

Programme Outcomes

Bihar National College, Patna is one of the oldest constituent units of Patna University. It runs different programmes of Arts and Science streams to inculcate creative ability and critical temper, sense of social services, human values to make responsible, dutiful and a noble citizen of India.

FACULTY OF ARTS

B. A. SANSKRIT			
Programme Outcomes of Sanskrit:			
1	A graduate shall be able to perform at the end of any Programme in which training has been imparted by the University.		
2	Critical Thinking: Take informed actions after identifying the assumptions that frame our thinking and actions, checking out the degree to which these assumptions are accurate and valid, and looking at our ideas and decisions (intellectual, organizational, and personal) from different perspectives.		
3	Communication: Listen, read, comprehend, speak and write clearly and effectively in person and through electronic media in English/regional language/language of the discipline and exhibit sound domain knowledge including academic concepts and terminologies.		
4	Self-directed and Life-long Learning: Engage in independent and lifelong learning in the broadest context of socio-technological changes.		
Part-I	Course-I		
	Course-II		
Part-II	Course-III		
	Course-IV		
Part-III	Course-V		
	Course-VI		
	Course-VII		
	Course-VIII		

B. A. HINDI

Programme Outcomes of Hindi:

1	Developing reading, writing, speaking and listening skills.		
2	Availing the job opportunities in translation		
3	Increasing the critical attitude about literary writing.		
4	Creating an interest in literature.		
5	Imbuing the literary research attitude.		
Part-I	Course-I		
	Course-II		
Part-II	Course-III		
	Course-IV		
Part-III	Course-V		
	Course-VI		
	Course-VII		
	Course-VIII		

B.A. MAITHILI

Programme Outcomes of Maithili:

1			
2			
3			
4			
5			
Part-I	Course-I		
	Course-II		
Part-II	Course-III		
	Course-IV		
Part-III	Course-V		
	Course-VI		
	Course-VII		
	Course-VIII		

B.A. URDU

Programme Outcomes of Urdu:

1	Developing reading, writing, speaking and listening skills.		
2	Availing the job opportunities in translation.		
3	Increasing the critical attitude about literary writing.		
4	Creating an interest in literature.		
5	Imbuing the literary research attitude.		
6	Provides job opportunity in journalism, higher education, mass communication and film.		
7	Inculcate the social values, philosophy, national integrity and univocal appeal to humanity.		
Part-I	Course-I		
	Course-II		
Part-II	Course-III		
	Course-IV		
Part-III	Course-V		
	Course-VI		
	Course-VII		
	Course-VIII		

B.A. ENGLISH

Programme Outcomes of English:

1	Basic knowledge of English as Language.		
2	Major knowledge of English as Literature.		
3	Basic knowledge of English Grammar.		
4	Critical study of English Literary studies.		
5	Relation between pleasure of literature and real life.		
Part-I	Course-I		
	Course-II		
Part-II	Course-III		
	Course-IV		
Part-III	Course-V		
	Course-VI		
	Course-VII		
	Course-VIII		

B.A. ECONOMICS

Programme Outcomes of Economics:

1	Understanding the efficiency and equity implications of market interference, including government policy.		
2	Developing the skill of data collection & use of sampling techniques in research.		
3	Developing the knowledge about theories of economic growth & development and issues of economic planning.		
4	Understanding characteristics, features, structural changes in Indian economy.		
5	Comprehension of the nature and impact of New Economic Reforms on the Indian economy.		
6	Knowing the problems of unemployment, poverty, rising economic and social inequality and problems of regional imbalances in India.		
7	Evaluating the changing role of agriculture, industrial and service sector and foreign sector in Indian economy.		
8	Measuring the problems and prospects of cottage and small scale industries, and industrial sicknesses.		
Part-I	Course-I		
	Course-II		
Part-II	Course-III		
	Course-IV		
Part-III	Course-V		
	Course-VI		
	Course-VII		
	Course-VIII		

B.A. SOCIOLOGY

Programme Outcomes of Sociology:

1	Acquaintance with social transactions, social relations, social formations, social control, social values and culture		
2	Knowing the significance of social institution, caste system, religion, nationalism, integrity, equality and justice.		
3	Getting the knowledge of the works of social reformers all over the nation.		
4	Ability to follow new stream of thoughts and theories of social thinkers.		
5	Getting the deep knowledge about various social groups like tribal community, women bulk, etc.		
6	Ability to deal with research in Sociology.		
Part-I	Course-I		
	Course-II		
Part-II	Course-III		
	Course-IV		
Part-III	Course-V		
	Course-VI		
	Course-VII		
	Course-VIII		

B.A. POLITICAL SCIENCE

Programme Outcomes of Political Science::

1	Knowledge about political system of the nation.		
2	Study of national and international political affairs.		
3	Study from competitive examination point of view.		
4	Understanding the government mechanism, its functions, duties and responsibilities.		
5	Creating appropriate and efficient political leaders.		
6	Getting knowledge of political law.		
7	Getting knowledge of Constitution of India.		
Part-I	Course-I		
	Course-II		
Part-II	Course-III		
	Course-IV		
Part-III	Course-V		
	Course-VI		
	Course-VII		
	Course-VIII		

B.A. PSYCHOLOGY

Programme Outcomes of Psychology:

1	Enhancement of stress management skills.		
2	Enhancement of coping skill with different problems in life		
3	Enabling to measure attitude, aptitude, interest, adjustment, skills, etc. within the people.		
4	Introduction to counselling process and techniques.		
5	Illustration of mental disorder and treatment.		
Part-I	Course-I		
	Course-II		
Part-II	Course-III		
	Course-IV		
Part-III	Course-V		
	Course-VI		
	Course-VII		
	Course-VIII		

