

LECTURE PLAN
DEPARTMENT OF PHYSICS

NAME: PROF.G.P.Gupta

DESIGNATION: ASST. PROF.

COURSE: B.Sc SEMISTER I

SESSION: 2018-2021

PAPER NAME: PHY-CC-1.T MATHEMATICAL PHYSICS-I

PAPER NO: CORE -I

SL. No	Topic/Sub Topic	Expected No. of Lecture
01.	Differential Equations: First Order and Second Order Differential equations: First Order Differential Equations and Integrating Factor. Homogeneous Equations with constant coefficients. Wronskian and general solution. (14 Lectures)	10
02.	Partial Differential Equations: Solutions to partial differential equations, using separation of variables: (6 Lectures)	10
03.	Vector Calculus: Vector triple product, Scalar triple product and their interpretation in terms of area and volume respectively. Scalar and Vector fields. (6 Lectures)	10
04.	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. Expression for divergence and curl in cartesian coordinate. (8 Lectures)	10
05	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. (18Lectures)	10
06	Orthogonal Curvilinear Coordinates: Orthogonal Curvilinear Coordinates. Derivation of Gradient, Divergence, Curl and Laplacian in Cartesian, Spherical and Cylindrical Coordinate Systems. (8 Lectures)	10
	Total Lecture=	60

Reference Books:

1. **Mathematical Methods for Physicists, G.B. Arfken, H.J. Weber, F.E. Harris, 2013, 7th Edn., Elsevier.**
2. **Mathematical Tools for Physics, James Nearing, 2010, Dover Publications.**
3. **Mathematical methods for Scientists and Engineers, D.A. McQuarrie, 2003, Viva Book**
4. **Advanced Engineering Mathematics, D.G. Zill and W.S. Wright, 5 Ed., 2012, Jones and Bartlett Learning**
5. **Advanced Engineering Mathematics, Erwin Kreyszig, 2008, Wiley India.**
6. **Essential Mathematical Methods, K.F.Riley & M.P.Hobson, 2011, Cambridge Univ. Press**
7. **Mathematical Physics - H K Das**
8. **Mathematical Physics - B D Gupta**
9. **Mathematical Physics - B S Rajput**

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PAPER NAME: PHY-CC-2.T: MECHANICS

PAPER NO: CORE -II

SL. No	Topic/Sub Topic	Expected No. of Lecture
01.	Elasticity: Relation between Elastic constants. Twisting torque on a Cylinder or Wire, Bending moment, Cantiliver, beam supported at the end and loaded at middle and its application to determine young's modulus, Searle'e experiments. (10 Lectures)	10
02.	Fluid Motion: Poiseuille's Equation for Flow of a Liquid through a Capillary Tube, Mayer's equations, Rankine methods for measurement of viscosity of gas.(8 Lectures)	8
03.	Hydrodynamics: Equation of continuity and deduction of Euler's equation (2 Lectures)	2
04.	Surface Tension: Surface tension and surface energy, angle of contact, principle of virtual work and its use to obtain expression for the pressure on two sides of curved liquid surface. Ripples and Gravity waves, Determination of surface tension by Ripple tank method and Quincke's method. (10 Lectures)	10
05.	Central Force Motion: Motion of a particle under a central force field: two body problem. Kepler's Page 8 of 24 Laws and their deduction. (8 Lectures)	8
06.	Non-Inertial Systems: Non-inertial frames and fictitious forces. Centrifugal force. Coriolis force and its applications-eastward deviation of falling bodies and flattening of earth.(8 Lectures)	8
	Special Theory of Relativity: Galilean transformation, Michelson-Morley Experiment and its outcome. Postulates of Special Theory of Relativity. Lorentz Transformations. Length contraction. Time dilation. Relativistic addition of simultaneity, Variation of mass with velocity.Massless Particles. Mass-energy Equivalence. Relativistic Doppler effect of light. (14 Lectures)	14
	Total Lecture=	60

Reference Books:

1. Mechanics, Berkeley Physics, vol.1, C.Kittel, W.Knight, et.al. 2007, Tata McGraw-Hill.
2. Analytical Mechanics, G.R. Fowles and G.L. Cassiday. 2005, Cengage Learning.
3. Feynman Lectures, Vol. I, R.P.Feynman, R.B.Leighton, M.Sands, 2008, Pearson Education

(Signature)

PAPER NAME: PHY-CC-1 & 2P (PRACTICAL)

SL. No	Topic/Sub Topic	Expected No. of Lecture
01	Measurements of length (or diameter) using vernier caliper, screw gauge and travelling microscope.	
02	To determine the height of a building using a Sextant.	
03	To study the Motion of Spring and calculate (a) Spring constant, (b) g and (c) Modulus of rigidity.	
04	Determination of Y by bending of beam method.	
05	To determine g and velocity for a freely falling body using Digital Timing Technique	
06	To determine Coefficient of Viscosity of water by Capillary Flow Method (Poiseuille's method).	
07	To determine the Young's Modulus of a Wire by Optical Lever Method.	
08	To determine the Modulus of Rigidity of a Wire by Maxwell's needle.	
09	To determine the elastic Constants of a wire by Searle's method.	

Reference Books :

1. Advanced Practical Physics for students, B. L. Flint and H.T. Worsnop, 1971, Asia Publishing House
2. Advanced level Physics Practicals, Michael Nelson and Jon M. Ogborn, 4th Edition, reprinted 1985, Heinemann Educational Publishers
3. A Text Book of Practical Physics, I.Prakash & Ramakrishna, 11th Edn, 2011, Kitab Mahal

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