PTM GOVERNMENT COLLEGE, PERINTHALMANNA

PROGRAMME AND COURSE OUTCOMES

Department of Physics

Course Outcome

I. Core Corse : BSc Physics

1. Semester 1

PHY1B01: METHODOLOGY OF SCIENCE AND BASIC MECHANICS

- Understand the features, methods and limitations of science
- Understand and apply the basic concepts of Newtonian Mechanics to physical systems
- Understand and apply the basic idea of work-energy theorem to physical systems
- Understand and apply the rotational dynamics of rigid
- Understand the basic ideas of elasticity

2. Semester 2

PHY2B02: MECHANICS

- Understand the features of non-inertial systems and fictitious forces
- Understand and analyze the features of central forces with respect to planetary motion
- Understand the basics ideas of harmonic oscillations

3. Semester 3

PHY3B03: ELECTRODYNAMICS I

- Understand and apply the fundamentals of vector calculus
- Understand and analyze the electrostatic properties of physical systems
- Understand the mechanism of electric field in matter
- Understand and analyze the magnetic properties of physical systems
- Understand and analyze the magnetic properties of physical systems
- Understand the mechanism of magnetic field in matter.

4. Semester 4

PHY4B04: ELECTRODYNAMICS II

- Understand the basic concepts of electrodynamics
- Understand and analyze the properties of electromagnetic waves
- Understand the behavior of transient currents
- Understand the basic aspects of ac circuits
- Understand and apply electrical network theorems

5. Semester 5

PHY5B06: COMPUTATIONAL PHYSICS

- Understand the Basics of Python programming
- Understand the applications of Python modules

- Understand the basic techniques of numerical analysis
- Understand and apply computational techniques to physical problems

PHY5B07: QUANTUM MECHANICS

- Understand the particle properties of electromagnetic radiation
- Describe Rutherford – Bohr model of the atom
- Understand the wavelike properties of particles
- Understand and apply the Schrödinger equation to simple physical systems
- Apply the principles of wave mechanics to the Hydrogen atom

PH5B08: OPTICS

- Understand the fundamentals of Fermat's principles and geometrical optics
- Understand and apply the basic ideas of interference of light
- Understand and apply the basic ideas of diffraction of light
- Understand the basics ideas of polarization of light
- Describe the basic principles of holography and fibre optics

PHY5B09: ELECTRONICS (ANALOG & DIGITAL)

- Understand the basic principles of rectifiers and dc power supplies
- Understand the principles of transistor
- Understand the working and designing of transistor amplifiers and oscillators
- Understand the basic operation of OpAmp and its applications
- Understand the basics of digital electronics
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PHY5D01(2): AMATEUR ASTRONOMY AND ASTROPHYSICS (Open course)

- Describe the history and nature of astronomy as a science
- Understand the motion of earth in space and the cause of seasons
- Understand the basic elements of solar system
- Understand the elementary concepts of solar system

6. **Semester 6**

PHY6B10: THERMODYNAMICS

- Understand the zero and first laws of thermodynamics
- Understand the thermodynamics description of the ideal gas
- Understand the second law of thermodynamics and its applications
- Understand the basic ideas of entropy
- Understand the concepts of thermodynamic potentials and phase transitions

STATISTICAL PHYSICS, SOLID STATE PHYSICS, SPECTROSCOPY & PHOTONICS

- Understand the basic principles of statistical physics and its applications
- Understand the basic aspects of crystallography in solid state physics
- Understand the basic elements of spectroscopy
- Understand the basics ideas of microwave and infra red spectroscopy
- Understand the fundamental ideas of photonics

PHY6B12: NUCLEAR PHYSICS AND PARTICLE PHYSICS

- Understand the basic aspects of nuclear structure and fundamentals of radioactivity
- Describe the different types of nuclear reactions and their applications
- Understand the principle and working of particle detectors
- Describe the principle and working of particle accelerators
- Understand the basic principles of elementary particle physics

PHY6B13: RELATIVISTIC MECHANICS AND ASTROPHYSICS

- Understand the fundamental ideas of special relativity
- Understand the basic concepts of general relativity and cosmology
- Understand the basic techniques used in astronomy
- Describe the evolution and death of stars
- Describe the structure and classification of galaxies

PHY6B14 (EL2): NANOSCIENCE AND TECHNOLOGY

- Understand the elementary concepts of nanoscience
- Understand the electrical transport mechanisms in nanostructures
- Understand the applications of quantum mechanics in nanoscience
- Understand the fabrication and characterization techniques of nanomaterials
- Enumerate the different applications of nanotechnology

PHY6B15: PRACTICAL II

- Apply and illustrate the concepts of properties of matter through experiments
- Apply and illustrate the concepts of electricity and magnetism through experiments
- Apply and illustrate the concepts of optics and spectroscopy through experiments
- Apply and illustrate the principles of heat through experiments

II. COMPLEMENTARY COURSES

1. Semester 1

PHY1C01: Properties of matter & Thermodynamics

- Understand the basic principles of elasticity
- Understand the concepts of surface tension
- Understand the aspects of viscosity
- Understand the basic principles of thermodynamics

2. Semester 2

PHY2C02 : Optics, Laser & Electronics

- Understand the basic concepts of interference and diffraction
- Understand the concepts of polarization
- Understand the fundamentals of electronics
- Understand the important principles of laser physics

3. Semester 3

PHY3C03: Mechanics, Relativity, Waves and Oscillations

- Understand the basic ideas of frames of reference and the principles of conservation of energy and momentum
- Understand the concepts of relativity
- Understand the basic ideas of oscillations and waves
- Understand the basic ideas of modern physics

4. Semester 4

PHY4C04: Electricity, Magnetism and Nuclear physics

- Understand the basic ideas of static and current electricity
- Understand the concepts of magnetism
- Describe the fundamental concepts of nuclear physics
- Understand the basic ideas of cosmic rays and elementary particles

Programme: M.Sc. (Physics)

P**rogramme objective:**

Physics is ultimately mechanics and it furnishes the official framework. It encompasses classical mechanics,quantum mechanics, electrodynamics and statistical mechanics. These are the four pillars upon which the structure of physics is built. In spite of having large number of branches and specializations in physics, the driving source that keeps them united under a common umbrella is mechanics. Any branch of physics which has its roots in the soil of mechanics grows as physics, otherwise it becomes nonphysics. The above mentioned four branches are the foundation subjects in physics. Frontier subjects are those in which current research is going on, such as atomic physics, molecular physics, nuclear physics, plasma physics, solid state physics, materials science, astrophysics etc. Frontier subjects are always rooted in the foundation subjects. Mathematical physics is the theoretical tool and electronics is the experimental tool for exploring physics. In this programme, all the foundation subjects and few frontier subjects are offered as core courses. Because of the time constraint, few other frontier subjects are offered as elective courses. Practical include general physics, electronics, modern physics and computational physics. A project work also has to be carried out as part of the masters programme.The programme objective is to provide quality education with a firm foundation in physics.

Programme specific outcomes:

On successful completion of the M.Sc. Physics programme, students will

- acquire a comprehensive knowledge in physics.
- develop a broad understanding of the physical principles of the universe.
- acquire laboratory skills to design advanced experiments and high precision measurements.
- be proficient in computing and interfacing techniques.
- be empowered for critical thinking and innovation in dealing with scientific problems and experiments.
- develop advanced laboratory techniques and instrumentation skills for a career in research.
- develop independent research skills through projects.
- be provided with opportunities to further their knowledge in frontier areas through elective courses.
- be empowered for planning career in physical sciences and also in taking up jobs in other fields in the contemporary society.
- be able to communicate effectively and participate actively in team work.

SEMESTER – I

PHY1C01: CLASSICAL MECHANICS

Objectives

- To learn Lagrangian and Hamiltonian formulation of mechanics.
- To learn the significance of the ideas of Lagrangian, Hamiltonian, Action, Poisson brackets, canonical transformations and their application in modified form in the formulation

of quantum mechanics.
- To learn and develop the analytical and mathematical skills for describing the dynamics of rigid bodies.
- To learn the theory of small oscillations which are characteristic of all bound physical systems.
- To learn the concepts in nonlinear dynamics and chaos.

Course outcome:

- Explain the fundamental concepts in Lagrangian and Hamiltonian formulation in mechanics.
- Apply the concepts of Lagrangian, Hamiltonian, Action, Poisson brackets, canonical transformations and their subsequent development to Heisenberg's matrix mechanics and Schrodinger's wave mechanics, to carry out numerical problems.
- Develop the analytical and mathematical skills for describing the dynamics of rigid bodies. It could be applied to practical situations. This can be applied spectroscopic analysis of samples.
- Explain the theory of small oscillations. Small oscillations are part and parcel of all bound physical systems.
- Elucidate the concepts in nonlinear dynamics and chaos. These techniques can be directly applied in nonlinear physics and also to verify various experimental results.

PHY1C02: MATHEMATICAL PHYSICS – I

Objectives:

Mathematics is the language of nature. Physics addresses fundamental questions in nature. Mathematical tools used for solving physical problems constitute mathematical physics. Mathematical Physics I, offered as a core course, delivers an entry level exposure to the fundamentals of this subject.

Course outcome:

- Describe coordinate systems appropriate for different physical problems. Applies it to solve Laplace's equation in different coordinate systems.
- Perform transformation operations and get the corresponding transformation matrices. Learns procedures for matrix diagonalisation.
- Distinguish the class of objects called tensors, their classifications and use.
- Understand differential equations of special nature and the ways to solve them.
- Identify differential equations of special nature and the ways to solve them. Apply to Illustrate special functions as solutions to problems in atomic, molecular nuclear, and solid state physics etc. and will put them in use.
- Distinguish Fourier series and integral transforms of different types and their properties. This will enable him/her to analyse or solve different mathematical problems in physical sciences.

PHY1C03: ELECTRODYNAMICS AND PLASMA PHYSICS

Objective:

- To understand Maxwell's equations and general electromagnetic wave equations, their solutions in terms of potentials and fields, multipole expansion of the potentials and multipole moments of different orders.
- To understand propagation of electromagnetic waves through free space and the consequences of reflection from different types of boundaries.
- To understands the propagation of electromagnetic waves through confined media.
- To understands the propagation characteristics of electromagnetic waves through confined media of different types.
- To learn elementary plasma physics.

Course Outcome:

- Explain the significance of displacement current and Maxwell's equations and general electromagnetic wave equations, their solutions in terms of potentials and fields. Another basic concept of physics called gauge transformation will be understood. Multipole expansion of the potentials, fields and multipole moments of different orders will be learned

- Describe the propagation of electromagnetic waves through free space and the consequences of reflection from different types of boundaries. These have important consequences in wave propagation.

- Discusses propagation of electromagnetic waves through confined media like wave guides and cavity resonators.

- Enables to appreciate the magnificent results of the blending of relativity and electrodynamics and motivates to take up a course on quantum field theory, the study of fields, interactions and symmetries.
- Understand the criteria for a medium to be called plasma and the various properties of it.

PHY1C04: ELECTRONICS

Objectives:

- To learn the properties of field effect transistors and their peculiarities over bipolar transistors.
- To understand various light emitting and light sensing devices and their use for different purposes, especially microwave communication.
- To understand the fundamentals of op-amps, their characteristics and simple applications.
- To understand the basics of digital electronics by way of understanding logic gates, flip flops,registers and counters and few elementary applications.

Course Outcome:

- Analyse characteristics of JFET and MOSFET and their specific applications.
- Distinguish the basic characteristics of light emitting and light sensing devices and illustrate the basic concepts behind integrating electronic and photonic devices suitably for microwave communication.
- Classify characteristics of op-amps and their implementation in various elementary level applications.
- Identify the basics of logic gates, flip flops and registers and the designing of counters, satisfying specific conditions. Understands RAM and D/A converter and basic features of specific microprocessors.

SEMESTER – II

PHY2C05: QUANTUM MECHANICS-I

Objectives

- To understand the importance of vector space, Dirac ket and bra notations, Hilbert space, operators,eigenvalue problems and generalized uncertainty principle in quantum mechanics. To understandthe need for quantum mechanical formalism and the basic approaches.

- To understand time evolution of quantum mechanical systems and learn different time evolution approaches - Schrodinger picture and Heisenberg picture, wavefunction interpretation and application of different approaches in various fundamental problems**.**
- To develop an understanding of the mathematical foundations of spin and angular momentum for a system of particles and to apply spherical harmonics and to compute Clebsch - Gordon coefficients.
- To apply Schrodinger equation to central potential problems.
- To learn invariance principles based on symmetry of the system and the associated conservation laws and to apply quantum mechanical concepts to analyze the ground state of Helium atom.

Course Outcome:

- Appreciate the importance and implication of vector spaces. Will be able to use Dirac ket and bra notations. Use operators and will be able to solve eigen value problems.
- Understand generalized uncertainty principle in quantum mechanics and the need for quantum mechanical formalism and its basic principles.
- Explain time evolution of quantum mechanical systems and learn different time evolution approaches -Schrodinger picture and Heisenberg picture. Apply different approaches in quantum dynamics to various fundamental problems.
- Develop a better understanding of the mathematical foundations of spin and angular momentum. Make use of spherical harmonics to compute Clebsch - Gordon coefficients.
- Apply Schrodinger's equation to central potentials problems, to solve various quantum mechanical problems.
- Understand invariance principles based on symmetry of the system and establish the associated conservation laws. These quantum mechanical concepts will be applied to analyse the ground state of Helium atom. Here it will be understood that all symmetry elements possess the mathematical property of groups.

PHY2C06: MATHEMATICAL PHYSICS-II (4C, 72 hrs)

Objectives:

- To provide the basic ideas of Complex variables, Cauchy's integral theorem, Taylor's and Laurent's theorems, and by the evaluation of the residues of complex functions.
- To introduce students to group theory.
- To understand the basic concepts of calculus of variation, which is widely used in different areas of physics.
- Introduce Greens function to develop expertise in solving equations showing causality relationships.

Course Outcome:

- In general, physical phenomena are expressed in equations involving complex quantities. Some times we get complex solutions to equations. Solving such problems requires special procedures. On completing this module he/she will be gain the skill for solving and interpreting such problems.
- Acquire a preliminary training in group theory. All symmetry elements possess the mathematical property of groups. Concepts of group theory will help to solve problems in quantum mechanics. It is quantum mechanics that gives more stress on symmetry than classical mechanics.
- Apply the techniques of calculus of variation to diverse problems in physics. Apply
- Apply the Greens function technique to solve problems showing causality relationships.

PHY2C07: STATISTICAL MECHANICS

Objectives:

- To provide an understanding of the concepts of different ensemble theories to explain the behavior of systems.
- To provide an understanding of the difference between classical statistics and quantum statistics.
- To provide an understanding of the statistical behavior of Bose-Einstein and Fermi-Dirac systems

Course Outcome :

- Understand macroscopic and the microscopic states, thermodynamic potentials, basic concepts of entropy, Liouville‟s theorem and its consequences. Also the students will have an understanding of the connection between statistics and thermodynamics.
- Have a detailed understanding different canonical ensembles. Understanding
- Develop an understanding of the statistical behavior of Bose-Einstein and Fermi-Dirac systems.

PHY2C08: COMPUTATIONAL PHYSICS

Objectives:

- To learn the basic concepts of computer programming using Python language.
- To learn the use of necessary modules in python language for doing advanced mathematical calculations and visualizations.
- Learn the use of numerical techniques and implement them for solving mathematical problems like interpolation, curve fitting, integration etc.
- Learn the techniques for solving mathematical problems like solution of differential equations, finding Fourier transforms etc. numerically, using computers.
- Learn the basic concepts of solving diverse problems in physics by computer simulation using python language.

Course Outcome:

- Write computer programs using core python
- Use advanced mathematical modules like Numpy and Pylab in python program for solving mathematical and physical problems and also to present the result visually using graphs and charts.
- Solve numerically mathematical problems like interpolation, curve fitting, integration etc. and to write python programs for these.
- Solve numerically mathematical problems like differential equations, Fourier transforms etc. and also to write python program for these.
- Analyse by simulating simple physical problems in physics like one-dimensional and two-dimensional motion, harmonic oscillator, radio active disintegration, chaos, solution of Schrodinger equation etc., using python programs by applying the knowledge acquired for the course.

SEMESTER – III

PHY3C09: QUANTUM MECHANICS –II

Objectives:

- To understand time independent perturbation theory and apply it to different quantum mechanical systems.
- To apply methods like Ritz variational technique and WKB approximation to quantum mechanical systems.
- To understand the time dependent perturbation theory and apply to different quantum mechanical systems.
- To understand theory of scattering and the partial wave analysis.
- To understand the need for relativistic quantum mechanics and the derivation of various relativistic wave equations and their interpretations.

Course Outcome:

- Understand time independent perturbation theory and to apply it to harmonic and anharmonic oscillators, and learn the fine structure and hyperfine splitting of Hydrogen atom in the presence of external magnetic and electric fields.

- Apply methods like Ritz variational technique and WKB approximation to quantum mechanical systems.
- Interpret time dependent perturbation theory and apply it to describe radiative transitions in atoms. Understand Fermi's Golden rule and learn Born approximation.
- Explain the theory of scattering and apply the method of partial waves to scattering by central potential and square well potential.
- Identify the principles of relativistic quantum mechanics and apply to Dirac particles, Klein-Gordon equation. Also understand the concept of spinors and the non-relativistic limit and Hole theory.

PHY3C10: NUCLEAR AND PARTICLE PHYSICS

Objectives

- To understand the basic properties of a nucleus, fundamentals of nucleon scattering and derive the
- information regarding deuteron structure.
- To understand different decay modes of unstable nuclei and to estimate the related parameters.
- Understand various nuclear models and nuclear processes like fission and fusion.
- Understand the working of radiation detectors and the associated nuclear electronics

Course Outcome:

- Interpret the properties of nucleus, binding energy, angular momentum, two nucleon scattering, spin dependence, tensor force, partial wave concept and the theory of deuteron structure.
- Elucidate the theory of various types of nuclear decay, selection rules of transition, concept of parity and multipole moments.
- Compare various nuclear models and nuclear processes like fission and fusion. Will be able to apply it to various nuclear systems in the chart of nuclides.
- Demonstrate the working of one or two nuclear radiation detectors of different types and the signal processing and analysing units.
- Compare basic interactions and classify the elementary particles. Interactions are linked with the concept of symmetry and conservation laws. Understand Sakata model, Gellmann- Okubo mass formula, Quark mode and their significance.