B.A. HISTORY

Programme Outcomes of History:

1	Analyze relationship between the past and the present is lively presented in the history.		
2	To develop practical skills helpful in the study and activities related to the historical events.		
3	Understanding of background of our religion and administration.		
4	Understanding the present existing social, political, religious and economic conditions of the people.		
5	To develop interest in the study of history and activities related to the history.		
Part-I	Course-I		
	Course-II		
Part-II	Course-III		
	Course-IV		
Part-III	Course-V		
	Course-VI		
	Course-VII		
	Course-VIII		

B.A. GEOGRAPHY

Programme Outcomes of Geography:

1	Study of geography and it's development		
2	Understand the surface features and it's importance of the world.		
3	Acquiring knowledge about environment and it's challenges.		
4	Study the socio-economic aspects of different parts of the world.		
5	Gain knowledge about urban areas		
6	Gain knowledge about remote sensing and G.I.S .		
7	Analyze, synthesize, and apply core geographic principles, concepts, models, and phenomena.		
8	Identify examples of human-environmental interaction and assess their past, present, and future impact.		
9	Evaluate and apply geographic methods and associated theories used to analyze and advance geographic concepts.		
Part-I	Course-I	PHYSICAL GEOGRAPHY	<p>1-Understand the origin of Earth and solar system.</p> <p>2-Study of internal Structure of earth and mechanism of waves related to Internal parts of earth.</p> <p>3-Study of relief of earth surface – Mountain, Plateau, Plain, Coastal area and its importance for man and its environment.</p> <p>4- Study of landforms of different part of Surface.</p> <p>5- Understand the Composition, Structure and importance of atmosphere.</p> <p>6-Gain knowledge about the components, different types of climate and climatic change.</p>
	Course-II	ASIA – REGIONAL STUDY	<p>1- Study the physical aspect of Asia like - Structure, physiography, drainage, Climate and Natural Vegetation</p> <p>2- understand the economic aspect like Agriculture, Mineral resources, Power resources etc</p> <p>3- Study the population of Asia and its impact.</p> <p>4- Brief study of China, Japan and neighbouring</p>

			country of India.
	Practical	1B AND 2B – PRACTICAL	<ul style="list-style-type: none"> 1- to study the scale map reduction and enlargement. 2- Gain knowledge about topographical maps. 3- Learn the construction of some selected to show distribution 4- Developing skill to construct different type of Map projections <p>To show different areas of world.</p>
Part-II	Course-III	GEOGRAPHY OF INDIA	<ul style="list-style-type: none"> 1- Study the Physical, Agricultural aspect of India. 2- Study mineral and power industries of India. 3- Understand the different aspect of population of India. 4- Study the geography of Bihar.
	Course-IV	ECONOMIC AND RESOURCE GEOGRAPHY	<ul style="list-style-type: none"> 1- Study the different types of farming in the world. 2- Study the Industrial and Agricultural location theory and some major industry (Iron and steel, Cotton Textile. Sugar) of world. 3- Gain knowledge about International Trade and Trade Routes. 4- Understand the concept of resources and the study of different resources like Soil, water, forest, mineral and power resources of the world.
	Practical	3B AND 4B – PRACTICAL	<ul style="list-style-type: none"> 1-Learn to draw monthly temperature and rainfall graph. 2. Learn the construction of different types of cartograms to show the distribution of different things. 3. Learn the different types of Projection to show the different areas of world. 4. Learn some statistical technique like Mean,

			Median, Mode, Quartile and Standard Deviation.
Part-III	Course-V	GEOGRAPHICAL THOUGHT AND HUMAN GEOGRAPHY	<ol style="list-style-type: none"> 1- Study the development of geography. 2- Understand the dualism in geography. 3- Acquiring knowledge of Human geography.
	Course-VI	PAPER -6	<ol style="list-style-type: none"> 1- Study of Environment and gain Knowledge about environment degradation and management. 2. Understand the satellite remote sensing and develop an idea about satellite image interpretation.
	Course-VII	OPTIONAL A- POPULATION GEOGRAPHY	<p>Gain knowledge about different aspect</p> <p>Like meaning n scope, growth, Composition</p> <p>Distribution, theories and policies with reference to world and India.</p>
	Course-VIII	OPTIONAL B- GEOLOGY OF INDIA	Gain knowledge about geology of India.
		OPTIONAL C – CARTOGRAPHY AND MAP MAKING	<ol style="list-style-type: none"> 1- Gain knowledge about astronomical terms, the odolite and Sextent, a real photography 2- Learn mathematical construction of some projection like zenithal, conical & cylindrical. 3-Study the modern technique of map making.
		OPTIONAL D – URBAN GEOGRAPHY AND PLANNING	<ol style="list-style-type: none"> 1- Gain knowledge about concept of urban geography. 2. Study the locational and functional <p>Classification of towns.</p> <p>3 study the Metropolitan planning and Master Plan</p>

			of Patna. 4- Know the concept of smart city.

