram and determine the composition of an unknown mixture
CO5. Construct the ternary phase diagram of acetic acid chloroform-water system and out the procedure in an unfamiliar situation to find out the composition of given homogeneous mixture.
CO6. Construct the tie-line in the ternary phase diagram of acetic acid chloroform-water system
CO7. Determine distribution coefficient using distribution law.
CO8. Determine the equilibrium constant employing the distribution law.
CO9. Determine the coordination number of Cu2+ in copper- ammonia complex.
CO10.D etermine Kf of solid solvent, molar mass of non-volatile solute, mass of solvent and composition of given solution
CO11. Determine KT of salt hydrate, molar mass of solute, mass of salt hydrate and composition of given solution.
CO12. Determine surface tension and parachor of liquids
CO13. Ascertain the relationship between surface tension with concentration of a liquid and use this to find out the composition of given homogeneous mixture.
CO14. Determine the concentration of given strong acid/alkali.
CO15. Determine the heat of ionisation of acetic acid.
CO16. Determine the heat of displacement of Cu2+ by Zn.

SEMESTER II

Course Code: CD 221 INORGANIC CHEMISTRY II (90 Hours)
Instructional hours per week: 5

Upon completion of this course, the student will be able to:
CO1. Obtain the term symbols of d n system and determine the splitting of terms in weak and strong octahedral and tetrahedral fields.
CO2. Explain the correlation diagrams for d n and d 10-n ions in octahedral and tetrahedral fields and interprets electronic spectra of complexes
CO3. Applies magnetic measurements in the determination of structure of transition metal complexes.
CO4. Relates crystalline structure to X-ray diffraction data and the reciprocal lattice and explains the diffraction methods
CO5. Explains crystal defects .
CO6. Elaborates the structure of selected compounds of AX, AX2, AmX2, ABX3 and spinels.
CO7. Explains the electronic structure of solids using free electron theory and band theory.
CO8. Understands the differences in semiconductor and dielectric materials and their electrical and optical properties
CO9. Explain the structure and reactions of S–N, P–N, B–N, S– P compounds and boron hydrides.
CO10. Analyse the topological approach to boron hydride structure and estimates styx numbers and apply Wade‟s rules in borane and carboranes.
CO11. Identify the electronic configurations and term symbols of lanthanides and actinides.
CO12.Sketches the shapes of f orbital and shows their splitting in cubic ligand field.
CO13. Elaborates the importance of the beach sands of Kerala and their important components.

Course Code: CD 222 ORGANIC CHEMISTRY II (90 Hours)
Instructional hours per week: 5

Upon completion of this course, the student will be able to:
CO1. Discuss the fundamentals, operating principles and instrumentation of separation techniques.
CO2. Differentiate the principle and applications of phase transfer catalysis with examples
CO3. Describe the various methods of determining reaction mechanisms and basic thermodynamic principles of organic reactions.
CO4. Explain the Hammet parameters of reaction and design an experiment to confirm the mechanism of a reaction.
CO5. Identify different types of rearrangement reactions, determine the product of the reaction applying migratory aptitude, and reproduce the evidences for the mechanism of the reaction.
CO6. Understand that the outcomes of pericyclic reactions may be understood in terms of frontier orbital interactions, correlation diagram, Mobius and Huckel approach.
CO7. Recall and define the various types of pericyclic reaction; define such terms as conrotatory, suprafacial.
CO8. Predict and rationalise the outcomes of pericyclic reactions including stereospecificity, regioselectivity, and stereoselectivity
CO9. State the synthetic importance of the above cycloaddition and rearrangement reactions, and give disconnections of target compounds corresponding to these reactions.
CO10. Describe the fate of excited molecule based on Jabolonoski diagram, predict the course of an organic photochemical reaction and identify the product with the type of functional group
CO11. Propose synthetic routes to a variety of molecules, starting from simple precursors with correct stereochemistry and reagents of selected reactions.

Course Code: CD 223 PHYSICAL CHEMISTRY II (90 Hours)
Instructional hours per week: 5

Upon completion of this course, the student will be able to:
CO1. Apply quantum mechanical principles in solving both real and imaginary spherical harmonics systems-multi electron systems and analyse spectral lines.