PHY3C11: SOLID STATE PHYSICS

Objectives:

- To understand the reciprocal lattice, Brillouine zone, crystal structures and various bondings in crystals.
- To understand different excitations in crystals and their after effects.
- To understand free electron model and the explanation for the properties of metals. To have a deeper understanding of band gaps in different situations.
- To understand the thermal, electrical and magnetic properties of matter.
- To understand electron pairing and superconductivity.

Course Outcome:

- Analyse the structure of materials based on X-ray diffraction and interpret it on the basis of the theory understood.
- Distinguish different excitations in crystals. Properties of quasiparticles could be explained. Arrive at proper explanation of for specific heat.
- Explain free electron model and interpret the properties of metals. Gain a deeper understanding of the energy bands based on the properties of carriers.
- Interpret properly the thermal, electrical and magnetic properties of materials. Will enable the student to understand the current research going on in the related areas.
- Illustrate using phase diagrams, phase transitions in materials leading to superconductivity and different types of superconductors.

PHY3E06: ELEMENTARY ASTROPHYSICS

Objectives

- Identify celestial objects from their celestial co-ordinates
- Understand photometric and spectroscopic measuring techniques
- Understand stellar evolution
- Understand how to make astronomical observations from ground in optical and radio wavelengths. Also understand the tools and techniques used to study celestial objects in multi-wavelengths.
- Learn space observation techniques carried out using satellites.

Course Outcome:

- Plan the observation, given co-ordinates of a celestial source. Apply
- Use the results of photometric and spectroscopic observation to study

the properties of stars.

- Apply the principles of physics to understand stellar evolution Apply
- Understand various techniques involved in ground based

observations.

- UnderstandDescribe the techniques involved in the observation of celestial objects

using space satellites.

SEMESTER IV

PHY4C12: ATOMIC AND MOLECULAR SPECTROSCOPY

Objectives:

- To provide an understanding of the interaction of electromagnetic waves with matter.
- To understand different spectroscopic techniques and the corresponding
- To realize the role and practical application of spectroscopy in research and development.

Course Outcome:

- Understand the behavior of atoms and molecules and their interactions with electromagnetic waves.
- Understanding to Apply the behavior of nonrigid rotor and understand the microwave spectroscopy
- Distinguish between Raman and IR spectroscopy and elucidate on the features of Raman spectrum.
- Explain electronic spectroscopy and applications Analyse
- Identify the structure of the sample from spin resonance and Mossbauer spectra

PHY4E17: ASTROPHYSICS AND POSITIONAL ASTRONOMY

Objectives:

- To introduce the students to the fundamental astronomical techniques and various aspects of positional astronomy.
- Provide a detailed study on galaxies.

Course Outcome:

- Identify the position of an astronomical object in terms of the astronomical parameters.
- Understand the fundamentals of astronomical techniques and to use different tools for

astronomical studies.

- Describe the rotation of Milky way galaxy and to understand the magnetic fields and cosmic rays present within the galaxy.
- Interpret the morphological structures and spectra of external galaxies and understand

the interactions of galaxies and super-clusters.

- Understand the active galactic nuclei and its features and the basics of Unified Model

of AGN.

PHY4E20: ADVANCED CONDENSED MATTER PHYSICS

Objectives

- To understand the idea of elementary excitation in solids
- To understand electron-electron interactions, electron-ion interactions and first principle approximations in solids.
- To understand the alloying phenomena in solids and physics of alloy formation
- To study band structure calculations, alloy super structures and quantum well structures
- To understand defects in solids and to study the various defects and imperfections in solids, alloys and compounds.
- To Study the science of nanoscale materials and nanostructures, types of nanostructures and energy density in various nanostructures.
- To Study thin film formation and factors affecting thin film formation and type as well as methods of thin film formation.

Course outcome

- Understand the concept of first principle approximation and the requirement of DFT and HF approximations in molecular modeling.
- Analyse the phase diagrams in alloy formations and formulations of ternary and quaternary compositions of compounds.
- Understand different types of defects in crystals.
- Analyse the importance of materials in nanoscale region and the quantum effect of nanomaterials.
- Understand the importance of 2-dimentional materials and their applications in recent technology and development and growth of thin films by different techniques.

CHEMISTRY DEPARTMENT

COURSE OUTCOMES

1. **Core Course I: CHE1B01- Theoretical and Inorganic Chemistry- I**

- **Objective (s)**

  To gain detailed knowledge of the principle of volumetric analysis and properties of s and p block elements. To provide the basic groundwork for a research project. Students will be able to analyse basic theory of acid base concept.

- **Course outcome (s)**
  - CO1 To apply the methods of a research project.
  - CO2 To understand the principles behind volumetry.
  - CO3 To analyse the characteristics of different elements.
  - CO4 To distinguish between different acid base concepts.
  - CO5 To analyse the stability of different nuclei.

2. **Core Course II: CHE2B02- Theoretical and Inorganic Chemistry- II**

- **Objective(s)**

  Module I – To introduce the students to the failures of classical physics theories in explaining many experiments and the emergence of quantum theory with which all of them could be satisfactorily explained. Module II – To enablethe students to understand the basic postulates of quantum mechanics and how to solve the time-independent Schrödinger wave equation of different systems including H atom. Module III – To introduce the quantum mechanical treatment of chemical bonding in diatomic molecules using VB and MO theories. Module IV - To introduce

the students to the quantum mechanical treatment of hybridization and bonding in polyatomic systems.

- **Course outcome (s)**
  - CO1 To understand the importance and the impact of quantum revolution in science.
  - CO2 To understand and apply the concept that the wave functions of hydrogen atom are nothing but atomic orbitals.
  - CO3 To understand that chemical bonding is the mixing of wave functions of the two combining atoms.
  - CO4 To understand the concept of hybridization as linear combination of orbitals of the same atom.
  - CO5 To inculcate an atomic/molecular level philosophy in the mind.

3. Core Course III: CHE3B03- PHYSICAL CHEMISTRY – I

- **Objective (s)**

  To introduce the concepts of chemical thermodynamics, equilibria and group theory
- **Course outcome (s)**
  - CO1 To understand the properties of gaseous state and how it links to thermodynamic systems.
  - CO2 To understand the concepts of thermodynamics and it's relation to statistical thermodynamics.
  - CO3 To apply symmetry operations to categorize different molecules.

4. Core Course IV: CHE4B04- ORGANIC CHEMISTRY– I

- **Objective (s)**

  To enable the students to analyse basic theory and concepts of organic chemistry and appreciate different organic reaction mechanism and their stereochemistry.
- **Course outcome (s)**
  - CO1 To apply the concept of stereochemistry to different compounds.
  - CO2 To understand the basic concepts of reaction mechanism.
  - CO3 To analyse the mechanism of a chemical reaction.
  - CO4 To analyse the stability of different aromatic systems.

5. Core Course V: CHE4B05 (P)-INORGANIC CHEMISTRY PRACTICAL – I

- **Objective (s)**

  To enable the students to gain skills in preparation of standard solutions and quantitative volumetric analysis.
- **Course outcome (s)**
  - CO1 To enable the students to develop skills in quatitative analysis and preparing inorganic complexes.
  - CO2 To understand the principles behind quantitative analysis.
  - CO3 To apply appropriate techniques of volumetric quantitative analysis in estimations.
  - CO4 To analyse the strength of different solutions.
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6. Core Course VI: CHE5B06- INORGANIC CHEMISTRY – III

- **Objective (s)**

  To enable the students to gain detailed knowledge of the chemistry of different analytical principles and to develop concerns for environment. To give a basic understanding of different metallurgical processes, interhalogen compounds and inorganic polymers.

- **Course outcome (s)**
  - CO1 To understand the principles behind quanlitative and quantitative analysis.
  - CO2 To understand basic processes of metallurgy and to analyse the merits of different alloys.
  - CO3 To understand the applications of different inorganic polymers.
  - CO4 To analyse different polluting agents.
  - CO5 To apply the principles of solid waste management.

7. Core Course VII: CHE5B07- ORGANIC CHEMISTRY – II

- **Objective (s)**

  To give the students a thorough knowledge about the chemistry of selected functional groups and their applications in organic preparations.
- **Course outcome (s)**
  - CO1 To understand the difference between alcohols and phenols.
  - CO2 To understand the importance of ethers and epoxides.
  - CO3 To apply organometallic compounds in the preparation of different functional groups.
  - CO4 To apply different reagents for the inter conversion of aldehydes, carboxylic acids and acid derivatives.
  - CO5 To apply active methylene compounds in organic preparations.

8. Core Course VIII: CHE5B08- PHYSICAL CHEMISTRY – II

- **Objective (s)**

  To familiarise the students with the concepts of kinetics, catalysis and photochemistry and to familiarize the applications of molecular spectroscopy and phase equilibrium.
- **Course outcome (s)**
  - CO1 To apply the concept of kinetics, catalysis and photochemistry to various chemical and physical processes.
  - CO2 To characterise different molecules using spectral methods.
  - CO3 To understand various phase transitions and its applications.

9. Core Course IX: CHE6B09- INORGANIC CHEMISTRY – IV

- **Objective (s)**

  To gain detailed knowledge of the electronic configuration and properties of transition and inner transition elements and their role in biological systems. To introduce the importance of different instruments used in analysis.
- **Course outcome (s)**
  - CO1 To understand the principles behind different instrumental methods.
  - CO2 To distinguish between lanthanides and actinides.
  - CO3 To appreciate the importance of CFT.
  - CO4 To understand the importance of metals in living systems.
  - CO5 To distinguish geometries of coordination compounds.

10. Core Course X: CHE6B10- ORGANIC CHEMISTRY – III

- **Objective(s)**

  To gain detailed knowledge of the chemistry of different bio molecules. To provide a basic understanding of different spectral techniques and their application in simple molecules. To differentiate diverse pericyclic reactions.

- **Course outcome (s)**
  - CO1 To elucidate the structure of simple organic compounds using spectral techniques.
  - CO2 To understand the basic structure and tests for carbohydrates.
  - CO3 To understand the basic components and importance of DNA.
  - CO4 To understand the basic structure and applications of alkaloids and terpenes.
  - CO5 To distinguish different pericyclic reactions.

11. Core Course XI: CHE6B11- PHYSICAL CHEMISTRY – III

- **Objective (s)**
  To get a thorough knowledge of electrochemistry, colligative properties and solid state.
- **Course outcome (s)**
  - CO1 To understand the basic concepts of electrochemistry.
  - CO2 To understand the importance of colligative properties.
  - CO3 To relate the properties of materials/solids to the geometrical properties and chemical compositions.

12. Core Course XII: CHE6B12- Advanced and Applied Chemistry

- **Objective (s)**
  To initiate the students to the role and opportunities of chemistry as a discipline in modern civilization.
- **Course outcome (s)**
  - CO1 To understand the importance of nanomaterials.
  - CO2 To appreciate the importance of green approach in chemistry.
  - CO3 To understand the uses and importance of computational calculations in molecular design.
  - CO4 To understand the role of chemistry in human happiness index and life expectancy.

13. Core Course XIII: CHE6B13(E2)- Elective 2. POLYMER CHEMISTRY

- **Objective (s)**
  To gain detailed knowledge about the classification of polymers and various mechanisms and technology adopted for polymerisation. To give a basic understanding of the properties of polymers like glass transition temperature, molecular weight and degradation of polymers. To give a detailed idea about different commercial polymers.
- **Course outcome (s)**
  - CO1 To understand various classification of polymers and types of polymerisation methods. CO2 To understand the important characteristics of polymers such as average molecular weight, glass transition temperature, viscoelasticity and degradation.
  - CO3 To appreciate the importance of processing techniques.
  - CO4 To characterise different commercial polymers and to understand the significance of recycling.

14. Core Course XIV: CHE6B14(P)- PHYSICAL CHEMISTRY PRACTICAL

- **Objective (s)**
  To familiarise the students with the relation between physical properties and chemical composition used for analysis. To provide students an idea of designing experimental methods to analyse the physical properties of molecules or materials.
- **Course outcome (s)**
  - CO1 To enable the students to develop analytical skills in determining the physical properties (physical constants).
  - CO2 To develop skill in setting up an experimental method to determine the physical properties.
  - CO3 To understand the principles of Refractometry, Potentiometry and Conductometry.

15. Core Course XV: CHE6B15(P)- ORGANIC CHEMISTRY PRACTICAL

- **Objective (s)**
  To empower the students to prepare different compounds without compromising yield. Characterisation and analysis of different organic compounds based on functional groups. To develop skill in separation and purification of mixtures.
- **Course outcome (s)**
  - CO1 To enable the students to develop analytical skills in organic qualitative analysis.
  - CO2 To develop talent in organic preparations to ensure maximum yield.
  - CO3 To apply the concept of melting or boiling points to check the purity of compounds. CO4 To analyse and characterise simple organic functional groups.
  - CO5 To analyse individual amino acids from a mixture using chromatography.

16. Core Course XVI: CHE6B16(P)- INORGANIC CHEMISTRY PRACTCAL-II

- **Objective (s)**
  To develop skill in quantitative analysis using gravimetric and colorimetric methods.
- **Course outcome (s)**
  - CO1 To enable the students to develop analytical skills in inorganic quantitative analysis.
  - CO2 To understand the principles behind gravimetry and to apply it in quantitative analysis.
  - CO3 To understand the principles behind colorimetry and to apply it in quantitative analysis.

17. Core Course XVII: CHE6B17(P)- INORGANIC CHEMISTRY PRACTCAL-III

- **Objective (s)**
  To develop skill in quanlitative analysis of inorganic compounds.
- **Course outcome (s)**
  - CO1 To enable the students to develop skills in inorganic quanlitative analysis.
  - CO2 To understand the principles behind inorganic mixture analysis and to apply it in qualitative analysis.
  - CO3 To analyse systematically mixtures containing two cations and two anions.

18. Core Course XVIII: CHE6B18(Pr)- PROJECT WORK

- **Objective (s)**

  To develop skill in scientific research, critical thinking and reasoning.

- **Course outcome (s)**
  - CO1 To understand the scientific methods of research project.
  - CO2 To apply the scientific method in life situations.
  - CO3 To analyse scientific problems systematically.

19. Open Course: CHE5D01- ENVIRONMENTAL CHEMISTRY

- **Course outcomes**
  - CO 1: Recall the technical/scientific terms involved in pollution.
  - CO 2: Understand the causes and effects of air pollution.
  - CO 3: Understand the sources, types and effects of water pollution.
  - CO 4: Describe water quality parameters.
  - CO 5: Know soil, noise, thermal and radioactive pollutions and their effects.
  - CO 6: Study various pollution control measures.
  - CO 7: Understand the basics of green chemistry.

BA ENGLISH

PROGRAMME OUTCOME

- By the study of English Language and Literature, a student will develop intellectual skills like problem solving, concrete concept, defined concept, discrimination and rule. She will also develop cognitive strategies for learning, analyzing, thinking and applying knowledge.
- By the end of the programme, the students:
  - will understand the history as well as the structure and function of English language and develop skills for communication and for creative expression.
  - will be able to collect, understand, process, evaluate and synthesize information from a variety of sources.
  - will learn language and differentiate concepts about representative literary and cultural texts of different genres within the historical, geographical, and cultural contexts.
  - will be able to understand critical and theoretical approaches to literature and apply them to the reading and analysis of literary and cultural texts.
  - will identify, analyse, interpret and describe the wide spectrum of critical ideas, values, and themes that appear in literary and cultural texts and understand how they inform and impact the world they live in.
  - will attempt at writing analytically in a variety of formats, including different types of essays, research papers, reflective and critical writing.
  - will understand and assimilate the process of communicating and interpreting human experiences through literary representation using historical contexts and disciplinary methodologies
  - will acquire such values and ideals that a citizen of a modern secular democratic state needs to have.

PROGRAMMES SPECIFIC OUTCOMES

- PSO1: Understand and differentiate between different types, canons, movements and contexts ofliterature
- PSO2: Develop and apply advance language skills both in and outside classroom.

- PSO3: Develop analytical ability and critical thinking
- PSO4: Assimilate literary theory and learn to connect text with its multiple contexts
- PS05: Critically examine the wide range of perceptions that exist in society through literary texts and thus imbibe a sense of democratic existence.

CORE COURSES

SEMESTER—I

COURSE CODE—ENG1B01

TITLE OF THE COURSE—INTRODUCING LITERATURE

COURSE OUTCOMES:

After the completion of the course students should be able to: -

- Differentiate between with the different aspects of the language of literature.
- Discover the linguistic structures of poetic texts.
- Distinguish diverse points of view within a single text and locate the rationale of polyphony.
- Determine and interpret the dominant voice/s within the text and its agendas.
- Discriminate marginalized voices and determine themselves to the voices of the child, Dalit, transgender and female.

SEMESTER—II

COURSE CODE— ENG2B02

TITLE OF THE COURSE— APPRECIATING POETRY

COURSE OUTCOMES:

After the completion of the course students should be able to: -

- Outline the basic elements of poetry, the stylistic and rhetorical devices and various genres of poetry.
- Analyze and identify the trends in poetry and the linguistic structures of poetic texts.
- Discover various perspectives in reading poetry like gender, race, caste, ethnicity, religion, region, environment and nation.
- Define different forms of poetry in British and American literature and classify different forms and themes of poetry across the globe in the history of literature.
- Appreciate poetry as an art form.

SEMESTER -III

COURSE CODE: ENG3B03

TITLE OF THE COURSE-- APPRECIATING PROSE

COURSE OUTCOMES:

After the completion of the course students should be able to: -

- Develop critical thinking.
- Interpret and appreciate different types of prose.
- Identify different styles of prose writing and understand the use of literary devices.
- Identify, analyse, interpret and describe the critical ideas, values, and themes that appear in literary and cultural texts
- Develop creative writing skills.

COURSE CODE ENG3B04

TITLE OF THE COURSE -- ENGLISH GRAMMAR AND USAGE

COURSE OUTCOMES:

After the completion of the course students should be able to: -

- Determine the key concepts of English grammar and to apply them more sensitively in their day-to-day communication needs.
- Manipulate the language in a better way by understanding of the sentence patterns in English.
- Develop a sense of English grammar, idioms, syntax, semantics and their usage
- Develop the logical and analytical skills in the use of language for communication.
- Appraise contemporary English usage.