FACULTY OF SCIENCE

PROGRAMME: B.Sc. BOTANY			
A. Program Specific Outcomes:			
1	Identifying different resources helpful for human life.		
2	Identifying different groups of plants.		
3	Acquiring knowledge about inheritance, biochemical and metabolic activities.		
4	Development of horticultural skill.		
5	Acquiring knowledge about importance of environment.		
B. Course Outcomes:			
Part-I	Course-I	General Biology, Microbiology, Mycology and Plant Pathology	<ol style="list-style-type: none"> 1. An introduction to living world. 2. Developing skill of identification of Microbes, Fungi and plant diseases.
	Course-II	Plant Diversity	<ol style="list-style-type: none"> 1. Developing interest in plant diversity. 2. Developing skill of identification of Algae, Bryophytes, Pteridophytes, and Gymnosperms.
	Practical	Based on paper-I & II	
Part-II	Course-III	Angiosperms and Economic Botany	<ol style="list-style-type: none"> 1. Developing skill of identification of flowering plants. 2. Characters of vascular plants and classification of plants. 3. The student can understand the knowledge about 1. Diversity in vascular plant. 4. Imparting knowledge of Horticulture. 5. Resource of plants to fulfil the basic needs
	Course-IV	Cell Biology, Cytogenetics and Plant Breeding	<ol style="list-style-type: none"> 1. History, distribution, structure and functions of different cell organelles. 2. The students can understand about a branch of genetics that deals with behaviour of chromosomes during cell division and the roles of cytoplasmic genetic material in genetics.

	Practical	Based on paper-III & IV	
Part-III	Course-V	Molecular Biology and Biotechnology	
	Course-VI	Plant Physiology and Biochemistry	Acquiring knowledge about biochemical, physiological mechanism in plants.
	Course-VII	Biodiversity, and Environmental Biology	1. Scientific study of their nature of habitant with environment
	Course-VIII	Practical	

B.Sc. STATISTICS

Programme Outcomes of Statistics:

1	Application of statistics in various walks of life.		
2	Knowing the statistical organization in India and Abroad.		
3	Ability to build statistical knowledge.		
4	Application of various distributions to real life situation.		
5	Ability to apply various statistical tools to research problem.		
6	Understanding how to collect, present, analyze and interpret the data.		
7	Ability to analyze the data by using MS-Excel.		
Part-I	Course-I		
	Course-II		
Part-II	Course-III		
	Course-IV		
Part-III	Course-V		
	Course-VI		
	Course-VII		
	Course-VIII		

PROGRAMME: B.Sc. GEOLOGY

A. Program Specific Outcomes:

1	Identifying different resources on earth for human life and prosperity.
2	Identifying different rocks & minerals and their process of formation.
3	Acquiring knowledge about the natural resources of economic importance..
4	Acquiring knowledge about ancient life and their contribution for the development of society at large.
5	Identifying different geological environments and their interpretation for solving the past problem.
6	Apply fundamental geological principles and concepts in theoretical, practical and vocational situations
7	Solve geological problems using logical scientific methods and creative thinking
8	Synthesise geological data on a range of spatial and temporal scales to make interpretations that allow for scientific uncertainty
9	Communicate geological information concisely and accurately using written, visual, and verbal means appropriate to the situation
10	Employ new and established technologies to collect and interpret geological data, recognizing their strengths and limitations
11	Acquire geological knowledge and expertise from a range of sources in a variety of situations
12	Appreciate international perspectives on geo-science and recognize the importance of global standards for collecting and reporting geological data
13	Recognize the need for sustainable use of Earth resources, and value environmental, indigenous and other community perspective on geological activities
14	Work ethically and professionally alone and as part of a team, complying with applicable legislation and managing time and other resources efficiently and effectively

B. Course Outcomes:

	Course-I	General, & Physical geology and structural Geology	<ul style="list-style-type: none"> 1. origin, age, interior of the earth. 2. Geological Time Scale. 3. Volcanoes and Earthquake. 4. Geological work of river, ground water, wind, glacier.
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Part-I			5. Structures- folds, faults, unconformity, their significance.
	Course-II	Mineralogy, Crystallography and optical mineralogy.	<ol style="list-style-type: none"> 1. Knowledge about minerals, their types, properties, paragenesis. 2. Knowledge of crystal models symmetry elements. 3. Laws of crystallography. 4. Development about knowledge of light propagation. 5. Petrological Microscope.
	Practical	Based on paper-I & II	
Part-II	Course-III	Igneous Petrology.	<ol style="list-style-type: none"> 1. Developing skill of identification of flowering plants. 2. Characters of vascular plants and classification of plants. 3. The student can understand the knowledge about 1. Diversity in vascular plant. 4. Imparting knowledge of Horticulture. 5. Resource of plants to fulfil the basic needs
	Course-IV	Cell Biology, Cytogenetics and Plant Breeding	<ol style="list-style-type: none"> 1. History, distribution, structure and functions of different cell organelles. 2. The students can understand about a branch of genetics that deals with behaviour of chromosomes during cell division and the roles of cytoplasmic genetic material in genetics.
	Practical	Based on paper-III & IV	
Part-III	Course-V	Molecular Biology and Biotechnology	
	Course-VI	Plant Physiology and Biochemistry	Acquiring knowledge about biochemical, physiological mechanism in plants.

