



Dr. Bhabha Vidnyan Lokshikshan Sanstha's  
**K. Z. S. SCIENCE COLLEGE, BRAMHANI**

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Program Specific Outcomes (PSOs) and Course Outcomes (COs) of Undergraduate department  
(Part of B.Sc. Program, offered in combination with three different subjects)

**Program Outcomes (POs)**

Completion of BSc Degree shall supplement the student's accomplishments as follows:-

1. They will be able to identify the essentials of basic sciences in a board manner.
2. This will help to orient students and develop applications in diverse streams of science.
3. Students will be able to validate, clarify and comprehend the significant aspects of Science.
4. Analyze facts with scientific approach and explicate with rational inference.
5. Application of scientific knowledge for the benefit of the society.
6. Apply moral principles and obligate to professional ethics.
7. Following the Sustainable Development Goals (SDGs) or Global Goals {Quality education (SDG 4)}.
8. Skilled based learning for handling scientific instruments, planning and performing laboratory experiments.
9. Progression for higher studies, like Master's degree in the subject of their interest and carry out research for the wellbeing of human race.
10. Grab opportunities for prestigious white collared jobs in Armed forces Civil services and even as Enterpreneurs.

**Programme specific outcomes of Chemistry:**

PSO	Programme outcomes
PSO-1	To explain nomenclature, structures, reactivity, and preparation of the chemical reactions
PSO-2	Know structure-activity relationship
PSO-3	Solve the problem and also think methodically, independently and draw a logical conclusion.
PSO-4	Make aware and handle the sophisticated instruments and good laboratory practices as well as safety.
PSO-5	Demonstrate, solve and an understanding of major concepts in all disciplines of chemistry.
PSO-6	Develop research oriented skills.
PSO-7	Create an awareness regarding the impact of chemistry on the environment, and society.
PSO-8	To inculcate the scientific temperament in the students and outside the scientific community.

**Course outcome of Chemistry:**

Course	COs	Course outcomes
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B. Semester- Paper-I Inorganic Chemistry	Sc. I	CO-1	Learn the basic concepts of structure of atom.
		CO-2	Students learn about the formation of different chemical bonds in Different molecules.
		CO-3	Learn the concept of geometry of molecules.
		CO-4	Explain the formation of various types of simple covalent bonds.
B. Semester- paper-II Physical Chemistry	Sc. I	CO-1	To understand the concept of thermodynamics and spontaneity of Chemical reaction.
		CO-2	To describe the different gases law and their derivation.
		CO-3	To study the properties and structure of liquid state.
		CO-4	To explain the adsorption and role of catalyst in chemical reaction.
B. Semester- Paper-I Organic Chemistry	Sc. II	CO-1	Be able to understand the concept of structure and bonding of organic compounds
		CO-2	To explain the basic concept of stereochemistry of organic compounds
		CO-3	Be able to understand the physical and chemical properties of alkanes, alkenes & cycloalkanes
		CO-4	To explain the preparation and properties of dienes & aromatic compounds. Describe the application of fuel chemistry
B. Semester- paper-II Physical Chemistry	Sc. II	CO-1	To comprehend the concept of thermodynamics
		CO-2	To study the phase equilibria and colligative properties of liquids
		CO-3	To understand the rate, order, kinetics and molecularity of reaction
		CO-4	To understand the basic needs of nuclear chemistry & effect of pollutant gases on environment.
B. Semester- Paper-I Inorganic Chemistry	Sc. III	CO-1	Differentiate between geometry and shapes of molecules. Construct molecular orbital diagram of diatomic molecules and selected heteronuclear di-Atomic molecules.
		CO-2	Understand characteristics properties of first transition series elements. Write the electronic configuration of second and third series elements and compare them with first series elements.
		CO-3	Write the electronic configuration of lanthanides and Actinides, and understand their Complex formation tendencies.

		CO-4	Identify the errors in chemical analysis. Understand the soil composition and their types.
B. Sc. Semester- III paper-II Organic Chemistry		CO-1	To explain the orientation, directive influence of aromatic compounds & chemical reactions of halogen derivative of alkanes.
		CO-2	To study the physical, chemical properties and reaction mechanism of alcohols and phenols.
		CO-3	To describe the synthesis, diverse chemical reaction & mechanism of nucleophilic addition of aldehyde & ketones.
		CO-4	Be able to understand the different methods of preparation & reaction of acid and its derivatives and applicability of pesticides
B. Sc. Semester- IV Paper-I Inorganic Chemistry		CO-1	Differentiate simple salt, double salt and complexes
		CO-2	Understand the isomerism in coordination compounds. Analyse the redox cycle.
		CO-3	Understand the different instrumental and separation techniques used in chemistry.
		CO-4	Compare different types of silicon. Know about water quality and its parameters.
B. Sc. Semester- IV paper-II Physical Chemistry		CO-1	Students will understand the importance of various solids and their classification.
		CO-2	Learn about different types of theories and laws from physical chemistry.
		CO-3	Explain the spectroscopic study of diatomic molecules.
		CO-4	Understand the basis of classical mechanics and quantum mechanics.
B. Sc. Semester- V Paper-I Organic Chemistry		CO-1	To describe the preparation, reaction & mechanism of N-containing aliphatic & aromatic amines.
		CO-2	To understand the concept of Molecular orbital picture & aromaticity of basic heterocyclic compounds.
		CO-3	To determine the elements of organic compounds and describe the application of organometallic compound.
		CO-4	To explain the basic concept of UV-VIS spectroscopy & how is it applicable for organic compounds.
B. Sc. Semester- V paper-II Physical Chemistry		CO-1	Understand the failure of classical mechanics. Know about wave functions.
		CO-2	Derive Schrodinger wave equation in 1D and 3D box. Understand the criteria for forming MO from AO (LCAO).
		CO-3	Understand the solution, its types and colligative properties and its applications. Students will know about magnetic properties of substances.
		CO-4	Understand the interaction of radiation with matter.
B. Sc. Semester- VI Paper-I Inorganic Chemistry		CO-1	Understand the crystal field theory of coordination compounds and Interpret electronic spectra of transition metal complexes.
		CO-2	Understand the magnetic properties of the metal complexes in terms of magnetic susceptibility, Magnetic moment and do its calculation. Understand the difference between thermodynamic and kinetic stability of the metal complexes.
		CO-3	Know about organometallic compounds and their applications. Understand metal carbonyls and the bonding in them.
		CO-4	Explain the role of trace elements in biological processes. Differentiate hard and soft acids and bases.
B. Sc. Semester- VI		CO-1	Be able to recognize the concept of organic spectroscopy
		CO-2	To explain the importance of enolates and carbohydrate chemistry

paper-II Organic Chemistry	CO-3	To develop the ability how amino acids, protein & nucleic acids essential for daily life.
	CO-4	To explain the synthetic applicability of dyes & drugs chemistry.

**Program Matrix**

**Name of program: B Sc**

**Number of courses: 12**

**(Low Correlation= L; Moderate Correlation =M; High Correlation =H)**

**Chemistry Department:**

PSO	Programme outcomes
PSO-1	To explain nomenclature, structures, reactivity, and preparation of the chemical reactions
PSO-2	Know structure-activity relationship
PSO-3	Solve the problem and also think methodically, independently and draw a logical conclusion.
PSO-4	Make aware and handle the sophisticated instruments and good laboratory practices as well as safety.
PSO-5	Demonstrate, solve and an understanding of major concepts in all disciplines of chemistry.
PSO-6	Develop research oriented skills.
PSO-7	Create an awareness regarding the impact of chemistry on the environment, and society.
PSO-8	To inculcate the scientific temperament in the students and outside the scientific community.

	Course outcomes (Cos)	Programme outcomes (POs)							
		Domain specific (PSO)							
		1	2	3	4	5	6	7	8
	<b>Name of course: B Sc Semester-I, Paper-I</b>								
CO-1	Learn the basic concepts of structure of atom.		M	L		L	L		
CO-2	Students learn about the formation of different chemical bonds in different molecules.	M				L			
CO-3	Learn the concept of geometry of molecules.	L	M	M					
CO-4	Explain the formation of various types of simple covalent bonds.	L							
	<b>Name of course: B Sc Semester-I, Paper-II</b>								
CO-1	To understand the concept of thermodynamics and spontaneity of chemical reaction.			L	L				
CO-2	To describe the different gases law and their derivation.		M			M			
CO-3	To study the properties and structure of liquid state.	M		M				M	
CO-4	To explain the adsorption and role of catalyst in chemical reaction.	M				M	M		
	<b>Name of course: B Sc Semester-II, Paper-I</b>								
CO-1	Be able to understand the concept of structure and bonding of organic compounds	H	M			M			
CO-2	To explain the basic concept of stereochemistry of organic compounds	M	M		M		M		
CO-3	Be able to understand the physical and chemical properties of alkanes, alkenes & cycloalkanes	M			M			M	
CO-4	To explain the preparation and properties of dienes & aromatic compounds. Describe the application of fuel chemistry	M		H		L	M		
	<b>Name of course: B Sc Semester-II, Paper-II</b>								
CO-1	To comprehend the concept of thermodynamics		M			L			
CO-2	To study the phase equilibria and colligative properties of liquids	M					M		
CO-3	To understand the rate, order, kinetics and molecularity of reaction			M					
CO-4	To understand the basic needs of nuclear chemistry & effect of pollutant gases on environment.				M			M	
	<b>Name of course: B Sc Semester-III, Paper-I</b>								
CO-1	Differentiate between geometry and shapes of molecules. Construct molecular orbital diagram of diatomic molecules and selected heteronuclear di-Atomic molecules.	M	M			L			

CO-2	Understand characteristics properties of first transition series elements. Write the electronic configuration of second and third series elements and compare them with first series elements.	M					M		
CO-3	Write the electronic configuration of lanthanides and Actinides, and understand their Complex formation tendencies.			M	M				
CO-4	Identify the errors in chemical analysis. Understand the soil composition and their types.			M					M
<b>Name of course: B Sc Semester-III, Paper-II</b>									
CO-1	To explain the orientation, directive influence of aromatic compounds & chemical reactions of halogen derivative of alkanes.	M				L		M	
CO-2	To study the physical, chemical properties and reaction mechanism of alcohols and phenols.	L	M		L		M		
CO-3	To describe the synthesis, diverse chemical reaction & mechanism of nucleophilic addition of aldehyde & ketones.	M	M	M					
CO-4	Be able to understand the different methods of preparation & reaction of acid and its derivatives and applicability of pesticides	M			L			M	
<b>Name of course: B Sc Semester-IV, Paper-I</b>									
CO-1	Differentiate simple salt, double salt and complexes		M				M		
CO-2	Understand the isomerism in coordination compounds. Analyse the redox cycle.	M				M			
CO-3	Understand the different instrumental and separation techniques used in chemistry.			M					
CO-4	Compare different types of silicon. Know about water quality and its parameters.			M	M				
<b>Name of course: B Sc Semester-IV, Paper-II</b>									
CO-1	Students will understand the importance of various solids and their classification.		M	H					M
CO-2	Learn about different types of theories and laws from physical chemistry.				M			M	
CO-3	Explain the spectroscopic study of diatomic molecules.		M				M		
CO-4	Understand the basis of classical mechanics and quantum mechanics.	M				M			
<b>Name of course: B Sc Semester-V, Paper-I</b>									
CO-1	To describe the preparation, reaction & mechanism of N-containing aliphatic & aromatic amines.	H				M			
CO-2	To understand the concept of Molecular orbital picture & aromaticity of		M	H			M		

	basic heterocyclic compounds.								
CO-3	To determine the elements of organic compounds and describe the application of organometallic compound.				M	M		M	
CO-4	To explain the basic concept of UV-VIS spectroscopy & how is it applicable for organic compounds.		H	M			H		
	<b>Name of course: B Sc Semester-V, Paper-II</b>								
CO-1	Understand the failure of classical mechanics. Know about wave functions.			M					
CO-2	Derive Schrodinger wave equation in 1D and 3D box. Understand the criteria for forming MO from AO (LCAO).	M				M			
CO-3	Understand the solution, its types and colligative properties and its applications. Students will know about magnetic properties of substances.	M			M			M	
CO-4	Understand the interaction of radiation with matter.						M		
	<b>Name of course: B Sc Semester-VI, Paper-I</b>								
CO-1	Understand the crystal field theory of coordination compounds and Interpret electronic spectra of transition metal complexes.	M				M			
CO-2	Understand the magnetic properties of the metal complexes in terms of magnetic susceptibility, Magnetic moment and do its calculation. Understand the difference between thermodynamic and kinetic stability of the metal complexes.	H		M				M	
CO-3	Know about organometallic compounds and their applications. Understand metal carbonyls and the bonding in them.				M				M
CO-4	Explain the role of trace elements in biological processes. Differentiate hard and soft acids and bases.					M			
	<b>Name of course: B Sc Semester-VI, Paper-II</b>								
CO-1	Be able to recognize the concept of organic spectroscopy		H					M	
CO-2	To explain the importance of enolates and carbohydrate chemistry	M			M				
CO-3	To develop the ability how amino acids, protein & nucleic acids essential for daily life.			M					
CO-4	To explain the synthetic applicability of dyes & drugs chemistry.	H			M				



## Physics Department

### Programme Specific Outcomes

<b>PSO</b>	<b>Programme Specific Outcomes</b>
<b>PSO-1</b>	To explain basic concept physics through experiments
<b>PSO-2</b>	To solve the problems on related topics from the syllabus provided by university by various tricks.
<b>PSO-3</b>	To prepare the students for various entrance examinations by providing guidance for higher studies such as NET/GATE.
<b>PSO-4</b>	To develop the skills for fabrication of basic instruments, kits of the practical experiment provided in the syllabus.
<b>PSO-5</b>	To inculcate scientific temperament and competence building in the students through various scientific programmes
<b>PSO-6</b>	To create the interest in research field, small projects are provided to students
<b>PSO-7</b>	To aware about the science knowledge by visiting various research labs, higher technical institutes and industries.

## Course Outcomes

Course	COs	Course Outcomes
<b>B. Sc. Semester-I Paper -I</b>	<b>After Completion of Paper-I of Semester-I, students should be able to-</b>	
	<b>CO-1</b>	To understand basic concepts of elasticity and plasticity, their applications in real life problems such as cantilever and bending of beams etc.
	<b>CO-2</b>	To understand concept of viscosity in general and the applications such as Bernoulli's theorem and equation of continuity in particular and they should be able to apply concept of terminal velocity to solve the numericals and why viscosity varies with temperature
	<b>CO-3</b>	To understand to correlate and apply the crux of surface tension and angle of contact in daily life and to understand what is importance of frame of reference , laws of motions and their impact in daily life phenomenon.
	<b>CO-4</b>	To gain the conservation of momentum phenomenon and their application in rotational dynamics and to know how moment of Inertia plays a vital role in studying motion of bodies having different shapes and sizes.
<b>B. Sc. Semester-I Paper -II</b>	<b>After Completion of Paper-II of Semester-I, students should be able to-</b>	
	<b>CO-1</b>	To understand similarities and differences between Coulomb's Law and Newton's Law of Gravitation and their significance to Understand the concept of Electric Field and Electric Potential and their related phenomenon.
	<b>CO-2</b>	To know the concept of Dielectrics, their importance. Applications of Dielectrics in Capacitors, industries etc.
	<b>CO-3</b>	To know the differences between static and dynamic electric and magnetic fields. What are the applications of both fields. To understand various laws that governs electrical circuits such as Kirchhoff's voltage and current laws, Faradays Laws, Lenz's Law etc. , their applications in LC,RC and LCR Circuits.
	<b>CO-4</b>	To understand concept of Phase Diagrams, phase difference in pure L,C,R circuits and what is importance of Quality factor Q and Power Factor in A.C. Circuits.
<b>B. Semester-II Paper -I</b>	<b>After Completion of Paper-I of Semester-II, students should be able to-</b>	
	<b>CO-1</b>	To understand the relations between Oscillatory, Periodic and Simple Harmonic Motions. What is the difference between Forced and Damped Oscillations.
	<b>CO-2</b>	Able to understand how phenomenon of resonance could be achieved by Forced oscillations. What is mean by power dissipation and quality factor.
	<b>CO-3</b>	To understand transport of mass, viscosity and conductivity in fluids, along with this they should have clear cut understanding of all gas laws such as Boyles Law, Charles Law etc. To Understand what is Thermal Equilibrium and relation between Heat Energy, internal energy and Work Done.
	<b>CO-4</b>	To Understand how Entropy is related to amount of heat and temperature, Carnot Engine its efficiency and Refrigerator. To understand different scales of measuring the temperatures such as Kelvin Scale, Fahrenheit Scale, Degree Celsius Scale etc and interconversion in these scales. What is mean by Joule Coefficient.

