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KARMAVEER BHAURAO PATIL COLLEGE, URUN-ISLAMPUR

Department of Physics

(2024-25)

Course Outcome's

B.Sc. (PHYSICS)-I	
Course Outcomes: B.Sc. I Paper I: DSC-1 A MECHANICS	
By the end of this Course student should be able to know about:	
CO1:	Students are able to understand and identify scalar and vector physical quantities in mechanics
CO2:	Students are able to understand and apply vector algebraic methods to elementary exercises in mechanics
CO3:	Students are able to understand and apply basic concepts of rotational motion
CO4:	In general, students are capable of correlating above concepts and methods in mechanics to both theoretical and experimental domains revealing analytical as well as numerical skills
B.Sc. I Paper I: DSC-2A ELECTRICITY & MAGNETISM-I	
By the end of this Course student should be able to know about:	
CO1:	Students are able to understand the physical significance of gradient, divergence and curl
CO2:	Students are able to apply concepts in vector calculus such as gradient, divergence and curl related to vector and scalar fields using Gauss, Stokes and green`s theorem
CO3:	Students are able to understand and apply concepts of electrostatic field, potential to point charges, electric dipole and geometrically regular charged bodies
CO4:	Students are able to understand and apply concept of energy density in electric field

CO5:	Students are capable of applying above concepts to solve numerical exercise in electrostatics
B.Sc. I Sem-I: DSC- PHYSICS Practical -I	
By the end of this Course student should be able to know about:	
CO1:	Apply fundamental mechanical principles: Utilize concepts like moment of inertia, simple harmonic motion, and gravity to design and conduct experiments, analysing and interpreting results.
CO2:	Develop experimental skills: Demonstrate competence in setting up apparatus, taking precise measurements, and calculating uncertainties, understanding limitations and sources of error.
CO3:	Explore electrical components and circuits: Classify and characterize resistors, capacitors, and galvanometers based on their properties and roles in circuits, measuring resistance and magnetic field strength.
CO4:	Investigate wave phenomena and their interactions: Analyze the behavior of sound waves in different media (magnetic vs. non-magnetic), employing a sonometer to determine frequency and comprehend the influence of material properties.
B.Sc. I Paper III: DSC-1B PROPERTIES OF MATTER	
By the end of this Course student should be able to know about:	
CO1:	Students are able to revise basic concepts such as stress, strain and elastic constants of elasticity
CO2:	Students are able to derive elastic constants for beam supported at both ends and at one end
CO3:	Students are able to derive elastic constant (eta) of a wire under torsional oscillations (Searle's Method)

CO4:	Students are able to explain the phenomenon of surface tension on the basis of molecular forces
CO5:	Students are able to derive the relation between surface tension and excess pressure
CO6:	Students are able to perform an experiment to determine ST by Jaeger`s method
CO7:	Students are able to discuss and state the factors affecting the ST
CO8:	Students are able to understand fluid dynamics and its applications
CO9:	Students are able to understand viscosity and experimental determination of coefficient of viscosity of liquid by Poiseuille's method
CO10:	Students are able to understand effect of temperature and pressure on viscosity of liquid.
CO11:	In general, students are capable of correlating above concepts and methods to both theoretical and experimental domains revealing analytical as well as numerical skills
BSc. I Paper III: DSC-2B ELECTRICITY & MAGNETISM-II	
By the end of this Course student should be able to know about:	
CO1:	Students are able to understand importance of complex numbers in analysis of AC Circuits contacting Inductance(L) Capacitor(C) and Resistance (R) and their various configurations
CO2:	Students are able to define and apply the concepts in AC circuits such as Impedance (Z), reactance (XC and XL), Admittance, Susceptance and Quality Factor (Q)
CO3:	Students are able to understand and design AC bridge: Owen`s Bridge
CO4:	Students are able to understand basic working principle of Ballistic galvanometer
CO5:	Students are able to define constants of ballistic galvanometer

CO6:	Students are able to understand the explain the phenomenon of hysteresis in magnetism
CO7:	Students are able to discriminate different magnetic materials based on their characteristic properties
BSc. I Sem-II: DSC- PHYSICS Practical -II	
By the end of this Course student should be able to know about:	
CO1:	Master mechanical measurements and principles: Utilize advanced techniques like Poiseuille's method, bending, and vibration to measure viscosity, Young's modulus, and Poisson's ratio, demonstrating understanding of fluid dynamics and elasticity.
CO2:	Analyze surface tension and its impact: Employ Jaeger's method to investigate surface tension, recognizing its role in various phenomena and its dependence on material properties.
CO3:	Explore AC circuits and impedance: Analyze the behavior of series and parallel LCR circuits, measuring impedance and comprehending the influence of individual components (L, C, R) on resonance and phase relationships.
CO4:	Investigate bridge circuits and transformers: Utilize a B.G. bridge to determine unknown resistances and delve into the principles and applications of transformers, understanding their role in AC power transmission and voltage transformation