SEMESTER –IV

COURSE CODE ENG4B05

TITLE OF THE COURSE -APPRECIATING FICTION

COURSE OUTCOMES:

After the completion of the course students should be able to: -

- Develop critical thinking and imagination through long and short fiction
- Interrelate cultural diversity through different representative samples of fiction.
- Discover the pleasures in reading fiction.
- Critique human condition and the complexities of life.
- Discover different types of fiction and analyze them.

COURSE CODE ENG4B06

TITLE OF THE COURSE- LITERARY CRITICISM

COURSE OUTCOMES:

After the completion of the course students should be able to: -

- Differentiate between judgment and appreciation.
- Identify various movements and schools of thought
- Critique plays, passages and poems
- Recognize the history and principles of literary criticism since Plato
- Develop the philosophical and critical skills with which literature can be appreciated.
- Appraise important texts and movements in the history of literary criticism.
- Demonstrate how literary criticism shapes literature and culture across centuries.
- Recognize and critique the major arguments underlying critical writings.
- Compare and contrast critical perspectives of Indian Poetics and Western critical Concepts.

SEMESTER V

COURSE CODE- ENG5B07

TITLE OF THE COURSE-APPRECIATING DRAMA AND THEATRE

COURSE OUTCOMES:

After the completion of the course students should be able to: -

- Establish and illustrate the basic elements of drama, including the historical progress of drama in different continents.
- appreciate drama as an art form.
- Identify the different genres and masters of drama.
- Assess the theatrical performances and the texts and evaluate them critically from various standpoints.
- Explain the insights, conventions and experimentations associated with English Drama.
- Demonstrate how writers use the resources language as a creativity
- Point out the entire range of human experience through drama as a literary form

COURSE CODE -ENG5B08

TITLE OF THE COURSE -LITERARY THEORY

COURSE OUTCOMES:

After the completion of the course students should be able to: -

- Develop an understanding of important texts and movements in the history of literary theory.
- Critique literature and culture in the context of theory.
- Develop various perspectives of thinking and critique the major arguments presented in theory.
- Construct a pluralistic perspective of culture and literature in a multicultural society.

- Identify, analyze, interpret and describe the critical ideas, values, and themes that appear in literary and cultural texts.
- Identify the origin of critical ideas in literature
- Define the function of criticism.

COURSE CODE - ENG5B09

TITLE OF THE COURSE -LANGUAGE AND LINGUISTICS

COURSE OUTCOMES:

After the completion of the course students should be able to: -

- Recognize key concepts of Linguistics and develop awareness of latest trends in Language Study
- Point out the features of languages, their sounds, their ways of forming words, their sentence structures, and their systems of expressing meaning.
- Examine through an objective study the relation of language with human mind and communicative action
- Operate the features of pronunciation and their general standards in every day conversation and in reading.
- Develop a sense of English syntax and will be able to provide complete syntactic analyses for sentences of English
- Develop a sense of awareness of principles of language that govern the distribution of
- morphology and how morphology interacts with other components of language.
- Recognize the fundamental topics in semantics and develop a concept of different semantic levels.

COURSE CODE - ENG5B10

TITLE OF THE COURSE -INDIAN WRITING IN ENGLISH

COURSE OUTCOMES:

After the completion of the course students should be able to: -

- Correlate the various phases of the evolution of Indian writing in English.
- Delineate the thematic concerns, genres and trends of Indian writing in English.
- Recognize the pluralistic aspects of Indian culture and identity.
- Determine how and why Indian literature emerged as a distinct field of study.
- Identify the development of history of Indian English literature from its beginning to the
- present day.
- Interpret the works of great writers of Indian writers in English.
- Demonstrate, through discussion and writing, an understanding of significant cultural and societal issues presented in Indian English literature.

SEMESTER -VI

COURSE CODE - ENG6B11

TITLE OF THE COURSE -VOICES OF WOMEN

COURSE OUTCOME:

After the completion of the course students should be able to: -

- Generalize and infer on what grounds women's writings can be considered as a separate genre.
- Interpret texts written by Women writers across different cultures.
- Differentiate between sex and gender and how the latter is a social construction.
- Identify the issues and concerns of the women writers of the developed, developing and under-developed countries.
- Identify the misconceptions regarding women and to evolve a human perspective about them.
- Develop a keen interest in analysing critically the diversity of women's experiences across the world and to marvel at their creative skills.

COURSE CODE-- ENG6B12

TITLE OF THE COURSE --CLASSICS OF WORLD LITERATURE

COURSE OUTCOMES:

After the completion of the course students should be able to: -

- Identify the classic literature and thereby composite cultures of the world
- Develop cross cultural perspective Classify literary texts in English or English translation in terms of their main stylistic and thematic features.
- Describe the literary, historical, social and cultural backgrounds of these texts.
- Identify some of the main theoretical and methodological issues involved in reading World Literature.

COURSE CODE ENG6B13

TITLE OF THE COURSE- FILM STUDIES

COURSE OUTCOMES:

After the completion of the course students should be able to: -

- Appraise film as an art form and its aesthetics.
- Relate and connect film with history, politics, technology, psychology and performance.
- Appraise the nature of representation on screen and how class, race ethnicity and sexuality
- are represented.
- Develop analytical skills so that the student can produce informed and thorough close
- readings of films.
- Discover the articulation of a film's content, form and structure.
- Identify and define the formal and stylistic elements of film.

- Develop an understanding of film language and terminology, and analyze the ways in which that this language constructs meaning and ideology.
- Identify and interpret significant film movements and key concepts.
- Point out the diverse forms of the moving image, including, for example, the feature film, experimental andavant-garde cinema, video art and moving image installation, television and digital media.

COURSE CODE- ENG6B14

TITLE OF THE COURSE -NEW LITERATURES IN ENGLISH

COURSE OUTCOMES:

After the completion of the course students should be able to: -

- Distinguish diverse cultures and modes of expression.
- Discuss issues of cultural plurality and hybridity
- Identify literary negotiations of colonization and decolonization, identity, inequality, marginalization and so on.
- Point out the canon of English literature, Commonwealth literature, Post Colonialism and the context of New Literatures

COURSE CODE ENG6B19

TITLE OF THE COURSE— ENGLISH LANGUAGE EDUCATION

COURSE OUTCOMES:

After the completion of the course students should be able to: -

- Outline the origin and evolution of English Language
- Develop an in-depth knowledge about the theories of English language teaching.
- Develop the skill to effectively transact language items to the class
- Identify the strategies and methods that best suit the classrooms for English language teaching.

PROJECT

COURSE CODE ENG6B21

COURSE OUTCOME

After the completion of the Project work students should be able to: -

- Demonstrate knowledge of and an ability to conduct research work in the several areas related to language and literature.
- identify, define and demonstrate the research problem
- Create original research projects which assess the contributions and/or complexities of a selected writer, literary movement, aspects of language etc.
- Assess, critique, evaluate a project work and construct meaningful tools for it.

OPEN COURSE

TITLE OF THE COURSE: ENGLISH FOR COMPETITIVE EXAMINATIONS

COURSE CODE ENG5D01

COURSE OUTCOMES:

After the completion of the course students should be able to: -

- Identify the important skills necessary for professional development
- Develop necessary linguistics skills that are relevant in English
- Appraise important aspects necessary for language development
- Recognize the importance of getting prepared for competitive exams.

COMMON COURSES

SEMESTER I

COURSE CODE: ENG1A01

TITLE OF THE COURSE: TRANSACTIONS: ESSENTIAL ENGLISH LANGUAGE SKILLS

OBJECTIVES OF THE COURSE:

- To impart the necessary macro and micro-English language skills to learners to enable them to express their feelings, opinions, ideas and thoughts fluently and accurately in a variety of personal and professional contexts.
- To create in learners a definitive sense of the stylistic variations of English and how they are used in real life situations.
- To inculcate in learners a taste for deeper pursuit and acquisition of advanced level of skills in English.
- To guide them on how to participate in discussions and make seminar presentations with special focus on specific vocabularies and styles of usage in such contexts.

COURSE CODE: ENG1A02

TITLE OF THE COURSE: WAYS WITH WORDS: LITERATURES IN ENGLISH

OBJECTIVES OF THE COURSE:

- To help students develop the acumen to read, appreciate and discuss literature.
- To introduce students to the linguistic qualities of a literary text and to unravel the many meanings of the text
- To acquaint the students with different genres of literature and to analyse them.

SEMESTER II

COURSE CODE: ENG2 A03

TITLE OF THE COURSE: WRITING FOR ACADEMIC AND PROFESSIONAL SUCCESS

OBJECTIVES OF THE COURSE:

- To develop writing skills, to learn to integrate writing and thought and to apply the conventions of academic writing correctly
- To acquire the correct sense of format, syntax, grammar, punctuation and spelling
- To acquire concepts, principles and vocabulary of reasoning and argumentation and use analysis, synthesis and evaluation to advance arguments
- To gain an understanding of discourse conventions ranging from structure and paragraphing to tone and mechanics

COURSE CODE: ENG2 A04

TITLE OF THE COURSE: ZEITGEIST: READINGS ON CONTEMPORARY CULTURE

OBJECTIVES OF THE COURSE:

- To inculcate the values enshrined in the constitution of India and to provide an insight on the secular framework of the country.
- To familiarize the learners with concepts such as conservation, sustainability and the life of the marginalized and their interconnectedness.
- To foster among learners an awareness of the diverse problems faced by women and the sexual minorities and to promote a culture of inclusion and mutual respect.
- To understand the "human" as articulated among the various cultures and promote a multicultural and plural understanding of rights

SEMESTER III

COURSE CODE: ENG3 A05

TITLE OF THE COURSE: SIGNATURES: EXPRESSING THE SELF

OBJECTIVES OF THE COURSE:

- To enable the students to read and critically appreciate the different genres of expressing the self
- To appreciate the fluid and flexible narratives of self-expression that transcendthe conventions of genre
- To understand how personal narratives intersect with the larger social realities
- To read personal narratives that move beyond the individual self to express the collective self
- To understand how the distinctions between fact and fiction blur in personal narratives

SEMESTER IV

COURSE CODE: ENG4 A06 SPECTRUM

TITLE OF THE COURSE: LITERATURE AND CONTEMPORARY ISSUES

OBJECTIVES OF THE COURSE:

- To make the learners aware of the liberal humanist dimensions of literature and media in the contemporary world.

- To enable the learners to understand concepts like globalization, commercialization and Intellectual Property Rights through new literatures.
- To inculcate the spirit of universal brotherhood by presenting critiques of race, Xenophobia, war and national borders.
- To disseminate knowledge about the rights of minorities such as children, animals and the disabled and thus create a positive change in the societal perception of them.

MA ENGLISH

PROGRAMME OUTCOMES

The students are expected to develop both an understanding of the cultures represented by the literatures discussed and abilities of critical thinking. The courses on marginalized discourses promote values-based thinking. The Project/Dissertation in the Fourth Semester is expected to be a window to research/project writing for prospective research scholars and professionals. The elective course on Teaching of English is directly career-oriented

SEMESTER I

COURSE CODE: ENG1CO1

TITLE OF THE COURSE: BRITISH LITERATURE FROM CHAUCER TO 18TH CENTURY

COURSE OUTCOMES:

- The students are expected to get a comprehensive view of British Literature from the Fourteenth to the
- Eighteenth Century. They are also expected to get an outline of British social and cultural history during the period.

COURSE CODE: ENG1 CO2

TITLE OF THE COURSE: BRITISH LITERATURE- 19TH CENTURY

COURSE OUTCOMES:

- The students are expected to get an outline of the vast body of British Literature in the Nineteenth
- Century, looking into trends, movements and influences. They are also expected to get an outline of
- British social and cultural history during the period, examining how social transition is represented/refracted in literature.

COURSE CODE: ENG1CO3

TITLE OF THE COURSE: HISTORY OF ENGLISH LANGUAGE

COURSE OUTCOMES:

- The students are expected to get a historical perspective of the English Language in general and to create awareness about the evolution of human language. They are also expected to develop critical thinking on a variety of topics like multiculturalism, power relations in evolution of languages, the dynamics of language change and principles of political correctness in language policy. Discussions on language variety and the use of English in the New Media are career-focused.

COURSE CODE: ENG1 C04

TITLE OF THE COURSE: INDIAN LITERATURE IN ENGLISH

COURSE OUTCOMES:

- The students are expected to trace the emergence and evolution of Indian Writing in English from the early
- Colonial phase to the modern phase. They gain an understanding of the various phases of Indian writing in English
- In the context of the wider postcolonial and transnational scenario, by critically engaging with notions of imitation, assimilation and experimentation.
- It further explores the cross pollination this cultural and aesthetic engagement entails. A student who has successfully completed the course is expected to be familiar with the evolving trajectory of English writing in India in its multiple manifestations and diversity.

SEMESTER: II

COURSE CODE: ENG2C05

TITLE OF THE COURSE: TWENTIETH CENTURY BRITISH LITERATURE UP TO 1940

COURSE OUTCOMES:

- The students are expected to familiarize themselves with the major trends, movements and authors in British
- literature in the first half of the Twentieth Century. The students are expected to undertake an inquiry/
- research in the area by brief discussions on comparable texts in European literatures which represent the various phases of Modernism.

COURSE CODE: ENG2C06

TITLE OF THE COURSE: LITERARY CRITICISM AND THEORY – PART 1(UP TO NEW CRITICISM)

COURSE OUTCOMES:

- The students are expected to enable themselves to develop a critical acumen rooted in a strong
- awareness of the historical trajectory of critical thought in western and non-western contexts. Students familiarize themselves with the key texts in Western literary theory. They are also expected to
- engage themselves with the central aesthetic concepts in Sanskrit critical tradition. The students are
- expected to read the seminal primary texts from the ancient Greek civilization to new criticism in the
- beginning of the twentieth century, relating them to the social and historical conditions in which
- they have been written and practiced and to the contemporary cultural and political contexts in which
- they are being studied and discussed. They are expected to be able to articulate the prominent features of different texts cogently and to develop a sensitivity to the social implications of different schools of criticism.

COURSE CODE: ENG2C07

TITLE OF THE COURSE: AMERICAN LITERATURE

COURSE OUTCOMES:

- The students are expected to familiarize themselves with the maturing phase of American literature inthe early Nineteenth Century to its evolution till the end of the Twentieth century. It focuses on theemergence of a distinct American style and the writing of American ethos in American literature

COURSE CODE: ENG2 C08

TITLE OF THE COURSE: POSTCOLONIAL WRITINGS

COURSE OUTCOMES:

- The students are expected to get an overview of the historical experience of colonization and its impacts on
- the colonized peoples across the globe, through the medium of literary writings. The students are expected to
- acquaint themselves with the major theoretical concepts associated with postcolonial studies as manifested
- through the literary discourse in the works under consideration. It also aims to familiarize students with questions of resistance and representation, the politics language and literary form, and the

quests for identity, autonomy and self-determination that mark postcolonial literary expression. It is also envisaged that students

- will acquire the theoretical formulations, methods and strategies for postcolonial analysis that may contribute
- to the writing of their Fourth Semester dissertation.

SEMESTER III

COURSE CODE: ENG3C09

TITLE OF THE COURSE: TWENTIETH CENTURY BRITISH LITERATURE POST 1940

COURSE OUTCOMES:

- The students are expected to get a comprehensive picture of British literature written after 1940, besidesgiving them an outline of the theoretical paradigms that informed them. The learners are expected to findthe course a mapping of British culture and society during the period for the learners.

COURSE CODE: ENG3C10

TITLE OF THE COURSE: LITERARY CRITICISM AND THEORY- PART 2

COURSE OUTCOMES:

- At the end of the course, the students are expected to read literary and critical texts with judicious appreciation and build up the competence to generate and articulate personal responses to literary and criticaltexts, as well to explain the premises and assumptions underlying such personal responses.

COURSE CODE: ENG3 E02

TITLE OF THE COURSE: EUROPEAN FICTION IN TRANSLATION

COURSE OUTCOMES:

- The students are expected to get a historical perspective of European fiction and glimpses intoEuropean culture and society across the centuries.

COURSE CODE: ENG 3 E 06

TITLE OF THE COURSE: TEACHING OF ENGLISH

COURSE OUTCOMES:

- The students are expected to acquire the basics of language teaching which will be of immense help to themwhen they join a teachers' training programme or when they take up amateur/semi-professional teaching assignments like those offered in the Additional Skills Acquisition Programme of the Government of Kerala. It is also expected to spur research in the still unexplored terrains of language teaching.

SEMESTER IV

COURSE CODE: ENG4C11 Lit

TITLE OF THE COURSE: ENGLISH lLiERATURE IN THE 21ST CENTURY

COURSE OUTCOMES:

- The students are expected to become aware of the multicultural nature of writings in English in the contemporary world and of how English serves as a vehicle for rumination and resistance for writers who come from diverse linguistic communities.

COURSE CODE: ENG 4 P01

TITLE OF THE COURSE: DISSERTATION/PROJECT COURSE

OUTCOMES:

- The Course is expected to explore the research aptitude of the learners and give them the much-needed background information and experience for taking up research programmes or professional assignments.

COURSE CODE: ENG4 E12

TITLE OF THE COURSE: LITERATURE AND ECOLOGY

COURSE OUTCOMES:

The students can expect the following objectives from the course:

- To expose students to the scopes of green poetics and green cultural studies through a variety of ecologically conscious literary works.
- To prepare students to contemplate environmental ethic
- To equip the learner to improve understanding of current global environmental issues.
- To build an interdisciplinary research outlook among students of English literature.

COURSE CODE: ENG4 E 17

TITLE OF THE COURSE: WRITINGS FROM The MIDDLE EAST

COURSE OUTCOMES:

- The students are expected to get glimpses of lives and world views of West Asian cultures which are constructed in literature. The students are also expected to acquire basic background information about the social and political history of West Asia.