CO2. Describe and explain the physical and chemical principles that underlie molecular structure determination techniques like microwave, vibrational, Raman and electronic spectroscopy.
CO3. Predict likely spectral characteristics of given molecular species, and be able to rationalise those characteristics on the basis of structural and electronic arguments.
CO5. Acquire knowledge of basics of statistical mechanics and compare statistical methods.
CO6. Understand and apply of theories of heat capacity.
CO7. Understand theories of electrolytes and electrochemical reactions
CO8. Ascertain the application of electrochemistry in industrial fields.
CO9. Understand the theories and applications behind various types of analytical techniques in electrochemistry.
CO10. Acquire skill in solving numerical problems.

SEMESTER III

Course Code: CD 231 INORGANIC CHEMISTRY III (90 Hours)
Instructional hours per week: 5

Upon completion of this course, the student will be able to:
CO1. Demonstrate knowledge of advanced content in the areas of inorganic chemistry such as in organometallic compounds, bioinorganic compounds, spectroscopic methods in inorganic Chemistry and nuclear chemistry.
CO2. Examine the bonding in simple and polynuclear carbonyls with and without bridging and complexes with linear π donor ligands.
CO3. Explain the structure and bonding of ferrocene and dibenzenechromium with the help of MO theory.
CO4. Understand fundamental reaction types and mechanisms in organometallics and to employ them to understand selected catalytic processes in industry.
CO5. Contrasts the thermodynamic and kinetic stability of complexes, analyses the factors affecting stability of complexes and explains the methods of determining stability constants.
CO6. Classifies ligand substitution reactions and explains its kinetics and various mechanisms.
CO7. Analyze the chemical and physical properties of metal ions responsible for their biochemical action as well as the techniques frequently used in bioinorganic chemistry such as oxygen transport, e-transfer, communication, catalysis, transport, storage etc.
CO8. Explain the principles of spectroscopic methods employed in inorganic chemistry and their applications in the study of metal complexes.
CO9. Demonstrate a knowledge of fundamental aspects of the structure of the nucleus, radioactive decay, nuclear reactions, counting techniques.
CO10. Evaluate the role of nuclear chemistry to find the most suitable measures, administrative methods and industrial solutions to ensure sustainable use of the world's nuclear resources.

Course Code: CD 232 ORGANIC CHEMISTRY III (90 Hours)
Instructional hours per week: 5

Upon completion of this course, the student will be able to:
CO1. Describe and explain the physical and chemical principles that underlie molecular structure determination techniques such as UV-visible, IR, mass NMR and mass spectroscopy.

CO2. Apply knowledge of molecular structure determination using UV-visible, IR, mass and NMR spectroscopic techniques to identify and/or characterise chemical compounds from experimental data
CO3. Calculate λmax of a compound, apply IR frequency table to determine the functional groups present in the molecule, interpret mass spectrum of compound from fragmentation.
CO4. Predict likely spectral characteristics of given molecular species; solve the structures of unknown molecules using appropriate spectroscopic techniques.
CO5.Revise a 2 D NMR of a compound based on learned principles and solve the structure of a compound based on NMR data.
CO6. Outline the synthesis, predict and compare the reactivity of heterocyclic compounds
CO7. Propose the retro synthetic pathways to a variety of drug molecules
CO 8. Outline the chemical and molecular processes that take place in organic chemical reactions and conclude the principles for effective synthesis strategies, stereoelectivity and catalysis

Course Code: CD 233 PHYSICAL CHEMISTRY III (90 Hours)
Instructional hours per week: 5

Upon completion of this course, the student will be able to:
CO1. Understand the theories of chemical bonding and their application with help of approximate methods predict the nature of orbitals and molecular spectra
CO2. Compare MO and VBT
CO3. Understand the properties of gases and liquids and the nature of the intermolecular forces in them.
CO4. Describe the principle behind the determination of surface tension and coefficient of viscosity.
CO5. Describe and explain the physical and chemical principles that underlie molecular structure determination techniques like NMR, ESR, Mossbauer, NQR and PES spectroscopy.
CO6. Judge the degrees of freedom of systems and understand theories of irreversible thermodynamic systems.
CO7. Understand the quantum mechanical and non-quantum mechanical methods in computational chemistry, potential energy surface and basis functions.
CO8. Write the Z matrix of simple molecules.
CO9. Acquire skill in solving numerical problems