<b>B. Semester-II Paper -II</b>	<b>Sc.</b>	<b>After Completion of Paper-II of Semester-II, students should be able to-</b>	
	<b>CO-1</b>	To understand Kepler's Laws of Planetary Motion, concept of Gravitation, Gravitational potential at different points in Solid Sphere etc.	
	<b>CO-2</b>	To understand facts and figures of our Solar System and Milky Way Galaxy. To measure size and distances of Planets by Parallax Method.	
	<b>CO-3</b>	To understand all theories about Magnetism, differences between Dia, Para and Ferromagnetic Materials. To understand Meissner's Effect, Superconductivity Phenomenon and importance of Curie temperature in Ferromagnetism.	
	<b>CO-4</b>	To understand basic concept about magnetic field such as magnetic dipole moment, Lorentz Equation, Ampere Circuital Law, Biot-Savart Law and Guass Law in Magnetism.	
<b>B.Sc. Semester III Paper - I</b>	<b>CO- 1</b>	To understand concept of wave propagation. Classification of waves. Basic terminology of music science.	
	<b>CO- 2</b>	To understand Transducers with reference to acoustics, microphone, loudspeakers, methods of recording and reproduction of sound and architectural acoustics of building.	
	<b>CO- 3</b>	To understand Ultrasonics: theory, production properties and application	
	<b>CO- 4</b>	To understand Concepts of rectifier and power supply	
<b>B.Sc. Semester III Paper - II</b>	<b>CO- 1</b>	To understand the basic concepts of interference (Newton's rings and Michelson's interferometer)	
	<b>CO- 2</b>	To understand the basic theory of diffraction, its application	
	<b>CO- 3</b>	To understand the basic concept of polarization, Nicol prism positive and negative crystals	
	<b>CO- 4</b>	To understand the fundamentals of E.M. waves: theoretical derivation.	
<b>B.Sc. Semester IV Paper - I</b>	<b>CO- 1</b>	To Introduce crystal Physics	
	<b>CO- 2</b>	To understand theory and generation of X-rays, properties and usage of X Rays hard and soft X-rays	
	<b>CO- 3</b>	To understand application of X-Ray in solid state Physics Braggs law and Bragg spectrometer.	
	<b>CO- 4</b>	To understand Lasers: concept, construction and application of Laser different types of Laser.	
<b>B.Sc. Semester IV Paper - II</b>	<b>CO- 1</b>	To understand semiconductor devices: Diodes, BJT and their characteristics	
	<b>CO- 2</b>	To understand construction and characteristics, working of JFET and MOSFET.	
	<b>CO- 3</b>	To understand concept of molecular spectroscopy: vibrational, rotational and electronic spectra of molecules. And its applications	
	<b>CO- 4</b>	To understand Raman Effect: theory and its application	
<b>B. Semester-V Paper -I</b>	<b>Sc.</b>	<b>CO-1</b>	To understand all atomic models, quantum numbers, L-S and J-J Coupling. To understand Pauli's Exclusion Principle, Zeeman , Anomalous Zeeman Effect and Stark Effect.
		<b>CO-2</b>	To understand Free electron theory and hence its dependence on electrical and thermal conductivity. To understand Bloch Theorem and hence kroning –penny model., Hall effect in semiconductors and metals/

		<b>CO-3</b>	To understand the concept of Probability distribution, Boltzman distribution law, r.m.s, value of speed of molecules etc.
		<b>CO-4</b>	To understand Bose-Einstein statistics and its application to Black body radiation. To understand Fermi-Dirac distribution, Concept of Negative temperature and overall comparison between M-B, B-E and F-D statistics.
<b>B. Semester-V Paper -II</b>	Sc.	<b>CO-1</b>	To Understand why Classical theory fails to explain phenomenon occurred in motion of microbodies and how Planck's radiation law explain them all. To understand what is wave-particle duality, de-Broglie Hypothesis and Heisenberg Uncertainty principle.
		<b>CO-2</b>	To Understand significance of Scrodinger wave equation in real life problems and what are the properties of well behaved wave function. To understand how Eigen values and Eigen functions actually represents wave function and particle.
		<b>CO-3</b>	To understand the terms Nano science and nanotechnology in broad perspective. To understand what is 1D,2D and 3D materials, synthesis approaches such as Top down and Bottom up approach of nanomaterials.
		<b>CO-4</b>	To understand various synthesis and characterization methods of Nanomaterials and their application in life.
<b>B. Semester-VI Paper -I</b>	Sc.	<b>CO-1</b>	To understand the basics of relativity in general and Einstein's special theory of relativity in particular. The concept of Ether, its properties , evidence , a hypothetical medium for propagation of light is to be understood by Famous Michelson- Morley Experiment
		<b>CO-2</b>	General idea of Mass and energy and their basics in Physics, its interdependence and inter-conversion is to be demonstrated by famous Einstein Mass-Energy relation $E= MC^2$ . To understand its practical importance
		<b>CO-3</b>	To know the importance and necessity of modern days green and clean energy sources using nuclear energy is demonstrated by Nuclear reactions and Nuclear reactors. The misconception about Nuclear power and energy is explained by fission and fusion reaction
		<b>CO-4</b>	Importance and applicability of Physics concepts for Bio medical instrumentation such as EEG, ECG for Human Body demonstrated. Working mechanism and principle of operation using Physics Phenomenon s are also vital importance
<b>B. Semester-VI Paper -II</b>	Sc.	<b>CO-1</b>	To understand the basic concept of amplifiers , its application in electronic industries. More emphasis on Operational amplifiers its significance to instrumentation in Physics
		<b>CO-2</b>	To understand the concept of light wave propagation through fibres in general and through optical fibres. Application of optical fibres in telecommunication network , types of fibres and its application in Biomedical instrumentations is to be understood..
		<b>CO-3</b>	To understand basics of wave propagation, radio waves , its applicability in radio wave communication. To understand the modulation process, its importance and types of AM, FM , PM Etc.
		<b>CO-4</b>	To understand the importance of side bands, Guard bands in radio frequency communication.

		To understand the basic concepts of different logics, Boolean Algebra and its application to digital circuits as a basic parts using different logic gates, its operation and application
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**KZS Science College, Bramhani , Kalmeshwar**

**DEPARTMENT OF PHYSICS**

**Programme Specific Outcomes (PSOs)**

<b>PSO</b>	<b>Programme Specific Outcomes</b>
<b>PSO-1</b>	To explain basic concept physics through experiments
<b>PSO-2</b>	To solve the problems on related topics from the syllabus provided by university by various tricks.
<b>PSO-3</b>	To prepare the students for various entrance examinations by providing guidance for higher studies such as NET/GATE.
<b>PSO-4</b>	To develop the skills for fabrication of basic instruments, kits of the practical experiment provided in the syllabus.
<b>PSO-5</b>	To inculcate scientific temperament and competence building in the students through various scientific programmes
<b>PSO-6</b>	To create the interest in research field, small projects are provided to students
<b>PSO-7</b>	To aware about the science knowledge by visiting various research labs, higher technical institutes and industries.

	Course Outcomes	Programme Outcomes (POs)						
		Programme Specific Outcomes (PSOs)						
		PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7
	<b>Name of Course-B. Sc. Semester-I, Paper -I</b>							
<b>CO-1</b>	To understand basic concepts of elasticity and plasticity, their applications in real life problems such as cantilever and bending of beams etc.	M						
<b>CO-2</b>	To understand concept of viscosity in general and the applications such as Bernoulli's theorem and equation of continuity in particular and they should be able to apply concept of terminal velocity to solve the numericals and why viscosity varies with temperature	M						
<b>CO-3</b>	To understand to correlate and apply the crux of surface tension and angle of contact in daily life and to understand what is importance of frame of reference , laws of motions and their impact in daily life phenomenon.		L					
<b>CO-4</b>	To gain the conservation of momentum phenomenon and their application in rotational dynamics and to know how moment of Inertia plays a vital role in studying motion of bodies having different shapes and sizes.	H						
	<b>Name of Course-B. Sc. Semester-I, Paper -II</b>							
<b>CO-1</b>	To understand similarities and differences between Coulomb's Law and Newton's Law of Gravitation and their significance to Understand the concept of Electric Field and Electric Potential and their related phenomenon.		M					
<b>CO-2</b>	To know the concept of Dielectrics, their importance. Applications of Dielectrics in Capacitors, industries etc.	M						
<b>CO-3</b>	To know the differences between static and dynamic electric and magnetic fields. What are the applications of both fields. To understand various laws that governs electrical circuits such as Kirchoff's voltage and current laws, Faradays Laws, Lenz's Law etc. , their applications in LC,RC and LCR Circuits.		H					
<b>CO-4</b>	To understand concept of Phase Diagrams, phase difference in pure L,C,R circuits and what is importance of Quality factor Q and Power Factor in A.C. Circuits.							M
	<b>Name of Course-B. Sc. Semester-II, Paper -I</b>							

<b>CO-1</b>	To understand the relations between Oscillatory, Periodic and Simple Harmonic Motions. What is the difference between Forced and Damped Oscillations.				M			
<b>CO-2</b>	Able to understand how phenomenon of resonance could be achieved by Forced oscillations. What is mean by power dissipation and quality factor.	M						
<b>CO-3</b>	To understand transport of mass, viscosity and conductivity in fluids, along with this they should have clear cut understanding of all gas laws such as Boyles Law, Charles Law etc. To Understand what is Thermal Equilibrium and relation between Heat Energy, internal energy and Work Done.		M					
<b>CO-4</b>	To Understand how Entropy is related to amount of heat and temperature, Carnot Engine its efficiency and Refrigerator. To understand different scales of measuring the temperatures such as Kelvin Scale, Fahrenheit Scale, Degree Celsius Scale etc and interconversion in these scales. What is mean by Joule Coefficient.		H					
<b>Name of Course-B. Sc. Semester-II,Paper -II</b>								
<b>CO-1</b>	To understand Kepler's Laws of Planetary Motion, concept of Gravitation, Gravitational potential at different points in Solid Sphere etc.	M						
<b>CO-2</b>	To understand facts and figures of our Solar System and Milky Way Galaxy. To measure size and distances of Planets by Parallax Method.	M						
<b>CO-3</b>	To understand all theories about Magnetism, differences between Dia, Para and Ferromagnetic Materials. To understand Meissner's Effect, Superconductivity Phenomenon and importance of Curie temperature in Ferromagnetism.	M						
<b>CO-4</b>	To understand basic concept about magnetic field such as magnetic dipole moment, Lorentz Equation, Ampere Circuital Law, Biot-Savart Law and Guass Law in Magnetism.	M						
<b>Name of Course-B. Sc. Semester-III,Paper -I</b>								
<b>CO - 1</b>	To understand concept of wave propagation. Classification of waves. Basic terminology of music science.	M						
<b>CO - 2</b>	To understand Transducers with reference to acoustics, microphone, loudspeakers, methods of recording and reproduction of sound and				H			



	architectural acoustics of building.							
CO - 3	To understand Ultrasonics: theory, production properties and application				M			
CO - 4	To understand Concepts of rectifier and power supply			H				
	<b>Name of Course-B. Sc. Semester-III,Paper -II</b>							
CO - 1	To understand the basic concepts of interference (Newton's rings and Michelson's interferometer)				M			
CO - 2	To understand the basic theory of diffraction, its application	M						
CO - 3	To understand the basic concept of polarization, Nicol prism positive and negative crystals				M			
CO - 4	To understand the fundamentals of E.M. waves: theoretical derivation.	M						
	<b>Name of Course-B. Sc. Semester-IV,Paper -I</b>							
CO - 1	To Introduce crystal Physics	M						
CO - 2	To understand theory and generation of X-rays, properties and usage of X Rays hard and soft X-rays						M	
CO - 3	To understand application of X-Ray in solid state Physics Braggs law and Bragg spectrometer.						M	
CO - 4	To understand Lasers: concept, construction and application of Laser different types of Laser.						M	
	<b>Name of Course-B. Sc. Semester-IV,Paper -II</b>							
CO - 1	To understand semiconductor devices: Diodes, BJT and their characteristics		M					
CO - 2	To understand construction and characteristics, working of JFET and MOSFET.		M					
CO - 3	To understand concept of molecular spectroscopy: vibrational, rotational and electronic spectra of molecules. And its applications	M						
CO - 4	To understand Raman Effect: theory and its application			M				
	<b>Name of Course-B. Sc. Semester-V,Paper -I</b>							
CO-1	To understand all atomic models, quantum numbers, L-S and J-J Coupling. To understand Pauli's Exclusion Principle, Zeeman , Anomalous Zeeman Effect and Stark Effect.			M				
CO-2	To understand Free electron theory and hence its dependence on electrical			M				

	and thermal conductivity. To understand Bloch Theorem and hence Kronig-penny model., Hall effect in semiconductors and metals/							
<b>CO-3</b>	To understand the concept of Probability distribution, Boltzmann distribution law, r.m.s, value of speed of molecules etc.	M		M				
<b>CO-4</b>	To understand Bose-Einstein statistics and its application to Black body radiation. To understand Fermi-Dirac distribution, Concept of Negative temperature and overall comparison between M-B, B-E and F-D statistics.			L				
<b>Name of Course-B. Sc. Semester-V, Paper -II</b>								
<b>CO-1</b>	To Understand why Classical theory fails to explain phenomenon occurred in motion of microbodies and how Planck's radiation law explain them all. To understand what is wave-particle duality, de-Broglie Hypothesis and Heisenberg Uncertainty principle.						H	
<b>CO-2</b>	To Understand significance of Schrodinger wave equation in real life problems and what are the properties of well behaved wave function. To understand how Eigen values and Eigen functions actually represents wave function and particle.	L						
<b>CO-3</b>	To understand the terms Nano science and nanotechnology in broad perspective. To understand what is 1D, 2D and 3D materials, synthesis approaches such as Top down and Bottom up approach of nanomaterials.						M	
<b>CO-4</b>	To understand various synthesis and characterization methods of Nanomaterials and their application in life.						M	
<b>Name of Course-B. Sc. Semester-VI, Paper -I</b>								
<b>CO-1</b>	To understand the basics of relativity in general and Einstein's special theory of relativity in particular. The concept of Ether, its properties, evidence, a hypothetical medium for propagation of light is to be understood by Famous Michelson-Morley Experiment	M						
<b>CO-2</b>	General idea of Mass and energy and their basics in Physics, its interdependence and inter-conversion is to be demonstrated by famous		M					

	Einstein Mass-Energy relation $E= MC^2$ . To understand its practical importance							
<b>CO-3</b>	To know the importance and necessity of modern days green and clean energy sources using nuclear energy is demonstrated by Nuclear reactions and Nuclear reactors. The misconception about Nuclear power and energy is explained by fission and fusion reaction					M		
<b>CO-4</b>	Importance and applicability of Physics concepts for Bio medical instrumentation such as EEG, ECG for Human Body demonstrated. Working mechanism and principle of operation using Physics Phenomenons are also vital importance							M
<b>Name of Course-B. Sc. Semester-VI,Paper -II</b>								
<b>CO-1</b>	To understand the basic concept of amplifiers , its application in electronic industries. More emphasis on Operational amplifiers its significance to instrumentation in Physics							M
<b>CO-2</b>	To understand the concept of light wave propagation through fibres in general and through optical fibres. Application of optical fibres in telecommunication network , types of fibres and its application in Biomedical instrumentations is to be understood..						M	
<b>CO-3</b>	To understand basics of wave propagation, radio waves , its applicability in radio wave communication. To understand the modulation process, its importance and types of AM, FM, PM Etc.	M						
<b>CO-4</b>	To understand the importance of side bands, Guard bands in radio frequency communication. To understand the basic concepts of different logics, Boolean Algebra and its application to digital circuits as a basic parts using different logic gates, its operation and application				M			

**Botany Department:****Programme Specific Outcomes (PSOs)**

PSO	Programme Specific Outcomes:
PSO-1	Understanding phylogenetic relationships of plants.
PSO-2	Identification of plants becomes easier.
PSO-3	Students will apply statistical method to interpret their data collected from various fields
PSO-4	Students will be able to explain plant development at molecular level, development of plant, plant anatomy, photosynthesis and life cycle of plants
PSO-5	Students will be able to develop practical skill in experimental techniques.