	Course-VII	Biodiversity, and Environmental Biology	1. Scientific study of their nature of habitant with environment
	Course-VIII	Practical	

B. Sc. Physics

Programme Outcomes of Physics:

1	Identifying and describing physical systems with their professional knowledge	
2	Developing their scientific intuition, ability and techniques to tackle problems either theoretical or experimental in nature	
3	Knowledge of general physics like sound, wave, friction, forces and laws of motion and use of mathematics	
4	Information of electrical current, circuits, construction and their use	
5	Learning about concepts of nuclear physics and nuclear energies and importance of their use for mankind	
6	Knowing about the light and its importance in life, its characteristics, properties and use in various instruments	
7	To develop an understanding of the basic processes and practices of research in Science and to understand and appreciate interdisciplinary approaches to study and research	
8	To analyze data both qualitatively and quantitatively and to draw correct inferences	
9	To develop clarity in the expression of ideas, both in speech and in writing	
10	To develop basic computer skills required for study and employment	
11	To demonstrate competence in entry-level examinations for employment or higher studies	
12	To successfully apply skills and knowledge learned in the classroom to practical life	
Part-I	Course-I	<p>Classical Mechanics</p> <ul style="list-style-type: none"> • D'Alembert's principle • Lagrange's equations of motion • Hamilton's equations of motion • Motion under central forces • Centrifugal and Coriolis force
		<p>Special theory of relativity</p> <ul style="list-style-type: none"> • The students develop analytic thinking ability which helps them in their career and future studies Michelson Morley experiment and outcome. • Lorentz transformation equation and

			<ul style="list-style-type: none"> • application. • Variation of mass with velocity and mass energy relation
	Course-II	Heat & Thermodynamics	<ul style="list-style-type: none"> • Zeroth law of thermodynamics and concept of temperature. • First law of thermodynamics and applications. • Second law of thermodynamics , Carnot s cycle and Carnot engine and efficiency. • Thermodynamic scale of temperature and its equivalence to perfect gas scale. • Concept of entropy, entropy changes in reversible and irreversible processes. • Third law of thermodynamics. • Thermodynamic potential properties and applications. • First and second order phase transition. • Maxwell s thermodynamic relation and applications. • Maxwell Boltzmann law of distribution of velocities. • Degrees of freedom and law of equipartition of energy. • Mean free path and transport phenomenon. • Van der wall s equation of state and critical constants.
Part-II	Course-III	Optics	<ul style="list-style-type: none"> • Longitudinal and transverse waves , waves equations. • Intensity of wave, ripple and gravity waves. • Newton s formula for velocity of sound with Laplace s correction. • Electromagnetic nature of light and Huygen s principle • Temporal and spatial coherence. • Interference of light and Young s double slit experiment and Fresnel s Biprism. • Phase change in reflection,

			<p>interference in thin film.</p> <ul style="list-style-type: none"> • Fringes of equal thickness and equal inclination. • Newton's rings .measurement of wavelength and refractive index. • Michelson interferometer and its applications. • Feby Perot interferometer and its applications. • Resolving power of telescope and grating. • Fresnel's halfperiod zone, zone plate.
		<p>Electromagnetic theory</p>	<ul style="list-style-type: none"> • Maxwell's equations. • Vector and Scalar Potentials. Gauge Transformations: Lorentz and Coulomb Gauge. • Boundary Conditions at Interface between Different Media. Wave Equations. • Plane Waves in Dielectric Media. • Poynting vector and Poynting Theorem. Electromagnetic (EM) Energy Density. • Plane EM waves through vacuum and isotropic dielectric medium, transverse nature of plane EM waves, refractive index and dielectric constant, wave impedance. • Propagation of electromagnetic wave through conducting media, relaxation time, skin depth. • Wave propagation through dilute plasma, electrical conductivity of ionized gases, plasma frequency, refractive index, skin depth. • Boundary conditions at a plane interface between two media. Reflection & Refraction of plane waves at plane interface between two dielectric media-Laws of Reflection & Refraction. • Fresnel's Formulae for perpendicular & parallel polarization cases, Brewster's law. Reflection & Transmission coefficients. Total

			<p>internal reflection.</p> <ul style="list-style-type: none"> • Description of Linear, Circular and Elliptical Polarization. Propagation of E.M. Waves in Anisotropic Media. Double Refraction. Polarization by Double Refraction. • Nicol Prism. Ordinary & extraordinary refractive indices. Production & detection of Plane, Circularly and Elliptically Polarized Light • Babinet Compensator and its Uses • Biot's Laws for Rotatory Polarization. Fresnel's Theory of optical rotation. • Laurent's half-shade polarimeter • Numerical Aperture. Step and Graded Indices
	Course-IV	Electrostatics and Magnetism	<ul style="list-style-type: none"> • Electric field, electric flux, Gauss's law and applications. • Laplace's and Poisson's equation and their solution. • Polarization, capacitor (parallel plate and spherical). • Biot-Savart's law and applications. Ampere's circuital Law • B-H curve and hysteresis. • Faraday's and Lenz's law, self and mutual induction. • Maxwell's equation, charge conservation and displacement current. • A.C. circuit, reactance and impedance • Series LCR circuit, resonance and Q-factor.
		Current Electricity	<p>Basic understanding of various vital electronic components such as capacitor, inductor, resistance and their combinations.</p> <p>Understanding of behavior of these components in the presence of ac and dc voltage</p>