Course Code: CD 234 INORGANIC CHEMISTRY PRACTICALS – II (125 Hours)
Instructional hours per week: 3

Upon completion of this course, the student will be able to:
CO1. Interpret data from an experiment, including the construction of appropriate graphs and the evaluation of errors.
CO2. Estimate a simple mixture of ions (involving quantitative separation) by volumetric and gravimetric methods
CO3. Perform COD, BOD, DO, TDS analysis
CO4. Predict likely spectral characteristics of given metal compexes solve the structures of unknown metal compexes using appropriate spectroscopic techniques and magnetic measurements .
CO5. Analyse the XRD of simple substances.
CO6. Interpret TG and DTA curves.

Course Code: CD 235 ORGANIC CHEMISTRY PRACTICALS – II (125 Hours)
Instructional hours per week: 3

Upon completion of this course, the student will be able to:
CO1. Interpret data from an experiment, including the construction of appropriate graphs and the evaluation of errors
CO2. Predict likely spectral characteristics of given drug molecule; solve the structures of unknown molecules using appropriate spectroscopic techniques
CO3. Develop paper chromatogram of a compound and determine its purity
CO5. Estimate quantitatively a drug in a given sample
CO6. Estimate colorimetricaly paracetamol, protein and ascorbic acid
CO7. Use green chemical principles in the synthesis
CO8. Utilize the principles of isolation to separate bioactive molecules from plants
CO9. Synthesise a drug molecule involving a heterocyclic ring

Course Code: CD 236 PHYSICAL CHEMISTRY PRACTICALS – II (125 Hours)
Instructional hours per week: 4

Upon completion of this course, the student will be able to:
CO1. Interpret data from an experiment, including the construction of appropriate graphs and the evaluation of errors.
CO2. Employ CADD strategies for Ligand preparation, protein preparation, active site determination and perform docking
CO3. Employ data mining techniques for drug design
CO4. Determine the strength of strong/ weak acids by conductometric titrations.
CO5. Verify Onsager equation and Kohlraush‟s law conductometrically .
CO6. Determine the activity and activity coefficient of electrolyte.
CO7. Determine the concentration of a solution potentiometrically or pH metrically.
CO8. Employ spectrophotometry in determining unknown concentration.
CO9. Determine the concentration of a liquid mixture using a refractometer .
CO10. Determine the unknown concentration of a given glucose solution.

SEMESTER IV

Course Code: CD 241 FUNDAMENTALS OF DRUG DISCOVERY (90 Hours)
Instructional hours per week: 5

Upon completion of this course, the student will be able to:
CO1. Demonstrate knowledge on the most recent developments of drug design and can illustrate drug action through examples
CO2. Combine the principles of pharmacokinetics and pharmacodynamics to understand the mechanism of drug action
CO3. Apply cheminformatic, bioinformatic tools in drug design
CO 4. Understand and be able to employ the kinetic models of enzymes
CO5. Appreciate potential complications of inhibiting enzymes with drugs
CO6. Correlate the drug action with the factors modifying drug action

Course Code: CD 242 PRINCIPLES OF DRUG DESIGN (90 Hours)
Instructional hours per week: 5

Upon completion of this course, the student will be able to:
CO1. Understand the basic principles of Drug design and development and the sequence of events necessary to bring a drug to market
CO2. Recognise the role of the drug target and how its activity is screened
CO3. Explain the sources and the methods for predictions are used to make early decisions in the drug discovery and development
CO4. Recognize the nature of information obtained in the different phases of drug development
CO5.Correlates the relationship between the chemical structure of a molecule and its biological activity.
CO6. Describe and justify the role and importance of the various disciplines involved in the different phases of drug discovery and development
CO7. Understand how modern drugs were developed by using pharmacophore modelling and docking technique
CO8.Compares different sources of chemical entities for drug development

MCOM

PO M.COM

P.G.DEPARTMENT OF COMMERCE

PO 1: To acquaint with conventional as well as contemporary areas in the discipline of Commerce.
PO 2: To well versed in national as well as international trends.
PO3: For conducting business, accounting and research practices.
PO 4: To understand role of regulatory bodies in corporate and financial sectors.