**Course outcome of Botany:**

Course	COs	Course outcomes
B. Sc. Semester- I Paper-I VIRUSES, PROKARYOTES AND ALGAE, BIOFERTILIZERS	CO-1	Understanding the microbial organisms in nature.
	CO-2	Understanding the concept of prokaryotes
	CO-3	Understanding the microbial organisms in nature and their diversity with Lower Plants
	CO-4	Understanding the Biofertilizers
B. Sc. Semester- I paper-II FUNGI, LICHEN, PLANT PATHOLOGY, BRYOPHYTA, MUSHROOM CULTIVATION	CO-1	Identify the different plant diseases,
	CO-2	Understand Cell structure, Reproduction and Economic importance of fungi, lichens
	CO-3	Understand Cell structure, Reproduction and Economic importance of Bryophytes
	CO-4	Skill based : Mushroom cultivation
B. Sc. Semester- II Paper-I PTERIDOPHYTA & GYMNOSPERMS, SOIL ANALYSIS	CO-1	Understanding the nature and life cycle of non flowering plants: Pleobotany
	CO-2	Understanding the Pteridophytes
	CO-3	Understanding the Gymnosperm
	CO-4	Understanding the concept of Soil analysis
B. Sc. Semester- II paper-II PALAEOBOTANY & MORPHOLOGY OF ANGIOSPERMS, FLORICULTURE	CO-1	Understand Root and leaf Morphology
	CO-2	Understand types of Inflorescences, flowers
	CO-3	Understand details structure of Flower and its parts, fruits.
	CO-4	Understanding the concept of floriculture
B. Sc. Semester- III Paper-I ANGIOSPERM TAXONOMY, EMBRYOLOGY, INDOORE GARDENING	CO-1	Understand the Modern trends in Taxonomy
	CO-2	Understand classification, Identification and taxonomical study Angiospermic plants.
	CO-3	Study of plant embryology
	CO-4	Understand the Principles of Indoor gardening
B. Sc. Semester- III Paper-II ANATOMY AND HORTICULTURE	CO-1	Study tissue system and meristem
	CO-2	Study of internal structure of Dicot and monocot plant parts.
	CO-3	Study of internal structure of plant parts
	CO-4	Study of concept of horticulture
B. Sc. Semester- IV Paper-I CELL BIOLOGY, PLANT	CO-1	Study of Cell Organelles
	CO-2	Study of biological activities in Cell
	CO-3	Plant breeding and evolution

BREEDING & Evolution, Seed technology	CO-4	Plant Nursery
B. Sc. Semester- IV Paper-II GENETICS & MOLECULAR BIOLOGY, PLANT NURSERY	CO-1	Study of Genetics Mendelian, Linkages, crossing over
	CO-2	Study of Genetics mutation
	CO-3	Understanding of Molecular Biology
	CO-4	Skill development: Plant nursery
B. Sc. Semester- V Paper-I BIOCHEMISTRY & PLANT PHYSIOLOGY-I, PLANT NUTRITION, HYDROPHONICS	CO-1	Understanding of plant and water relation
	CO-2	Concept of Photosynthesis respiration
	CO-3	Study of Nitrogen fixation, Plant movement, photoperiodism
	CO-4	Skill development: Mineral nutrition and hydroponics
B. Sc. Semester-V Paper-II PLANT ECOLOGY – I, ORGANIC FARMING	CO-1	Study of plant and environment
	CO-2	Understanding of Ecosystem
	CO-3	Study of plant succession and adoption
	CO-4	Skill development: organic farming
B. Sc. Semester- VI Paper-I BIOCHEMISTRY, BIOTECHNOLOGY, & HERBAL TECHNOLOGY	CO-1	Study of Biochemistry, enzymology and lipids
	CO-2	Understanding of plant tissue culture
	CO-3	Understanding of Genetic engineering
	CO-4	Skill development: Herbal technology
B. Sc. Semester- VI Paper-II PHYTOGEOGRAPHY, UTILIZATION OF PLANTS, TECHNIQUES & PHARMACOGNOSY	CO-1	Study of Phytogeography, pollution and natural resources
	CO-2	Study of plant utilization and ethnobotany
	CO-3	Understanding working of instruments and microscopy
	CO-4	Skill development: Pharmacognosy

**Department of Botany:**

**Programme Specific Outcomes (PSOs)**

PSO	Programme Specific Outcomes:
PSO-1	Understanding phylogenetic relationships of plants.
PSO-2	Identification of plants becomes easier.
PSO-3	Students will apply statistical method to interpret their data collected from various fields
PSO-4	Students will be able to explain plant development at molecular level, development of plant, plant anatomy, photosynthesis and life cycle of plants
PSO-5	Students will be able to develop practical skill in experimental techniques.

**Course outcomes**

	Course outcomes (Cos)	Programme outcomes (POs)				
		Domain specific (PSO)				
		1	2	3	4	5
	<b>Name of course: B Sc Semester-I PAPER I</b>					
CO-1	Understanding the microbial organisms in nature.	L	M	L	L	M
CO-2	Understanding the concept of prokaryotes	M	L	L	L	M
CO-3	Understanding the microbial organisms in nature and their diversity with Lower Plants	M	M	L	L	M
CO-4	Understanding the Biofertilizers	-	L	M	-	H
	<b>Name of course: B Sc Semester -I PAPER II</b>					
CO-1	Identify the different plant diseases,	-	L	L	L	M
CO-2	Understand Cell structure, Reproduction and Economic importance of fungi, lichens	M	M	L	L	M
CO-3	Understand Cell structure, Reproduction and Economic importance of Bryophytes	M	M	L	L	L
CO-4	Skill based : Mushroom cultivation	L	M	L	L	H
	<b>Name of course: B Sc Semester -II PAPER I</b>					
CO-1	Understanding the nature and life cycle of non- flowering plants: Pleobotany	M	M	L	L	M
CO-2	Understanding the Pteridophytes	M	M	L	M	M
CO-3	Understanding the Gymnosperm	M	M	L	M	M
CO-4	Understanding the concept of Soil analysis	L	L	M	L	H
	<b>Name of course: B Sc Semester -II PAPER II</b>					
CO-1	Understand Root and leaf Morphology	M	M	L	M	H
CO-2	Understand types of Inflorescences, flowers	M	M	L	M	H
CO-3	Understand details structure of Flower and its parts, fruits.	M	H	L	H	M
CO-4	Understanding the concept of floriculture	L	H	L	M	H

	<b>Name of course: B Sc Semester -III PAPER I</b>					
CO-1	Understand the Modern trends in Taxonomy	H	M	M	M	M
CO-2	Understand classification, Identification and taxonomical study Angiospermic plants.	H	H	M	H	M
CO-3	Study of plant embryology	M	L	L	ML	
CO-4	Understand the Principles of Indoor gardening	L	M	L	L	H
	<b>Name of course: B Sc Semester -III PAPER II</b>					
CO-1	Study tissue system and meristem	M	L	L	M	L
CO-2	Study of internal structure of Dicot and monocot plant parts.	M	M	L	M	M
CO-3	Study of internal structure of plant parts	M	M	L	M	M
CO-4	Study of concept of horticulture	L	M	L	M	H
	<b>Name of course: B Sc Semester -IV PAPER I</b>					
CO-1	Study of Cell Organelles	L	M	L	H	M
CO-2	Study of biological activities in Cell	L	L	L	H	L
CO-3	Plant breeding and evolution	H	L	M	M	L
CO-4	Plant Nursery	L	M	L	M	H
	<b>Name of course: B Sc Semester -IV PAPER II</b>					
CO-1	Study of Genetics Mendelian, Linkages, crossing over	H	L	H	H	H
CO-2	Study of Genetics mutation	H	L	H	H	L
CO-3	Understanding of Molecular Biology	H	L	H	H	L
CO-4	Skill development: Plant nursery	L	H	M	L	H
	<b>Name of course: B Sc Semester -V PAPER I</b>					
CO-1	Understanding of plant and water relation	L	L	L	H	L
CO-2	Concept of Photosynthesis respiration	L	L	M	H	L
CO-3	Study of Nitrogen fixation, Plant movement, photoperiodism	L	L	L	H	L
CO-4	Skill development: Mineral nutrition and hydroponics	L	M	M	M	H
	<b>Name of course: B Sc Semester -V PAPER II</b>					
CO-1	Study of plant and environment	M	M	M	M	L
CO-2	Understanding of Ecosystem	L	M	L	M	L
CO-3	Study of plant succession and adaptation	L	M	M	M	L
CO-4	Skill development: organic farming	L	L	M	L	H
	<b>Name of course: B Sc Semester -VI PAPER I</b>					
CO-1	Study of Biochemistry, enzymology and lipids	L	L	M	M	L
CO-2	Understanding of plant tissue culture	L	M	M	M	L

CO-3	Understanding of Genetic engineering	M	L	M	H	L
CO-4	Skill development: Herbal technology	L	M	L	M	H
<b>Name of course: B Sc Semester -VI PAPER II</b>						
CO-1	Study of Phytogeography, pollution and natural resources	H	M	M	L	L
CO-2	Study of plant utilization and ethnobotany	M	H	L	M	M
CO-3	Understanding working of instruments and microscopy	L	L	M	M	H
CO-4	Skill development: Pharmacognosy	L	M	M	M	H



## Zoology Department:

### Programme specific outcomes (PSOs)

<b>PSO1</b>	Learn scientific way of classification and identification of animals. Also, understand anatomical, morphological and physiological similarities and differences among non-chordates and chordates
<b>PSO2</b>	Understand the importance and role of every animal in maintaining harmony with the environment for coexistence
<b>PSO3</b>	Understand not only the basic concepts of cell biology, molecular biology, genetics, animal physiology, developmental biology and immunology, but also learn how to apply this knowledge in real life
<b>PSO4</b>	Understand how to apply basic knowledge of zoology in its applied branches like aquaculture, entomology
<b>PSO5</b>	Understand the principles behind every technique used in various biotechniques like filtration, sterilization, separation along with others like microtechnique and biotechnology so as to evolve into skilled and employable workforce
<b>PSO6</b>	Understand and implement basic concepts of biology and blend the knowledge with concepts from other branches of science to have proficiency in interdisciplinary branches like bioinformatics and biostatistics for better analysis of the experimental data

### Course Outcomes (COs)

After completion of these courses, the students would be able to:

<b>SEMEST</b>	<b>Structure and Function of Invertebrates</b>
<b>ER-I</b>	<b>(Protozoa to Annelida) Paper I</b>
CO1	Understand the general characters of Phylum Protozoa and various taxa under Protozoa up to classes and able to identify animals based on their character.
CO2	Describe anatomical and morphological features of <i>Paramecium</i> and <i>Plasmodium</i> with the knowledge of their life cycles
CO3	Understand the modes of infection of parasitic protozoans of humans like <i>Entamoeba</i> , <i>Trypanosoma</i> , <i>Giardia</i> and <i>Leishmania</i> and learn the methods to control these protozoans
CO4	Describe general characteristics of Phylum Porifera and understand classification up to classes
CO5	Understand structure, reproduction and development of <i>Sycon</i> as an example of poriferans and understand various types of canal systems in observed in sponges
CO6	Learn general characteristics of Phylum Coelenterata with classification of animals under various taxa up to classes
CO7	Describe structure, life cycle of <i>Obelia</i> as representative coelenterate and study dynamics of coelenterate corals communities
CO8	Understand the general characters of Phylum Platyhelminthes and characteristics of different taxa up to classes under the phylum
CO9	Understand life cycle, morphology and reproductive systems of <i>Ascaris</i>
CO10	Learn anatomy, morphology and life cycle of <i>Taenia solium</i> and parasitic

	adaptations observed in Helminths
CO11	Describe characteristics of Phylum Annelida and various taxa up to classes
CO12	Describe morphology and various systems including digestive and urinogenital systems of Leech
CO13	Understand various life forms during indirect development and study Trochophore larva in details
CO14	Understand importance of worms and practice vermiculture and understand its importance
CO15	Able to handle laboratory equipment's, prepare temporary and permanent mountings and understand basic principles of staining
<b>SEMESTER-I</b>	<b>Environmental Biology Paper II</b>
CO1	Understand different zones of atmosphere, their importance and components of air
CO2	Learn the global distribution and physico-chemical properties of water
CO3	Describe various types of rocks and understand the process of formation of soil
CO4	Understand the renewable and non-renewable energy sources, the differences between them and their importance its types and their importance with example of pond ecosystem
CO5 & CO6	Understand the meaning and importance of food chains and webs for maintaining balance in the ecosystems and the concept of ecological pyramids
CO7	Describe various models of energy flow in an ecosystem, namely, Single Channel, Y – Shape and Universal model
CO8	Understand the concept and importance of biodiversity, its conservation and causes of depletion of biodiversity
CO9	Study the Wildlife Conservation Acts (1972 and 1984),
CO10	Understand the concept of National parks and sanctuaries with examples of Tadoba, Kanha, Bharatpur and Nagzira
CO11	Describe the concept of hot spots of biodiversity and enlist such hot spots in India
CO12	Describe the causes, effects of water-, noise-, and air-pollution and study various control measures
CO13	Understand the concepts and causes of acid rain, greenhouse effect, ozone depletion leading to global warming; also to study measures to control global warming
CO14	Understand the concepts of bioaccumulation and biomagnifications; describe the effects of heavy metals (lead, cadmium and mercury) on organisms
CO15	Able to understand how to measure pH using pH paper and pH meter; estimate dissolved oxygen and carbon dioxide in water samples by understanding basic principles of titration; study various physical and chemical properties of water
CO16	Prepare temporary and permanent mountings and master principles of staining Life
<b>SEMESTER-II</b>	<b>Diversity of Animals-Non-chordates (Arthropoda to Hemichordata) Paper III</b>
CO1	Understand the general characters of Phylum Arthropoda and categorization of animals into various taxa up to classes
CO2	Learn mouth parts, digestive system and reproductive system of cockroach as representative of arthropods
CO3	Identify various insect vectors, namely, mosquitoes, houseflies, sandflies, Tse-Tse

	flies and study their importance in completion of life cycles of various pathogens wherever applicable
CO4	Understand indirect development in arthropods and study crustacean larvae, namely, Nauplius, Zoea, and Megalopa
CO5	Understand the concept of social behavior in insects with the example of honeybees; learn the intricacies of behavior of honeybees contributing to their colony
CO6	Learn general characters of Phylum Mollusca and its taxa up to classes
CO7	Understand morphology and digestive, respiratory and reproductive systems of <i>Pila</i> that represents Phylum Mollusca
CO8	Understand economic importance of molluscs with reference to pearl formation
CO9	Understand indirect development in molluscs with study of molluscan larvae, namely, Glochidium and Veliger
CO10	Describe general characteristics of Phylum Echinodermata and classify animals into various taxa up to classes
CO11	Describe external features of starfish and study digestive and water vascular systems with a reference to locomotion
CO12	Understand indirect development in echinoderms through Bipinnaria and Auricularia larvae
CO13	Learn about general characters of Phylum Hemichordata and its phylogeny
CO14	Understand reproduction, development through Tornaria larva in <i>Balanoglossus</i> and study affinities of <i>Balanoglossus</i> with other minor and major phyla
CO15	Achieve fluency in handling laboratory instruments; prepare temporary and permanent mountings
<b>SEMESTER-II</b>	<b>Cell Biology Paper IV</b>
CO1	Understand the concept of a cell and study ultrastructure of prokaryotic and eukaryotic cell
CO2	Describe various models of structure of plasma membrane with emphasis on Fluid Mosaic Model and understand various functions of plasma membrane
CO3	Understand the ultrastructure and functions of smooth and rough endoplasmic reticulum.
CO4	Understand the ultrastructure and functions of Golgi complex
CO5	Describe structural details of mitochondria and understand the process of oxidative phosphorylation through Glycolysis, Krebs's Cycle, Electron Transport Chain and Terminal Oxidation
CO6	Learn the structural details, concept of polymorphism in lysosomes and their functions
CO7	Describe the ultrastructure of nuclear membrane and understand the importance of it.
CO8	Understand the structure, types of chromosomes including Lamp-brush and polytene chromosomes and the concept of nucleosome
CO9	Learn the structure and functions of nucleolus.
CO10	Explain structure, types of ribosome with emphasis on Lake's model
CO11	Understand the cell cycle and its phases; also study the importance of synaptonemal complex, crossover and recombination.