B.Sc. (PHYSICS)-II

Course Outcomes: B.Sc. II Paper V: DSC- C1THERMAL PHYSICS & STATISTICAL MECHANICS-I

By the end of this Course student should be able to know about:	
CO1:	Highlight different types of velocities of gas molecules.
CO2:	Acquire Knowledge of Maxwell's distribution of gas molecules.
CO3:	Visualize Merits and drawbacks of thermometers.
CO4:	Apply knowledge of thermodynamic processes in design of heat engine
BSc. II Paper VI: DSC- C2 WAVE AND OPTICS -I	
By the end of this Course student should be able to know about:	
CO1:	Apply superposition principle to develop mathematical model of harmonic oscillators.
CO2:	To develop the mathematical model for coupled oscillations.
CO3:	Understand the ultrasonic waves and their applications.
CO4:	Use of Basic principles of sound in context of acoustics of buildings
BSc. II Paper VII: DSC- D1THERMAL PHYSICS & STATISTICAL MECHANICS-II	
By the end of this Course student should be able to know about:	
CO1:	Develop Conceptual clarity of thermodynamic functions and Clausius - Clapeyron equation.
CO2:	Appreciate the problem associated with the black body radiation spectrum.
CO3:	Know, how the problems can be solved by using Planck's law of radiation.
CO4:	Acquire preliminary knowledge of classical and quantum statistical mechanic
BSc. II Paper VIII: DSC- D2 WAVE AND OPTICS -I	
By the end of this Course student should be able to know about:	

CO1:	**Draw ray diagrams to demonstrate Cardinal points.**
CO2:	**Determine the resolving power of prism and grating by making use of Rayleigh criterion.**
CO3:	**Qualitatively study phenomenon of polarization of light.**
CO4:	**Apply phenomenon of interference of light for determination of its wavelength.**
BSc. II Sem-III & IV: DSC- PHYSICS Practical - III & IV	
By the end of this Course student should be able to know about:	
CO1:	**Acquire skills in setting up of optics experiments.**

CO2:	**Develop the practical skills and techniques for accurate measurements.**
CO3:	**Acquire observational skills**
CO4:	**Determine Least counts of different measuring instruments**

B.Sc. (PHYSICS)-III	
B.Sc. III Paper IX DSC- E1 MATHEMATICAL PHYSICS & CLASSICAL ELECTRODYNAMIS	
By the end of this Course student should be able to know about:	
CO1:	Understand the orthogonal curvilinear co-ordinate system.
CO2:	Understand the different ways of solving first and second order differential equations.
CO3:	Understand charge dynamic particles and solve the Laplace and Poisson's equations.
CO4:	Understand the Ampares circuit law, displacement current and Biot-Savarats law.
CO:5	Understand and solve different medium Maxwells equations.
BSc. III Paper X DSC- E2 QUANTUM MECHANICS	
By the end of this Course student should be able to know about:	
CO1:	Understand different types of operators used in quantum mechanics and are able to use them to solve different problems.
CO2:	Understand and solve problems related to different types of potential like, Square-well, Bloch wave, Kroning-Penney square periodic potential.
CO3:	Understand and solve hydrogen atom problem
CO4:	Understand the angular momentum operators & their Eigen values
BSc. III Paper XI DSC- E3 CLASSICAL MECHANICS & CLASSICAL ELECTRODYNAMICS	
By the end of this Course student should be able to know about:	
CO1:	Students are able to understand and solve central force problems and understands the conservation of energy, linear momentum and angular Momentum in system
CO2:	Students are able to understand how to impose constraints on a system in order to simplify the methods used in solving physics problems.
CO3:	Students are able to understand the concept of special theory of relativity.