PSO 1: This program imparts the students training in various aspects of business and its environment
PSO 2: To develop managerial and analytical skills to meet the challenges of ever-changing business environment.

COURSE OUTCOME (COs)

SEMESTER I

Paper 1: CO 211

BUSINESS ETHICS AND CORPORATE GOVERNANCE

Instructional Hours Per Week:25. **Marks:75**

Upon completion of this course, the student will be able to:
CO 1: To convey basic understandings on the theories of Business Ethics
CO 2: To provide a understanding on Corporate Governance practices and the provisions of the Companies Act relating to corporate governance

Paper 2: CO 212

LEGAL FRAMEWORK FOR BUSINESS

Instructional Hours Per Week:25. **Marks:75**

Upon completion of this course, the student will be able to:
CO 1: To enable student acquire updated knowledge and develop understanding of the regulatory framework for business
CO 2:To make students aware of opportunities available in various legal compliances so as to enable them employable.
CO 3: To expose students in emerging trends in good governance practices including governance.

Paper 3: CO 213

RESEARCH METHODOLOGY

Instructional Hours Per Week:25. **Marks:75**

Upon completion of this course, the student will be able to:
CO 1: To provide an insight into the fundamentals of social science research.

CO2 :To understand the need, significance and relevance of research and research design.
CO3: To acquire practical knowledge and required skills in carrying out research.

Paper 4: CO 214

PLANNING AND DEVELOPMENT ADMINISTRATION

Instructional Hours Per Week:25. **Marks:75**

Upon completion of this course, the student will be able to:
CO 1:To generate an overall insight on planning process in Indian Economy
CO 2:To make the students aware about new planning initiatives in India

Paper 5: CO 215

ADVANCED CORPORATE ACCOUNTINGAND REPORTING

Instructional Hours Per Week:25. **Marks:75**

Upon completion of this course, the student will be able to:
CO 1:To acquaint the students about important accounting standards
CO2:To gain ability to prepare financial statements including consolidated financial statements of group companies and financial reports of various types of entities by applying relevant accounting standards.
CO3: To expose the students to advanced accounting issues and practices such as insurance claims, investment accounting and liquidation of companies.

SEMESTER II

Paper 1: CO 221

E-BUSINESS & CYBER LAWS

Instructional Hours Per Week:25. **Marks:75**

Upon completion of this course, the student will be able to:
CO 1:To equip the students with the emerging trends in business
CO 2:To equip the students to introduce and explore the use of information technology in all aspects of business.
CO 3: To familiarise with the students cyber world and cyber regulations

Paper 2: CO 222

STRATEGIC MANAGEMENT

Instructional Hours Per Week:25. **Marks:75**

Upon completion of this course, the student will be able to:
CO 1:To create a conceptual awareness on various strategies.
CO 2:To familiarise students with the formulation, implementation and evaluation of strategies

Paper 3: CO 223

QUANTITATIVE TECHNIQUES AND FINANCIAL ECONOMETRICS

Instructional Hours Per Week:25. **Marks:75**

Upon completion of this course, the student will be able to:
CO1: To impart expert knowledge in the application of Quantitative Techniques and Business Econometrics in research.
CO2: To impart knowledge in the use of SPSS in processing and analysis of data.

Paper 4: CO 224

INTERNATIONAL BUSINESS

Instructional Hours Per Week:25. **Marks:75**

Upon completion of this course, the student will be able to:
CO1:To introduce the concept of international business and to create awareness on the changes in the international business area.

Paper 5: CO 225

INVESTMENT MANAGEMENT

Instructional Hours Per Week:25. **Marks:75**

Upon completion of this course, the student will be able to:
CO1:To provide a general understanding about investment avenues and personal finance.
CO 2:To give a broader understanding about behavioural finance and how it equip to decide personal investment**.**

SEMESTER III

Paper 1: CO 231U

INCOME TAX PLANNING AND MANAGEMENT

Instructional Hours Per Week: 25. **Marks:75**

Upon completion of this course, the student will be able to:
CO 1:To impart deep knowledge about the latest provisions of Income Tax Act
CO 2:To develop application and analytical skill of the provisions of Income Tax Law for Income Tax planning and Management.