		Modern physics	<ul style="list-style-type: none"> • Wave-particle duality and different experimental evidences in its support, particles as wave packets. Group and Phase velocities, Probability, • Heisenberg uncertainty principle, its derivation and applications. • Schrodinger equation for non-relativistic particles; physical interpretation of a wave function, Probability and probability current densities probabilities and normalization Position, Momentum and Energy operators; stationary states. • Application of Schrodinger equation to one dimensional potential problem. • Stability of the nucleus • Radioactive decay • Electron-positron pair creation by gamma photons in the vicinity of a nucleus. • Mass defect, - nature of fragments and emission of neutrons in nuclear fission. • Fusion and thermonuclear reactions driving stellar energy. • Spontaneous and Stimulated emissions. Metastable states. Einstein's A and B coefficients. Optical Pumping and Population Inversion. Three-Level and Four-Level Lasers.
Part-III	Course-V	Mathematical Physics	<ul style="list-style-type: none"> • Grad , Divergence and Curl and their applications. • Gauss's divergence, Green's and Stoke's theorem and their applications. • Orthogonal and curvilinear coordinate • Expression for gradient , divergence and Curl, Laplacian in orthogonal curvilinear co-ordinates. • Derivation of gradient , divergence ,

			<p>Curl and Laplacian spherical and cylindrical co- ordinate system.</p> <ul style="list-style-type: none"> • Fourier series, orthogonality and sine and cosine function. • Expansion of function with arbitrary period. • Application, analysis of sawtooth and square wave. • Forbenius method and its application to differential equation. • Legendre , Bessel and properties of Legendre polynomials. • Bessel functions of the first kind, generating function. • Beta and gamma functions and relation between them. • Solution to partial differential equations using separation variables. • Laplace equation , rectangular , cylindrical and spherical symmetry.
		<p>Quantum Mechanics</p>	<ul style="list-style-type: none"> • Postulates of Quantum Mechanics. • Time dependent Schrodinger equation and dynamical evolution of a quantum state. Properties of Wave Function. • Linearity and Superposition Principles. Eigenvalues and Eigenfunctions. • Commutator of position and momentum operators; Expectation values of position and momentum. • Wave function of a Free Particle. • Hamiltonian, stationary states and energy eigenvalues. • General solution of the time dependent Schrodinger equation in terms of linear combinations of stationary states. • Application to spread of Gaussian wave-packet for a free particle in one dimension; wave packets, Position-momentum uncertainty principle. • continuity of wave function, boundary condition and emergence of discrete energy levels. • Application to square well potential, • Quantum mechanics of simple

			<p>harmonic oscillator-energy levels and energy eigen functions using Frobenius method; Hermite polynomials; ground state, zero point energy & uncertainty principle.</p> <ul style="list-style-type: none"> • Electron angular momentum. Space quantization. Electron Spin and Spin Angular Momentum. Larmor's Theorem. Spin Moment. • Stern-Gerlach Experiment. • Electron Magnetic Moment and Magnetic Energy, Gyromagnetic Ratio and Bohr Magneton. Normal and Anomalous Zeeman Effect. • Paschen Back and Stark Effect. • Pauli's Exclusion Principle, Symmetric & Antisymmetric Wave Functions. • Spin orbit coupling. Spectral Notations for Atomic States. Total angular momentum. • Vector Model. Spin-orbit coupling in atoms- L-S and J-J couplings. • Hund's Rule. Term symbols. Spectra of Hydrogen and Alkali Atoms.
Course-VI	Statistical Mechanics		<ul style="list-style-type: none"> • Elementary Concept of Ensemble, Entropy and Thermodynamic Probability • Maxwell-Boltzmann Distribution Law, Partition Function, Thermodynamic Functions of an Ideal Gas • Gibbs Paradox, Sackur-Tetrode equation, Law of Equipartition of Energy • Properties of Thermal Radiation. Laws of Blackbody Radiation • Spectral Distribution of Black Body Radiation and its laws • B-E distribution law • Bose-Einstein condensation, properties of liquid He (qualitative description) • Radiation as a photon gas and Thermodynamic functions of photon gas. • Fermi-Dirac Distribution Law

			<ul style="list-style-type: none"> • Electron gas in a Metal, Specific Heat of Metals • White Dwarf Stars and Chandrasekhar Mass Limit
		Electronics	<ul style="list-style-type: none"> • Semiconductor diodes and their characteristics. • Energy Level Diagram. Conductivity and Mobility, Barrier Formation in PN Junction Diode. Static and Dynamic Resistance. • Current Flow Mechanism in Forward and Reverse Biased Diode. Drift Velocity. Derivation of Barrier Potential, Barrier Width and Current for Step Junction. • Semi-conductor Rectifiers, calculation of Ripple Factor and Rectification Efficiency, • Zener Diode and Voltage Regulation. • Principle and structure of LEDs, Photodiode and Solar Cell. • Transistors, their types and configurations. • Characteristics of transistor in different Configurations. Current gains α and β and their . • Load Line analysis of Transistors. • Transistor Biasing and Stabilization Circuits. • Transistor as 2-port Network. h-parameter Equivalent Circuit. Analysis of a single-stage CE amplifier using Hybrid Model. • Classification of Class A, B & C Amplifiers. • RC-coupled amplifier and its frequency response.
	Course-VII	Solid State Physics	<ul style="list-style-type: none"> • Crystal structure, Lattice Translation Vectors. Unit Cell. Miller Indices. Reciprocal Lattice. Types of Lattices. • Brillouin Zones. Diffraction of X-rays by Crystals. Bragg's Law. Atomic and Geometrical Factor.