CO12	Describe the process and types of cell division, namely, mitosis and meiosis; understand the special uncontrolled cell division leading to cancer and factors responsible for it
CO13	Describe the process of cellular aging and events leading to the apoptosis
CO14	Perform cell biology experiments with available material from plant source to have better understanding of cell biology; able to use information technology resources to have understanding of animal systems
<b>SEMESTER-III</b>	<b>Life and Diversity of Animals-Chordates (Protochordata to Amphibia) Paper V</b>
CO1	Describe animals belonging to protochordata up to order scientifically
CO2	Understand the structure and digestive system in <i>Herdmania</i> ; study the process of development through <i>Ascidian</i> tadpole and also to understand retrogressive metamorphosis
CO3	understand morphology and anatomy through various systems, namely, digestive, circulatory, excretory systems and sense organs in <i>Amphioxus</i>
CO4	Learn general characters of Cyclostomata with reference to <i>Petromyzon</i> and <i>Myxine</i>
CO5	Describe characteristics of Chondrichthyes and Osteichthyes
CO6	Understand the evolution of fishes in terms of occurrence of paired fins; learn about occurrence and importance of accessory respiratory organs in fishes
CO7	Study the phenomenon of migration in fishes
CO8	Describe Amphibia and classify the amphibians up to order by studying the identifying characters
CO9	Understand occurrence and importance of parental care and its various types; describe neoteny in Amphibia
CO10	Describe the process of gametogenesis in vertebrates and describe type of eggs and the process of fertilization of eggs based on their types
CO11	With emphasis on fish development, understand post fertilization changes
CO12	Describe types of scales in fishes and study development of placoid scales
CO13	Understand the development of frogs through cleavages, blastulation and gastrulation; learn about various morphogenetic movements with reference to frog gastrula
CO14	Understand the concept and importance of fate map
CO15	Understand the development of respiratory organs and aortic arches in frog
CO16	Prepare permanent preparations of fish scales and other biological samples; understand the histology of various organs of lower vertebrates and fish and frogs
<b>SEMESTER-III</b>	<b>Genetics Paper VI</b>
CO1	Understand the principles of inheritance with the help of Mendel's experiments and also understand allelic interactions that do not follow Mendelian laws
CO2	Understand the phenomenon of gene interactions with emphasis on epistasis and altered Mendelian ratios
CO3	Understand Quantitative genetics with the help of polygenic traits; understand impact of inbreeding, outbreeding and hybrid vigor on gene pool, gene and allelic frequencies and overall recombination process.
CO4	Describe the concept and importance of extracellular genome with reference to mitochondrial DNA and plasmids

CO5	Learn about the phenomenon of inheritance through cytoplasm with reference to Kappa particles in <i>Paramecium</i> , CO <sub>2</sub> sensitivity in <i>Drosophila</i> and milk factor in mice
CO6	Understand theories of linkage, its types and effects of linkage on crossing over
CO7	Understand different concepts of genes, namely, cistron, muton and recon.
CO8	Understand the altered physiology and inheritance of genetic disorders in humans with reference to hemoglobin disorders, namely, thalassemia and sickle cell anemia and the metabolic disorder phenylketonuria.
CO9	Understand various patterns of sex determination, namely, ZZ, XY, XO and ZW patterns; also describe genic balance mechanism of sex determination in <i>Drosophila</i> and role of environment in sex determination of <i>Bonellia</i>
CO10	Describe various structural chromosomal aberrations, namely, addition, deletion, duplication and inversion and understand their effects
CO11	Describe numerical chromosomal aberrations with reference to Turner, Klinefelter and Down syndromes
CO12	Understand the concept of mutations and describe spontaneous and induced mutations; also describe various types of mutagenic agents and their effects on DNA sequences and expressions
CO13	Understand the concept of lethal genes and the consequences
CO14	Learn the basic concepts of population genetics with emphasis on Hardy Weinberg equilibrium
CO15	Understand the importance of genetic counselling to deal with various hereditary diseases and disorders
CO16	Describe the use and importance of DNA fingerprinting, amniocentesis and karyotyping techniques and the usefulness of sperm banks to understand the applicability of genetics
CO17	Demonstrate the genetic crosses using coloured beads to understand Mendelian principles; perform population surveys for various traits and testing the hypothesis with appropriate statistical tools
CO18	Understand the Hardy-Weinberg principle with suitable example and perform calculations to find out gene and allele frequencies in a population
<b>SEMESTER-IV</b>	<b>Life and Diversity of Animals-Chordates (Reptilia, Aves and Mammals) Paper VII</b>
CO1	Understand the classification of reptiles considering the temporal vacuities
CO2	Study snakes with reference to the poison apparatus, biting mechanism and also understand the importance of snake venom
CO3	Compare Ratitae with Caranitae; understand flight adaptations
CO4	Understand Migration in birds
CO5	Describe the general characters of subclasses Prototheria, Metatheria and Eutheria of class Mammalia
CO6	Understand and discuss Darwinism and Neo-Darwinism
CO7	Understand the cursorial, aquatic, terrestrial, fossorial and volant adaptations with suitable examples
CO8	Describe the genetic basis of evolution with reference to species and demes and the variations responsible for the process
CO9	Understand the Caucasoid, Negroid, Mongoloid and Australoid races in man to

	know more about racial differences among the members of the same species
CO10	Compare aortic arches and hearts in reptiles, birds and mammals
CO11	Understand the structure of egg of a hen and study the development of chick embryo up to primitive streak stage
CO12	Understand the development and functions of extra embryonic membranes in chick
CO13	Describe structure and the importance of blastocyst in mammals
CO14	Describe implantation of embryo in mammals; study types of placenta on the basis of morphological and histological structures and the functions
CO15	Understand the concept of stem cells; study the sources, types and importance of stem cells in human welfare
CO16	Understand the behavior in birds with respect to the diurnal and rhythmic behavior and pheromones and reproductive behavior in mammals
CO17	Discuss the skeletal systems in birds and mammals with examples of fowl and rabbit respectively
CO18	Prepare permanent mountings of chick embryos representing various developmental milestones
<b>SEMESTER-IV</b>	<b>Molecular Biology and Immunology Paper VIII</b>
CO1	Understand the landmark experiments that proved DNA and RNA as genetic materials
CO2	Understand the intricacies of the proposed and accepted models for structures of DNA
CO3	Learn about various forms of DNA, their properties and understand the physico-chemical parameters in which those forms exist
CO4	Understand various forms of RNA and describe their structures, their properties and roles in cellular physiology
CO5	Understand structural details of the prokaryotic and eukaryotic genes and describe various other structural elements regulating these genes
CO6	Describe Griffith's experiment to understand bacterial transformation; also learn about other modes of recombination, namely, conjugation and transduction in bacteria
CO7	Understand various experiments including Meselson-Stahl experiment which helped understand the replication process
CO8	Describe the semiconservative model of replication with the help of concepts like origin of replication and directionality of replication
CO9	Learn about the concept and characteristics of genetic code including Wobble hypothesis
CO10	Understand the mechanism of processes transcription and translation with various regulating factors to describe the process of protein synthesis
CO11	Understand regulation of gene expression with emphasis on Lac operon and Trp operon
CO12	Describe the concept of immunity and understand the importance of having an immune system; study innate and acquired immunity in addition to different organs of the immune system
CO13	Understand the basics of structure, diversity, functions and types of antigens and antibodies

CO14	Understand the mechanism of antigen-antibody interactions based on structural details to explain humoral immunity
CO15	Understand the intricacies of the B cell response and the T cell response to understand the humoral as well as cell mediated immunity
CO16	Understand the concept and pathways of the complement system and its importance
CO17	Describe one of the most important the molecular players of the immune response which are cytokines and learn about cytokines related disorders
CO18	Describe impaired immune system causing autoimmune diseases and learn about the ways in which those can be treated
CO19	Understand the immunodeficiencies including AIDS and others and understand the ways to manage those diseases
CO20	Understand the principles and working of laboratory instruments used in molecular biology experiments; learn to stain nucleic acids and also to isolate DNA from a suitable source
CO21	Demonstrate the antigen-antibody interaction and learn about organs of the immune system
<b>SEMESTER-V</b>	<b>General Mammalian Physiology-I: (Enzymology; digestive, respiratory and circulatory systems) Paper IX</b>
CO 1	Understand the concept, chemical nature and distribution of enzymes
CO2	Describe the general properties and classification of enzymes
CO3	Understand various physico-chemical factors and conditions affecting the enzyme action
CO4	Describe the histology and physiology of digestive glands, namely, salivary, gastric, intestinal glands, liver, and pancreas
CO5	Understand the endocrinology of gastrointestinal hormones
CO6	Understand the physiology of digestion and absorption of proteins, carbohydrates, and lipids
CO7	Describe various fat soluble and water-soluble vitamins with reference to their sources, the deficiencies and related diseases
CO8	Learn about the types, distribution and the physico-chemical properties including binding dynamics with the respiratory gases of various respiratory pigments
CO9	Understand the detailed mechanism of respiration including transport of O <sub>2</sub> and CO <sub>2</sub> along with various respiratory pigments and working of respiratory organs.
CO10	Understand the disorders of respiratory systems with special reference to effect of smoking
CO11	Learn about normal and abnormal constituents and functions of blood
CO12	Describe the importance of intrinsic and extrinsic blood clotting factors and understand the principles behind ABO blood grouping system and Rh factor
CO13	Learn about different phases of cardiac cycle; understand the principle behind ECG and describe various factors regulating blood pressure
CO14	Demonstrate enzyme action on substrate by using salivary amylase
CO15	Perform detection tests for carbohydrates, proteins and fats
CO16	Detect presence of vitamins A and C
CO17	Measure total WBC and RBC counts; demonstrate presence of haemin crystals
CO18	Measure lung capacity by using suitable method

CO19	Understand the histology of various mammalian organs with the help of available permanent slides.
<b>SEMESTER-V</b>	<b>Applied Zoology-I (Aquaculture and Economic Entomology) Paper X</b>
CO 1	Understand and discuss the parameters used for construction of various ponds used for rearing various stages of fish
CO2	Explain breeding of fishes by bund and Chinese hatcheries and understand the practice and importance of induced breeding using hypophysation and the new generation drugs
CO3	Explain different culture methods, namely, polyculture, cage culture, sewage fed fish culture and integrated fish farming
CO4	Learn about commercial aspects of aquaculture by studying fish products and by products and study different methods of fish preservation
CO5	Explore commercial aspects aquaculture with respect to prawn culture and pearl culture
CO6	Understand commercial setup required for culturing aquarium fish species and study the process of fabrication and setting up of aquaria, their maintenance and breeding of aquarium fishes
CO7	Learn about different diseases caused by different causative agents, namely, fungi, bacteria, protozoa and helminths
CO8	Describe the use, mode of action, merits and demerits of using different classes of chemicals as insecticides.
CO9	Explain use, merits and demerits of using predators and parasites as biological control agents for insect pests
CO10	Describe the life cycle of, damage caused by and control measures for plant pests, <i>Earias vitella</i> , <i>Sitophilus oryzae</i> and animal pests <i>Musca nebulo</i> and <i>Stomoxys calcitrans</i>
CO11	Explain life cycles, rearing methods of different species of silkworms, namely, <i>Bombyx mori</i> and <i>Antheraea mylitta</i>
CO12	Understand cocoon processing steps for synthesis of silk fabric, namely, cocoon boiling, reeling, rereeling, winding, doubling, twisting and weaving
CO13	Explain types, life cycles of honey bees and explain methods of apiculture along with commercial importance of bee products
CO14	Understand the life cycle of the lac insect, <i>Laccifer lacca</i> and the processing of raw lac to prepare various products and understand their economic importance
CO15	Describe the economically important food and aquarium fishes; study various systems through virtual dissection or through other available media; prepare permanent mountings of scales and zooplanktons following ethical guidelines
CO16	Describe various economically important insect species; study various mountings related to insects
CO17	Understand different breeding/ rearing setups by visiting different facilities/ educational centres
<b>SEMESTER-VI</b>	<b>General Mammalian Physiology-II: (Nervous, muscular, excretory, endocrine and reproductive systems) Paper XI</b>
CO1	Describe neuronal cell types and understand the structure of neurons including electron micrographs of different regions of neurons



CO2	Understand the conduction of impulse across the nerve
CO3	Understand the ultrastructure of a striated muscle and the physiology of muscle contraction with the help of sliding filament theory
CO4	Describe various properties of muscles, namely, twitch, tetanus, tonus, summation, All or None Principle and muscle fatigue with better understanding of muscle physiology
CO5	Learn about the structural details of a uriniferous tubule
CO6	Understand the mechanism of urine formation with emphasis on counter – current mechanism and describe the idea of dialysis
CO7	Describe normal and abnormal constituents of urine
CO8	Understand the position, morphology, histology and physiology of the pituitary, thyroid, parathyroid, adrenal and pineal glands
CO9	Understand the oestrous and menstrual cycles to describe reproductive physiology of females
CO10	Describe the chemical nature and functions of male and female sex hormones
CO11	Describe the causes of infertility in males and females
CO12	Understand the concept and importance of contraception and describe different mechanical and hormonal contraceptives
CO13	Understand the concept and importance of in vitro fertilization
CO14	Perform experiments for detection of various normal and abnormal constituents of urine
CO15	Perform qualitative analysis of the semen sample
CO16	Study different endocrine gland of fish with suitable diagrams/ digital tools
CO17	Observe various histological slides to understand the ultrastructure of various organs of muscular, nervous, endocrine, reproductive and excretory systems
<b>SEMESTER-VI</b>	<b>Applied Zoology-II (Biotechniques, Microtechnique, Biotechnology, Bioinformatics and Biostatistics) Paper XII</b>
CO1	Explain various techniques of sterilization from crude to the most sophisticated techniques, namely, filtration, autoclaving, dry heat sterilization, wet sterilization and radiation
CO2	Understand various separation techniques, namely, centrifugation, chromatography, agarose gel electrophoresis, SDS-PAGE
CO3	Describe the working principles of colorimeter and spectrophotometers
CO4	Understand basics of microtomy and the steps involved from tissue fixation to section cutting and also understand the ways of troubleshooting the process of microtomy/ section cutting and the spreading of tissue sections
CO5	Understanding the basic concepts of staining with various kinds of stains and describe double staining using hematoxylin and eosin
CO6	Describe basics and practical applications of histochemical staining techniques for carbohydrates, proteins and lipids
CO7	Understand basic concepts of recombinant DNA technology and describe the types and uses of DNA manipulation enzymes
CO8	Learn the theoretical aspects of shotgun cloning
CO9	Understand the concept of cloning vectors, their types and the merits and limitations
CO10	Understand the principles behind insertion of DNA fragment and ligation using

	blunt and cohesive ends
CO11	Describe the application of biotechnology for recombinant insulin and vaccine production
CO12	Understand the basic concepts, importance and role of bioinformatics in life sciences and describe the concept and types of databases used in bioinformatics including nucleotide and protein databases
CO13	Understand the concept and importance of biostatistics and learn about tabulation and presentation of data
CO14	Understand the meaning and importance concepts used in biostatistics, namely, sampling errors, mean, mode, median, probability, standard error and standard deviation
CO15	Perform experiments related to use of various biotechniques studied in theory including sterilization and separation techniques
CO16	Get acquainted with microtechnique and staining procedures
CO17	Use computer software to analyze biological data using statistical tools
CO18	Practice using various basic computer programs
CO19	Perform specific searches related to biological information using bioinformatic tools and databases
CO20	Understand working principles of various sophisticated instruments by visiting biotechnology institutions and research centers

**Zoology Department:****Programme specific outcomes (PSOs)**

<b>PSO1</b>	Learn scientific way of classification and identification of animals. Also, understand anatomical, morphological and physiological similarities and differences among non-chordates and chordates
<b>PSO2</b>	Understand the importance and role of every animal in maintaining harmony with the environment for coexistence
<b>PSO3</b>	Understand not only the basic concepts of cell biology, molecular biology, genetics, animal physiology, developmental biology and immunology, but also learn how to apply this knowledge in real life
<b>PSO4</b>	Understand how to apply basic knowledge of zoology in its applied branches like aquaculture, entomology
<b>PSO5</b>	Understand the principles behind every technique used in various biotechniques like filtration, sterilization, separation along with others like microtechnique and biotechnology so as to evolve into skilled and employable workforce
<b>PSO6</b>	Understand and implement basic concepts of biology and blend the knowledge with concepts from other branches of science to have proficiency in interdisciplinary branches like bioinformatics and biostatistics for better analysis of the experimental data