DEPARTMENT OF MATHEMATICS

Aims, Objectives and Outcomes

PROGRAMME OUTCOME:

Upon completing the B. Sc degree in the field of Mathematics, students have/capable of:

- A solid understanding of Higher secondary level Calculus and Geometry.
- Using their mathematical knowledge to analyze certain problems in day to day life .
- Communicate mathematics accurately and effectively in both written and oral form.
- Conducting scholarly or professional activities in an ethical manner.

MTS1 B01 BASIC LOGIC & NUMBER THEORY

Logic, the study of principles of techniques and reasoning, is fundamental to every branch of learning. Besides, being the basis of all mathematical reasoning, it is required in the field of computer science for developing programming languages and also to check the correctness of the programmes. Electronic engineers apply logic in the design of computer chips. The first module discusses the fundamentals of logic, its symbols and rules. This enables one to think systematically, to express ideas in precise and concise mathematical terms and also to make valid arguments. How to use logic to arrive at the correct conclusion in the midst of confusing and contradictory statements is also illustrated.

The classical number theory is introduced and some of the very fundamental results are discussed in other modules. It is hoped that the method of writing a formal proof, using proof methods discussed in the first module, is best taught in a concrete setting, rather than as an abstract exercise in logic. Number theory, unlike other topics such as geometry and analysis, doesn't suffer from too much abstraction and the consequent difficulty in conceptual understanding. Hence, it is an ideal topic for a beginner to illustrate how mathematicians do their normal business. By the end of the course, the students will be able to enjoy and master several techniques of problem solving such as recursion, induction etc., the importance of pattern recognition in mathematics, the art of conjecturing and a few applications of number theory. Enthusiastic students will have acquired knowledge to read and enjoy on their own a few applications of number theory in the field of art, geometry and coding theory. Successful completion of the course enables students to

- Prove results involving divisibility, greatest common divisor, least common multiple and a few applications.
- Understand the theory and method of solutions of LDE.
- Understand the theory of congruence and a few applications.
- Solve linear congruent equations.
- Learn three classical theorems viz. Wilson's theorem, Fermat's little theorem and Euler's theorem and a few important consequences.

MTS2 B02 CALCULUS OF SINGLE VARIABLE-1

The mathematics required for viewing and analyzing the physical world around us is contained in calculus. While Algebra and Geometry provide us very useful tools for expressing the relationship between static quantities, the concepts necessary to explore the relationship between moving/changing objects are provided in calculus. The objective of the course is to introduce students to the fundamental ideas of limit, continuity and differentiability and also to some basic theorems of differential calculus. It is also shown how these ideas can be applied in the problem

of sketching of curves and in the solution of some optimization problems of interest in real life. This is done in the first two modules.

The next two modules deal with the other branch of calculus viz. integral calculus. Historically, it is motivated by the geometric problem of finding out the area of a planar region. The idea of definite integral is defined with the notion of limit. A major result is the Fundamental Theorem of Calculus, which not only gives a practical way of evaluating the definite integral but establishes the close connection between the two branches of Calculus. The notion of definite integral not only solves the area problem but is useful in finding out the arc length of a plane curve, volume and surface areas of solids and so on. The integral turns out to be a powerful tool in solving problems in physics, chemistry, biology, engineering, economics and other fields. Some of the applications are included in the syllabus.

MTS3 B03 CALCULUS OF SINGLE VARIABLE-2

Using the idea of definite integral developed in previous semester, the natural logarithm function is defined and its properties are examined. This allows us to define its inverse function namely the natural exponential function and also the general exponential function. Exponential functions model a wide variety of phenomenon of interest in science, engineering, mathematics and economics. They arise naturally when we model the growth of a biological population, the spread of a disease, the radioactive decay of atoms, and the study of heat transfer problems and so on. We also consider certain combinations of exponential functions namely hyperbolic functions that also arise very frequently in applications such as the study of shapes of cables hanging under their own weight.

After this, the students are introduced to the idea of improper integrals, their convergence and evaluation. This enables to study a related notion of convergence of a series, which is practically done by applying several different tests such as integral test, comparison test and so on. As a special case, a study on power series- their region of convergence, differentiation and integration etc.,- is also done.

A detailed study of plane and space curves is then taken up. The students get the idea of parametrization of curves, they learn how to calculate the arc length, curvature etc. using parametrization and also the area of surface of revolution of a parametrized plane curve. Students are introduced into other coordinate systems which often simplify the equation of curves and surfaces and the relationship between various coordinate systems are also taught. This enables them to directly calculate the arc length and surface areas of revolution of a curve whose equation is in polar form. At the end of the course, the students will be able to handle vectors in dealing with the problems involving geometry of lines, curves, planes and surfaces in space and have acquired the ability to sketch curves in plane and space given in vector valued form

MTS4 B04 LINEAR ALGEBRA

An introductory treatment of linear algebra with an aim to present the fundamentals in the clearest possible way is intended here. Linear algebra is the study of linear systems of equations, vector spaces, and linear transformations. Virtually every area of mathematics relies on or extends the tools of linear algebra. Solving systems of linear equations is a basic tool of many mathematical procedures used for solving problems in science and engineering. A number of methods for solving a system of linear equations are discussed. In this process, the student will become competent to perform matrix algebra and also to calculate the inverse and determinant of a matrix. Another advantage is that the student will come to understand the modern view of a matrix as a linear transformation. The discussion necessitates the introduction of central topic of linear algebra namely the concept of a vector space. The familiarity of the students with planar vectors and their algebraic properties under vector addition and scalar multiplication will make them realize that the idea of a general vector space is in fact an abstraction of what they already know. Several examples and general properties of vector spaces are studied. The idea of a subspace, spanning vectors, basis and dimension are discussed and fundamental results in these areas are explored. This enables the student to understand the relationship among the solutions of a given system of linear equations and some important subspaces associated with the coefficient matrix of the system.

After this, some basic matrix transformations in the vector spaces $\mathbb{R}2$ *and* $\mathbb{R}3$,having interest in the field of computer graphics, engineering and physics are studied by specially pinpointing to their geometric effect.

Just like choosing an appropriate coordinate system greatly simplifies a problem at our hand as we usually see in analytic geometry and calculus, a right choice of the basis of the vector space $\mathbb{R}n$ greatly simplifies the analysis of a matrix operator on it. With this aim in mind, a study on eigenvalues and eigenvectors of a given matrix (equivalently, that of the corresponding matrix operator) is taken up. Practical method of finding out the eigenvalues from the characteristic equation and the corresponding eigenvectors are also discussed. A bonus point achieved during this process is a test for the invertibility of a square matrix. As diagonal matrices are the matrices with simplest structure, the idea of diagonalization of a matrix (and hence the diagonalization of a matrix operator) is introduced and students learn a few fundamental results involving diagonalization and eigenvalues which enable them to check whether diagonalization is possible. They realise that there are matrices that cannot be diagonalized and even learn to check it. Also they are taught a well defined procedure for diagonalizing a given matrix, if this is actually the case. The topic is progressed further to obtain the ultimate goal of spectral decomposition of a symmetric matrix. In this process , students realise that every symmetric matrix is diagonalizable and that this diagonalization can be done in a special way ie., by choosing an orthogonal matrix to perform the diagonalization. This is known as orthogonal diagonalization. Students also learn that only symmetric matrices with real entries can be orthogonally diagonalized and using GramSchmidt process a well defined procedure for writing such a diagonalization is also taught. In short, the course gives the students an opportunity to learn the fundamentals of linear algebra by capturing the ideas geometrically, by justifying them algebraically and by preparing them to apply it in several different fields such as data communication, computer graphics, modelling etc.

MTS5 B05 ABSTRACT ALGEBRA

The brilliant mathematician Evariste Galois developed an entire theory that connected the solvability by radicals of a polynomial equation with the permutation group of its roots. The theory now known as Galois theory solves the famous problem of insolvability of quintic. A study on symmetric functions now becomes inevitable. One can now observe the connection emerging between classical algebra and modern algebra. The last three modules are therefore devoted to the discussion on basic ideas and results of abstract algebra. Students understand the abstract notion of a group, learn several examples, are taught to check whether an algebraic system forms a group or not and are introduced to some fundamental results of group theory. The idea of structural similarity, the notion of cyclic group, permutation group , various examples and very fundamental results in the areas are also explored.

MTS5 B06 BASIC ANALYSIS

In this course, basic ideas and methods of real and complex analysis are taught. Real analysis is a theoretical version of single variable calculus. So many familiar concepts of calculus are reintroduced but at a much deeper and more rigorous level than in a calculus course. At the same time there are concepts and results that are new and not studied in the calculus course but very much needed in more advanced courses. The aim is to provide students with a level of mathematical sophistication that will prepare them for further work in mathematical analysis and other fields of knowledge, and also to develop their ability to analyse and prove statements of mathematics using logical arguments. The course will enable the students

- to learn and deduce rigorously many properties of real number system by assuming a few fundamental facts about it as axioms. In particular they will learn to prove Archimedean property, density theorem, existence of a positive square root for positive numbers and so on and the learning will help them to appreciate the beauty of logical arguments and embolden them to apply it in similar and unknown problems.
- to know about sequences,their limits, several basic and important theorems involving sequences and their applications. For example, they will learn how monotone convergence theorem can be used in establishing the divergence of the harmonic series, how it helps in the calculation of square root of positive numbers and how it establishes the existence of the transcendental number e (Euler constant)

- to understand some basic topological properties of real number system such as the concept of open and closed sets, their properties, their characterization and so on.
- to get a rigorous introduction to algebraic, geometric and topological structures of complex number system, functions of complex variable, their limit and continuity and so on. Rich use of geometry, comparison between real and complex calculus-areas where they agree and where they differ, the study of mapping properties of a few important complex functions exploring the underlying geometry etc. will demystify student's belief that complex variable theory is incomprehensible.

MTS5 B07 NUMERICAL ANALYSIS

The goal of numerical analysis is to provide techniques and algorithms to find approximate numerical solution to problems in several areas of mathematics where it is impossible or hard to find the actual/closed form solution by analytical methods and also to make an error analysis to ascertain the accuracy of the approximate solution. The subject addresses a variety of questions ranging from the approximation of functions and integrals to the approximate solution of algebraic, transcendental, differential and integral equations, with particular emphasis on the stability, accuracy, efficiency and reliability of numerical algorithms. The course enables the students to

- Understand several methods such as bisection method, fixed point iteration method, regulafalsi method etc. to find out the approximate numerical solutions of algebraic and transcendental equations with desired accuracy.
- Understand the concept of interpolation and also learn some well known interpolation techniques.
- Understand a few techniques for numerical differentiation and integration and also realize their merits and demerits.
- Find out numerical approximations to solutions of initial value problems and also to understand the efficiency of various methods.

MTS5 B08 LINEAR PROGRAMMING

Linear programming problems are having wide applications in mathematics, statistics, computer science, economics, and in many social and managerial sciences. For mathematicians it is a sort of mathematical modelling process, for statisticians and economists it is useful for planning many economic activities such as transport of raw materials and finished products from one place to another with minimum cost and for military heads it is useful for scheduling the training activities and deployment of army personnel. The emphasis of this course is on nurturing the linear programming skills of students via. the algorithmic solution of smallscale problems, both in the general sense and in the specific applications where these problems naturally occur. On successful completion of this course, the students will be able to

- solve linear programming problems geometrically
- understand the drawbacks of geometric methods
- solve LP problems more effectively using Simplex algorithm via. the use of condensed tableau of A.W. Tucker
- convert certain related problems, not directly solvable by simplex method, into a form that can be attacked by simplex method.
- understand duality theory, a theory that establishes relationships between linear programming problems of maximization and minimization
- understand game theory
- solve transportation and assignment problems by algorithms that take advantage of the simpler nature of these problems

MTS5 B09 INTRODUCTION TO GEOMETRY AND THEORY OF EQUATIONS

Geometry

Geometry is, basically, the study concerned with questions of shape, size, and relative position of planar and spatial objects. The classical Greek geometry, also known as Euclidean geometry after the work of Euclid, was once regarded as one of the highest points of rational thought, contributing to the thinking skills of logic, deductive reasoning and skills in problem solving.

In the early 17 th century, the works of Rene Descartes and Pierre de Fermat put the foundation stones for the creation of analytic geometry where the idea of a coordinate system was introduced to simplify the treatment of geometry and to solve a wide variety of geometric problems.

Desargues, a contemporary of Descartes was fascinated towards the efforts of artists/painters to give a realistic view of their art works/paintings usually done on a flat surface such as canvas or paper. To get a realistic view of a three dimensional object/scene depicted on a flat surface, a right impression of height, width, depth and position in relation to each other of the objects in the scene is required. This idea is called perspective in art. If two artists make perspective drawings of the same object, their drawings shall not be identical but there shall be certain properties of these drawings that remain the same or that remain invariant. The study of such invariant things crystallised into what is now called projective geometry. Now days, it plays a major role in computer graphics and in the design of camera models.

Another development is the evolution of affine geometry. In simple terms, if we look at the shadows of a rectangular window on the floor under sunlight, we could see the shadows not in perfect rectangular form but often in the shape of a parallelogram. The size of shadows also changes with respect to the position of the sun. Hence, neither length nor angle is invariant in the transformation process. However, the opposite sides of the images are always parallel. So this transformation keeps parallelism intact. The investigation of invariants of all shadows is the basic problem of affine geometry.

Towards the end of nineteenth century, there were several different geometries: Euclidean, affine, projective, inversive, spherical, hyperbolic, and elliptic to name a few. It was the idea of Felix Klein to bring the study of all these different geometries into a single platform. He viewed each geometry as a space together with a group of transformations of that space and regarded those properties of figures left unaltered by the group as geometrical properties. In this course, it is intended to take up a study of a few geometries based on the philosophy of Klein.

Theory of equations

Theory of equations is an important part of traditional algebra course and it mainly deals with polynomial equations and methods of finding their algebraic solution or solution by radicals. This means we seek a formula for solutions of polynomial equations in terms of coefficients of polynomials that involves only the operations of addition, subtraction, multiplication, division and taking roots. A well knitted formula for the solution of a quadratic polynomial equation is known to us from high school classes and is not difficult to derive. However, there is an increasing difficulty to derive such a formula for polynomial equations of third and fourth degree. One of our tasks in this learning process is to derive formulae for the solutions of third and fourth degree polynomial equations given by Carden and Ferrari respectively. In the mean time, we shall find out the relationship between the roots and coefficients of annt^h degree polynomial and an upper and lower limit for the roots of such a polynomial. This often help us to locate the region of solutions for a general polynomial equation. Methods to find out integral and rational roots of a general nt^h degree polynomial with rational coefficients are also devised. However, all efforts to find out an algebraic solution for general polynomial equations of degree higher than fourth failed or didn't work. This was not because one failed to hit upon the right idea, but rather due to the disturbing fact that there was no such formula.

Upon successful completion of the course, students will be able to

- Understand several basic facts about parabola, hyperbola and ellipse (conics) such as their equation in standard form, focal length properties, and reflection properties, their tangents and normal.
- Recognise and classify conics.
- Understand Kleinian view of Euclidean geometry
- Understand affine transformations, the inherent group structure, the idea of parallel projections and the basic properties of parallel projections.
- Understand the fundamental theorem of affine geometry.
- Learn to solve polynomial equations upto degree four.

MTS6 B10 REAL ANALYSIS

The course is built upon the foundation laid in Basic Analysis course of fifth semester. The course thoroughly exposes one to the rigour and methods of an analysis course. One has to understand definitions and theorems of text and study examples well to acquire skills in various problem solving techniques. The course will teach one how to combine different definitions, theorems and techniques to solve problems one has never seen before. One shall acquire ability to realise when and how to apply a particular theorem and how to avoid common errors and pitfalls. The course will prepare students to formulate and present the ideas of mathematics and to communicate them elegantly.

On successful completion of the course, students will be able to

- State the definition of continuous functions, formulate sequential criteria for continuity and prove or disprove continuity of functions using this criteria.
- Understand several deep and fundamental results of continuous functions on intervals such as boundedness theorem, maximumminimum theorem, intermediate value theorem, preservation of interval theorem and so on.
- Realise the difference between continuity and uniform continuity and equivalence of these ideas for functions on closed and bounded interval.
- Understand the significance of uniform continuity in continuous extension theorem.
- Develop the notion of Riemann integrability of a function using the idea of tagged partitions and calculate the integral value of some simple functions using the definition.
- Understand a few basic and fundamental results of integration theory.
- Formulate Cauchy criteria for integrability and a few applications of it. In particular they learn to use Cauchy criteria in proving the non integrability of certain functions.
- Understand classes of functions that are always integrable
- Understand two forms of fundamental theorem of calculus and their significance in the practical problem of evaluation of an integral.
- Find a justification for ‘change of variable formula’ used in the practical problem of evaluation of an integral.
- Prove convergence and divergence of sequences of functions and series
- Understand the difference between pointwise and uniform convergence of sequences and series of functions
- Answer a few questions related to interchange of limits.
- Learn and find out examples/counter examples to prove or disprove the validity of several mathematical statements that arise naturally in the process/context of learning.
- Understand the notion of improper integrals, their convergence, principal value and evaluation.
- Learn the properties of and relationship among two important improper integrals namely beta and gamma functions that frequently appear in mathematics, statistics, science and engineering.

MTS6 B11 COMPLEX ANALYSIS

The course is aimed to provide a thorough understanding of complex function theory. It is intended to develop the topics in a fashion analogous to the calculus of real functions. At the same time differences in both theories are clearly emphasised. When real numbers are replaced by complex numbers in the definition of derivative of a function, the resulting complex differentiable functions (more precisely analytic functions) turn out to have many remarkable properties not possessed by their real analogues. These functions have numerous applications in several areas of mathematics such as differential equations, number theory etc. and also in science and engineering. The focus of the course is on the study of analytic functions and their basic behaviour with respect to the theory of complex calculus.

