

ACADEMIC CALENDER FOR NEWLY INTRODUCED CBCS IN PHYSICS HONORS
SESSION 2018-2019

Paper Units	Course Content Semester-1	Nos. Of Total Lecture in hour	July,2018 to September, 18	10 Weeks	October,2018 to December , 18	6 Weeks	to
PHSACOR01T	<p>Mathematical Physics</p> <p>Calculus:</p> <p>Recapitulation: Limits, continuity, average and instantaneous quantities, differentiation. Plotting functions. Intuitive ideas of continuous, differentiable, etc. functions and plotting of curves. Approximation: Taylor and binomial series (statements only). Convergence condition of Taylor series and corresponding tests.</p> <p>First Order and Second Order Differential equations: First Order Differential Equations and Integrating Factor. Homogeneous and Inhomogeneous Equations with constant coefficients, particular integral. Wronskian and general solution. Statement of existence and Uniqueness Theorem for Initial Value Problems. Particular Integral.</p> <p>Calculus of functions of more than one variable: Partial derivatives, exact and inexact differentials. Integrating factor, with simple illustration. Constrained Maximization using Lagrange Multipliers.</p> <p>Vector Calculus:</p> <p>Recapitulation of vectors: Properties of vectors under rotations. Scalar product and its invariance under rotations. Vector product, Scalar triple product and their interpretation in terms of area and volume respectively. Scalar and Vector fields.</p>	7 8 5 5	7 8 5 5	INTERNAL ASSESSMENT	PERIODICAL EXAMINATION	END SEMESTER UNIVERSITY EXAMINATION	

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PHSACOR01T	Vector Differentiation: Directional derivatives and normal derivative. Gradient of a scalar field and its geometrical interpretation. Divergence and curl of a vector field. Del and Laplacian operators. Vector identities using Kronecker delta and Levi-civita symbols.	8	5	INTERNAL ASSESSMENT	3	PERIODICAL EXAMINATION	END SEMESTER UNIVERSITY EXAMINATION
	Vector Integration: Ordinary Integrals of Vectors. Multiple integrals, Jacobian. Notion of infinitesimal line, surface and volume elements. Line, surface and volume integrals of Vector fields. Flux of a vector field. Gauss' divergence theorem, Green's and Stokes Theorems and their applications (no rigorous proofs).	10	10		10		
	Orthogonal Curvilinear Coordinates. Derivation of Gradient, Divergence, Curl and Laplacian in Cartesian, Spherical and Cylindrical Coordinate Systems.	7	7		7		
	Introduction to probability: Independent random variables: Probability distribution functions; binomial, Gaussian, and Poisson, with examples. Mean and variance. Page Dependent events: Conditional Probability. Bayes' Theorem.	10	8		2		
Paper Units	Course Content Semester-1	Nos. Of Lecture in hour	July ,18 to September,18 10 Weeks		October,2018 to December , 18 6 Weeks		
PHSACOR02T	Mechanics						

	<p>Fundamentals of Dynamics:</p> <p>Reference frames. Inertial frames; Review of Newton's Laws of Motion. Galilean transformations; Galilean invariance. Momentum of variable- mass system: motion of rocket. Dynamics of a system of particles. Centre of Mass. Principle of conservation of momentum. Impulse.</p> <p>Work and Energy:</p> <p>Work and Kinetic Energy Theorem. Conservative and non- conservative forces. Potential Energy. Qualitative study of one dimensional motion from potential energy curves. Stable and unstable equilibrium. Elastic potential energy. Force as gradient of potential energy. Work & Potential energy. Work done by nonconservative forces. Law of conservation of Energy</p> <p>Collisions:</p> <p>Elastic and inelastic collisions between particles. Centre of Mass and Laboratory frames.</p> <p>Rotational Dynamics:</p> <p>Angular momentum of a particle and system of particles. Torque. Principle of conservation of angular momentum. Rotation about a fixed axis. Moment of Inertia. Perpendicular axes theorem and parallel axes theorem and their applications in calculations of moment of inertia for rectangular, cylindrical and spherical bodies. Kinetic energy of rotation. Motion involving both translation and rotation.</p> <p>Elasticity:</p> <p>Relation between Elastic constants. Twisting torque on a Cylinder or Wire. Bending of a beam - internal bending moment..</p> <p>flow, Reynolds's number. Poiseuille's Equation for Flow of a viscous Liquid through a Capillary Tube.</p> <p>Gravitation and Central Force Motion:</p> <p>Law of gravitation. Gravitational potential energy. Inertial and gravitational mass. Potential and field due to spherical shell</p>	5	5		INTERNAL ASSESSMENT	5	PERIODICAL EXAMINATION	END SEMESTER UNIVERSITY EXAMINATION
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Paper Units	Course Content Semester-I	Nos. Of Lecture in hour	July,2018 to September, 18 10 Weeks		October,2018 to December , 18 6 Weeks		
PHSACOR 02T	<p>Fluid Motion: Kinematics of Moving Fluids: Equation of continuity. Idea of streamline and turbulent</p> <p>Kinematics of Moving Fluids: Equation of continuity. Idea of streamiline and turbulent flow, Reynold's number. Poiseuille's Equation for Flow of a viscous Liquid through a Capillary Tube.</p> <p>Gravitation and Central Force Motion: Law of gravitation. Gravitational potential energy. Inertial and gravitational mass. Potential and field due to spherical shell and solid sphere. Motion of a particle under a central force field. Two-body problem and its reduction to one-body problem and its solution. The energy equation and energy diagram. Kepler's Laws. Satellite in circular orbit and applications. Geosynchronous orbits. Weightlessness. Basic idea of global positioning system (GPS).</p> <p>Oscillations: SHM: Simple Harmonic Oscillations. Differential equation of SHM and its solution. Kinetic energy, potential energy, total energy and their time-average values. Damped oscillation. Forced oscillations: Transient and steady states; Resonances, sharpness of resonance; power dissipation and Quality Factor.</p> <p>Non-Inertial Systems Non-inertial frames and fictitious forces. Uniformly rotating frame. Laws of Physics in rotating coordinate systems. Centrifugal force. Coriolis force and its applications.</p>	4	4				
		9	5	INTERNAL ASSESSMENT	4	PERIODICAL EXAMINATION	END SEMESTER UNIVERSITY EXAMINATION
		7	5		2		
		4			4		