	<b>Course Outcomes (COs)</b>	<b>Program Outcomes (POs)</b>					
	<b>Course Name:</b>	<b>Domain Specific (PSO)</b>					
<b>SEMES TER-I</b>	<b>Structure and Function of Invertebrates (Protozoa to Annelida) Paper I</b>	1	2	3	4	5	6
CO1	Understand the general characters of Phylum Protozoa and various taxa under Protozoa up to classes and able to identify animals based on their character.	M	L	H	L	L	L
CO2	Describe anatomical and morphological features of <i>Paramecium</i> and <i>Plasmodium</i> with the knowledge of their life cycles	L	L	L	L	L	L
CO3	Understand the modes of infection of parasitic protozoans of humans like <i>Entamoeba</i> , <i>Trypanosoma</i> , <i>Giardia</i> and <i>Leishmania</i> and learn the methods to control these protozoans	M	M	M	M	L	L
CO4	Describe general characteristics of Phylum Porifera and understand classification up to classes	L	L	L	M	L	L
CO5	Understand structure, reproduction and development of <i>Sycon</i> as an example of poriferans and understand various	M	M	M	M	L	L

	types of canal systems in observed in sponges						
CO6	Learn general characteristics of Phylum Coelenterata with classification of animals under various taxa up to classes	L	L	L	L	L	L
CO7	Describe structure, life cycle of <i>Obelia</i> as representative coelenterate and study dynamics of coelenterate corals communities	M	M	L	L	L	L
CO8	Understand the general characters of Phylum Platyhelminthes and characteristics of different taxa up to classes under the phylum	M	M	L	L	L	L
CO9	Understand life cycle, morphology and reproductive systems of <i>Ascaris</i>	M	H	L	L	L	L
CO10	Learn anatomy, morphology and life cycle of <i>Taenia solium</i> and parasitic adaptations observed in Helminths	H	M	L	L	L	L
CO11	Describe characteristics of Phylum Annelida and various taxa up to classes	H	M	L	L	L	L
CO12	Describe morphology and various systems including digestive and urinogenital systems of Leech	M	M	L	L	L	L
CO13	Understand various life forms during indirect development and study Trochophore larva in details	H	M	M	L	L	L
CO14	Understand importance of worms and practice vermiculture and understand its importance	L	H	L	L	H	M
CO15	Able to handle laboratory equipment's, prepare temporary and permanent mountings and understand basic principles of staining	L	L	L	L	L	L
<b>SEMES TER-I</b>	<b>Environmental Biology Paper II</b>						
CO1	Understand different zones of atmosphere, their importance and components of air	M	M	L	L	L	L
CO2	Learn the global distribution and physico-chemical properties of water	M	H	L	L	L	L
CO3	Describe various types of rocks and understand the process of formation of soil	M	L	L	L	L	L
CO4	Understand the renewable and non- renewable energy sources, the differences between them and their importance its types and their importance with example of pond ecosystem	M	M	L	L	L	L
CO5 & CO6	Understand the meaning and importance of food chains and webs for maintaining balance in the ecosystems and the concept of ecological pyramids	M	L	L	L	L	L
CO7	Describe various models of energy flow in an ecosystem, namely, Single Channel, Y – Shape and Universal model	L	L	L	L	L	L
CO8	Understand the concept and importance of biodiversity, its conservation and causes of depletion of biodiversity	M	L	L	L	L	L
CO9	Study the Wildlife Conservation Acts (1972 and 1984),	L	M	L	L	L	L
CO10	Understand the concept of National parks and sanctuaries with examples of Tadoba, Kanha, Bharatpur and Nagzira	M	M	L	L	L	L

CO11	Describe the concept of hot spots of biodiversity and enlist such hot spots in India	M	M	H	L	L	L
CO12	Describe the causes, effects of water-, noise-, and air-pollution and study various control measures	L	H	H	L	L	L
CO13	Understand the concepts and causes of acid rain, greenhouse effect, ozone depletion leading to global warming; also to study measures to control global warming	L	H	H	L	L	L
CO14	Understand the concepts of bioaccumulation and biomagnifications; describe the effects of heavy metals (lead, cadmium and mercury) on organisms	L	M	H	L	L	L
CO15	Able to understand how to measure pH using pH paper and pH meter; estimate dissolved oxygen and carbon dioxide in water samples by understanding basic principles of titration; study various physical and chemical properties of water	L	M	H	L	L	L
CO16	Prepare temporary and permanent mountings and master principles of staining Life	L	L	H	L	L	L
<b>SEMES TER-II</b>	<b>Diversity of Animals-Non-chordates (Arthropoda to Hemichordata) Paper III</b>						
CO1	Understand the general characters of Phylum Arthropoda and categorization of animals into various taxa up to classes	H	H	L	L	L	L
CO2	Learn mouth parts, digestive system and reproductive system of cockroach as representative of arthropods	H	H	L	L	L	L
CO3	Identify various insect vectors, namely, mosquitoes, houseflies, sandflies, Tse-Tse flies and study their importance in completion of life cycles of various pathogens wherever applicable	H	H	L	L	L	L
CO4	Understand indirect development in arthropods and study crustacean larvae, namely, Nauplius, Zoea, and Megalopa	L	L	L	L	L	L
CO5	Understand the concept of social behavior in insects with the example of honeybees; learn the intricacies of behavior of honeybees contributing to their colony	H	H	L	L	L	L
CO6	Learn general characters of Phylum Mollusca and its taxa up to classes	H	H	L	L	L	L
CO7	Understand morphology and digestive, respiratory and reproductive systems of <i>Pila</i> that represents Phylum Mollusca	M	M	L	L	L	L
CO8	Understand economic importance of molluscs with reference to pearl formation	M	M	L	L	L	L
CO9	Understand indirect development in molluscs with study of molluscan larvae, namely, Glochidium and Veliger	L	L	L	L	L	L
CO10	Describe general characteristics of Phylum Echinodermata and classify animals into various taxa up to classes	H	M	L	L	L	L
CO11	Describe external features of starfish and study digestive and water vascular systems with a reference to locomotion	H	M	L	L	L	L

CO12	Understand indirect development in echinoderms through Bipinnaria and Auricularia larvae	H	M	L	L	L	L
CO13	Learn about general characters of Phylum Hemichordata and its phylogeny	L	L	L	L	L	L
CO14	Understand reproduction, development through Tornaria larva in <i>Balanoglossus</i> and study affinities of <i>Balanoglossus</i> with other minor and major phyla	M	M	L	L	L	L
CO15	Achieve fluency in handling laboratory instruments; prepare temporary and permanent mountings	M	M	L	L	L	L
<b>SEMES TER-II</b>	<b>Cell Biology Paper IV</b>						
CO1	Understand the concept of a cell and study ultrastructure of prokaryotic and eukaryotic cell	H	M	L	L	L	L
CO2	Describe various models of structure of plasma membrane with emphasis on Fluid Mosaic Model and understand various functions of plasma membrane	H	L	L	L	L	L
CO3	Understand the ultrastructure and functions of smooth and rough endoplasmic reticulum.	H	L	L	L	L	L
CO4	Understand the ultrastructure and functions of Golgi complex	H	L	H	L	M	L
CO5	Describe structural details of mitochondria and understand the process of oxidative phosphorylation through Glycolysis, Krebs's Cycle, Electron Transport Chain and Terminal Oxidation	H	L	H	L	M	L
CO6	Learn the structural details, concept of polymorphism in lysosomes and their functions	H	L	H	L	L	L
CO7	Describe the ultrastructure of nuclear membrane and understand the importance of it.	H	L	H	L	L	L
CO8	Understand the structure, types of chromosomes including Lamp-brush and polytene chromosomes and the concept of nucleosome	H	L	L	L	L	L
CO9	Learn the structure and functions of nucleolus.	H	L	L	L	L	L
CO10	Explain structure, types of ribosome with emphasis on Lake's model	H	L	L	L	L	L
CO11	Understand the cell cycle and its phases; also study the importance of synaptonemal complex, crossover and recombination.	H	L	L	L	L	L
CO12	Describe the process and types of cell division, namely, mitosis and meiosis; understand the special uncontrolled cell division leading to cancer and factors responsible for it	H	L	M	L	L	L
CO13	Describe the process of cellular aging and events leading to the apoptosis	H	M	M	L	L	L
CO14	Perform cell biology experiments with available material from plant source to have better understanding of cell biology; able to use information technology resources to	H	L	H	M	M	M

	have understanding of animal systems						
<b>SEMES TER-III</b>	<b>Life and Diversity of Animals-Chordates (Protochordata to Amphibia) Paper V</b>						
CO1	Describe animals belonging to Protochordata up to order scientifically	H	M	L	L	L	L
CO2	Understand the structure and digestive system in <i>Herdmania</i> ; study the process of development through <i>Ascidian</i> tadpole and also to understand retrogressive metamorphosis	H	L	L	L	L	L
CO3	understand morphology and anatomy through various systems, namely, digestive, circulatory, excretory systems and sense organs in <i>Amphioxus</i>	H	M	L	L	L	L
CO4	Learn general characters of Cyclostomata with reference to <i>Petromyzon</i> and <i>Myxine</i>	H	L	L	L	L	L
CO5	Describe characteristics of Chondrichthyes and Osteichthyes	H	L	L	L	L	L
CO6	Understand the evolution of fishes in terms of occurrence of paired fins; learn about occurrence and importance of accessory respiratory organs in fishes	M	M	L	L	L	L
CO7	Study the phenomenon of migration in fishes	H	M	L	L	L	L
CO8	Describe Amphibia and classify the amphibians up to order by studying the identifying characters	H	M	L	L	L	L
CO9	Understand occurrence and importance of parental care and its various types; describe neoteny in Amphibia	H	M	L	L	L	L
CO10	Describe the process of gametogenesis in vertebrates and describe type of eggs and the process of fertilization of eggs based on their types	H	L	L	L	L	L
CO11	With emphasis on fish development, understand post fertilization changes	L	L	L	L	L	L
CO12	Describe types of scales in fishes and study development of placoid scales	H	L	L	L	L	L
CO13	Understand the development of frogs through cleavages, blastulation and gastrulation; learn about various morphogenetic movements with reference to frog gastrula	L	L	L	L	L	L
CO14	Understand the concept and importance of fate map	L	L	L	L	L	L
CO15	Understand the development of respiratory organs and aortic arches in frog	M	L	L	L	L	L
CO16	Prepare permanent preparations of fish scales and other biological samples; understand the histology of various organs of lower vertebrates and fish and frogs	H	L	L	L	H	L
<b>SEMES TER-III</b>	<b>Genetics Paper VI</b>						
CO1	Understand the principles of inheritance with the help of Mendel's experiments and also understand allelic interactions that do not follow Mendelian laws	H	L	H	H	L	H
CO2	Understand the phenomenon of gene interactions with	-	-	H	M	M	M

	emphasis on epistasis and altered Mendelian ratios						
CO3	Understand Quantitative genetics with the help of polygenic traits; understand impact of inbreeding, outbreeding and hybrid vigor on gene pool, gene and allelic frequencies and overall recombination process.	M	M	H	M	-	H
CO4	Describe the concept and importance of extracellular genome with reference to mitochondrial DNA and plasmids	L	L	H	L	-	M
CO5	Learn about the phenomenon of inheritance through cytoplasm with reference to Kappa particles in <i>Paramecium</i> , CO <sub>2</sub> sensitivity in <i>Drosophila</i> and milk factor in mice	H	L	H	L	-	M
CO6	Understand theories of linkage, its types and effects of linkage on crossing over	L	M	H	-	-	M
CO7	Understand different concepts of genes, namely, cistron, muton and recon.	H	L	H	H	-	H
CO8	Understand the altered physiology and inheritance of genetic disorders in humans with reference to hemoglobin disorders, namely, thalassemia and sickle cell anemia and the metabolic disorder phenylketonuria.	M	M	H	M	-	M
CO9	Understand various patterns of sex determination, namely, ZZ, XY, XO and ZW patterns; also describe genic balance mechanism of sex determination in <i>Drosophila</i> and role of environment in sex determination of <i>Bonellia</i>	H	M	H	M	M	H
CO10	Describe various structural chromosomal aberrations, namely, addition, deletion, duplication and inversion and understand their effects	-	M	H	L	L	L
CO11	Describe numerical chromosomal aberrations with reference to Turner, Klinefelter and Down syndromes	-	M	H	M	L	M
CO12	Understand the concept of mutations and describe spontaneous and induced mutations; also describe various types of mutagenic agents and their effects on DNA sequences and expressions	-	M	H	M	H	H
CO13	Understand the concept of lethal genes and the consequences	-	L	H	L	L	H
CO14	Learn the basic concepts of population genetics with emphasis on Hardy Weinberg equilibrium	-	H	H	M	L	H
CO15	Understand the importance of genetic counselling to deal with various hereditary diseases and disorders	M	M	H	L	-	H
CO16	Describe the use and importance of DNA fingerprinting, amniocentesis and karyotyping techniques and the usefulness of sperm banks to understand the applicability of genetics	H	M	H	-	-	H
CO17	Demonstrate the genetic crosses using coloured beads to understand Mendelian principles; perform population surveys for various traits and testing the hypothesis with	M	M	H	M	M	H



	appropriate statistical tools						
CO18	Understand the Hardy-Weinberg principle with suitable example and perform calculations to find out gene and allele frequencies in a population	L	M	H	M	L	H
<b>SEMES TER-IV</b>	<b>Life and Diversity of Animals-Chordates (Reptilia, Aves and Mammals) Paper VII</b>						
CO1	Understand the classification of reptiles considering the temporal vacuities	H	H	-	-	-	M
CO2	Study snakes with reference to the poison apparatus, biting mechanism and also understand the importance of snake venom	M	M	L	-	-	M
CO3	Compare Ratitae with Caranitae; understand flight adaptations	H	M	L	-	-	M
CO4	Understand Migration in birds	M	M	L	-	-	M
CO5	Describe the general characters of subclasses Prototheria, Metatheria and Eutheria of class Mammalia	H	M	L	-	-	L
CO6	Understand and discuss Darwinism and Neo-Darwinism	M	H	L	-	-	L
CO7	Understand the cursorial, aquatic, terrestrial, fossorial and volant adaptations with suitable examples	M	H	L	-	-	L
CO8	Describe the genetic basis of evolution with reference to species and demes and the variations responsible for the process	M	H	M	-	-	M
CO9	Understand the Caucasoid, Negroid, Mongoloid and Australoid races in man to know more about racial differences among the members of the same species	M	M	L	-	-	L
CO10	Compare aortic arches and hearts in reptiles, birds and mammals	M	H	L	-	-	M
CO11	Understand the structure of egg of a hen and study the development of chick embryo up to primitive streak stage	M	M	L	-	-	M
CO12	Understand the development and functions of extra embryonic membranes in chick	H	H	L	-	-	M
CO13	Describe structure and the importance of blastocyst in mammals	M	H	L	-	-	M
CO14	Describe implantation of embryo in mammals; study types of placenta on the basis of morphological and histological structures and the functions	M	M	L	-	-	M
CO15	Understand the concept of stem cells; study the sources, types and importance of stem cells in human welfare	H	H	L	-	L	M
CO16	Understand the behavior in birds with respect to the diurnal and rhythmic behavior and pheromones and reproductive behavior in mammals	M	H	M	-	M	M
CO17	Discuss the skeletal systems in birds and mammals with examples of fowl and rabbit respectively	H	M	M	-	-	L
CO18	Prepare permanent mountings of chick embryos representing various developmental milestones	M	L	M	-	H	M
<b>SEMES</b>	<b>Molecular Biology and Immunology</b>						