The course enables students

- to understand the difference between differentiability and analyticity of a complex function and construct examples.
- to understand necessary and sufficient condition for checking analyticity.
- to know of harmonic functions and their connection with analytic functions
- to know a few elementary analytic functions of complex analysis and their properties.
- to understand definition of complex integral, its properties and evaluation.
- to know a few fundamental results on contour integration theory such as Cauchy's theorem, Cauchy-Goursat theorem and their applications.
- to understand and apply Cauchy's integral formula and a few consequences of it such as Liouville's theorem, Morera's theorem and so forth in various situations.
- to see the application of Cauchy's integral formula in the derivation of power series expansion of an analytic function.
- to know a more general type of series expansion analogous to power series expansion viz. Laurent's series expansion for functions having singularity.
- to understand how Laurent's series expansion lead to the concept of residue, which in turn provide another fruitful way to evaluate complex integrals and, in some cases, even real integrals.
- to see another application of residue theory in locating the region of zeros of an analytic function

MTS6 B12 CALCULUS OF MULTI VARIABLE

The intention of the course is to extend the immensely useful ideas and notions such as limit, continuity, derivative and integral seen in the context of function of single variable to function of several variables. The corresponding results will be the higher dimensional analogues of what we learned in the case of single variable functions. The results we develop in the course of calculus of multivariable is extremely useful in several areas of science and technology as many functions that arise in real life situations are functions of multivariable.

The successful completion of the course will enable the student to

- Understand several contexts of appearance of multivariable functions and their representation using graph and contour diagrams.
- Formulate and work on the idea of limit and continuity for functions of several variables.
- Understand the notion of partial derivative, their computation and interpretation
- Understand chain rule for calculating partial derivatives.
- Get the idea of directional derivative, its evaluation, interpretation, and relationship with partial derivatives.
- Understand the concept of gradient, a few of its properties, application and interpretation.
- Understand the use of partial derivatives in getting information of tangent plane and normal line.

- Calculate the maximum and minimum values of a multivariable function using second derivative test and Lagrange multiplier method.
- Find a few real life applications of Lagrange multiplier method in optimization problems. Extend the notion of integral of a function of single variable to integral of functions of two and three variables.
- Address the practical problem of evaluation of double and triple integral using Fubini's theorem and change of variable formula.
- Realize the advantage of choosing other coordinate systems such as polar, spherical, cylindrical etc. in the evaluation of double and triple integrals.
- See a few applications of double and triple integral in the problem of finding out surfacearea ,mass of lamina, volume, center of mass and so on.
- Understand the notion of a vector field, the idea of curl and divergence of a vector field, their evaluation and interpretation.
- Understand the idea of line integral and surface integral and their evaluations.
- Learn three major results viz. Green's theorem, Gauss's theorem and Stokes' theorem of multivariable calculus and their use in several areas and directions.

MTS6 B13 DIFFERENTIAL EQUATIONS

Differential equations model the physical world around us. Many of the laws or principles governing natural phenomenon are statements or relations involving rate at which one quantity changes with respect to another. The mathematical formulation of such relations (modelling) often results in an equation involving derivative (differential equations). The course is intended to find out ways and means for solving differential equations and the topic has wide range of applications in physics, chemistry, biology, medicine, economics and engineering.

On successful completion of the course, the students shall acquire the following skills/knowledge.

- Students could identify a number of areas where the modelling process results in a differential equation.
- They will learn what an ODE is, what it means by its solution, how to classify DEs, what it means by an IVP and so on.
- They will learn to solve DEs that are in linear, separable and in exact forms and also to analyse the solution.
- They will realise the basic differences between linear and non linear DEs and also basic results that guarantees a solution in each case.
- They will learn a method to approximate the solution successively of a first order IVP.
- They will become familiar with the theory and method of solving a second order linear homogeneous and nonhomogeneous equation with constant coefficients.
- They will learn to find out a series solution for homogeneous equations with variable coefficients near ordinary points.
- Students acquire the knowledge of solving a differential equation using Laplace method which is especially suitable to deal with problems arising in engineering field.
- Students learn the technique of solving partial differential equations using the method of separation of variables

MSc MATHEMATICS

PROGRAMME OUTCOME:

Upon completing the M. Sc degree in the field of Mathematics, students have/capable of:

- A solid understanding of graduate level algebra, analysis and topology.
- Using their mathematical knowledge to analyze certain problems in day to day life .
- Identifying unsolved yet relevant problems in a specific field.
- Undertaking original research on a particular topic.
- Communicate mathematics accurately and effectively in both written and oral form.
- Conducting scholarly or professional activities in an ethical manner.

Course Outcome: Upon the successful completion of the course students will:

MTH T1C01: ALGEBRA – I

- Learn factor group computation.
- Understand the notion of group action on a set.
- Learn Sylow theorems and its applications.
- Understand the notion of free groups.
- Understand the concept rings of polynomials
- Learn group presentation

MTH 1C02: LINEAR ALGEBRA

- Learn basic properties of vector spaces
- Understand the relation between linear transformations and matrices
- Understand the concept of diagonalizable and triangulable operators and various fundamental results of these operators
- Understand Primary decomposition Theorem.
- Learn basic properties inner product spaces

MTH 1C03: REAL ANALYSIS – I

- Learn the topology of the real line
- Understand the notions of Continuity, Differentiation and Integration of real functions
- Learn Uniform convergence of sequence of functions, equicontinuity of family of functions, and Weierstrass theorems.

MTH 1C04DISCRETE MATHEMATICS

- Understand the fundamentals of Graphs
- Learn the structure of graphs and familarize the basic concepts used to analyse different problems in different branches such as chemistry, computer science etc.
- Acquire a basic knowledge of formal languages, grammars and automata.
- Learn the equivalence of deterministic and non-deterministic finite accepters.
- Learn the concepts of partial order relation and total order relation.
- Acquire a knowledge of Boolean algebras and Boolean function and understand how these concepts arise in certain real-life problems.

MTH 1C05: NUMBER THEORY

- Be able to effectively express the concepts and results of number theory.
- Learn basic theory of arithmetical functions and Dirichlet multiplication, averages of some arithmetical functions. and
- Understand distribution of prime numbers and prime number theorem.
- Learn the concept of quadratic residue and Quadratic reciprocity laws.
- Get a basic knowledge in Cryptography

MTH 2C06: ALGEBRA – II

- Learn different types of extensions of fields.
- Learn automorphisms of fields.
- Get a basic knowledge in Galois Theory.
- Learn how to apply Galois Theory in various contexts.

MTH 2C07: REAL ANALYSIS – II

- Learn why and for what the theory of measure was introduced
- Learn the concept of measures and measurable functions
- Learn Lebesgue integration and its various properties
- Learn how to generalize the concept of measure theory
- Learn that a measure may take negative values.

MTH 2C08: TOPOLOGY

- Be proficient in abstract notion of a topological space, where continuous function is defined in terms of open sets not in the traditional $\varepsilon - \delta$ definition used in analysis).
- Realize Intermediate value theorem is a statement about connectedness, Bolzano weierstrass theorem is a theorem about compactness and so on.
- Learn the concept of quotient topology.
- Learn five properties such as T0, T1, T2, T3 and T4 of a topological space X which express how rich the open sets is. More precisely, each of them tells us how tightly a closed subset can be wrapped in an open set.

MTH2C09: ODE AND CALCULUS OF VARIATIONS

- Learn the existence of uniqueness of solutions for a system of first order ODEs.
- Learn many solution techniques such as separation of variables, variation of parameter power series method, Frobeniious method etc.
- Learn method of solving system of first order differential calculus equations.
- Get an idea of how to analyze the behavior of solutions such as stability, asymptotic stability etc.
- Get a basic knowledge of Calculus of variation.

MTH2C10: OPERATIONS RESEARCH

- Learn graphical method and the simplex algorithm for solving a linear programming problem.
- Learn more optimization techniques for solving the linear programming modelstransportation problem and integer programming problem.
- Learn optimization techniques for solving some network related problems.
- Learn sensitivity analysis and parametric programming, which describes how various changes in the problem affect its solution.

MTH3C11: MULTIVARIABLE CALCULUS AND GEOMETRY

- Be proficient in differentiation of functions of several variables.
- Understand curves in plane and in space.
- Get a deep knowledge of Curvature, torsion, Serret-Frenet formulae
- Learn Fundamental theorem of curves in plane and space.
- Learn the concept of Surfaces in three dimension, smooth surfaces, surfaces of revolution
- Learn explicitly tangent and normal to the surfaces.
- Get a thorough understanding of oriented surfaces, first and second fundamental forms surfaces, gaussian curvature and geodesic curvature and so on.

MTH3C12: COMPLEX ANALYSIS

- Learn the concept of (complex) differentiation and integration of functions defined on the complex plane and their properties.
- Be thorough in power series representation of analytic functions, different versions of Cauchy's Theorem.
- Get an idea of singularities of analytic functions and their classifications.
- Learn different versions of maximum modulus theorem.

MTH3C13: FUNCTIONAL ANALYSIS

- Learn the concept of normed linear spaces and Hilbert spaces.
- Learn various properties operators defined on both normed and Hilbert spaces.
- Understand the concept dual space.
- Learn the completeness of the space bounded linear operators.

MTH3C14: PDE and Integral Equations

- Learn a technique to solve first order PDE and analyse the solution to get information about the parameters involved in the model.
- Learn explicit representations of solutions of three important classes of PDE Heat equations Laplace equation and wave equation for initial value problems.
- Get an idea about Integral equations.
- Learn the relation between Integral and differential Equations.

MTH3E02: CRYPTOGRAPHY

- Understand the fundamentals of cryptography and cryptanalysis.
- Acquire a knowledge of Claude Shanon’s ideas to cryptography, including the concepts of perfect secrecy and the use of information theory to cryptography
- Learn to use substitution -permutation networks as a mathematical model to introduce many of the concepts of modern block cipher design and analysis including differential and linear cryptoanalysis.
- Familiarize different cryptographic hash functions and their application to the construction of message authentication codes.

MTH4C15 ADVANCED FUNCTIONAL ANALYSIS

- Understand the notions of Fredholm theory of compact Operators and their properties
- Apply the theory to understand and solve some problems of integral equations at an appropriate level of difficulty.
- Describe the construction of the spectral integral.
- Recognize the fundamentals of Banach spaces and Banach Algebras.

MTH4E08: COMMUTATIVE ALGEBRA

- Basic properties of commutative rings, ideals and modules over commutative rings,
- Learn uniqueness theorem for a decomposable ideal.
- Learn integrally closed domain and valuation ring.
- Understand the basic theory of Noetherian and Artin Rings

MTH4E09: DIFFERENTIAL GEOMETRY

- Understand how calculus of several variables can be used to develop the geometry of ndimensional oriented n-surface in $\mathbb{R}^{n+1}$.
- Understand locally n- surfaces and parametrized n- surfaces are the same.
- Develop a knowledge of the Gauss and Weingarten maps and apply them to apply them to describe various properties of surfaces.

MTH4E11: GRAPH THEORY

- Learn different types of graphs
- Learn the concept matching in graphs and related results.
- Understand what is meant by coloring.
- Learn Planar Graphs.

AimsofBachelor'sdegreeprogrammeinMathematics

The overall aim of B.Sc. Mathematics and B.A./B.Sc. with Mathematics as a Complementary course is to

1. Createdeepinterestinlearningmathematics;
2. Develop broad and balanced knowledge and understanding of definitions, concepts, principles and theorems;
3. Familiarizethestudentswithsuitabletoolsofmathematicalanalysistohandleissuesand problems in mathematics and related sciences;
4. Enhance the ability of learners to apply the knowledge and skills acquired by them during theprogrammetosolvespecifictheoreticalandappliedproblemsinmathematics;
5. Provide students/learners sufficient knowledge and skills enabling them to undertake further studies in mathematics and its allied areas on multiple disciplines concerned with mathematics;
6. Encourage the students to develop a range of generic skills helpful in employment, internshipsand social activities.

ProgrammeOutcomes

The programme outcome of the B.Sc Mathematics undergraduate course are the summation of theexpectedcourselearningoutcomesgivenbelow.

PO1Disciplinaryknowledge:

Capabilityofdemonstratingcomprehensiveknowledgeofmathematicsandunderstanding of one or more disciplines which form a part of an undergraduate programme of study.

PO2Communicationsskills:

(i) Ability to communicate various concepts of mathematics effectively using examples and their geometrical visualizations.

(ii) Abilitytousemathematicsasapreciselanguageofcommunicationinotherbranches of human knowledge.

(iii) Abilitytoshowtheimportanceofmathematicsasprecursortovariousscientific developments since the beginning of the civilization.

PO3Criticalthinking:

Abilitytoemploycriticalthinkinginunderstandingtheconceptsineveryareaofmath- ematics.

PO4Analyticalreasoning:

Abilitytoanalyzetheresultsandapplytheminvariousproblemsappearingindifferent branches of mathematics.

PO5Problemsolving:

(i) Capabilitytosolveproblemsusingconceptsoflinearalgebra.

(ii) Capability to solve various models such as growth and decay models, radioactive decay model, LCR circuits and population models using techniques of differential equations.

(iii) Ability to solve linear system of equations, linear programming problems and net- work flow problems.

(iv) Ability to provide new solutions using the domain knowledge of mathematics ac- quired during this programme.

PO6Research-relatedskills:

(i) Capability for inquiring about appropriate questions relating to the concepts in various fields of mathematics.

(ii) Toknowabouttheadvancesinvariousbranchesofmathematics

PO7

Information/digital literacy : Capability to use appropriate software to solve systemofequationsanddifferentialequations.

PO8Self-directedlearning:

Abilitytoworkindependentlyanddoin-depthstudyofvariousnotionsofmathematics.

PO9Lifelonglearning:

Ability to think, acquire knowledge and skills through logical reasoning and to inculcate the habit of self-learning.

PO10Applicationskills:

Abilitytoapplytheacquiredknowledgeinallaspects.

PO11Experimentalskills:

PO12Moralandethicalawareness/reasoning:

Ability to identify unethical behaviour such as fabrication, falsification ormisrepresenta-tionofdataandadoptingobjective,unbiasedandtruthfulactionsinallaspects

Courselearningoutcomes

Course learning outcomes of each course in B.Sc.Mathematics and B.A./B.Sc.Programme with Mathematics as a complementary course have been enshrined in the beginning of course contents of each course.

	CORECOURSES													
Programme outcomes	BasicLogicand NumberTheory	Calculusof SingleVariable–1	Calculusof SingleVariable–2	LinearAlgebra	AbstractAlgebra	BasicAnalysis	NumericalAnalysis	LinearProgramming	IntroductiontoGeometry andTheoryofEquations	RealAnalysis	ComplexAnalysis	CalculusofMultivariable	DifferentialEquations
Disciplinary knowledge	√	√	√	√	√	√	√	√	√	√	√	√	√
Communicationskills	√	√	√	√	√	√	√	√	√	√	√	√	√
Critical thinking	√	√	√	√	√	√	√	√	√	√	√	√	√
Analytical thinking	√	√	√			√				√	√	√	
Problem solving	√		√	√	√		√	√	√	√	√		√
Research related skills	√		√	√			√		√	√	√		√
Information/ Digital Literacy		√			√	√		√				√	
	√	√	√	√	√	√	√	√	√	√	√	√	√
Self-directedlearning	√			√		√				√			
Lifelong learning	√	√	√		√		√	√	√		√	√	√
Applicational skills	√	√	√				√	√					√
Experimental learning	√			√			√	√				√	√
		√	√	√	√	√			√	√	√	√	

ELECTIVECOURSES

Programmeoutcomes	Graph Theory	TopologyofMetric spaces	Mathematical Programming withPythonandLaTeX
	√	√	√
Disciplinaryknowledge		√	√
Communication skills		√	√
Critical thinking Analytical	√	√	√
thinking Problem solving	√	√	√
Researchrelatedskills	√	√	√
	√	√	√
Information/Digital Literacy		√	√
Self-directed learning Lifelong	√	√	√
learning Applicational skills	√		√
Experimental learning	√	√	√
Employability options	√		√
		√	

OPENCOURSES

Programmeoutcomes	Applied Calculus	DiscreteMathematics for Basic and Applied Sciences	Linear Mathematical Models	Mathematics for Decision Making
~~Disciplinaryknowledge~~	√	√	√	√
~~Communicationskills~~	√	√	√	√
~~Criticalthinking~~	√	√	√	√
~~Analyticalthinking~~	√	√	√	
~~Problemsolving~~	√	√	√	√
~~Researchrelatedskills~~	√	√	√	√
Information/Digital ~~Literacy~~	√	√	√	√
~~Self-directedlearning~~	√	√	√	√
~~Lifelonglearning~~	√	√	√	√
~~Applicationalskills~~	√	√	√	√
~~Experimentallearning~~	√	√	√	√
~~Employabilityoptions~~	√	√	√	√
~~Ethics~~	√	√	√	√

COMPLEMENTARYCOURSES								
Programme outcomes	Mathematics				Mathematical Economics			
	MTS1C01	MTS2C02	MTS3C03	MTS4C04	MEC1C01	MEC2C02	MEC3C03	MEC4C04
Disciplinaryknowledge	√	√	√	√	√	√	√	√
Communication skills	√	√	√	√	√	√	√	√
Critical thinking	√	√	√			√		√
Analytical thinking	√	√	√			√		√
Researchrelatedskills				√	√		√	
~~Information/DigitalLiteracy~~				√			√	
~~Self-directed learning~~	√	√	√	√	√	√		√
~~Lifelong learning~~	√			√		√		√
~~Applicational skills~~		√	√	√	√		√	√
Experimentallearning			√	√				
Employabilityoptions	√			√			√	
Ethics	√	√	√		√	√	√	√

COMMERCE DEPARTMENT
B.B.A DEGREE PROGRAMME

The following are the learning objectives and outcomes of B.B.A Degree programme

LEARNING OBJECTIVES

- This course intends to develop conceptual knowledge of Business Management. The study approachalso enables students to understand and analyse practical aspects of management to become skilledmanagerin a corporate business set up.
- To acquaint the students with the economic concepts and principles relevant forbusinessdecisions.
- Italsointendstoenablethestudentstoapplytheeconomicprinciplesinmanagerialdecisions.
- It aims toequip the students with skills for preparing books ofaccountsof businessorganisation.
- It also aims to enrich the students to prepare the financial statements of proprietaryorganizations. Modules in this course also intent to provide knowledge to the students in respect ofaccounting of issue of securities, accounting for hire purchase transactions and the accounting ofbranches.
- To orient the students with the marketing principles and also to familiarize them withtheprocess of marketingin modern business firm.
- Toenablethestudentstoacquireknowledgeofnumericalequations,matricesprogressions,financialmathematicsand descriptivestatistics.
- To updateandexpandbasic Informaticsskillsofthe students.
- Toequip thestudents toeffectivelyutilizethe digitalknowledgeresourcesfortheirstudy.
- To acquaint the students with the knowledge about corporate accounting. Themodules introduce the fundamental Indian accounting standard and equip the students with skills forpreparingcorporateaccounts.
- It aims to enable students to understand the basic concepts of financial Management andmakethem awareof majordecisional areas offinancial management.
- Tofamiliarizethestudentswithmajorstatutesaffectingtheoperationsofbusinessorganizations.
- Tofamiliarizethestudentswiththeconceptofentrepreneurship.
- Toidentifyanddevelop theentrepreneurial talentsof thestudents.
- Togenerateinnovativebusiness ideasintheemergingindustrialscenario.
- Toenablethestudentstoacquire knowledgeaboutbasicsofBankingandInsurance.
- Tofamiliarizethestudentswiththemoderntrendsinbanking.
- ToacquaintthestudentswiththebasicConcepts andtoolsofcostandManagementAccounting
- Tofamiliarizethestudentswithcorporatelaw andtomakethemawareoftheapplicationsofimportanceofcompanylaw in the management oforganizations.
- To familiarizestudentwiththeusequantitativetechniquesinmanagerialdecisionmaking.
- Togive aconceptual understandingofhumanresourcepracticesinorganizations.