Paper 2: CO 232F

SECURITY ANALYSIS AND PORTFOLIO MANAGEMENT

Instructional Hours Per Week: 25. **Marks:75**

Upon completion of this course, the student will be able to:
CO1. To provide a comprehensive understanding on the principles of security analysis and develop the skill in portfolio management.
CO 2. Equip the students to value the real worth of securities.

Paper 3: CO 233 F

INTERNATIONAL FINANCIAL MANAGEMENT

Instructional Hours Per Week: 25. **Marks:75**

Upon completion of this course, the student will be able to:
CO 1:To familiarise the students with the international financial markets and instruments.
CO 2: convey an understanding about foreign exchange risk management

Elective Course II: Stream 3: Travel and Tourism
CO 1461.3
TOURISM PRODUCTS
No of instructional hours: 5 hrs No of Credits: 4

Upon completion of this course, the student will be able to:
CO1. To give a description about the natural products and manmade products
CO2.To give an insight into the natural resources of India

Paper 4: CO 234F

STRATEGIC COST AND MANAGEMENT ACCOUNTING

Instructional Hours Per Week: 25. **Marks:75**

Upon completion of this course, the student will be able to:
CO 1:To comprehend and familiarize the established techniques, methods and practices in Strategic Cost and Management Accounting to the students.
CO 2:To introduce the evolving Strategic approaches and techniques in Cost and Management field and to developed industrial behaviour among the students in the emerging business areas.

SEMESTER IV

Paper 1: CO 241W

GOODS AND SERVICE TAX & CUSTOMS DUTY- LAW AND PRACTICE

Instructional hours per week -25. **Mark-75**

Upon completion of this course, the student will be able to:
CO 1: gain expert knowledge of the principles and law relating to Goods and Service Tax and Customs Act.
CO 2: impart skill in applying and analysing the provisions of Goods and Service Tax Act and Customs Act in handling practical situations.

Paper 2: CO 242F

RISK MANAGEMENT AND DERIVATIVES

Instructional hours per week -25. **Mark-75**

Upon completion of this course, the student will be able to:
CO 1: To understand the risk management process and its application
CO 2: give a broader awareness on derivatives and its applications

Paper 3: CO 243F

ACCOUNTING STANDARDS

Instructional hours per week -25. **Mark-75**

Upon completion of this course, the student will be able to:
CO 1: To acquaint the students to understand the structure, process and organizational set up involved in evolving accounting standards in India.

CO 2: To enable the students to apply some key standards while preparing and presenting the financial statements Course.

Paper 4: CO 244S

MANAGEMENT OPTIMIZATION TECHNIQUES

Instructional hours per week -25. **Mark-75**

Upon completion of this course, the student will be able to:
CO 1: To convey basic principles and application of optimization tools of resource utilization.
CO 2: provide an insight into optimal project implementation Techniques under deterministic and probabilistic conditions.

M. Sc Degree Program
in
Physics

Objectives: Major objective of the M. Sc Physics program of University of Kerala is to equip the students for pursuing higher studies and employment in any branches of Physics and related areas. The program also envisages developing thorough and in-depth knowledge in Mathematical Physics, Classical Mechanics, Quantum Mechanics, Statistical Physics, Electromagnetic Theory, Nuclear Physics, Atomic and Molecular Spectroscopy and Electronics. The program also aims to enhance problem solving skills of students so that they will be well equipped to tackle national level competitive exams. The program also acts as a bridge between theoretical knowhow and its implementation in experimental scenario. The program also introduces the students to the scientific research approach in defining problems, execution through analytical methods, systematic presentation of results keeping in line with the research ethics through M. Sc dissertations.

Program Outcome

(i) Define and explain fundamental ideas and mathematical formalism of theoretical and applied physics.

(ii) Identify, classify and extrapolate the physical concepts and related mathematical methods to formulate and solve real physical problems.