			<ul style="list-style-type: none"> • Lattice Vibrations and Phonons, Qualitative Description of the Phonon. • Dulong and Petit's Law, Einstein and Debye theories of specific heat of solids. T^3 law. • Dia-, Para-, Ferri- and Ferromagnetic Materials. Classical Langevin Theory of Dia and Paramagnetic Domains. • Quantum Mechanical Treatment of Paramagnetism. Curie's law, Weiss's Theory of Ferromagnetism and Ferromagnetic Domains. • B-H Curve. Hysteresis and Energy Loss • Polarization. Electric Susceptibility. Polarizability. • Clausius-Mosotti Equation. Classical Theory of Electric Polarizability. • Langevin-Debye equation. Complex Dielectric Constant • Normal and Anomalous Dispersion. • Periodic potential and Bloch Theorem, Kronig-Penny model. • Band Gap. Conductor, Semiconductor and insulator. Conductivity of Semiconductor, mobility, Hall Effect. Measurement of conductivity & Hall coefficient.
	Course-VIII	Plasma Physics & Electrodynamics	<ul style="list-style-type: none"> • Four-vectors: Concept of four-force • Criteria for the existence of plasma • Occurrence of plasma in nature • Various models of plasmas • Magnetohydrodynamic (MHD) equations • Magnetohydrodynamic (MHD) waves • Four-vectors • Equation of motion of charged particle & Maxwell's equations in tensor form • Potentials due to a moving charge: Lienard-Wiechert potentials
		Nuclear and Particle Physics	<ul style="list-style-type: none"> • Constituents of nucleus and their Intrinsic properties • Main features of binding energy versus mass number curve, N/A plot, angular momentum, parity, magnetic

			<p>moment, electric moments, nuclear excites states</p> <ul style="list-style-type: none">• Liquid drop model approach, semi empirical mass formula• Fermi gas model, nuclear shell structure and nuclear magic numbers• basic assumption of shell model, concept of mean field and residual interaction
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B. Sc. Chemistry

Programme Outcomes of Chemistry:

After the completion of B. Sc. in Chemistry, the students are able to:

1	get a broad foundation in chemistry that focuses on scientific reasoning and analytical problem solving with a molecular perspective		
2	achieve the skills required to succeed in graduate school, the chemical industry and professional school.		
3	compete at national level exams because our syllabus is very wide in course coverage		
4	familiarise with a breadth of experimental techniques using traditional chemical techniques		
5	synthesize organic and inorganic compounds		
6	understand the importance of the Periodic Table of the Elements, how it came to be, and its role in organizing chemical information		
7	understand the interdisciplinary nature of chemistry and to integrate knowledge of mathematics, physics and other disciplines to a wide variety of chemical problems		
8	learn the laboratory skills needed to design, safely and interpret chemical research		
9	acquire a foundation of chemistry of sufficient breadth and the depth to enable them to understand and critically interpret the primary chemical literature		
10	develop the ability to communicate scientific information and results in written and oral formats		
11	learn professionalism, including the ability to work in teams and apply basic ethical principles		
12	present their concepts at seminars such as National Science Day with suitable models		
Part-I	Course-I	Organic, Inorganic, Physical, Practical	Students get knowledge of fundamentals of chemistry like atomic structure, chemical bonding etc. In organic chemistry, they get knowledge of aromatic character and aromatic compounds. Environmental chemistry makes them aware of the environment. In practical chemistry, they are trained in analytical chemistry like analysis of acid and basic radicals in a given salt mixture, different kinds of titrations, synthesis of organic and inorganic compounds.
Part-II	Course-II	Organic, Inorganic, Physical, Practical	In Inorganic chemistry, they know about coordination compounds, lanthanides, actinides etc. In organic compounds, they get knowledge of functional compounds like alcohols, aldehydes and ketones. They also get

			trained in basics of physical chemistry and in practical, they synthesize a number of organic compound.
Part-III	Course-III	Organic, Inorganic, Physical, Practical	The last year of the graduation focuses on some of the advanced techniques such as modern theories of coordination compounds, their reaction kinetics, metal carbonyls etc. In organic chemistry, they are exposed to polymeric materials, dyes and their chemistries. They also get trained in advanced chemical techniques like spectroscopic methods, understanding of which are essential for scientific research. In practical, they carry out studies like measurement of surface tension, viscosity, thermodynamics and practical like titration using conductance measurements. They also synthesize a number of organic dyes.

B.Sc./B.A. MATHEMATICS

Programme Outcomes of Mathematics:

1	Ability to calculate and reason to design complex and critical financial models for Bank and Insurance Companies.		
2	Ability to understand both concrete and abstract problems.		
3	Ability to make critical observations.		
4	Ability to accurately organize, analyze and interpret data.		
5	Develop the mathematical logic which is very useful for solving mathematical reasoning problems		
6	Equip the students with necessary skills such as problem solving.		
7	.The students develop analytic thinking ability which helps them in their career and future studies		
8	Possess basic knowledge of various branches in mathematics such as Analysis, Calculus, Algebra, Geometry, Operations research, etc where they understand the real world problems and learn to apply the mathematical concepts to solve those problems		
Part-I	Course-I	Theory of Equations	<ul style="list-style-type: none"> • Describe the relation between roots and coefficients • Find the sum of the power of the roots of an equation using Newton's Method. • Transform the equation through roots multiplied by a given number, increase the roots, decrease the roots, removal of terms • Solve the reciprocal equations. • Analyse the location and describe the nature of the roots of an equation. • Obtain integral roots of an equation by using Newton's Method
	Course-II	Abstract Algebra	<ul style="list-style-type: none"> • Define subgroup, center, Normalizer of a subgroup. • Find cycles and transpositions of a given permutations. • Prove Lagrange's theorem ,Euler's theorem and Fermats theorem • Define cyclic groups. • Prove a group has no proper subgroup if it is cyclic group of prime order. • Define normal subgroups , quotient groups and index of a subgroup.