- To provide an insight into the fundamentals of business research and to acquire practical knowledgeand required skills in carrying out research which they are expected to possess when they enter theindustryas practitioners.
- Tofamiliarizethestudentswiththeconcepts,toolsandpracticesofoperationsmanagement and to learn about the decisions and processes of operations management in a businessfirm.
- Tofamiliarizethestudentswiththebasicconceptsofindividualbehaviorandorganizationalbehavior
- Toenablethestudentstocatchan ideaabout inter-personalandgroupbehaviour
- Toacquireknowledgeregardingtheorganizationalchangeandorganizationaldevelopment
- Toprovidea basicknowledgeaboutoperationsresearchandto acquaintthestudentssomecommonoperations researchtools forvarious businessdecisionmarketingsituations.
- ToenablethestudentstoacquirebasicknowledgeofdifferentfacetsofProjectManagement.
- To impart basic knowledge and equip students with application of principles and provisions ofIncomeTaxAct, 1961 amended up-to-date.
- To provide basic knowledge about the structure, organization and working of financial system inIndia.
- To develop understanding aboutthevariousfinancialservicesandinvestmentopportunitiesavailable inthe country.
- To familiarize the students with the world of investments and to provide a theoretical frameworkforthe analysis and valuation ofinvestments.

LEARNING OUTCOMES

- Understand and applytheconceptsofplanning,organizing,staffingandcontrollingforeffective management.
- Awareand applytheethicallyand sociallyresponsible behavior in Management.
- Awareandpursuethemodernmanagement practicesinbusiness.
- Acquireknowledgeregardingrelevanteconomicconceptsapplicableinmanagerialdecisions.
- Designcompetitionstrategies,includingcosting,pricing,productdifferentiationandmarketenvironmentaccording to thenatures of productsandthe structures ofthe markets.
- Makeoptimalbusinessdecisionsbyintegratingtheconceptsofeconomics.
- UnderstandanddevelopinsightsandknowledgebaseofvariousconceptsofQuantitativeTechniques.
- DevelopskillsforeffectivelyanalyzeandapplyQuantitative Techniquesindecisionmaking.
- Developinsightsonvariousconceptsand FunctionsofHumanResource Management.
- UnderstandanddevelopinsightsandknowledgebaseofvariousconceptsinResearch.
- Developskills forconductingbusinessresearch.

- UnderstandthedifferentconceptsofoperationManagement.
- Acquiretheknowledgeto makeplans attheoperational levelofan industry.
- UnderstandthedifferentconceptsofOrganizationalBehavior.
- Analyseindividualandgroupbehavior.
- Understandanddealwithorganizational change,developmentandstress.
- The students will be able to learndifferent OR techniques useful inmanagerialdecisions.
- Understandthedifferentconceptsofmanaginga project Analysethe viabilityofaproject.
- The students will be able to understand the latestprovisionsof IncomeTax ActLawandenabletocomputedifferentheadsofincomeaswellastotalincomeand taxliability.
- To understand different aspects and components of financialInstitutions and financial markets. This will enable the students to take rational decisions on financialmarketand institutions.
- The students will be able to aware of various financial services available inIndian financial system.
- UnderstandanddevelopinsightsandknowledgebaseofvariousconceptsofQuantitativeTechniques.
- DevelopskillsforeffectivelyanalyzeandapplyQuantitative Techniquesindecisionmaking.
- The students will be able to aware of various investmentopportunitiesfrom aninvestor'sperspectiveofmaximizingreturn oninvestment.
- Discussand applyfundamental accountingconcepts, principlesandconventions.
- Recordbasicaccountingtransactionsandprepareannualfinancialstatementsforasoleproprietorship business.
- Recordaccountingtransactionsinrespectofhirepurchaseandinstallmentsystemandbranches.
- Understandanddevelopinsightsandknowledgebaseofvariousconceptsthatdriving marketingstrategies.
- Developskillsinorganizingforeffectivemarketingandinimplementingthe marketplanningprocess.

- Thestudentswillbeabletounderstand,numericalequations,matrix,progression, financialmathematics,descriptivestatisticsandtheirapplications.
- UnderstandandapplyfundamentalIndASsoninventories,PPE,provisions,incometax,borrowingcost and intangibleassets.
- Prepareannualfinancialstatementsforcompaniesandcomputeaccountingratios.
- Recordaccountingtransactionsinrespectof redemptionofpreferencesharesanddebentures.
- Understandanddevelopinsightsandknowledge baseofvariousconceptsof finance
- DevelopskillsforeffectiveFinancial, InvestmentandDividenddecisionsmaking.
- Analysestatutoryprovisionsand thecoreconceptsin businesslaws.
- Analyzelegalissuesarisinginday-to-daybusinessoperationsprevalentinIndia.
- Discusspossiblesolutionstoissuesinorganisationsintheframeworkof businesslaws.

- Understandcostandmanagementaccountingconceptsanditsapplication fordecisionmaking.
- Awareasto cost consciousnessandthevariousmethodsand techniques ofcosting
- Understandthe featuresanddifferenttypesofcompanies
- Awareastotheformationofcompaniesand alsoas todifferentdocuments ofcompanies.
- Understandthesharecapitalandother relevantprovisionsofthesame.
- Understand the management, corporate governance, corporate social responsibility and some basicaspectsof SEBI.
- Understandthe provisionsofconductingmeetings and also thewindingupprocedureofcompanies.

M.COM DEGREE PROGRAMME

LEARNING OBJECTIVES

- Tofamiliarizestudentswiththeconceptsofmacro-economicinwhichaBusinessorganizationoperates.
- Togiveanideaaboutthepoliciesofthegovernmentandassesstheirimpacton business.
- Tofamiliarizethestudentswiththeknowledgeofcorporateethics.
- Toenablethestudentstounderstandtheemergingtrendsingoodgovernancepractices.
- Tocreatecorporatefinancialreports intheglobalintheglobal andIndiancontext.
- Toacquaintstudentswithimportantquantitativetechniques,whichenablesoundbusinessdecision making.
- Tomakestudentslearntheprocessofapplyingappropriatequantitativetechniquesforvalidatingfindingsandinterpreting results.
- Toenablestudentstounderstandandapplytools,techniques,andconceptsinmanagerialdecision-makingprocess.
- Toinculcateanalyticalskillsininterpretinganddiagnosingbusinessproblems.
- Togenerateawarenessamongstudentsaboutvariouscompetitive.examinations
- Tomotivate studentstotakepartin NETexamination.
- To provide knowledge and skills in the theory and practice ofcorporatefinancialaccounting.

- Toprovideinsightintosomeoftheimportantaccountingstandards ofIFRS/IndAS.
- Toenableproblemsolvingabilitiesamongstudentsinmattersofvariousco rporatesituationssuchasconsolidationofgroupinformation,corporatere structuringandliquidation.
- Toenablethestudentstoknowtheapplicationsof Costaccountingtools,Techniques andconceptsinmanagerial decision-makingprocess.
- Toprovidestudentsadequateknowledgeofcostmanagementandcontroltechniquesandt oenablethemtoapplytheseformanagingbusiness.
- Tofamiliarizestudentswithconceptsofmanagementscienceandtoolssupportingdecision making.
- ToenablestudentstoapplyManagementsciencetechniquesinappropriatedecisionsituatio ns.
- Topromoteinnovationandentrepreneurshipamongstudents.
- Toprovideopportunityforcreativemindandcreativityincampuses.
- Toacquaintthestudentswiththebasicanalyticaltechniquesandmethodsoffinancialmanag ementofbusinessorganization.
- To provide the students the exposure to certain advanced analytical techniques that are used for takingfinancialpolicy decisions.
- To enable students to understand computation of income under various heads, taxable income of variousentities, tax planningandprocedureofassessment. Toacquaintstudentswithprocessandmethodologyofresearch.
- Toenablestudentstoidentifyresearchproblems,collectandanalysedataandpresentresults.
- To establish a conceptual framework for the study of security analysis and portfolio management. Thiscoursewillprovidethe students theabilitytounderstandandutilizetheskill ofoptimizingreturns.
- To provide the students a sound information and knowledge of broad framework of

financial markets andinstitutions.

- To impartthestudentsanunderstanding oftheinter-linkagesandregulatory framework withinwhichthesystem operatesinIndia.
- To make the students efficient in the area of derivatives, by giving them the knowledge of basics inoptions, futures,swapsetc.
- Toacquaintthestudentswiththeoreticalandpracticalknowledgeofassessmentandtaxplanningofdifferentassesses.
- To familiarize the students with major and latest provisions of the India tax laws and related judicialpronouncements pertaining to various assesses with a view to derive maximum possible tax benefitsadmissibleunderthe law.
- Tobuildanunderstandingamongstudentsabouttheconcepts,vitaltools andtechniquesusedforfinancialdecisionmaking bya businessfirm.
- Tounderstandtheconceptandsignificanceofinternationalfinance
- Tounderstandtheinternationalfinancialmarketsandexchangetheories
- Togetanideaaboutforeignexchangeexposureandriskmanagement

LEARNING OUTCOMES

- To acquaint a student with conventional as well as contemporary areas in the discipline of Commerce.
- To train the student to develop conceptual, applied and research skills as well as competencies required for effective problem solving and right decision making in routine and special activities relevant to financial management and Banking Transactions of a business.
- To facilitate the students for conducting business, accounting and auditing practices, role of regulatory bodies in corporate and financial sectors nature of various financial instruments.
- To provide in-depth understanding of all core areas specifically Advanced Accounting, International Accounting, Management, Security Market Operations and Business Environment, Research Methodology and Tax planning.
- Develop an ability to apply knowledge acquired in problem solving.
- The students can work in different domains like Accounting, Taxation,Banking and Administration.

- Ability to start their own business.
- Ability to work in M.N.Cs as well as pvt, and public companies.
- To develop team work, leadership and managerial and administrative skills.
- To provide understanding of the Tasks, Functions and Skills of strategic management and latest developments.
- To impart knowledge of a theoretical foundation for the preparation and presentation of financial statements
- To inculcate the understanding of rules of measurement and reporting relating to various types of business entities.
- The student will be versed in the fundamental concepts of different aspects of income tax.
- To give knowledge about Submission of Income Tax Return, Advance Tax, and Tax deducted at Source, Tax Collection Authorities under the Income Tax Act, 1961.
- To make students aware about the challenges and opportunities of Financial Management.
- To explain the students with the areas of Business Research Activities.
- To enhance capabilities of students to conduct the research in the field of social sciences and business.
- To facilitate students, in developing the most appropriate methodology for their research studies.
- To aware the students with the art of using different research methods and techniques.
- To provide in depth knowledge about process of formation of group behavior in an organization set up.

To make the students understand various concepts of organization behaviour

BA Arabic Language &Literature

PROGRAMME SPECIFIC OUTCOMES

1. The learner understands the lingua franca of the Arab countries and also to equip them to acquire basic skills in professional and functional Arabic.
2. The learner qualifies to seek employment in several new fields. In India and Gulf- Arab countries, which demand knowledge in Functional Arabic.
3. The Students develop communication Skills and values of communication

among them.

4. Equipping the Students to handle Arabic language in real life situations with working knowledge in different fields of life.
5. Attaining the Mastery of Arabic language with sufficient knowledge in applied grammar.
6. Acquiring proficiency in professional & business Arabic.
7. Sensitizing the student to the aesthetic, cultural and social aspects of literary appreciation and analysis and the socio – literary elements of classical & Modern Arabic Literature.
8. Estimate the scope of various genres in Arabic literature.
9. Reading &Understanding literary and general works in Arabic.
10. Acquiring a practical knowledge in functional Arabic required for the fields of Travel, Tourism, Hospitality Management, Health, Export and Journalism.
11. Understand the cultural and historical background of Islam in the medieval period.
12. Expanding translation and correspondence skills related with the various business field.
13. Acquire the essential mastery in technical Arabic.
14. The Student prepared for a rhetoric approach of literary appreciation and evaluation.
15. Introduce the world of Indian Arabic Literature and also asquint the works of eminent authors in India with a glimpse on Kerala.
16. Acquaint with the role of Arabic literature as a medium of resistance against European colonialism in Malabar.
17. Study the contribution of medieval Arabs to the development of human knowledge and science in the middle Ages.
18. Enhance and expand the basic informatics skills and attitudes relevant to the emerging society.
19. Pursuing the development of new trends in Arabic Language and literature since the Arabic Literary Renaissance.

CORE COURSES

ARB 1 B 01 Basic Arabic Grammar

Course outcomes

- The learner acquires the capacity to identify and analyze the basic structure patterns in Arabic language.
- The learner acquires the capacity to be familiar with the terms and terminologies of Arabic Grammar.
- The learner understands practicing how to put words together to create coherent ideas.
- The learner understands the meaning of grammatical structures in spoken and written areas.
- The learner improves capacity to read and write Arabic texts.

ARB 2 B 02Advanced Arabic Grammar

Course outcomes

- The learner acquires the capacity to identify and analyze the basic structure patterns in Arabic language.
- The learner becomes familiar with the Arabic grammar to apply in various situations.
- The learner gains the ability to read and understand the passages in Arabic Language.
- The learner acquires the capacity to use Arabic language effectively for study and job purpose.
- The learner gains fluency and accuracy in Arabic communication.

ARB 3 B 03 Applied Arabic Grammar

Course outcomes

- The learner acquires the capacity to identify and analyze thebasic structure patterns in Arabic language.
- The learner gains the ability to read and write a passage in Arabic Language.
- The learner becomes familiar with the Arabic grammar to apply in various situations.
- The learner acquires the capacity to use Arabic language effectively for study and job purpose.
- The learner enhances the writing style needed for creative writing.

ARB 3 B 04 Reading Modern Arabic Prose

Course outcomes

- Familiarize with the development of prose writing in Arabic.
- The learner assesses the difference between literary prose and artistic prose in Modern Arabic.
- Understand the characteristics of modern Literature in Arabic.
- Estimate the major works in Arabic Prose.

ARB 4 B 05 Methodology of Arabic

Course outcomes

- Understand the origin and evolution of the language and knowledge.
- The learner familiarizes with the methodology of Arabic language and literature
- Acquire the advanced vocabulary and different methods of writing and reading.
- The learner gets ability to identify and analyze the various linguistic discourses.

ARB 4 B 06 Reading Modern Arabic Poetry

Course outcomes

- Understand the various genres of Modern Arabic Poetry.
- Sensitize to the Modern styles and trends of poetic experiments of revolutionary poets and the socio-literary elements of Modern Arabic poetry.
- Inspire to develop their creative writing in modern poetry.
- Estimate the scope of various genres of Modern Arabic poetry.

ARB 5 B 07 Novel Literature in Arabic

Course outcomes

- The learner understands the distinct features of Arabic novels.
- The learner gets acquainted with the prominent novels and novelists in Arabic.
- The learner assesses the development of novel Literature in Arabic.
- The Learner appreciates the celebrated novelists and their contributions in Arabic.

ARB 5 B 08 Reading Medieval Arabic Literature

Course outcomes

- Understand the literary tradition of Medieval Arabic Literature.
- The learner appreciates and analyzes the literary texts in Medieval Arabic Literature.
- The learner gets light on various genres in Medieval Arabic Literature.

- The learner becomes aware of aesthetic, cultural and social aspects of Medieval Literary Texts.

ARB 5 B 09 Introduction to Translation

Course outcomes

- Emerge the ability in undertaking the translation assignments of different areas.
- Acquire the basic theories and principles of translation.
- Familiarizes with commercial vocabulary and technical language in the different domains.
- The learner becomes aware of the major problems and difficulties of translation.
- practice of simple and general translation from Arabic to English and Malayalam &vice versa.

ARB 5 B 10 Informatics in Arabic

Course outcomes

- The learner gets acquaintance with the stages of growth of digital technologies.
- Update and expand the basic informatics skills and attitudes relevant to the emerging knowledge.
- Equip the students to utilize the digital knowledge/ E-resources effectively for their chosen course of study.
- Review the basic concepts and functional knowledge in the field of Informatics.
- Provide theoretical and practical experience in Arabic computing.

ARB 5 B 11 Commercial and Business Arabic

Course outcomes

- Acquire the practical knowledge in commercial Arabic used in various translation fields.
- The learner prepares commercial and business documents in Arabic.
- Acquire the ability to find out equivalent terms and structure in the source language and target language.
- The learner becomes capable for translation in Arabic to English and vice versa.
- Acquire the skill of the translation of documents.

ARB 6 B 12 Reading Classical Arabic Literature

- Appreciate and analyze the literary texts in ClassicalArabic Literature.

- The learner gets light on various genres in Classical Arabic literature.
- The learner gets awareness of literary tradition of Classical Arabic.
- Evaluate the aesthetic, cultural and social aspects of Classical Literary texts.

ARB 6 B 13 Introduction to Literary Criticism

1. The learner gains the ability for literary reading.
2. The learner gets an idea on origin and development of Arabic literary criticism.
3. The learner gets an idea on different schools of literary criticism in Arabic.
4. The learner acquires terms of literary criticism.