<b>TER-IV</b>	<b>Paper VIII</b>						
CO1	Understand the landmark experiments that proved DNA and RNA as genetic materials	M	M	H	M	H	M
CO2	Understand the intricacies of the proposed and accepted models for structures of DNA	M	M	H	L	H	M
CO3	Learn about various forms of DNA, their properties and understand the physico-chemical parameters in which those forms exist	M	M	H	L	H	M
CO4	Understand various forms of RNA and describe their structures, their properties and roles in cellular physiology	M	M	H	L	H	M
CO5	Understand structural details of the prokaryotic and eukaryotic genes and describe various other structural elements regulating these genes	M	L	H	M	L	L
CO6	Describe Griffith's experiment to understand bacterial transformation; also learn about other modes of recombination, namely, conjugation and transduction in bacteria	L	M	H	M	H	M
CO7	Understand various experiments including Meselson-Stahl experiment which helped understand the replication process	M	M	H	M	H	M
CO8	Describe the semiconservative model of replication with the help of concepts like origin of replication and directionality of replication	L	M	H	M	H	M
CO9	Learn about the concept and characteristics of genetic code including Wobble hypothesis	M	M	H	M	H	M
CO10	Understand the mechanism of processes transcription and translation with various regulating factors to describe the process of protein synthesis	L	L	H	L	L	L
CO11	Understand regulation of gene expression with emphasis on Lac operon and Trp operon	L	M	H	M	L	L
CO12	Describe the concept of immunity and understand the importance of having an immune system; study innate and acquired immunity in addition to different organs of the immune system	L	M	H	L	L	L
CO13	Understand the basics of structure, diversity, functions and types of antigens and antibodies	H	M	L	L	L	L
CO14	Understand the mechanism of antigen-antibody interactions based on structural details to explain humoral immunity	L	L	H	L	L	L
CO15	Understand the intricacies of the B cell response and the T cell response to understand the humoral as well as cell mediated immunity	L	L	H	-	L	L
CO16	Understand the concept and pathways of the complement system and its importance	L	-	H	-	L	L
CO17	Describe one of the most important the molecular players of the immune response which are cytokines and learn	L	L	H	-	L	L

	about cytokines related disorders						
CO18	Describe impaired immune system causing autoimmune diseases and learn about the ways in which those can be treated	L	L	H	-	L	M
CO19	Understand the immunodeficiencies including AIDS and others and understand the ways to manage those diseases	-	L	H	-	-	M
CO20	Understand the principles and working of laboratory instruments used in molecular biology experiments; learn to stain nucleic acids and also to isolate DNA from a suitable source	M	L	H	L	H	M
CO21	Demonstrate the antigen-antibody interaction and learn about organs of the immune system	L	M	H	L	L	M
<b>SEMESTER-V</b>	<b>General Mammalian Physiology-I: (Enzymology; digestive, respiratory and circulatory systems) Paper IX</b>						
CO 1	Understand the concept, chemical nature and distribution of enzymes	-	H	L	L	L	L
CO2	Describe the general properties and classification of enzymes	-	H	L	L	L	L
CO3	Understand various physico-chemical factors and conditions affecting the enzyme action	-		L	L	L	M
CO4	Describe the histology and physiology of digestive glands, namely, salivary, gastric, intestinal glands, liver, and pancreas	-	L	L	L	L	L
CO5	Understand the endocrinology of gastrointestinal hormones	-	L	L	L	L	L
CO6	Understand the physiology of digestion and absorption of proteins, carbohydrates, and lipids	-	H	L	-	L	L
CO7	Describe various fat soluble and water-soluble vitamins with reference to their sources, the deficiencies and related diseases	-	H	L	L	L	L
CO8	Learn about the types, distribution and the physico-chemical properties including binding dynamics with the respiratory gases of various respiratory pigments	-					
CO9	Understand the detailed mechanism of respiration including transport of O <sub>2</sub> and CO <sub>2</sub> along with various respiratory pigments and working of respiratory organs.	-	-	H	H	H	M
CO10	Understand the disorders of respiratory systems with special reference to effect of smoking	-	-	H	L	-	M
CO11	Learn about normal and abnormal constituents and functions of blood	-	-	H	M	H	M
CO12	Describe the importance of intrinsic and extrinsic blood clotting factors and understand the principles behind ABO blood grouping system and Rh factor	-	-	H	M	M	M
CO13	Learn about different phases of cardiac cycle; understand the principle behind ECG and describe various factors regulating blood pressure	-	-	H	M	L	M

CO14	Demonstrate enzyme action on substrate by using salivary amylase	-	-	L	M	M	M
CO15	Perform detection tests for carbohydrates, proteins and fats	-	-	H	M	M	M
CO16	Detect presence of vitamins A and C	-	-	H	M	M	M
CO17	Measure total WBC and RBC counts; demonstrate presence of haemin crystals	-	-	H	M	H	M
CO18	Measure lung capacity by using suitable method	-	-	H	M	M	M
CO19	Understand the histology of various mammalian organs with the help of available permanent slides.	-	-	H	M	M	M
<b>SEMES TER-V</b>	<b>Applied Zoology-I (Aquaculture and Economic Entomology) Paper X</b>						
CO 1	Understand and discuss the parameters used for construction of various ponds used for rearing various stages of fish	H	H	L	L	L	L
CO2	Explain breeding of fishes by bund and Chinese hatcheries and understand the practice and importance of induced breeding using hypophysation and the new generation drugs	H	H	H	H	L	L
CO3	Explain different culture methods, namely, polyculture, cage culture, sewage fed fish culture and integrated fish farming	H	H	H	H	L	L
CO4	Learn about commercial aspects of aquaculture by studying fish products and by products and study different methods of fish preservation	H	H	H	H	H	L
CO5	Explore commercial aspects aquaculture with respect to prawn culture and pearl culture	H	H	H	H	L	L
CO6	Understand commercial setup required for culturing aquarium fish species and study the process of fabrication and setting up of aquaria, their maintenance and breeding of aquarium fishes	H	H	H	H	L	L
CO7	Learn about different diseases caused by different causative agents, namely, fungi, bacteria, protozoa and helminths	H	H	H	H	L	L
CO8	Describe the use, mode of action, merits and demerits of using different classes of chemicals as insecticides.	H	H	H	H	L	L
CO9	Explain use, merits and demerits of using predators and parasites as biological control agents for insect pests	H	H	H	H	L	L
CO10	Describe the life cycle of, damage caused by and control measures for plant pests, <i>Earias vitella</i> , <i>Sitophilus oryzae</i> and animal pests <i>Musca nebulosa</i> and <i>Stomoxys calcitrans</i>	H	H	H	H	L	L
CO11	Explain life cycles, rearing methods of different species of silkworms, namely, <i>Bombyx mori</i> and <i>Antheraea mylitta</i>	H	H	H	H	L	L
CO12	Understand cocoon processing steps for synthesis of silk fabric, namely, cocoon boiling, reeling, rereeling, winding, doubling, twisting and weaving	H	H	H	H	L	L
CO13	Explain types, life cycles of honey bees and explain	H	H	H	H	L	L

	methods of apiculture along with commercial importance of bee products						
CO14	Understand the life cycle of the lac insect, <i>Laccifer lacca</i> and the processing of raw lac to prepare various products and understand their economic importance	H	H	H	H	L	L
CO15	Describe the economically important food and aquarium fishes; study various systems through virtual dissection or through other available media; prepare permanent mountings of scales and zooplanktons following ethical guidelines	H	L	H	H	L	L
CO16	Describe various economically important insect species; study various mountings related to insects	L	H	H	H	L	L
CO17	Understand different breeding/ rearing setups by visiting different facilities/ educational centres	L	H	H	H	L	L
<b>SEMES TER-VI</b>	<b>General Mammalian Physiology-II: (Nervous, muscular, excretory, endocrine and reproductive systems) Paper XI</b>						
CO1	Describe neuronal cell types and understand the structure of neurons including electron micrographs of different regions of neurons	-	-	H	-	H	L
CO2	Understand the conduction of impulse across the nerve	-	-	H	-	M	L
CO3	Understand the ultrastructure of a striated muscle and the physiology of muscle contraction with the help of sliding filament theory	-	-	H	-	M	L
CO4	Describe various properties of muscles, namely, twitch, tetanus, tonus, summation, All or None Principle and muscle fatigue with better understanding of muscle physiology	-	-	H	-	M	L
CO5	Learn about the structural details of a uriniferous tubule	-	-	H	-	L	L
CO6	Understand the mechanism of urine formation with emphasis on counter – current mechanism and describe the idea of dialysis	L	-	H	-	L	L
CO7	Describe normal and abnormal constituents of urine	-	-	H	-	L	L
CO8	Understand the position, morphology, histology and physiology of the pituitary, thyroid, parathyroid, adrenal and pineal glands	M	L	L	L	H	L
CO9	Understand the oestrous and menstrual cycles to describe reproductive physiology of females	L	L	M	L	M	L
CO10	Describe the chemical nature and functions of male and female sex hormones	L	L	M	L	L	L
CO11	Describe the causes of infertility in males and females	M	L	M	-	-	-
CO12	Understand the concept and importance of contraception and describe different mechanical and hormonal contraceptives	M	L	L	-	-	L
CO13	Understand the concept and importance of in vitro fertilization	M	-	L	-	-	-

CO14	Perform experiments for detection of various normal and abnormal constituents of urine	-	L	L	-	L	L
CO15	Perform qualitative analysis of the semen sample	-	L	M	L	L	L
CO16	Study different endocrine gland of fish with suitable diagrams/ digital tools	L	-	L	-	-	-
CO17	Observe various histological slides to understand the ultrastructure of various organs of muscular, nervous, endocrine, reproductive and excretory systems	L	-	H	-	H	L
<b>SEMES TER-VI</b>	<b>Applied Zoology-II (Biotechniques, Microtechnique, Biotechnology, Bioinformatics and Biostatistics) Paper XII</b>						
CO1	Explain various techniques of sterilization from crude to the most sophisticated techniques, namely, filtration, autoclaving, dry heat sterilization, wet sterilization and radiation	-	-	M	H	H	L
CO2	Understand various separation techniques, namely, centrifugation, chromatography, agarose gel electrophoresis, SDS-PAGE	-		H	H	H	L
CO3	Describe the working principles of colorimeter and spectrophotometers	-	-	L	H	H	L
CO4	Understand basics of microtomy and the steps involved from tissue fixation to section cutting and also understand the ways of troubleshooting the process of microtomy/ section cutting and the spreading of tissue sections	-	-	H	H	H	L
CO5	Understanding the basic concepts of staining with various kinds of stains and describe double staining using hematoxylin and eosin	-	-	H	H	H	L
CO6	Describe basics and practical applications of histochemical staining techniques for carbohydrates, proteins and lipids	-	-	H	H	H	L
CO7	Understand basic concepts of recombinant DNA technology and describe the types and uses of DNA manipulation enzymes	-	-	H	H	H	L
CO8	Learn the theoretical aspects of shotgun cloning	-	-	H	-	L	L
CO9	Understand the concept of cloning vectors, their types and the merits and limitations	-	-	H	-	L	L
CO10	Understand the principles behind insertion of DNA fragment and ligation using blunt and cohesive ends	-	-	H	-	L	L
CO11	Describe the application of biotechnology for recombinant insulin and vaccine production	L	H	L	-	H	L
CO12	Understand the basic concepts, importance and role of bioinformatics in life sciences and describe the concept and types of databases used in bioinformatics including nucleotide and protein databases	-	L	L	-	L	H
CO13	Understand the concept and importance of biostatistics and learn about tabulation and presentation of data	-	L	L	-	L	H
CO14	Understand the meaning and importance concepts used in	-	L	L	-	L	H

	biostatistics, namely, sampling errors, mean, mode, median, probability, standard error and standard deviation						
CO15	Perform experiments related to use of various biotechniques studied in theory including sterilization and separation techniques	-	L	L	-	H	H
CO16	Get acquainted with microtechnique and staining procedures	-	L	L	-	H	L
CO17	Use computer software to analyze biological data using statistical tools	-	L	L	-	L	H
CO18	Practice using various basic computer programs	-	L	-	L	L	H
CO19	Perform specific searches related to biological information using bioinformatic tools and databases	-	-	L	-	L	H
CO20	Understand working principles of various sophisticated instruments by visiting biotechnology institutions and research centers	-	L	L	-	H	H

**Mathematics Department:****Program Specific Outcomes (PSOs)**

<b>Program Outcomes</b>	
PSO-1	The program helps the students to understand concept so that, they can recognize to apply the definitions and techniques which they have studied.
PSO-2	The program helps the students to acquire good knowledge and understanding in advanced areas so that, they are able to set career goals by pursuing higher education
PSO-3	Mathematical Science develops scientific temper and analytical ability amongst students to join research development in multidisciplinary research.
PSO-4	Knowledge in Mathematics will be helpful for students in working on field projects, real life problems and technical issues, in order to provide them experiential training on- applying mathematical modeling for arriving at the conclusion.
PSO-5	Students will be able to evaluate primary literature, in oral and written form so that they can present ideas clearly and confidently with skills to negotiate with others.
PSO-6	Studying three subjects throughout a 3- year degree programme in Mathematical Sciences enhances student's overall development, critical thinking, analytical aptitude and problem-solving skill.
PSO-7	Students will be able to analyze information logically and make a reasoned judgment by observation, understanding and evaluation of sources, such as data, facts and research findings.
PSO-8	Students will be able to work as a leader in a team for group projects and group activities so that they can participate actively, in a healthy spirit

<b>Course</b>	<b>COs</b>	<b>Course Outcome</b>
B. Sc. Semester-I Paper-I <b>Elementary Mathematics</b>	CO-1	Students will be able to find nth root of unity and study about elementary functions using theory of complex numbers.
	CO-2	Students will be able to find Rank of Matrix and solve homogeneous as well as non-homogeneous system of linear equations.
	CO-3	Students will be able to solve cubic and biquadratic equations and find the nature of roots of polynomials of any degree.
	CO -4	Students will be able to solve Diophantine Equation using concept of Number Theory.
B. Sc. Semester- I paper-II <b>Differential and Integral Calculus</b>	CO-1	Students will be able to solve higher order derivative problems and apply this concept to find Series expansion of functions and evaluate limits using L'Hospitals Rule.
	CO-2	Students will be able to study Partial Differentiation and apply this concept to find Envelope and Asymptote of family of curves.
	CO-3	Students will be able to find Extreme values in functions of several variable.
	CO -4	Students will be able to find integration of Algebraic rational functions, Trigonometric Functions and Irrational functions.
B. Sc. Semester- II Paper-I <b>Geometry, Differential and Difference Equation</b>	CO-1	Students will be able to find Equation of Sphere, right circular Cone and Cylinder.
	CO-2	Students will be able to solve first order linear differential equation.
	CO-3	Students will be able to solve second order linear differential equation.
	CO -4	Students will be able to solve linear difference equation and Higher order Difference equation.
B. Sc.	CO-1	Students will learn about Vector Differentiation and can apply the



Semester- II paper-II <b>Vector Analysis</b>		concept to find Gradient, Divergence and Curl.
	CO-2	Students will be able to Evaluate double as well as triple Integration and apply this concept to find area bounded by curve and volume of given region.
	CO-3	Students will be able to calculate line integral, Surface integral and Volume integral.
	CO -4	Students will learn Greens Theorem, Stokes Theorem and Gauss Divergence Theorem to evaluate Integrals.
B. Sc. Semester- III Paper-I <b>Partial Differential Equation</b>	CO-1	Students will be able to study simultaneous differential equation of order one which is considered as origin of first order PDEqn.
	CO-2	Students will be able to study linear and nonlinear partial differential equation using charpits method and Jacobi method.
	CO-3	Students will be able to solve Higher order linear Partial differential Equation
	CO -4	Students will be able to find Extremals of Functionals using Euler's Equation.
B. Sc. Semester- III paper-II <b>Modern Algebra</b>	CO-1	Students will be able to study Group and properties of Group and Subgroups.
	CO-2	Students will be able to study concept of Normal subgroup, Permutation Group, Homomorphism and Isomorphism.
	CO-3	Students will be able to study Ring theory and properties of Ring, subring and Ideals.
	CO -4	Students will be able to learn field theory, Integral domain, Euclidean Domain, Principle Ideal Domain and unique Factorisation Domain.
B. Sc. Semester- IV Paper-I <b>Real Analysis</b>	CO-1	Students will be able to apply the monotone convergence theorem to prove convergence of bounded monotone sequence.
	CO-2	Students will be able to apply Inverse and Implicit function theorems in solving problems.
	CO-3	Students will be able to demonstrate competence with properties of real numbers by finding Supremum and Infimum of set and using the completeness property of real numbers.
	CO -4	Students will be able to recognize the importance of Riemann and Lebesgue integral of a bounded function.
B. Sc. Semester- IV paper-II <b>Mathematical Methods</b>	CO-1	Students will be able to apply the concepts of Fourier Integrals and Fourier transform to solve problems and partial differential equations.
	CO-2	Students will be able to acquire the knowledge of Laplace transform, their properties and inverse Laplace transform to obtain the solution of ordinary differential equation.
	CO-3	Students will be able to understand concepts of finite Fourier transform, finite Sturm-Liouville transform and generalized finite Fourier transform.
	CO -4	Students will be able to solve problems using Finite Hankel transform, Finite Legendre transform and finite Mellin transform.
B. Sc. Semester- V Paper-I <b>Complex Analysis</b>	CO-1	Students will be able to understand the knowledge on complex numbers and their elementary properties.
	CO-2	Students will be able to define the limits and continuity for complex functions and consequences of continuity.
	CO-3	Students will be able to apply the concept and analyticity and Cauchy Riemann equations, Cauchy integral function, types of

		convergence, complex contour integrals.
	CO -4	Students will be able to apply the Cauchy integral theorem and Residue theorem to solve complex integrations and obtain singularity, residues of complex functions.
B. Sc. Semester- V paper-II <b>Mechanics</b>	CO-1	Students will be able to learn fundamental of dynamics, review Newton's laws of motion, Gallilean invariance principle and related problems.
	CO-2	Students will be able to learn work energy theorem, conservative system, its physical application and related problems.
	CO-3	Students will be able to find the radial and transverse components of velocity and acceleration using path of motion of particle.
	CO -4	Students will be able to study the basic concepts of Lagrange's dynamics, principle of virtual work using D'Alembert principle and differential equation of an orbit
B. Sc. Semester- VI Paper-I <b>Linear Algebra</b>	CO-1	Students will be able to recognize and use basic properties of subspaces and vector spaces.
	CO-2	Students will be able to discuss the kernel and image of a linear transformation in terms of nullity and rank of the matrix.
	CO-3	Students will be able to use equivalent forms to identify matrices and solve linear systems
	CO -4	Students will be able to describe the determinant of a product of matrices relates to the determinant of the individual matrices.
B. Sc. Semester- VI paper-II <b>Special theory of Relativity</b>	CO-1	Students will be able to demonstrate the knowledge and broad understanding of special relativity and define the frame of reference.
	CO-2	Students will be able to derive the transformation equation for components of velocity in acceleration of a particle using Lorentz transformation.
	CO-3	Students will be able to discuss the geometrical representation of Space-Time.
	CO -4	Students will be able to derive the expression for the kinetic energy of a particle moving at a relativistic speed and hence establish the relationship showing the equivalence of its mass and energy.