			<ul style="list-style-type: none"> • Define homomorphism, kernel of a homomorphism, isomorphism. • Prove Cayley's theorem, the fundamental theorem of homomorphism for groups • Define rings, zero divisors of a ring, integral domain, field.
Part-II	Course-III	Linear Algebra	<ul style="list-style-type: none"> • Define Vector Space, Quotient space Direct sum, linear span and linear independence, basis and inner product. • Discuss the linear transformations, rank, nullity. • Find the characteristic equation, eigen values and eigen vectors of a matrix. • Prove Cayley- Hamilton theorem, Schwartz inequality, Gramschmidt orthogonalisation process. • Solve the system of simultaneous linear equations
	Course-IV	Real Analysis	<ul style="list-style-type: none"> • Define countable, uncountable sets • Write Holders and Minkowski inequality • Define and recognize the concept of metric spaces, open sets, closed sets, limit points, interior point. • Define and Illustrate the concept of completeness • Determine the continuity of a function at a point and on a set. • Define connectedness • Describe the connected subset of \mathbb{R}. • Define compactness • Characterize the concept of compactness in metric space.
		Theory of Numbers	<ul style="list-style-type: none"> • Illustrate the Division and Euclidean Algorithm • Describe the properties of prime numbers • Show that every positive integer can be expressed as product of prime power in unique way • Write a formula for the number of positive integers less than n that are relatively prime to n • Define congruences and describe the properties of congruences • Solve the system of linear congruences • State Chinese Remainder Theorem, Fermat's and Wilson's theorem.

Part-III	Course-V	Numerical Analysis	<ul style="list-style-type: none"> • Define Basic concepts of operators • Find the difference of polynomial • Solve problems using Newton forward formula and Newton backward formula. • Derive Gauss's formula and Stirling formula using Newton forward formula and Newton backward formula. • Derive Simpson's $1/3$, $3/8$ rules using trapezoidal rule • Find the solution of the first order equation with constant coefficient • Find the solution of ordinary differential equation of first by Euler, Taylor and Runge-Kutta methods
		Statics & Dynamics	<ul style="list-style-type: none"> • Define Resultant, Component of a Force, Coplanar forces, like and unlike parallel forces, Moment of a force and Couple with examples. • Prove the Parallelogram of Forces, Triangle of Forces, Converse of the Triangle of Forces, Polygon of Forces, Lami's Theorem, Varignon's theorem of moments. • Find the resultant of coplanar couples, equilibrium of couples and the equation to the line of action of the resultant. • Prove that the path of a projectile is a parabola. • Define Simple Harmonic Motion and find its Geometrical representation.
	Course-VI	Differential equations and its applications	<ul style="list-style-type: none"> • Extract the solution of differential equations of the first order and of the first degree by variables separable, Homogeneous and Non-Homogeneous methods. • Compute all the solutions of second and higher order linear differential equations with constant coefficients, linear equations with variable coefficients. • Solve simultaneous linear equations with constant coefficients and total differential equations.
	Course-VII	Integral Calculus and Fourier Series	<ul style="list-style-type: none"> • Solve Basic Integral Calculus problems. • Explain properties of definite integrals. • Evaluate double and triple integrals. • Apply change of variable method to find the value of double and triple integral.

			<ul style="list-style-type: none"> • Find Fourier series expansions for given functions. • Find Cosine and Sine series expansions for given functions.
		Complex Analysis	<ul style="list-style-type: none"> • Compute sums, products, quotients, conjugate, modulus, and argument of complex numbers. • Calculate exponentials and integral powers of complex numbers. • Understand the significance of differentiability for complex functions and be familiar with the Cauchy-Riemann equations. • Determine whether a given function is analytic.
	Course-VIII	Linear Programming	<ul style="list-style-type: none"> • Define basic feasible solutions, Slack and Surplus variable. • Explain simplex method. • Demonstrate Big-M method • Define transportation problem. • Find a basic feasible solution to the transportation problem by using North west corner rule, Vogel's approximation method. • Illustrate Assignment problem and Travelling salesman problem.
		Analytical Geometry 3D and Vector Calculus	<ul style="list-style-type: none"> • Describe the various forms of equation of a plane, straight line, Sphere, Cone and Cylinder. • Find and interpret the gradient curl, divergence for a function at a given point. • Interpret line, surface and volume integrals. • Evaluate integrals by using Green's Theorem, Stokes theorem, Gauss's Theorem.

B.Sc./B. A. in Computer Applications

BCA programme has been designed to prepare graduates for attaining the following specific outcomes:

1	An ability to apply knowledge of mathematics, computer science and management in practice.		
2	An ability to enhance not only comprehensive understanding of the theory but its application too in diverse field.		
3	An ability to design a computing system to meet desired needs within realistic constraints such as safety, security and applicability in multidisciplinary teams with positive attitude.		
4	An ability to communicate effectively.		
5	Effectively communicate business issues, management concepts, plans and decisions both in oral and written form using appropriate supportive technologies		
6	Develop various real time applications using latest technologies and programming languages.		
7	In order to enhance programming skills of the young IT professionals, the program has introduced the concept of project development in each language/technology learnt during year		
8	Outcomes identify what students will know and be able to do if they master the material. At the end of this class, the successful student will: have a broad understanding of database concepts and database management system software. have a high-level understanding of major DBMS components and their function.		
Part-I	Course-I	BDP & COBOL	<ol style="list-style-type: none"> 1. Understand the basic Information to data processing, data collection, preparation, verification, editing and validation. 2. Understand the data processing in accounting or business management. Administrative data processing. Data processing - (computer science) a series of operations on data by a computer in order to retrieve or transform or classify information.. 3. Creating the different types of files and their organizations. 4. Learn how to create structure of a COBOL Program- Divisions, sections, paragraphs etc. 5. Learn how to apply logic for problems. 6. Enhance their programming skills. 7. Understand database concepts and structures. 8. Understand the objectives of data and information management. 9. Development of a Business application using COBOL.