ARB 6 B 14 Rhetoric and Prosody

1. The learner earns the capacity to understand the fundamentals of Arabic rhetoric and poetics.
2. The learner gains the ability to use the rhetoric techniques in Arabic Literature.
3. The learner acquires the capacity to be familiar with the difference between literary texts and others.
4. The learner gains ability to sensitize the theories of Rhetoric in Arabic Literary Works.
5. The learner acquires the experience in using tools and techniques in Arabic literary works.
6. The learner gains the capacity of Arabic poetry when they familiarize with the meters of Arabic poetry.

ARB 6 B 15 Arabic Journalism and Media

1. To learner understand the legacy of printing technology in the Arab World
2. The learner aquaints with the Arabic Journalism and its various aspects
3. Understand the development of journalism in general and the Arabic Journalism in the World
4. The student familiar with the terminologies in the field of Arabic Journalism.
5. Acquire experience in preparing simple journalistic news and articles in Arabic.

ARB 6 B 16 Indian Writings in Arabic

1. The learner understands the legacy of Arabic Study in India.
2. The learner attains the salient features of Arabic literature in India.
3. The learner familiarizes with the pioneers of Arabic literature and works.
4. The student understands the role of literature in creating patriotism.

Complementary Courses

ARB 1(2) C 01 Thareekh al Islam al Siyaasiwa al thaqafi –Part I

- The learner acquires the knowledge on the Geography of Arabia, situations and life of Arabs before Islam, tribal culture, religious beliefs and social systems prevailed in the Pre- Islamic days.
- The learner understands early career of Prophet, advantages and days of Prophet-hood, ultimate migration to Medina, victories during Prophetic period.
- The learner becomes familiar with the administrative set up formed by pious Caliphs.
- The learner understands on the Political, Cultural and social Conditions of Umayyad period.
- The learner gains an idea about major Umayyad dynasty rulers and their important works and reforms to the Muslim civilization.
- The learner becomes aware of the political and intellectual movements of Umayyad Dynasty and their influences on the Muslim world.

ARB 4 (3) C 02 Thareekh al Islam al Siyaasiwa al thaqafi –Part II

- The learner becomes familiar with the Abbasid Period and political, cultural and social Conditions of Abbasid period.
- The learner gains an idea about major Abbasid dynasty rulers and their important works and reformations to the Muslim civilization.
- The learner becomes aware of the relevance of House of Wisdom and some small kingdoms led to the political and intellectual improvements of Abbasid period
- The learner understands on Ottoman Empire, Major rulers, crusades, fall of Ottomans and declaration of secularism.
- The learner understands legacy of Muslim Spain and some famous rulers and Khalifs in Spain and gains an idea on contributions of Spain to arts and culture.
- The learner understands History of Islam in India and various features led to the cultural and educational reforms in India.
- The learner becomes familiar with the history of Islam in Kerala and cultural & educational developments of Muslims in Kerala.

ARB 1 (2) C 03 Functional Arabic–Part I

1. Acquire the basic structure of language and proficiency in communication.
2. The learner gains the ability to read texts and communicate with others.
3. The Student attains speaking skills in Arabic.
4. The learner gets familiarized with the vocabulary and phrases in communication.

ARB 4 (3) C 04 Functional Arabic–Part II

Acquire the basic structure of language and proficiency in communication.

1. The learner gains the ability to read texts and communicate with others.
2. The Student attains speaking skills in Arabic.
3. The learner gets familiarized with the vocabulary and phrases in communication.
4. Acquire the communication and response in real life situation.

OPEN COURSES

ARB 5 D 01 Practice on Gulf Arabic

1. Understand the elementary components of Arabic.

2. Familiarize with basic working knowledge in Communicative Arabic .

3. Acquaint with the colloquial usages of Modern Arabic prevalent in major Arab countries.

ARB 5 D 02 An Introduction to Arabic Literature

1. Understand the origin of Arabic language and literature.

2. The learner familiarizes with the stages of development of Arabic literature.

3. The learner appreciates the aesthetic aspects of Arabic language.

4. The learner gets enlightened with the different genres of Arabic Literature, major works and authors in Arabic literature.

ARB 5 D 03 Heritage of Arab Muslim Sciences

1. Understand the origin and development of various science epistemologies of Arab Muslims.
2. Assess the features of Arab Muslim heritage in science.
3. Familiarize with the contribution of Medieval Arabs to the development of human knowledge and science in the Middle Ages.

Programme Specific Outcomes of

MA Arabic Language and Literature

On successful completion of this programme a learner will be able to:

- PSO1: Communicate in Arabic in various life situations through listening,

- speaking, reading and writing in person and via electronic media.
- PSO2: Apply the advanced structure in oral and written form of Arabic Language.
- PSO3: Engage in creative writing by using individual potential acquired.
- PSO4: Construct syntactically and semantically correct sentences in Arabic
- Language.
- PSO5: Develop sense of national and international understanding and cooperation along with the feeling of oneness of the humanity
- PSO6: Recognize different value system and understand the moral and
- constitutional dimensions of individual decisions
- PSO7: Appreciate Arabic poetry in the different periods: Jahiliyya, Ismlamic,
- Umayyads, Abbasid, Modern and Contemporary
- PSO8: Analyze and recognize new trends in modern Arabic poetry.
- PSO9: Elucidate the socio-cultural and historical background of the different
- periods and its impact on the literary works in these periods.
- PSO10: Understand the concepts of linguistics in general and Arabic in particular
- PSO11: Analyze the modern linguistic theories and Classify the branches of
- modern linguistics
- PSO12: Apply Arabic rhetorical theories in analyzing literary texts.
- PSO13: Identify the metered poetry and free verse.
- PSO14: Summarize the contribution of prominent literary personalities in classical,medieval, modern and contemporary periods.
- PSO15: Evaluate the role of fiction in the emergence of Arabic literature in
- contemporary world PSO16: Appreciate and evaluate the literary texts in modern fiction
- PSO17: Evaluate the political, historical and cultural dimensions in the evolution of the modern Arab world.
- PSO18: Use the digital tools in collection and production of resources in Arabic
- PSO19: Examine historical contexts for the development of contemporary criticism and its theory. PSO20: Apply theories of literary criticism in the critical evaluation of literary texts
- PSO21: Differentiate the types of media and the importance of new media in the
- digital era
- PSO22: Prepare and present news, news reports, editorial and column and
- advertisements in Arabic

Detailed Curriculam Structure and Syllabus – MA Arabic

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- PSO23: Acquaint with the history of the development of Arabic language and literature in Arabic and evaluate the scholarly and literary works of Indian scholars in Arabic

- PSO24: Appreciate the literary texts of Indian Writers in Arabic
- PSO25: Identify the literary style and thematic selection of prominent women writers of prose and poetry from different countries of the modern Arab world.
- PSO26: Appreciate the literary and scholarly works of prominent women writers
- PSO27: Prepare research papers scientifically
- PSO28: Impart experience in understanding various stages of a research work.
- PSO29: Recognize the research aptitude in individual and Inculcate sprit of scientific inquiry.

- PSO30: Compare the theme, methodology and style of description of different Interpreters of Quran. PSO31: Survey and summarize the origin and development of Drama in Arabic.
- PSO32: Appreciate the drama in Arabic.
- PSO33: Sensitize the emotional density of the dialogues in this performing art form
- PSO34: Identify the advanced level concepts and theories in the field of translation
- PSO35: Translate the official and nonofficial documents related to government, industry and service. PSO36: Familiarize the various genres of Islamic literature and assess the influence of Islamic Literature on Arabic literature
- PSO37: Familiarize with the development of Essay Writing, Autobiographical and Travelogue Literature in Arabic
- PSO38: Estimate the major Works in the areas of Essay Writing, Autobiographical and Travelogue Literature in Arabic
- PSO39: Understand the vast treasure of classic literary and nonliterary works in Arabic.
- PSO40: Identify the literary genres in Arabic Literature in the Maghrib
- PSO41: Assess the contribution of literary personalities in the Maghrib in fiction,poetry and criticism so as to appreciate literary texts in the Maghrib.

ARA 1 C 01 Advanced Arabic Structure

- CO1: Understand the advanced structure of Arabic language
- CO2: Construct syntactically and semantically correct sentences in ArabicLanguage.
- CO3:Analyze the structure of simple and complex structures in Arabic language
- CO4:Analyze the grammatical theories related to nominal sentences in Arabic
- CO5:Apply the advanced structure in oral and written form of Arabic Language
- ARA 1 C 02 Modern and Contemporary Arabic Poetry
- CO1: Elucidate the socio-cultural and historical background of the period and its Impact on poetry
- CO2: Analyze poems and recognize new trends in modern Arabic poetry.

- CO3: Apply critical reading to identify the context, theme, message, mood, tone,emotions and language of the poems.
- CO4: Bring out the implied meanings of the text.

ARA 1 C 03 Linguistics, Rhetoric and Prosody

- CO1: Understand the concepts of linguistics in general and especially in Arabic
- CO2: Analyze the modern linguistic theories
- CO3: Estimate the contribution of western and Arab scholars in linguistics
- CO4: Compare the characteristics of language, language system, and modern language theories.
- CO5: Classify the branches of modern linguistics.
- CO6: Understands the basic and advanced concepts of Arabic Rhetoric andProsody.
- CO7: Differentiate between literary and non-literary texts
- CO8: Apply Arabic rhetorical theories in analyzing literary texts.
- CO9: Identify the metered poetry and free verses
- CO10: Apply the theories in prosody in compiling poetry.
- CO11: Differentiate between prose and poetic texts and understand the role of prosody in it.

ARA 1 C 04 Classical Arabic Literature

- CO1: Appreciate the Arabic Prose and Arabic Poetry in classical periods.
- CO2: Understand the socio-political situations of Arabia in Pre Islamic, Islamic and Umayyad Periods. CO3: Identify the origin and development of Arabic literature in classical period.
- CO4: Summarize the contribution of prominent literary personalities in classicalPeriod.
- CO5: Evaluate the influence of socio-political situations of Arabia in the poetry in classical period
- CO6: Evaluate the role of qura'an and Hadith in preserving Arabic language

ARA 1 A 01 Ability Enhancement Course - Book Review and Presentation

- CO1: Familiar with the process of data collection, analysis and reporting
- CO2: Enhance the capacity of the learners in reading, understanding, analyzing and comprehending the literary text in Arabic
- CO3: Prepare book reviews about the books read by the learner
- CO4: Prepare slide presentation on the basis of the book review
- C05: Enhance comprehension and assimilation skills in learners

ARA 2 C 05 Modern Arabic Fiction

- CO1: Summarize the development of fiction literature in Arabic.
- CO2: Identify the difference between narrative style in traditional texts and modern texts.
- CO3: Evaluate the role of fiction in the emergence of Arabic literature in contemporary world
- CO4: Appreciate and evaluate the literary texts in modern fiction
- CO5: Express feelings and emotions fictionally

ARA 2 C 06 History of Contemporary Arab World

- CO1: Evaluate the political, historical and cultural dimensions in the history of modern Arab world.
- CO2: Explain the specific features of political movements and its the impacts in the modern Arab Gulf.
- CO3: Explain Palestine issues and its influences on the contemporary Arab world.
- CO4: Comprehend and analyze the resistance movements against invasion in the contemporary Arab world.
- CO5: Express diverse view of the issues and concerns in the contemporary Arab world.
- CO6: Surveys the current situations in the contemporary Arab world.
- CO7: Assess the role of oil economy and its influences in the modern Arab world.
- CO8: Develop international understanding, brotherhood and peaceful co-existence

ARA 2 C 07 Medieval Arabic Literature

- CO1: Appreciate the Arabic Prose and Poetry in medieval period.
- CO2: Understand the socio-political situations of Arabia in Abbasid Period.
- CO3: Summarize the development of Arabic literature in medieval period.
- CO4: Evaluate the translation and compilation movements in medieval period
- CO5: Estimate the contribution of prominent literary personalities in the development of prose and poetry in Arabic
- CO6: Analyze the development of Maqamat in Abbasid period

ARA 2 C 08 Arabic Enabled ICT in Academic Writing

- CO1: Familiarize the use of ICT in teaching and learning process

- CO2: Understand the ICT tools in academic writing
- CO3: Use the digital tools in collection and production of resources in Arabic
- CO4: Apply theoretical and practical knowledge in Word Processing and spreadsheet in preparation of research articles.
- CO5: Prepare slide presentations using presentation software
- CO6: Use internet as a tool for data collection and communication in Arabic.

ARA 2 A 02 Professional Competency Course (PCC) Translation of Literary Works

- CO1: Familiarize with basic concepts of literary translation
- CO2: Identify the specularities of literary translation
- CO3: Translate the literary texts from Arabic to English/ Malayalam and vise versa

ARA 3 C 09 Literary Criticism: Theory and Practice

- CO1: Define Literature and identifies the elements of literature
- CO2: Summarize the origin and development of Arabic literary criticism from the period of Jahiliyya, Umayyad, Abbasid and the middle a
- CO3: Identify major theoretical/critical movements and theories, as well as primary concepts with which they are associated.
- CO4: Define and apply specific theoretical concepts, theories, and terms to literary and cultural texts.
- CO5: Evaluate and analyses strengths and limitations of critical/theoretical arguments.
- CO6: Examine historical contexts for the development of contemporary theory and criticism comparing influence of European Literary Schools in Arabic.
- CO7: Strengthen and deepen critical reading, writing, and interpretive practices.
- CO8: Apply theories of literary criticism in the critical evaluation of literary texts.
- CO9: Acquaint with the literary thoughts and movements like Classicism, Neo Classicism, Romanticism, Realism, Impressionism, Expressionism, Symbolism etc.

ARA 3 C 10 Creative Writing for Media

- CO1: Familiarize and Summarize the development of Press and Journalism in Arabic
- CO2: Identify the new media and evaluate the presence of Arabic Language in it.

- CO3: Analyze the basic concepts and characteristics of journalism
- CO4: Differentiate the types of media and the importance of new media in the digital era.
- CO5: Understand news, news reports and other journalistic articles in Arabic
- CO6: Analyze news, news reports and other journalistic articles in Arabic
- CO7: Prepare and present news, news reports, editorial and column writings in Arabic.
- CO8: Prepare advertisements in Arabic for media
- CO9: Translate the journalistic articles from Arabic to English / Malayalam and vice versa
- CO10: Conduct and prepare press interviews

ARA 3 E 01 Arabic Literature in India

- CO1: Appreciate the literary texts of Indian Writers in Arabic
- CO2: Acquaint with the history of the development of Arabic language and literature in India.
- CO3: Summarize the contribution of Indian scholars in Arabic language and Literature.
- CO4: Acquaint with the major scholarly works of Indian Arabic scholars
- CO5: Evaluate the scholarly and literary works of Indian scholars in Arabic

ARA 3 E 02 Women's Writing in Arabic

- CO1: Acquaint with the history, development and the rise of women writings in Arabic.
- CO2: Summarize the biography and literary works of the women writers like Al Khansa, SakkeenaBinth, Laila Akheeliya, Rabiya Al Adviyya etc.
- CO3: Identify the literary style and thematic selection of prominent women writers of prose and poetry from different countries of the modern Arab world.
- CO4: Appreciate the selected prose and poetry portions from the works of women writers like May Ziyada, Buthaina, Thavakkul Karman, Qamar Kailany etc.

ARA 3 E 03 Research Methodology

- CO1: Identify the different methods of research and analytical techniques.
- CO2: Summarize the basic canons of scientific enquiry and data collection.
- CO3: Prepare research papers scientifically
- CO4: Impart experience in understanding various stages of a research work.
- CO5: Apply scientific citation and referencing methods
- CO6: Recognize the research aptitude in individual
- CO7: Inculcate sprit of scientific inquiry

ARA 3 E 04 Development of Thafseer Literature

- CO1: Comprehend origin, development and fundamentals of Quran Tafsir.
- CO2: Distinguish the difference between 'Tafsir' and 'Ta'wil' in Quran interpretations.
- CO3: Compare the theme, methodology and style of description of different interpreters of Quran.
- CO4: Find out the development of Quran Thafseer and schools of Quran Thafseer.
- CO5: Understand the relevance of Quranic interpretation during Prophet's lifetime-
- CO6: Assess the trends and approaches of Quranic exegesis in modern period.

ARA 4 C 12 Drama and Interaction Skills

- CO1: Survey and summarize the origin and development of Drama in Arabic.
- CO2: Assess the elements and various types of Drama Literature.
- CO3: Familiarize modern dramatists and the features of their works.
- CO4: Judge the depth and relevance of themes of the drama
- CO5: Sensitize the emotional density of the dialogues in the performing art form

ARA 4 C 13 Advanced Translation and Simultaneous Interpretation

- CO1: Identify the advanced level concepts and theories in the field of translation
- CO2: Infuse the emergence of the job avenues in the field of translation
- CO3: Implement the theories of translation in the process of translation at advanced level
- CO4: Translate the documents in the fields of tourism, medical tourism, medical,business, commerce, diplomatic, court etc.
- CO5: Carry out translation of journalistic articles
- CO6: Practice literary translation from Arabic to English / Malayalam and vice Versa/ translation and Computer assisted translation
- CO8: Practice on simultaneous interpretation in Arabic and English

ARA 4 E 05 Islamic Literature In Arabic

- CO1: Familiarize the various genres of Islamic literature
- CO2: Assess the influence of Islamic Literature on Arabic literature
- CO3: Estimate the interface of literature and popular culture, arts, religion, nationalism and politics.
- CO4: Compare the changes in the Islamic literature throughout the ages

ARA 4 E 06 Modern Essay, Biography and Travelogue

- CO1: Familiarize with the development of Essay Writing, Autobiographical and Travelogue Literature in Arabic
- CO2: Summarize the contribution of prominent literary personalities in the Essay,Autobiography and Travelogue Literature
- CO3: Evaluate the style of prominent Arab Writers in the field of Essay, Autobiography and Travelogue.
- CO4: Estimate the major Works in the areas of Essay Writing, Autobiographical and Travelogue Literature in Arabic
- CO5: Appreciate the texts in Arabic Essay, Autobiography and Travelogue

ARA 4 E 07 Classic Works in Arabic

- CO1: Understand the historical developments of Arabic writings.
- CO2: Identify the role of various centers of knowledge in development of Arabic writings.
- CO3: List the major resource and reference works in Arabic language.
- C04: Categorize classic Arabic dictionaries and encyclopedia based on its style and contents.
- C05: Analyze Arabic works in various disciplines.