**Mathematics Department:**

**Programme Specific Outcomes (PSOs)**

<b>Program Outcomes</b>	
PSO-1	The program helps the students to understand concept so that, they can recognize to apply the definitions and techniques which they have studied.
PSO-2	The program helps the students to acquire good knowledge and understanding in advanced areas so that, they are able to set career goals by pursuing higher education
PSO-3	Mathematical Science develops scientific temper and analytical ability amongst students to join research development in multidisciplinary research.
PSO-4	Knowledge in Mathematics will be helpful for students in working on field projects, real life problems and technical issues, in order to provide them experiential training on- applying mathematical modeling for arriving at the conclusion.
PSO-5	Students will be able to evaluate primary literature, in oral and written form so that they can present ideas clearly and confidently with skills to negotiate with others.
PSO-6	Studying three subjects throughout a 3- year degree programme in Mathematical Sciences enhances student's overall development, critical thinking, analytical aptitude and problem-solving skill.
PSO-7	Students will be able to analyze information logically and make a reasoned judgment by observation, understanding and evaluation of sources, such as data, facts and research findings.
PSO-8	Students will be able to work as a leader in a team for group projects and group activities so that they can participate actively, in a healthy spirit

<b>Course Outcome (COs)</b>		<b>Program Outcomes (POs)</b>							
		<b>Domain Specific (PSO)</b>							
	<b>Name of Course-B. Sc. Semester-I, Paper -I</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>	<b>8</b>
CO1	Students will be able to find nth root of unity and study about elementary functions using theory of complex numbers.	H	M		M	L	H	M	L
CO2	Students will be able to find Rank of Matrix and solve homogeneous as well as non-homogeneous system of linear equations.	H		H		M	H		
CO3	Students will be able to solve cubic and biquadratic equations and find the nature of roots of polynomials of any degree.	H	L			M	L	H	L
CO4	Students will be able to solve Diophantine Equation using concept of Number Theory.	H	M	L		L	L	M	
	<b>Name of Course-B. Sc. Semester-I, Paper -II</b>								
CO1	Students will be able to solve higher order derivative problems and apply this concept to find Series expansion of functions and evaluate limits using L'Hospitals Rule.	H	H		M	M	M		L

CO2	Students will be able to study Partial Differentiation and apply this concept to find Envelope and Asymptote of family of curves.	H	M				L	L	
CO3	Students will be able to find Extreme values in functions of several variable.	H	M	L		M	M		L
CO4	Students will be able to find integration of Algebraic rational functions, Trigonometric Functions and Irrational functions.	H	H					L	
<b>Name of Course-B. Sc. Semester-II, Paper -I</b>									
CO1	Students will be able to find Equation of Sphere, right circular Cone and Cylinder.	H	M			L			
CO2	Students will be able to solve first order linear differential equation.	H	H				M	L	
CO3	Students will be able to solve second order linear differential equation.	H	M		L			L	
CO4	Students will be able to solve linear difference equation and Higher order Difference equation.	H			M	L			
<b>Name of Course-B. Sc. Semester-II, Paper -II</b>									
CO1	Students will learn about Vector Differentiation and can apply the concept to find Gradient, Divergence and Curl.	H	M						
CO2	Students will be able to Evaluate double as well as triple Integration and apply this concept to find area bounded by curve and volume of given region.	H	H	M		L	H		L
CO3	Students will be able to calculate line integral, Surface integral and Volume integral.	H	L		M			L	
CO4	Students will learn Greens Theorem, Stokes Theorem and Gauss Divergence Theorem to evaluate Integrals.	H					M		
<b>Name of Course-B. Sc. Semester-III, Paper -I</b>									
CO1	Students will be able to study simultaneous differential equation of order one which is considered as origin of first order PDEqn.	H	M			M			M
CO2	Students will be able to study linear and nonlinear partial differential equation using charpits method and Jacobi method.	H	H		L		M	L	
CO3	Students will be able to solve Higher order linear Partial differential Equation	H	M		M		M		M
CO4	Students will be able to find Extremals of Functionals using Euler's Equation.	H		L					
<b>Name of Course-B. Sc. Semester-III, Paper -II</b>									
CO1	Students will be able to study Group and properties of Group and Subgroups.	H				M	M	H	
CO2	Students will be able to study concept of Normal subgroup, Permutation Group, Homomorphism and Isomorphism.	H	L			M	L	L	

CO3	Students will be able to study Ring theory and properties of Ring, subring and Ideals.	H	M				M	M	L
CO4	Students will be able to learn field theory, Integral domain, Euclidean Domain, Principle Ideal Domain and unique Factorisation Domain.	H		M			L	H	
<b>Name of Course-B. Sc. Semester-IV, Paper -I</b>									
CO1	Students will be able to apply the monotone convergence theorem to prove convergence of bounded monotone sequence.	H	H	M	H	L	M	L	M
CO2	Students will be able to apply Inverse and Implicit function theorems in solving problems.	H	M	M	L	L		H	
CO3	Students will be able to demonstrate competence with properties of real numbers by finding Supremum and Infimum of set and using the completeness property of real numbers.	H	H	L	L	M	H	H	M
CO4	Students will be able to recognize the importance of Riemann and Lebesgue integral of a bounded function.	H	H				M	H	
<b>Name of Course-B. Sc. Semester-IV, Paper -II</b>									
CO1	Students will be able to apply the concepts of Fourier Integrals and Fourier transform to solve problems and partial differential equations.	H	H			L	M		
CO2	Students will be able to acquire the knowledge of Laplace transform, their properties and inverse Laplace transform to obtain the solution of ordinary differential equation.	H	M	L				M	L
CO3	Students will be able to understand concepts of finite Fourier transform, finite Sturm-Liouville transform and generalized finite Fourier transform.	H	M		L				
CO4	Students will be able to solve problems using Finite Hankel transform, Finite Legendre transform and finite Mellin transform.	H	L						
<b>Name of Course-B. Sc. Semester-V, Paper -I</b>									
CO1	Students will be able to understand the knowledge on complex numbers and their elementary properties.	H				H	M		L
CO2	Students will be able to define the limits and continuity for complex functions and consequences of continuity.	H	M					M	
CO3	Students will be able to apply the concept and analyticity and Cauchy Riemann equations, Cauchy integral function, types of convergence, complex contour integrals.	H	H	M		H	L	M	
CO4	Students will be able to apply the Cauchy integral theorem and Residue theorem to solve complex integrations and obtain singularity, residues of complex	H	M		L			L	

	functions.								
	<b>Name of Course-B. Sc. Semester-V, Paper -II</b>								
CO1	Students will be able to learn fundamental of dynamics, review Newton's laws of motion, Gallilean invariance principle and related problems.	H	M	L	M	L	M	H	L
CO2	Students will be able to learn work energy theorem, conservative system, its physical application and related problems.	H	M	L	L	M	M		L
CO3	Students will be able to find the radial and transverse components of velocity and acceleration using path of motion of particle.	H	M	M			L		L
CO4	Students will be able to study the basic concepts of Lagrange's dynamics, principle of virtual work using D'Alembert principle and differential equation of an orbit	H	M	M			L	L	
	<b>Name of Course-B. Sc. Semester-VI, Paper -I</b>								
CO1	Students will be able to recognize and use basic properties of subspaces and vector spaces.	H	M	L	L		M	L	L
CO2	Students will be able to discuss the kernel and image of a linear transformation in terms of nullity and rank of the matrix.	H					L		
CO3	Students will be able to use equivalent forms to identify matrices and solve linear systems	H		L	L	M			
CO4	Students will be able to describe the determinant of a product of matrices relates to the determinant of the individual matrices.	H	M		M	M	M	M	L
	<b>Name of Course-B. Sc. Semester-VI, Paper -II</b>								
CO1	Students will be able to demonstrate the knowledge and broad understanding of special relativity and define the frame of reference.	H	M	M	L	M	M	L	L
CO2	Students will be able to derive the transformation equation for components of velocity in acceleration of a particle using Lorentz transformation.	H	M	M		M	M	L	
CO3	Students will be able to discuss the geometrical representation of Space-Time.	H	M	L					L
CO4	Students will be able to derive the expression for the kinetic energy of a particle moving at a relativistic speed and hence establish the relationship showing the equivalence of its mass and energy.	H	M		M	M		L	L

**Computer Science Department:****Programme Specific outcomes**

PSO	Programme outcomes
PSO-1	Analyze and compare alternative solutions to computing problems
PSO-2	Design, correctly implement and document solutions to significant computational problems
PSO-3	Apply algorithmic, mathematical and scientific reasoning to a variety of computational problems
PSO-4	Implement software systems that meet specified design and performance requirements
PSO-5	Work in the IT sector as system engineer, software tester, junior programmer, web developer, system administrator, software developer etc.

**Course Outcomes**

Course	Cos	Course Outcome
<b>B.Sc. Semester-I Paper-I Programming in C</b>	<b>CO-1</b>	Illustrate the flowchart and design an algorithm for a given problem to develop a c programs using operators. Develop conditional and iterative statements to write c programs.
	<b>CO-2</b>	Enables students to develop logics which will help them to create programs, applications in C. Enables students to develop logics which will help them to create programs, applications in C. Develop conditional and iterative statements to write c programs.
	<b>CO-3</b>	Inscribe c programs that use pointers to access arrays, strings and functions. Exercise user defined data types including structures and unions to solve problems. Writing C programs using pointers and to allocate memory using dynamic memory management functions Inscribe c programs using pointers and to allocate memory using dynamic memory management functions.
	<b>CO-4</b>	Inscribe c programs using pointers and to allocate memory using dynamic memory management functions. Inscribe c programs using pointers and to allocate memory using dynamic memory management functions.
<b>B.Sc. Semester-I Paper-II Fundamentals Of Information Technology</b>	<b>CO-1</b>	Introducing skills relating to IT basics, computer applications, programming, interactive Medias, internet basics.
	<b>CO-2</b>	Helps Students to peruse specialized Programs leading to technical and professional careers and certifications in the IT industry.
	<b>CO-3</b>	Introducing skills relating to IT basics, computer applications, programming, interactive Medias, internet basics.
	<b>CO-4</b>	It provides introductory overview of IT concepts including hardware, software, networks, IT careers and skills.
<b>B.Sc. Semester-II Paper-I Object Oriented Programming Using 'C++'</b>	<b>CO-1</b>	Describe OOPs concepts.
	<b>CO-2</b>	Understand tokens, expressions and control structures. Use functions and pointers in C++ Programs.
	<b>CO-3</b>	Explain arrays and strings and create programs using them. Able to solve real world problems using OOP techniques.
	<b>CO-4</b>	Explain arrays and strings and create programs using them.

<b>B.Sc. Semester-II Paper-II System Analysis and Design</b>	<b>CO-1</b>	It examines the issues and professional responsibilities that need to be considered at different phases in the development of information systems for an organization.
	<b>CO-2</b>	A firm basis for understanding the life cycle of a systems development project. An understanding of the analysis and development techniques required as a team member of a medium-scale information systems development project
	<b>CO-3</b>	Experience in developing information systems models. Experience in developing systems project documentation.
	<b>CO-4</b>	An understanding of the ways in which an analyst's interaction with system sponsors and users play a part in information systems development.
<b>B.Sc. Semester-III Paper-I Data Structures</b>	<b>CO-1</b>	Describe how arrays, records, linked structures, stacks, queues, trees, and graphs are represented in memory and used by algorithms
	<b>CO-2</b>	Demonstrate different methods for traversing trees.
	<b>CO-3</b>	Compare alternative implementations of data structures with respect to performance. Compare and contrast the benefits of dynamic and static data structures implementations
	<b>CO-4</b>	Compare alternative implementations of data structures with respect to performance. Compare and contrast the benefits of dynamic and static data structures implementations.
<b>B.Sc. Semester-III Paper-II Operating Systems</b>	<b>CO-1</b>	Learn different types of operating systems along with concept of file systems algorithms used in operating system.
	<b>CO-2</b>	Learn different types of Process scheduling algorithms used in operating system.
	<b>CO-3</b>	Provide students knowledge of memory management and deadlock handling algorithms.
	<b>CO-4</b>	Implement various algorithms required for management, scheduling, allocation and communication used in Operating System.
<b>B.Sc. Semester-IV Paper-I Java Programming</b>	<b>CO-1</b>	Able to understand the use of OOPs concepts. Able to solve real world problems using OOP techniques. Able to understand the use of abstraction.
	<b>CO-2</b>	Able to understand the use of Packages and Interface in java. Able to develop and understand exception handling, multithreaded applications with synchronization.
	<b>CO-3</b>	Able to design GUI based applications and develop applets for web applications. Able to handle IO streams, Use and create package and interfaces in a Java program.
	<b>CO-4</b>	Able to design GUI based applications and develop applets for web applications. Able to handle IO streams, Use and create package and interfaces in a Java program.
<b>B.Sc. Semester-IV Paper-II Linux Operating</b>	<b>CO-1</b>	Discuss the architecture, networking and basic commands of LINUX. Implement various file processing commands used in LINUX.
	<b>CO-2</b>	Apply Regular expression to perform pattern matching using utilities like grep,sed and awk. Construct various shell scripts for simple applications.