(iii) Identify and solve interdisciplinary problems that require simultaneous implementation of concepts from different branches of physics and other related areas.

(iv) To define a research problem, translate ideas into working models, interpret the data collected draw the conclusions and report scientific data in the form of dissertation.

(v) To disseminate scientific knowledge and scientific temper in the society to contribute towards greater human cause

Course Outcomes: Semester 1

Course code & Name PH 211: CLASSICAL MECHANICS (6L, 1T)

Objectives: This course is aimed to provide basic and advanced concepts in classical mechanics. The course discusses Lagrangian and Hamiltonian formalisms, central force problems, theory of small oscillations, Hamilton -Jacobi equations, Kepler's problem, Rigid body dynamics and Euler's equations, Concepts of special and general theory of relativity, Non linear dynamical systems and chaos.

CO.No.	Upon completion of this course, students will be able to	PSO addressed	CL
CO –1	Students are able to learn the concepts of Lagrangian and Hamiltonian mechanics and use them to solve problems in mechanics. Able to learn concepts of generating functions, Poisson brackets Hamilton Jacobi equations and action angle variables	PSO -10	Understand
CO –2	To equip the students to deal with central force problem and analyzing Kepler's laws	PSO -11	Apply
CO –3	To inculcate the students the concepts of special and general theory of relativity andrelated problems	PSO -1	Remember
CO –4	To acquaint the students about the theory of small oscillations and Euler's equations of motions of rigid bodies	PSO -10	Apply
CO –5	To analyze nonlinear dynamical systems and to explain the concepts of classical chaos	PSO -10	Apply

Course Code & Name: PH 212: Mathematical Physics (6L, 1T)

Objectives: This course is aimed to equip the students with the mathematical techniques used for developing strong back ground in the basic and advanced level problems. The course describes about curvilinear coordinates, Fourier series and transforms, probability distributions, partial differential equations and different integral transforms, special functions, tensors and group theory.

CO.No.	Upon completion of this course, students will be able to	PSO addressed	CL
CO –1	To apply and analyze the various vector and matrix operations and to perform complex analysis for solving physical problems.	PSO- 10	Understand
CO –2	To demonstrate and utilize the concepts of Fourier series and its transforms	PSO -11	Apply
CO –3	To explain and differentiate different probabilistic distributions	PSO -1	Remember
CO –4	To apply partial differential equations and special functions for solvingmathematical problems	PSO -10	Apply
CO –5	To illustrate and apply concepts of group theoretical operations and tensors	PSO -10	Apply

Course Code & Name: PH 213: BASIC ELECTRONICS (6L,1T)

Objectives: This course is aimed to introduce the students with the basic knowledge of analog and digital circuits. The course illustrates the concepts of various amplifier circuits, solid state electronic devices, sequential digital circuits, optoelectronics devices and measurements using electronic instruments.

CO.No	Upon completion of this course, students will be able to	PSO addressed	CL
CO –1	To equip the students design and analyze different analogue and digital circuits	PSO - 9	Remember
CO –2	To summarize the knowledge of basic arithmetic and data processing circuits and memory devices	PSO –2,9	Apply

CO –3	To equip the students to explain various components in optical communications systems and microwave devices	PSO - 9	Understand
CO–4	To measure and analyze the different electronic signals	PSO –2,9	Analyze

Course Outcomes: Semester 2

Course Code & Name: PH 221: MODERN OPTICS AND ELECTROMAGNETIC THEORY (6L, 1T)

Objectives: This course covers linear and non-linear optical phenomenon, propagation of electromagnetic waves, relativistic electrodynamics, radiation and antenna theory.

CO.No	Upon completion of this course, students will be able to	PSO addressed	CL
CO –1	To demonstrate the linear and nonlinear optical phenomena	PSO - 1 PSO - 2 PSO - 3	Knowledge Remember Application Analysis
CO –2	To explain and discuss propagation of electromagnetic waves through differentmedia	PSO - 1 PSO - 2	Knowledge Remember Application
CO-3	To restate formulations and relativistic effects in electrodynamics	PSO- 7 PSO- 8	Knowledge Remember creation
CO-4	To analyse the propagation of electromagnetic waves through waveguides	PSO- 1 PSO- 2 PSO- 7	Knowledge Remember Applications creation
CO-5	To use radiation theory in developing different antennas	PSO- 1 PSO- 2	Knowledge Remember Application

Course Code & Name: PH 222: THERMODYNAMICS, STATISTICAL PHYSICS AND BASIC QUANTUMMECHANICS (6L, 1T)

Objectives: This course is aimed to introduce the concepts of thermodynamic equations, foundationsof classical and quantum statistics, theory of phase transitions and foundations quantum mechanics together with problems.