ARA 4 E 08 Modern Arabic Literature in the Magrib

- CO1: Familiarize with the development of Arabic Literature in the Magrib
- CO2: Identify the literary genres in Arabic Literature in the Magrib
- CO3: Assess the contribution of literary personalities in the Magrib in Fiction and poetry.
- CO4: Estimate the literary works in the Magrib
- CO5: Appreciate the Arabic poems in the Magrib
- CO6: Appreciate the Arabic fiction in the Magrib

ARA4C14 Special Authors - General Study

- CO1: Survey and Evaluate the contribution of Special Authors: Najib Mahfouz, Abbas Mahmood al Aqqad and Ali Ahmad Ba Kathir
- CO2: Analyze the literary works of Special Authors: Najib Mahfouz, Abbas Mahmood al Aqqad and Ali Ahmad Ba Kathir.
- CO3: Prepare detailed notes on the selected works of Special Authors: Najib Mahfouz, Abbas Mahmood al Aqqad and Ali Ahmad Ba Kathir

STATISTICS COMPLEMENTARY COURSES FOR B.Sc. MATHEMATICS PROGRAMME CBCSSUG 2019 (2019 ADMISSION ONWARDS)

COMPLEMENTARY COURSE : STA 1 C 01 - INTRODUCTORY STATISTICS

Course Objectives: The main objectives of this course are to:

1. Understand the origin, significance and scope of Statistics

2. Know the significance of presenting data in the form of tables and diagrams

3. Learn computational aspects of basic statistical measures.

4. Understand the relationship between two variables

5. Be acquainted with the knowledge of time series analysis

6. Understand the significance of index numbers and its types

Course Learning Outcomes:

After successful completion of the course, the Student should be able to:

1. Know the functions of Central Statistical Office, National Sample Survey Organization and the Department of Economics and Statistics.

2. Understand the scope and necessities of Statistics

3. Analyse the nature of the data and interpret the measures.

4. Analyse the data and predict the future values using curve fitting.

5. Measure and interpret the degree of relationship between variables and estimate the average relationship using regression

6. Acquire knowledge in time series data and various index numbers using unweighted and weighted indices.

COMPLEMENTARY COURSE : STA 2 C 02 - PROBABILITY THEORY

Course Objectives:

1. Understand theoretical probability and its concepts.

2. Introduce the concept of random variable and its types.

3. Introduce distribution function and generating functions

4. Extend univariate variable to bivariate variable and study its properties.

Course Learning Outcomes:

After successful completion of the course, the Student should be able to:

1. Understand the concept of probability and relate to real life situations.

2. Apply the theorems in practical problems with conditional probability.

3. Understand the concept of random variable and classification.

4. Understand probability distribution function and its properties.

5. Know the mathematical expectation, moment generating function, characteristic function and their properties.

6. Understand the concept of marginal and conditional probability distribution for two dimensional random variables and their independence.

COMPLEMENTARY COURSE : STA 3 C 03 - PROBABILITY DISTRIBUTIONS AND SAMPLING THEORY

Course Objectives:

1. Introduce various types of probability distributions and study its properties

2. Explore the applications of probability distributions

3. Study the significance of various Limit theorem.

4. Learn various methods of sampling

5. Understand various statistic generally used and study their inter-relationship

Course Learning Outcomes:

After successful completion of the course, the Student should be able to:

1. Understand different discrete probability distribution associated with real life situations.

2. Understand the characteristics of different continuous distribution.

3. Understand the uses of Chebyschev’s inequality and Central Limit Theorem.

4. Understand simple sampling with and without replacement, systematic sampling, stratified sampling and cluster sampling.

5. Understand functions of normal variables leading to Chi-square, t and F distribution and inter relations.

COMPLEMENTARY COURSE : STA 4 C 04 - STATISTICAL INFERENCE AND QUALITY CONTROL

Course Objectives:

1. Introduce concept of point estimation and interval estimation.

2. Understand testing of statistical hypothesis

3. Understand test of significance, test based on normal, 't', chi-square and 'F' distribution

4. Impart the knowledge of performing analysis of variance.

5. Understand non parametric test.

6. Understand the concepts of statistical quality control.

Course Learning Outcomes:

After successful completion of the course, the Student should be able to:

1. Understand the concept of Statistical inference and parametric estimation.

2. Understand point estimation, interval estimation and testing of hypothesis

3. Understand the concept of most powerful test based on normal, Chi-square, t and F distribution.

4. Understand non parametric tests – Mann –Whiteny U test, Wilcoxon test and Kruskal Wallis test.

5. Understand need for Statistical Quality Control , control chart for variables (mean and range) and control chart for attributes (c, p and np).

HISTORY DEPARTMENT

Course Outcome

1- HIS1 (2) C02- Modern World History from AD- 1500: I

CO 1 Familiarise the students about the changes in the history of the modern world and to analyse the agenda of the imperialist powers in Latin America and Africa

CO 2: Create an understanding among the students about the liberal ideas and freedom struggles.

2- HIS1(2) C03 Social and Cultural History of Britain: I

C O 1- Students will acquire basic understanding regarding the major historical situations which contributed to design the socio-political and economic atmosphere of Britain

CO 2- Create the Critical appraisal of social and cultural trends that transform the British

CO 3- Enable the student to understand the major aspects of royal absolutism in England and challenges against the same to have a better understanding of the nature of English people and the development of English literature during the 17^{th} and 18^{th} centuries.

3- HIS4(03) C03 Social and Cultural History of Britain: II

CO 1- Students will acquire basic understanding regarding the major historical situations and the major thinkers who contributed to enrich the historical situations which contributed to design the socio-political and economic atmosphere of the colonial and post-colonial Britain.

CO2- Equip the students with knowledge of socio-economic and intellectual background of Britain.

CO3- Enable the students to understand the English literature in the background of the Commonwealth countries and post-colonial America.

4- HIS4(3) C02- Modern World History from AD- 1500: II

CO 1- Students will acquire basic understanding regarding the major historical situations which contributed to design the socio-political and economic atmosphere of the modern and contemporary world.

Department of Computer Science

Course Objectives and Outcomes of Computer Science (Complementary) Courses

Semester 1:

CSC1C01 – Computer Fundamentals

Aim of the Course:

To impart the students with fundamental principles and operations of various units of computer and to impart them with the basic skill in application packages.

Objectives of the Course:

- To learn the basics of computer hardware units and how they work together
- To acquire basic skill with office packages

Course Outcomes:

- CO1 To understand the basic number system, Conversion and Computer Codes
- CO2 To learn Boolean Algebra and different axioms and theorems in it
- CO3 To understand the basic Computer Organisation
- CO4 To Familiarize with algorithms and flowcharts

Semester 2:

CSC2C02 – Fundamentals of System Software ,Networks and DBMS

Aim of the Course:
To impart the students with the basic concepts of system software, Computer Networks and Database.

Objectives of the Course:

- To learn the basic concepts of various system software
- To learn the basics of Computer Networks
- To learn the basics of Databases

Course Outcomes:

- CO1 To understand the Concept of System Software
- CO2 To learn the Computer Network
- CO3 To familiarize the database management System

Semester 3:

CSC3C03 – Problem Solving Using C

Aim of the Course:

To equip the students with the basic concepts of problem solving using computers.

Objectives of the Course:

- To learn the concepts of programming.
- To learn the C language

Course Outcomes:

- CO1. To learn the basic syntax of C language
- CO2. To understand the Control , conditional, loop statements in C
- CO3. To familiarize with the user defined functions, pointers, and datafiles in C

Semester 4:

CSC4C04 – Data Structure Using C

Objectives of the Course:

- To introduce the concept of datastructures
- To make the students aware of various datastructures
- To equip the students implement fundamental datastructures

Course Outcomes:

- CO1.To learn the Concepts of datastuctures using C
- CO2. To understand the concepts of Linked Lists,
- CO3 To learn the different searching and sorting techniques

CSC4C05 – Programming Lab: C and Data structure

Objectives of the Course:

- To develop C Programming skills
- To make the students equipped to solve mathematical or scientific problems using C
- To learn how to implement various data structures.

Course Outcomes:

- CO1.To Acquire the practical knowledge of C language and data structures
- CO2. To obtain knowledge of the implementation of searching, sorting, Linked list

HINDI DEPARTMENT

PROGRAMMES AND OUTCOMES

BA/BSC PROGRAMME FIRST SEMESTER

Common Additional Language course in Hindi

HIN 1 A07(1) PROSE AND DRAMA

No.of Credits: 4 No.of contact hours: 72

Aim of course: To sensitize the students to the aesthetic,cultural and social aspects of literary appreciation and analysis.

Objective of the course:

1)To acquaint the students with different forms of thoughts and styles used in Hindi Prose writing. To make them able to express their thoughts in these different forms.

2)To introduce Hindi Drama to the students for appreciation and critical analysis.

3)To help them develop their creative thinking and writing .

Course Outcome :

- Approach literary texts in terms of genre, gender and the canon
- Understand and use academic conventions: referencing and bibliography.
- exposed to the origin and development of Hindi drama and its various themes and forms of different ages and stages
- Helps students explore how writers use the resources language as a creativity to explore the entire range of human experience through dramas as a literary form.

BA/BSC PROGRAMME SECOND SEMESTER

Common Additional Language Course in Hindi

HIN 2 A08(1) GRAMMAR AND TRANSLATION

No.of Credits : 4 No.of contact hours :72

Aim of the course :

To make students able to use Hindi language correctly and efficiently. To make them understand various types of letters both personal and business. To facilitate the use of translation as a tool for communication between different languages.

Objectives of the course :

1. Grammar is essential to the study of language. Developing a correct grammar sense is very important for written communication.

2. A student who successfully complete the course should be able to write in Hindi independently in their personal and professional life.

3. Familiarizing the technology of translation with its possibilities.

Course Outcome

- Understand the differences between spoken and written Hindi
- Understand the factors that influence use of grammar and vocabulary in speech and writing
- Understand the different ways in which grammar has been described
- Define the link between translation theory and translation practice.
- Define the effects of translation theories on translation practice.
- Define the contribution of translation practice to translation theory

BA/BSC PROGRAMME THIRD SEMESTER

Common Addtional Language course in Hindi

HIN 3 A09 POETRY IN HINDI

No.of Credits : 4 No.of Contact hours :90

Aim of the Course :

To sensitize the students to the aesthetic cuitural and social aspects of literacy appreciation and analysis .

Objectives of the course :

1. Appreciation of poetry using the best specimens provided in an anthology .

2. Understanding the origin and development of Hindi poetry through selected poems .

Course Outcome

- Understand the common techniques underlying free verse and traditional forms of poetry
- Identify personal experiences that can be used when writing poems
- Understand the basic terminology and practical elements of poetry.

BA/BSC PROGRAMME FOURTH SEMESTER

Common Addtional Language course in Hindi

HIN 4 A 10 NOVEL AND SHORT STORIES

No. of Credits : 4 No. of contact Hours : 90

Aim of the course :

To sensitize the students to aesthetic,cultural and social aspects of literacy appreciation and analysis.To provide them the best specimens of Hindi fiction of eminent authors of different periods.

Objectives of the course :

1. To acquaint the students with different forms of thoughts and styles of Hindi fiction.

2. To help them develop their thinking and writing .

Course Outcome:

- Enables the students to analyze literature and fiction using appropriate theoretical, historical, and cultural apparatus.
- Students get to know various cultures and construction of gender, nation and race throughout the history.
- The prescribed fiction helps the students to learn human values and the behavioral patterns from great works of art, and develops the ability to understand human race.

BCOM / BBA PROGRAMME FIRST SEMESTER

Common Additional Language course in Hindi

HIN 1 A 07(2) PROSE FORMS IN HINDI LITERATURE

No.of Credits : 4 No.of Contact Hours : 90

Aim of the course : To sensitize the students to aesthetic , cultural and social aspects of literacy appreciation and analysis.

Objectives of the Course : To aquaint the students with different forms of thoughts and styles in Hindi Prose writing .

Course Outcome :

- Approach literary texts in terms of genre, gender and the canon
- Understand and use academic conventions: referencing and bibliography.
- The learner will be aware of socio-political and economic conditions of the society from different periods.

BCOM / BBA PROGRAMME SECOND SEMESTER

Common Addtional Language course in Hindi

HIN 2A 08(2) POETRY,CORRESPONDANCE AND TRANSLATION

No.of Credits : 4 No.of contact Hours : 90

Aim and Objectives of the course :

1.To sensitize the students to the aesthetic ,cultural and social aspects of literacy appreciation and analysis .

2.To make them aware of the importance of correspondence and translation .To make them proficient to prepare certain basic kinds of letters independently in their personal and professional life. 3.Familiarizing the technology of translation with its possibilities.

Course Outcome

- Understand the common techniques underlying free verse and traditional forms of poetry
- Identify personal experiences that can be used when writing poems Understand the basic terminology and practical elements of poetry
- Define the link between translation theory and translation practice.
- Define the effects of translation theories on translation practice.
- Define the contribution of translation practice to translation theory
- Understand the importance of correspondence.

DEPARTMENT OF MALAYALAM

Programme outcomes & course outcomes

Common course for BA /B.Sc/BBA Programm

OBJECTIVES

- To give an authentic knowledge about the chronological developments of Malayalam language and literature.
- To familiarize the students with the different genres of literature and our variety artforms.
- To increase the creative and communicative skills of students.
- To discuss about the recent trends in Malayalam language and literature and its practical aspects in current situations.
- To enable them to make multidisciplinary approaches towards other disciplines
- To welcome them in the world of Translation works and its wide cultural and linguistic importance.
- To enable them for analysing the recent social,cultural,environmental issues and response to it.
- To know the basic grammatical concepts of Malayalam language
- To know about the vocabulary of administrative language and its use.

Course Outcomes

1st semester

Course code-MALIA07(1)

Course Name-Malayalasahithyam-1

Course outcomes

- To give general awareness about ancient Malayalam poetry and its genres.
- To understand the oral traditions and it variety streams.
- To develope a clear concept about Malayalam short-story and its developments.
- Provide opportunities to them to read different types of fiction.
- To familiarize the students with different perceptive of short-story writers and approach in a critical way.
- introduce different artforms of Kerala and understand basic

2nd semester

Course code-MAL2A08(1)

Course Name-Malayalasahithyam-2

Course outcomes

- To understand the aesthetic concept of modern poetry.
- To know about the eminent poets in modern Malayalam poetry.
- To introduce the ideas of romanticism Realism,modernism and post-modernism.
- To give clear views about Malayalam criticism and it's diffetent ways.

3rd Sem ester

Course code-MAL3A09

Course Name-Malayalasahithyam-3

Course outcomes

- To know about general concepts about Malayalam drama and it's importance in literature.
- To recognise drama as a litererical form and also as a theatre art.
- To provide the basic concepts of film making and give information's about it’s technical sides.To appreciate the beauty of Malayalam films and realize it with its powerful screenplay.
- To provide general idea about biography and auto-biography literature in Malayalam.

4th Semester

Course code-MAL4A10

Course Name-Malayalasahithyam-4

Course outcomes

- To give general awareness about the socio-cultural aspects of dialects.
- To analyse the postmodern novel concepts
- To realize translations as an important tool for cultural and informational changes.

1st semester BBA

Course code-MAL1A07(2)

Course Name-Malayalasahithya Padanam-1

Course Outcomes

- To analyse the application level and it's distinctiveness of language in scientific articles.
- To analyse the narrative styles and perspectives of Eminent Novelists and storywriters
- To realise the fictional beauty of Malayalam shorts tories
- To understand the creative beauty of Malayalam novels.

2nd semester BBA

Course code-MAL2A08(2)

Course Name-Malayalasahithya Padanam-2

Course Outcomes

- To provide the knowledge about the evolution of Malayalam poetry in different time.
- To know about the general concepts about Malayalam shortstory.
- To recognize drama as a literary work and also a performing art.
- To give opportunities to students for crative performances.
- **To read biography and autobiography of famous personalities and get inspired by it's valuable messages**

PHYSICAL EDUCATION

OPEN COURSE IN PHYSICAL EDUCATION

Name of the course: Physical Activity Health and Wellness

Course code: VI D 30 PE

No. of credits: 4

Aim of the course

The course aims at creating consciousness among the students towards health, fitness and wellness and in developing and maintaining a healthy life style.

Objectives of the course

1. To introduce the fundamental concepts of physical education, health and wellness.

2. To provide a general understanding on nutrition, first aid and stress management.

3. To familiarize the students regarding yoga and other activities for developing fitness.

4. To create awareness regarding hypo-kinetic diseases and various measures of fitness and health assessment.

Course outline

Module – I: Concept of Physical Education and Health Definition, Aims and Objectives of Physical Education Importance and Scope of Physical Education Modern concept of Health, Physical fitness and Wellness

Module- II: Components of Physical Fitness Physical fitness components: Speed, Strength, Endurance, Flexibility and Coordinative abilities. Types of Physical Fitness - Health related Physical Fitness - Performance related Physical Fitness - Cosmetic Fitness Fitness Balance

Module - III: Principles of Exercise Programme Activities for developing Physical Fitness Components Principles of First Aid Nutritional Balance

Module – IV: Yoga and Stress Management Asanas and its effects Padmasana HalasanaBhujangasanaShalabhasanaShavasanaVajrasanaChakrasanaTikonasanaPadahastha sana Postural Deformities – Corrective measures Stress Management and Relaxation Techniques

Module- V: Lifestyle Disease and its Management Lifestyle Disease/ Hypo-kinetic Diseases and its Management - Diabetes - Hypertension - Obesity - Osteoporosis - CHD -

Back pain Health related Physical Fitness and Assessment Body Mass Index/ Skin fold Measurement, BMR, Pulse Rate, and Blood Pressure Health Related Physical fitness Test Note on course work

Outcome - This course work will provide fundamental concepts of physical education, health and yoga. It will familiarize the students towards various hypo-kinetic diseases and its management. It will also provide practical guidelines and testing of health related fitness and other health indices.