	Course-II	DBMS & FOXPRO	<ol style="list-style-type: none"> 1. Understand database concepts and structures. 2. Understand the objectives of data and information management. 3. Understand data modelling and database development process. 4. Construct and normalize conceptual data models. 5. Implement a relational database into a database management system. 6. Understand a relational table schema (including keys and foreign key references) 7. Design a relational database schema for a subject of interest to the student. 8. Write and read (understand) queries using FoxPro commands 9. Learn how to create structure of a FoxPro Program using different types of commands. 10. Learn how to apply logic for problems. 11. Enhance their programming skills. 12. How to create reports, different windows, menus, popup menus etc. 13. Designed of a database for a business application, design of data entry forms and reports layouts for this database, creation of programs to access and manipulate database.
Part-II	Course-III	ADBMS (Advanced Database Management System)	<ol style="list-style-type: none"> 1. The main objective of BCA course is to prepare efficient Software professionals who can design, develop, administer and maintain system models that automate management of information using different software tools that are available in the market. 2. Database Management is the most essential as well as an integral part of such system development process. 3. Oracle being the most popular DBMS used by the majority in the corporate sector, imparting advanced training in this software will enable the students to hone their skills in this tool thereby making them competent for the

			software development jobs as well as database management based other jobs.
	Course-IV	Skill development: IS (Information System)	<ol style="list-style-type: none"> 1. Object Oriented and Event Driven concepts form the base for programming. 2. Visual/Windows programming concepts help to deliver better Front-End interfaces for end users. 3. These concepts are used in all other windows programming languages, most popular being the DOT NET programming which are used for software development. 4. Therefore, imparting hands-on training in these concepts, using VB programming, will enable the students to prepare themselves for the advanced training in any such programming languages. 5. Moreover, this paper also includes hands-on for Back-End (database) connectivity with Front-End interface. Thus it helps to understand the implementation of Data Communication.
Part-III	Course-V		
	Course-VI		
	Course-VII		
	Course-VIII		

B. Sc. Zoology

Programme Outcomes of Zoology:

1	To understand the basic concepts and characters of Invertebrate phyla and various classifications on the basis of morphology and evolution.		
2	To develop an ability to describe one to several animal types from each major phylum by learning the anatomy, physiology and the relationship of structure to functional requirements of the environment		
3	To acquire a complete knowledge of chordates with the various classifications with a description of many representative types from each class		
4	To comprehend the comparative anatomy of vertebrates dealing with the morphology, development and evolution of various systems		
5	To acquire knowledge of Immunology which helps each and every one to keep his/her own defence system in a better working condition which helps them to lead a disease – free life		
6	To have their interest aroused when they observe various cell inclusions by using microscopes and various cytochemical methods of cell preparation		
7	To gain knowledge of tissues and their biochemical, histochemical and physiological processes of tissues		
8	To enhance their creative skills in practical classes by examining and understanding the histological preparations		
Part-I	Course-I	Animal Diversity	<ul style="list-style-type: none"> • Familiar with the non-chordate world that surrounds us. • Able to appreciate the process of evolution (unicellular cells to complex, multicellular organisms) • Able to identify the invertebrates and classify them up to the class level with the basis of systematic • Understand the basis of life processes in the non-chordates and recognize the economically important invertebrate fauna. • Describe the diversity in form, structure and habits of vertebrates • Explain general characteristics and classification of different classes of vertebrates
	Course-II	Cell Biology	<ul style="list-style-type: none"> • Develop deeper understanding of what life is and how it functions at cellular level. • Describe cellular membrane structure and function,

Part-II			<p>fine structure and function of cell organelles.</p> <ul style="list-style-type: none"> • Perform a variety of molecular and cellular biology techniques
Part-III	Course-V	Immunology and Microbiology	<ul style="list-style-type: none"> • Appreciate the contribution of great immunologists • Distinguish Innate immunity and Acquired Immunity • Understand the importance of Immune system • Familiar with the tools and techniques used in Microbiology and pathogenic Microbes
	Course-VI	Physiology and Biochemistry	<ul style="list-style-type: none"> • Understand the function of various systems • Apply the knowledge to lead a healthy life • Understand the importance of Bio molecules • Familiar with various biochemical pathways
	Course-VII	Developmental biology and experimental embryology	<ul style="list-style-type: none"> • Familiar with various stages involved in the developing embryo • Apply the knowledge to collect various Biological data • Understand the initial development al procedures involved in Amphioxus, frog and chick • Familiar with types of placenta • Ability to explain various Prenatal Diagnosis • Familiarise with the principle of developmental biology • Familiarise with various Techniques and tools of Embryology
	Course-VIII	Ecology, ethology, evolution and zoogeography	<ul style="list-style-type: none"> • Familiar with various stages involved in the developing embryo • Apply the knowledge to collect various Biological data • Understand the initial development al procedures involved in Amphioxus, frog and chick • Familiar with types of placenta • Ability to explain various Prenatal Diagnosis • Familiarize with the principle of developmental biology • Familiarise with various Techniques and tools of Embryology