CO. No	Upon completion of this course, students will be able to	PSO addressed	CL
CO –1	To explain the basic thermodynamic relations, Maxwell's equations and itsconsequences	PSO - 9	Remember
CO –2	To equip the students to demonstrate and apply classical and quantum statistics in different physical phenomena	PSO –2,9	Apply
CO –3	To distinguish the different phase transitions using Ising model	PSO - 9	Understand
CO –4	Outline and apply foundations of quantum mechanics	PSO –2,9	Analyze

Course Code & Name: PH 223: COMPUTER SCIENCE AND NUMERICAL TECHNIQUES (6L, 1T)

Objectives: This course provides introduction to computer architecture, microprocessors, programming in python and C++ and computational numerical methods.

CO. No.	Upon completion of this course, students will be able to	PSO addressed	CL
CO –1	To summarize computer hardware and its operating systems	PSO 1	Knowledge Remember Application
CO –2	Explain internal architecture of microprocessors 8085 and create assembly languageprograming	PSO 1 PSO2	Knowledge Remember

CO-3	To develop and compile programs in python and C++	PSO2 PSO7	Knowledge Remember Application
CO –4	Apply numerical methods to solve physical problems	PSO1 PSO2	Knowledge Remember Analysis

Course Outcomes: Semester 3

Course Code & Name: PH231: ADVANCED QUANTUM MECHANICS (6 L, 1 T)

Objectives: This course describes a thorough conceptual understanding of advanced quantum mechanics covering variation method, WKB approximation, perturbation theory, symmetry andconservation laws, theory of scattering, system of identical particles, angular momentum and relativistic quantum mechanics.

CO.No.	Upon completion of this course, students will be ableto	PSO addressed	CL
CO –1	To extend the use of approximation methods viz variation, WKB, time dependent and time independent perturbations.	PSO 1 PSO2	Knowledge Remember
CO –2	To summarize different types of symmetry, conservation laws and quantum theory of scattering	PSO - 4 PSO - 5	Knowledge Remember
CO –3	To distinguish different approximation methods, to study the structure and properties of manyelectron systems	PSO - 4 PSO - 5	Knowledge Remember
CO –4	To compute eigen values of angular momentum and evaluation of CG coefficients	PSO - 2	Applicationn
CO –5	Infer the requirements of relativistic quantum mechanics	PSO - 2	Application

Course Code & name: PH 232: ATOMIC AND MOLECULAR SPECTROSCOPY (6L, 1T)

Objectives: This course provides an overview of symmetry of molecules, concepts of atomic spectra, Photoelectron and photo acoustic spectroscopy, Rotational, vibrational, electronic, Raman, Mossbauer, nuclear and electron spin resonance spectroscopic techniques.

CO.No.	Upon completion of this course, students will be ableto	PSO addressed	CL
CO –1	Explain different symmetry operations and deduction of molecular structure	PSO - 7	Know, Remember
CO –2	Distinguish and classify the different spectra shown by atoms and molecules	PSO - 7	Apply
CO –3	Illustrate the various spectroscopic experimental techniques	PSO - 7	Analysis /synthesis /creation

Course Code & name: PH 233 M: MATERIALS SCIENCE –I (SPECIAL PAPER I)

Objectives: To understand and familiarize fundamentals of materials, structure and its imperfections, growth techniques and associated nucleation theories.