CO4:	Students are able to understand the concept of lagrangian and Hamiltonian transformations and are able to solve problems on lagrangian and Hamiltonian transformations.
BSc. III Paper XII DSC- E4 DIGITAL & ANALOG CIRCUITS & INTRUMENTATION	
By the end of this Course student should be able to know about:	
	CO1: Students are able to understand basic logic gates
	CO2: Students are able to understand transistor amplifier and CRO
	CO3: Students are able to understand timer and Operational amplifier
BSc. III Paper XIII DSC- F1 NUCLEAR & PARTICLE PHYSICS	
By the end of this Course student should be able to know about:	
CO1:	Students are able to understand the nuclear properties
CO2:	Students are able to analyse the single particle nuclear shell model and related phenomena
CO3:	Students are able to understand and apply selection rule of elementary particles and fission, fusion reactions
CO4:	Students are able to understand and apply the particle accelarators and nuclear detector to solve numerical problems.
BSc. III Paper XIV DSC- F2 SOLID STATE PHYSICS	
By the end of this Course student should be able to know about:	
CO1:	Understand different crystal structures, interaction with X-ray and also understands various properties about crystals
CO2:	Understand different types of crystal defects.
CO3:	Understand different properties of semiconducting and superconducting properties
CO4:	Understand theoretical background of dielectric and magnetic properties of material
BSc. III Paper XIV DSC- F3 ATOMIC & MOLECULAR PHYSICS & ASTROPHYSICS	
By the end of this Course student should be able to know about:	
CO1:	Understand and apply ll-coupling, ss-coupling, LS coupling in atomic spectra and able to calculate and their selection rules.
CO2:	Understand Zeeman effect and Paschen-Back of two electrons, Stark effect of hydrogen and Compton effect.
CO3:	Understand the concepts related to various types of astronomy along with various instruments to apply it for practical purposes.

CO4:	Students are able to understand structure of universe, Raman spectra and of stars and stellar evaluation
BSc. III Paper XIV DSC- F4 ENERGY STUDIES & MATERIAL SCIENCE	
By the end of this Course student should be able to know about:	
CO1:	Understand Study of Solar Wind and Interaction with Magnetized Planets
CO2:	Understand Magnetosphere in the solar system and Effects of Solar activities on Technological Earth Systems
CO3:	To understand bio energy and bio mass conversion
CO4:	Students are able to understand structure of universe, Raman spectra and of stars and stellar evaluation
CO5:	To understand nanotechnology

B.Sc. Part III Physics Laboratory Experiments	
Group I	Use resonance pendulum to determine damping coefficient of air Examine Surface tension of Soap solution and Mercury. Determine Y by Koenig's method and Cornu's method. Calculate Y and η of given material of Flat spiral Spring. Arrange Given set of numbers in Ascending/ Descending order and Find largest and smallest number from given set of numbers using C programming. Use SCILAB to determine eigen values and eigen vectors and to determine Inverse of matrix.
Group II	Trace cardinal points by Turn table and Newton's method. Illustrate Brewster's law to find refractive index of a glass. Examine Diffraction at single slit and at cylindrical obstacle. Determine wavelength of monochromatic source using LLloyd's single mirror. Study refractive indices for extra ordinary and ordinary rays for given prism. Investigate diameter of Lycopodium powder. Plot Caustic curve for a given thick plano convex lens to determine ratio of transverse aberration of extreme rays to radius of least confusion. Study absorption spectrum of given liquid Solution.
Group III	Assess self-inductance by Owen's bridge and mutual inductance by Ballastic galvanometer. Measure B_H, B_V , and θ by magnetometer method. Determine resistance of Ballastic Galvanometer by half deflection method. Determine e/m by Thomson's method. Callibrate wire by Griffiths method.

	Calculate absolute capacity of condenser. Plot I-V characteristics of Solar Cell. Use p-n junction Diode to calculate Band gap energy of semiconductor. Use LED to determine Planck's constant.
Group IV	Verify truth tables of gates and De- Morgan's theorems with IC- 74 series. Design single stage CE using voltage divider bias, astable multivibrator and momostable multivibrator using IC -555 Timer. To build and Test Colpitts oscillator and phase shift oscillator using BJT. Measure unknown frequency and Determine AC and DC sensitivity of CRO Study OP-AMP as an inverting amplifier and as Schmitt trigger
Group VA	Observe and calculate divergence of LASER beam. Use schusters method for optical leveling of spectrometer. Obtain biprism fringes without lateral shift. Measure Wavelength of LASER using plane diffraction grating and distance between two coherent sources using biprism experiment. Plot polar graph using photo cell. Use Tunnel diode to study quantum tunneling effect. Test electronic components. Edit Save and Execute given C programmes
Group VB	Measure Radius of capillary bore using mercury thread, Phase shift of RC network using CRO and resistance of Galvanometer using Kelvin's method. Estimate errors. Determine Lattice constants using XRD powder pattern. Use of half and full adder. Simplify digital circuit using Boolean laws. Wiring of electric bulb, switch and plug. Trace given electronic circuit. Assemble electronic circuit using soldering method.
Group VI	**Assessment of Annual work of a student.** Complete and certify laboratory journal Prepare study tour report. Prepare 2 seminar reports.

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