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	<p>Special Theory of Relativity: Michelson-Morley Experiment and its outcome. Postulates of Special Theory of Relativity. Lorentz Transformations. Simultaneity and order of events. Lorentz contraction. Time dilation. Relativistic transformation of velocity, frequency and wave number. Relativistic addition of velocities. Relativistic Doppler effect.</p>	8			8		
Paper Units	Course Content Semester-II Electricity and Magnetism.	Nos. Of Lecture in hour	January,19- April'19 14 weeks	May,2019to June,2019 4 weeks			
PHSACOR 03T	<p>Electric Field and Electric Potential: Electric field: Electric field lines. Electric flux. Gauss' Law with applications to charge distributions with spherical, cylindrical and planar symmetry. Charge density of a point charge – Definition of Dirac delta function. Properties of Dirac delta function. Conservative nature of Electrostatic Field. Electrostatic Potential. Laplace's and Poisson equations. Potential and Electric Field of a dipole. Force and Torque on a dipole. Uniqueness theorem. Method of Images and its application to: (1) Plane Infinite Sheet and (2) Sphere. Electrostatic energy of system of charges. Electrostatic energy of a charged sphere. Conductors in an electrostatic Field. Surface charge and force on a conductor. Capacitance of a system of charged conductors. Parallel-plate capacitor. Capacitance of an isolated conductor. Energy stored in Electrostatic</p>	15	10	INTERNAL ASSESSMENT	5	PERIODICAL EXAMINATION	END SEMESTER UNIVERSITY EXAMINATION

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PHSACOR 03T	<p>Magnetic Properties of Matter Magnetization vector (M). Magnetic Intensity (H). Magnetic Susceptibility and permeability. Relation between B, H, M. Ferromagnetism. B-H curve and hysteresis. Boundary conditions at the interface of two media.</p>	5	5	INTERNAL ASSESSMENT	PERIODICAL EXAMINATION	END SEMESTER UNIVERSITY EXAMINATION	
	<p>Electromagnetic Induction Faraday's Law. Lenz's Law. Self-Inductance and Mutual Inductance, calculation in simple cases (e.g. circular loops, solenoids). Reciprocity Theorem. Energy stored in a Magnetic Field.</p>	6					6
	<p>Electrical Circuits Charge Conservation - equation of continuity. Transients in D.C.:Growth and decay of current, charging and discharging of capacitors in CR, LR & LCR circuits; oscillatory discharge; time constant; time variation of total energy in LCR circuit. AC Circuits: Kirchhoff's laws for AC circuits. Complex Reactance and Impedance. Phasor diagram. Series LCR Circuit: (1) Resonance, (2) Power Dissipation and (3) Quality Factor, and (4) Band Width. Parallel LCR Circuit Network theorems 6 Lectures Ideal Constant-voltage and Constant-current Sources.</p>	10	10				
	<p>Network Theorems: Thevenin theorem, Norton theorem, Superposition theorem, Reciprocity theorem, Maximum Power Transfer theorem. Applications to dc circuits.</p>	6	2				4