CO.No.	Upon completion of this course, students will be able to	PSO addressed	CL
CO –1	To identify and distinguish various crystal structures and the associated imperfections	PSO-1 PSO-2	Knowledgee Remember
CO –2	To prepare and demonstrate the synthesis of crystalline materials by different growth techniques	PSO - 4 PSO - 5	Knowledgee Remember
CO –3	To demonstrate different methods for growth of thin films	PSO - 4 PSO - 5	Knowledgee Remember
CO –4	To discuss various nucleation theories of film growth and analyze thesynthesized thin films	PSO - 2	Application

Course Outcomes: Semester 4

Course Code & Name: PH 241: CONDENSED MATTER PHYSICS (6L, 1T)

Objectives: To understand and familiarize fundamentals of crystals, lattice vibrations, band theory, dielectric, magnetic and superconducting properties of materials. To introduce the synthesis and

characterization techniques of nanomaterials.

CO. No	Upon completion of this course, students will be able to	PSO addressed	CL
CO –1	Discuss crystal physics, lattice vibrations, models of thermal properties and band theory of solids	PSO- 7	Distinguish
CO –2	Explain the theoretical concepts of semiconductors, dielectric, magnetic and superconducting materials	PSO- 7	Illustrate
CO –3	To describe the synthesis and characterization techniques of nanomaterials	PSO- 8	Discuss, Demonstrate
CO –4	To apply the concepts in condensed matter physics to meet the challenges	PSO-7	Explain

Course Code & Name: PH 242: NUCLEAR AND PARTICLE PHYSICS (6L, 1T)

Objectives: To familiarize the fundamental properties of nucleus, its structure, models, nuclear reactions, nuclear detectors and accelerators. To introduce the concept of elementary particles and their interactions.

CO. No.	Upon completion of this course, students will be able to	PSO addressed
CO –1	To describe and analyze nuclear structure, models and reactions	PSO-7
CO –2	To illustrate the mechanisms of nuclear fission and fusion reactions	PSO- 8
CO –3	Discuss various nuclear detectors and particle accelerators	PSO- 7
CO –4	To classify elementary particles and discuss their interactions	PSO- 8

Course Code & name: PH 243 M: MATERIALS SCIENCE –II (SPECIAL PAPER II)

Objectives: This course introduces optical and thermal properties of materials, synthesis of nanostructured materials, its characterization and applications. It also gives elements of nanoelectronicsand its applications.

CO.No.	Upon completion of this course, students will be able to	PSO addressed	CL
CO –1	Discuss optical and thermal properties of materials	PSO 1 PSO2	Knowledgee Remember

CO –2	Explain fundamentals of nanostructured materials, synthesis and various characterizationtechniques	PSO - 4 PSO - 5	Knowledgee Remember
CO –3	Discuss basic ideas and applications of nanoelectronics	PSO - 4 PSO - 5	Knowledgee Remember

Practical Course

Course Outcomes: Semester 1 &2

Course Code & Name: PH 251: GENERAL PHYSICS PRACTICALS

Objectives: Demonstrate and understand various general physics experiments for acquiringfundamental concepts.

Upon completion of this course, students will be able to :

CO-1: To measure and analyze various physical quantities.
CO-2: To calculate error in various general physics experiments.
CO-3: To develop experimental skills

Course Code & Name: PH 252 Electronics and Computer Science Practicals

Objectives: Design, construct and verify various electronics circuits and object-oriented programing using C++ to solve numerical problems.

Upon completion of this course, students will be able to:

CO-1: To design and construct various electronic circuits and its validation.
CO-2: To calculate error in various electronics experiments.
CO-3: To develop experimental and programming skills

Course Outcomes: Semester 3 &4

Course Code & Name: PH 261 Advanced Physics Practicals

Objectives: Demonstrate and understand various advanced physics experiments for acquiring fundamental concepts and analyze various experimental data.

Upon completion of this course, students will be able to:

CO-1: To measure and analyze various physical quantities.
CO-2: To calculate error in various advanced physics experiments.
CO-3: To develop experimental skills
CO-4: To analyze and point out results of experimental data.

Course Code & Name: PH 262 E Advanced Electronics Practicals

Objectives: Design, construct and study various electronics circuits and programing using microprocessor.

Upon completion of this course, students will be able to:

CO-1: To design and construct various electronic circuits and its validation.
CO-2: To calculate error in various electronics experiments.
CO-3: To develop and test assembly language programs using microprocessors