<b>System</b>	<b>CO-3</b>	Explain the process management using system calls. Analyze the structure of OS and basic architectural components involved in OS design.
	<b>CO-4</b>	Analyse and design the applications to run in parallel either using process or thread models of different OS. Analyse the various device and resource management techniques for timesharing and distributed systems. Interpret the mechanisms adopted for file sharing in distributed Applications.
<b>B.Sc. Semester-V Paper-I Visual Basic Programming</b>	<b>CO-1</b>	The student will use VB to build Windows applications using structured and object based programming techniques. Students are exposed to the following concepts and skills at an introductory conceptual level
	<b>CO-2</b>	Design, formulate, and construct applications with VB Integrate variables and constants into calculations applying VB. Determine logical alternatives with VB decision structures.
	<b>CO-3</b>	Design, formulate, and construct applications with VB. Integrate variables and constants into calculations applying VB. Determine logical alternatives with VB decision structures.
	<b>CO-4</b>	Assemble multiple forms, modules, and menus into working VB solutions Create VB programs using multiple array techniques. Build integrated VB solutions using files and structures with printing capabilities.
<b>B.Sc. Semester-V Paper-II Database Management System</b>	<b>CO-1</b>	Enables students obtain a broad understanding of database concepts and database management system software. Helps obtain a high level understanding of major DBMS concepts and their functions.
	<b>CO-2</b>	Helps to program a data-intensive applications using DBMS APIs. Helps students understand software development processes and to apply software engineering principles in software development.
	<b>CO-3</b>	Familiarization with Database Management System. Comprehensive knowledge of database models. Be familiar with relational database theory, and able to write relational algebra expressions for queries.
	<b>CO-4</b>	Usage of DML and TCL statements. An ability to work in one or more significant application domains.
<b>B.Sc. Semester-VI Paper-I Compiler Construction</b>	<b>CO-1</b>	Compiler design principles provide an in-depth view of translation and optimization process.
	<b>CO-2</b>	Studying compilers enables you to design and implement your own domain-specific language.
	<b>CO-3</b>	It studies Phases of the compilation process, Syntax and semantic specification of language
	<b>CO-4</b>	The course students will understand the overall structure of a compiler, and will know significant details of a number of important techniques commonly used.
<b>B.Sc. Semester-VI Paper-II SQL And PL/SQL</b>	<b>CO-1</b>	Ability to code database transactions using SQL. Skill to write PL/SQL programs.
	<b>CO-2</b>	Master the basics of SQL and construct queries using SQL. Be familiar with relational database theory, able to write relational algebra expressions for queries
	<b>CO-3</b>	Master the basics of PL/SQL Composite Data types like Procedures,

		Functions, Packages and Triggers. An ability to work in one or more significant application domains
	<b>CO-4</b>	Master the basics of PL/SQL Composite Data types like Procedures, Functions, Packages and Triggers. An ability to work in one or more significant application domains.

**Computer Science Department:****Programme specific outcomes (PSOs)**

PSO	Programme outcomes
PSO-1	Analyze and compare alternative solutions to computing problems
PSO-2	Design, correctly implement and document solutions to significant computational problems
PSO-3	Apply algorithmic, mathematical and scientific reasoning to a variety of computational problems
PSO-4	Implement software systems that meet specified design and performance requirements
PSO-5	Work in the IT sector as system engineer, software tester, junior programmer, web developer, system administrator, software developer etc.

**Course outcome of B.Sc Computer Science**

	Course outcomes (COs)	Programme outcomes (POs)				
		Domain specific (PSO)				
	Name of course: <b>B.Sc. Semester-I (Paper-I)</b> <b>Programming in C</b>	1	2	3	4	5
CO-1	Illustrate the flowchart and design an algorithm for a given problem to develop a c programs using operators. Develop conditional and iterative statements to write c programs.	M	M	L	H	H
CO-2	Enables students to develop logics which will help them to create programs, applications in C. Develop conditional and iterative statements to write c programs.	M	M	L	H	H
CO-3	Exercise user defined data types including structures and unions to solve problems.	H	M	M	M	M
CO-4	Writing C programs using pointers and to allocate memory using dynamic memory management functions.	H	M	L	H	H
	Name of course: <b>B.Sc. Semester-I (Paper-II)</b> <b>Fundamentals Of Information Technology</b>					
CO-1	Introducing skills relating to IT basics, computer applications, programming, interactive Medias, internet basics.	L	L	M	M	H
CO-2	Helps Students to peruse specialized Programs leading to technical and professional careers and certifications in the IT industry.	L	L	H	H	H
CO-3	Introducing skills relating to IT basics, computer applications, programming, interactive Medias, internet basics.	M	M	M	H	H
CO-4	It provides introductory overview of IT concepts including hardware, software, networks, IT careers and skills.	L	L	M	M	M
	<b>B.Sc. Semester-II (Paper-I)</b>					

<b>Object Oriented Programming Using 'C++'</b>						
<b>CO-1</b>	Describe OOPs concepts.	L	L	M	M	M
<b>CO-2</b>	Understand tokens, expressions and control structures. Use functions and pointers in C++ Programs.	L	L	H	M	M
<b>CO-3</b>	Explain arrays and strings and create programs using them. Able to solve real world problems using OOP techniques.	M	M	M	H	H
<b>CO-4</b>	Explain arrays and strings and create programs using them.	L	L	M	M	M
<b>B.Sc. Semester-II (Paper-II) System Analysis and Design</b>						
<b>CO-1</b>	It examines the issues and professional responsibilities that need to be considered at different phases in the development of information systems for an organization.	M	M	H	H	H
<b>CO-2</b>	A firm basis for understanding the life cycle of a systems development project. An understanding of the analysis and development techniques required as a team member of a medium-scale information systems development project	L	L	L	H	H
<b>CO-3</b>	Experience in developing information systems models. Experience in developing systems project documentation.	M	M	M	H	H
<b>CO-4</b>	An understanding of the ways in which an analyst's interaction with system sponsors and users play a part in information systems development.	L	L	L	M	M
<b>B.Sc. Semester-III (Paper-I) Data Structures</b>						
<b>CO-1</b>	Describe how arrays, records, linked structures, stacks, queues, trees, and graphs are represented in memory and used by algorithms	M	M	M	H	H
<b>CO-2</b>	Demonstrate different methods for traversing trees.	M	M	H	H	H
<b>CO-3</b>	Compare alternative implementations of data structures with respect to performance.	M	H	H	M	M
<b>CO-4</b>	Compare and contrast the benefits of dynamic and static data structures implementations.	L	L	M	H	H
<b>B.Sc. Semester-III Paper-II Operating Systems</b>						
<b>CO-1</b>	Learn different types of operating systems along with concept of file systems algorithms used in operating system.	L	L	M	M	M
<b>CO-2</b>	Learn different types of Process scheduling algorithms used in operating system.	M	M	H	H	H
<b>CO-3</b>	Provide students knowledge of memory management and deadlock handling algorithms.	L	M	H	M	M
<b>CO-4</b>	Implement various algorithms required for management, scheduling, allocation and communication used in Operating System.	M	L	L	H	H
<b>B.Sc. Semester-IV (Paper-I) Java Programming</b>						
<b>CO-1</b>	Able to understand the use of OOPs concepts. Able to solve real world problems using OOP techniques.	L	L	M	M	M

	Able to understand the use of abstraction.					
<b>CO-2</b>	Able to understand the use of Packages and Interface in java. Able to develop and understand exception handling, multithreaded applications with synchronization.	M	M	H	H	H
<b>CO-3</b>	Able to design GUI based applications and develop applets for web applications.	M	M	M	H	H
<b>CO-4</b>	Able to handle IO streams, Use and create package and interfaces in a Java program.	M	M	M	H	H
	<b>B.Sc. Semester-IV (Paper-II) Linux Operating System</b>					
<b>CO-1</b>	Discuss the architecture, networking and basic commands of LINUX. Implement various file processing commands used in LINUX.	L	L	L	M	M
<b>CO-2</b>	Apply Regular expression to perform pattern matching using utilities like grep, sed and awk. Construct various shell scripts for simple applications.	L	L	L	M	M
<b>CO-3</b>	Explain the process management using system calls. Analyze the structure of OS and basic architectural components involved in OS design.	L	L	M	H	M
<b>CO-4</b>	Analyze and design the applications to run in parallel either using process or thread models of different OS. Analyze the various device and resource management techniques for timesharing and distributed systems. Interpret the mechanisms adopted for file sharing in distributed Applications.	M	M	M	H	H
	<b>B.Sc. Semester-V Paper-I Visual Basic</b>					
<b>CO-1</b>	The student will use VB to build Windows applications using structured and object based programming techniques. Students are exposed to the following concepts and skills at an introductory conceptual level	L	L	M	M	M
<b>CO-2</b>	Design, formulate, and construct applications with VB Integrate variables and constants into calculations applying VB.	L	M	M	H	H
<b>CO-3</b>	Determine logical alternatives with VB decision structures. Create VB programs using multiple array techniques.	M	M	M	M	M
<b>CO-4</b>	Assemble multiple forms, modules, and menus into working VB solutions Build integrated VB solutions using files and structures with printing capabilities.	L	L	M	M	H
	<b>B.Sc. Semester-V (Paper-II) Database Management System</b>					
<b>CO-1</b>	Enables students obtain a broad understanding of database concepts and database management system software. Helps obtain a high level understanding of major DBMS concepts and their functions.	L	L	M	H	H
<b>CO-2</b>	Helps to program a data-intensive applications using DBMS APIs. Helps students understand software development processes and to apply software engineering principles in software development.	M	M	L	M	M
<b>CO-3</b>	Familiarization with Database Management System. Comprehensive knowledge of database models. Be familiar with relational database theory, and able to write relational algebra expressions for	L	L	M	M	H

	queries.			
<b>CO-4</b>	Usage of DML and TCL statements. An ability to work in one or more significant application domains.	M	M	H
<b>B.Sc. Semester-VI (Paper-I) Compiler Construction</b>				
<b>CO-1</b>	Compiler design principles provide an in-depth view of translation and optimization process.	L	M	M
<b>CO-2</b>	Studying compilers enables you to design and implement your own domain-specific language.	M	M	H
<b>CO-3</b>	It studies Phases of the compilation process, Syntax and semantic specification of language	L	L	M
<b>CO-4</b>	The course students will understand the overall structure of a compiler, and will know significant details of a number of important techniques commonly used.	M	M	L
<b>B.Sc. Semester-VI (Paper-II) SQL And PL/SQL</b>				
<b>CO-1</b>	Ability to code database transactions using SQL. Skill to write PL/SQL programs.	L	L	M
<b>CO-2</b>	Master the basics of SQL and construct queries using SQL. Be familiar with relational database theory, able to write relational algebra expressions for queries	L	L	H
<b>CO-3</b>	Master the basics of PL/SQL Composite Data types like Procedures, Functions, Packages and Triggers.	M	M	H
<b>CO-4</b>	An ability to work in one or more significant application domains.	M	M	M

#### Language Department:

##### Programme specific outcomes of English:

PSO	Programme outcomes
PSO-1	In pursuance with an emphasis on Language, English gains a deeper understanding of the resources of the written word.
PSO-2	It helps students to explore the entire range of human experience in the arena of language, specifically in Fiction, Poetry, and Drama.
PSO-3	It helps students to build skills of analytical and interpretive arguments; becomes careful and critical reader, practice writing in a variety of genres as a process of intellectual inquiry, creative expression and ultimately to become more effective thinkers and communicators who remains well equipped for a variety of careers in our information intensive society.
PSO-4	It offers students the opportunity to study influential writings from the British, American and global Anglophone traditions.
PSO-5	It provides imagination and critical insights into all areas of human experience - war and peace, nature and culture, love and sexuality, selfhood and social identity, justice and atrocity, the burdens of history and the dreams of the future.
PSO-6	Reads complex texts, actively recognizes key passages, raises questions, appreciates complexity and ambiguity, and comprehends the literal and figurative uses of language.
PSO-7	Increases confidence in speaking publicly, articulates clear questions and ideas in class discussion; listens thoughtfully and respectfully other ideas and prepares, organizes and delivers engaging oral presentations.

##### Course outcomes of English:

Course	COs	Course outcomes
B. Sc. Semester- I &	CO-1	Comprehend the nature of literary forms like prose, poetry drama, short stories.

II Compulsory English	CO-2	Learn to draft an application, letter, and report.
	CO-3	Comprehend and compare passages.
	CO-4	Develop and improve vocabulary skills through one word substitute.
	CO-5	Learn antonyms and synonyms and use them in sentences.
	CO-6	Learn appropriate use of parts of speech.
	CO-7	Learn to draft curriculum vitae.
	CO-8	Learn to identify common errors in English.
	CO-9	Learn to prepare sentences from given words.
B. Sc. Semester- I & II Supplementary English	CO-1	Illustrate the nature of literary forms like prose, poetry drama, short stories.
	CO-2	Comprehend the passage and make a précis of it.
	CO-3	Improve vocabulary by learning one word for a group of words.
	CO-4	Learn word formation.
	CO-5	Improve essay writing skill.
	CO-6	Learn usage of foreign words in English.
	CO-7	Learn to prepare news reports.
	CO-8	Learn to prepare advertisements.
	CO-9	Learn to improve writing skill through expansion of idea.

### Marathi (optional):

PSO	Programme outcomes
PSO-1	साहित्य व भाषाविषयक आकलनभ्रमता वाढते.
PSO-2	मराठी साहित्य, भाषा व संस्कृती यांचा जवळून पुरचय होतो
PSO-3	मराठी भाषा व साहित्य अवलोकनाची क्षमता वाढते.
PSO-4	साहित्यकृतीला मुक्त चिंतनाद देण्याची क्षमता मिळते.
PSO-5	साहित्यभाषा व व्यवहारभाषा यांचे ठोस निष्पत्ती.
PSO-6	लेखन, वाचन, संभाषण, आकलन, ई. भाषिक कौशल्यांचा विकास होतो.

### Course outcomes of Marathi:

Course	COs	Course outcomes
B. Sc. Semester- I & II Marathi	CO-1	मराठी भाषेतून वैज्ञानिक दृष्टीकोन वृद्धिंगत होतो.
	CO-2	मराठीभाषेतून सामाजिक समता जवळ्याचा यथार्थता केला जातो.
	CO-3	साहित्य यातून वाचकांचे महत्त्व व नवीन विपत्तीला कळते.
	CO-4	मराठी साहित्य यातून मराठी तंत्रज्ञानाचा एक वेगळ्या दृष्टीकोन होतो.
	CO-5	मराठी साहित्य यातून मानवताविधीत विचार समृद्ध होण्यास मदत होते.
	CO-6	भाषेतून मराठी साहित्य, भाषा व संस्कृती यांचा जवळून पुरचय होतो.
	CO-7	भाषेद्वारे मानवांचे भावनांचे गतीकरण होते.
	CO-8	मराठी भाषेतून राष्ट्रीय एकात्मतेचे मूल्य जवळ्या जाते.
	CO-9	साहित्य यातून सामाजिक कार्याचा संदर्भ पुरवला जातो.
	CO-10	साहित्य यातून सामाजिक जागृतीचे मूल्य ठरवले जाते.
	CO-11	साहित्य यातून व भाषेतून नवा आशावाद पुरवला जातो.
	CO-12	साहित्यकृतीला मुक्त चिंतनाद देण्याची क्षमता

	निमाण होते.
C0-13	साहित्य यातून लेखन वाचन संभाषण आकलन इ यादी भाषिक कौश्यांचा विकास होतो.
C0-14	मराठी साहित्य यातून उच्च शिक्षण वाचा परीक्षेची होती



English Department:

**Programme specific outcomes (PSOs)**

PSO	Programme outcomes
PSO-1	In pursuance with an emphasis on Language, English gains a deeper understanding of the resources of the written word.
PSO-2	It helps students to explore the entire range of human experience in the arena of language, specifically in Fiction, Poetry, and Drama.
PSO-3	It helps students to build skills of analytical and interpretive arguments; becomes careful and critical reader, practice writing in a variety of genres as a process of intellectual inquiry, creative expression and ultimately to become more effective thinkers and communicators who remains well equipped for a variety of careers in our information intensive society.
PSO-4	It offers students the opportunity to study influential writings from the British, American and global Anglophone traditions.
PSO-5	It provides imagination and critical insights into all areas of human experience - war and peace, nature and culture, love and sexuality, selfhood and social identity, justice and atrocity, the burdens of history and the dreams of the future.
PSO-6	Reads complex texts, actively recognizes key passages, raises questions, appreciates complexity and ambiguity, and comprehends the literal and figurative uses of language.
PSO-7	Increases confidence in speaking publicly, articulates clear questions and ideas in class discussion; listens thoughtfully and respectfully other ideas and prepares, organizes and delivers engaging oral presentations.

**Course outcomes English**

COs	Course outcomes	Programme outcomes (POs)						
		Domain specific (PSO)						
<b>B Sc Semester-I &amp; II, English</b>		<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>
CO-1	Comprehend the nature of literary forms like prose, poetry drama, short stories.	H	M	M	M	H	H	M
CO-2	Learn to draft an application, letter, and report.	H	M	M	M	H	M	M
CO-3	Comprehend and compare passages.	H	M	H	M	M	H	M
CO-4	Develop and improve vocabulary skills through one word substitute.	M	L	H	M	L	M	M
CO-5	Learn antonyms and synonyms and use them in sentences.	M	M	M	M	M	M	M
CO-6	Learn appropriate use of parts of speech.	M	M	M	M	M	M	M
CO-7	Learn to draft curriculum vitae.	H	M	M	M	M	M	M
CO-8	Learn to identify common errors in English.	M	L	M	M	M	M	M
CO-9	Learn to prepare sentences from given words.	M	M	H	M	M	M	M





