

PHOOL SINGH BISHT RAJKIYA MAHAVIDYALAYA NAUGHAR, LAMBGAON, TEHRI GARHWAL B.Sc. I SEM [PHYSICS, MECHANICS PAPER-I] TEACHING PLAN FOR ACADEMIC SESSION 2023-24 COURSE TEACHER: Dr. VIJAY SINGH RANA COURSE TITLE AND OTHERS SPECIFICATION			
Course Title: Course No.: Maximum Marks: 100		Mechanics PAPER-I External Exam+ Internal Assessment: 75+25	
Total No. of Lectures-Tutorials-Practical (in hours per week): 4-0-0			
Course Description		This course is very beneficial for students. This course contains basic knowledge of Mechanics and applied approaches in mechanical applications.	
UNIT	TOPIC	Number of Lectures	Name of the Course teacher
Unit I: Vectors Algebra	Vector algebra. Scalar and vector products, scalar and vector triple products, Derivative of a vector with respect to a parameter	3	Dr. Vijay S Rana
	Del operator, gradient, divergence and curl	2	
	Gauss divergence theorem and applications, Stokes curl theorem and applications; and Green's theorem	3	
	Line, surface and volume integral of a vector function.	2	
Unit: II Gravitation field and potential	Gravitational field and potential, Gravitational potential energy	2	Dr. Vijay S Rana
	Gravitational field Intensity and potential due to a ring, a spherical shell, solid sphere and circular disc	4	
	Gravitational self-energy, Inverse square law of forces	2	
	Kepler's laws of planetary motion	2	
Unit: III Conservation Laws	Frames of reference, Concept of inertial and Non-inertial frames of references	2	Dr. Vijay S Rana
	Work energy theorem, Conservative and non-conservative forces, Linear restoring force	3	
	Gradient of potential, Conservation of energy for the particle	3	

	Energy function		
	Concept of Centre of mass, Angular momentum and torque, Laws of conservation of total energy, total linear momentum and total angular momentum along with their examples.	7	
Unit: IV Dynamics of Rigid Body and Moment of Inertia	Translatory and Rotatory motion, Equation of motion for Rotating rigid body, angular momentum vector and moment of inertia,	2	Dr. Vijay S Rana
	Theorem of parallel and perpendicular axes	1	
	Moment of inertia of a cylinder, rod, lamina, ring, disc, spherical shell, solid sphere	5	
	Kinetic energy of rotation, rolling along a slope, Application to compound pendulum.	2	
UNIT V: Properties of Matter	Basic concept, Elastic constants and their Interrelations	4	Dr. Vijay S Rana
	torsion of cylinder, bending of beam, bending moment	3	
	Cantilever, shape of Girders/ rail tracks.	2	
	Viscosity, Stokes's law, Poiseuille's formula	2	
	Equation of continuity, Bernoulli's theorem	2	
	Surface tension and its molecular interpretation.	2	

- 1 .Berkeley Physics Course : Mechanics Vol-I
- 2 R.P. Feynman, R.B.Lightan and M.Sand : The Feynman Lectures in Physics
3. D.S. Mathur : Mechanics
4. D.S. Mathur : Elements of Properties of Matter
5. Murray Spiegel, Seymour Lipschutz, Dennis Spellman, "Schaum's Outline Series: Vector Analysis", McGraw Hill, 2017.

Suggested Online Link:

1. MIT Open Learning - Massachusetts Institute of Technology, <https://openlearning.mit.edu/>
2. National Programme on Technology Enhanced Learning (NPTEL), <https://www.youtube.com/user/nptelhrd>
3. Swayam Prabha - DTH Channel, https://www.swayamprabha.gov.in/index.php/program/current_he/8

This course can be opted as an elective by the students of following subjects: The course can be opted as an elective, which is open to all students.

Suggested Continuous Evaluation (25 Marks):

Continuous internal evaluation shall be based on allotted assignment and class tests. The

marks shall be as follows:

Class Test/Assignment/ attendance- (10+10+5)

Course Prerequisites: Physics and Mathematics in 12th

Countersigned [Principal]

Sig. [Head]

Sig. [Course teacher]

PHOOL SINGH BISHT RAJKIYA MAHAVIDYALAYA NAUGHAR, LAMBGAON, TEHRI GARHWAL B.Sc. II SEM [PHYSICS, ELECTRICITY AND MAGNETISM PAPER-I] TEACHING PLAN FOR ACADEMIC SESSION 2023-24			
COURSE TEACHER: Dr. VIJAY SINGH RANA			
COURSE TITLE AND OTHERS PECIFICATION			
Course Title: Course No.: Maximum Marks: 100		ELECTRICITY AND MAGNETISM PAPER-I External Exam+ Internal Assessment: 75+25	
Total No. of Lectures-Tutorials-Practical (in hours per week): 4-0-0			
Course Description		This course contains basic knowledge about Electricity and Magnetism and applied approach related with applications.	
UNIT	TOPIC	Number of Lectures	Name of the Course teacher
UNIT I: Electric field and potential	Coulomb law, Gauss' theory, its integral and differential forms, line integral of Electric field,	3	Dr. Vijay S Rana
	Electric field and potential due to an arbitrary charge distribution	2	
	Electrostatic energy, energy stored in an Electric field.	2	
	Electric field and potential due to long charged wire, Spherical shell, sphere, disc, dipole.	8	
UNIT II: Electric and Magnetic fields in Matter	Moments of charge distributions, Polar and non-polar molecule	2	Dr. Vijay S Rana
	Polarization vector, electric displacement vector, three electric vectors	3	
	Dielectric susceptibility and permittivity, polarizability	3	
	Clausius-Mossotti relation Magnetization, magnetic susceptibility	2	
	Diamagnetic, paramagnetic and ferromagnetic substances, Hysteresis and B-H curve, Langevin's theories of Diamagnetism and paramagnetism, Weiss theory of ferromagnetism.	5	
UNIT III: Electric Currents (Steady and Varying)	Current density, Equation of Continuity	2	Dr. Vijay S Rana
	Ohm's law and electrical conductivity, Lorentz Drude theory, Wiedmann-Frenz law, Kirchoff's Laws and their applications,	4	
	Transient current, Growth and decay of D. C. in L - R and L - C circuits, charging and discharging of a capacitor through a	4	

	resistance.		
UNIT IV: Magnetostatics	Lorentz force, Bio-Savert's law, Ampere's law, Application of Biot-Saver law	3	Dr. Vijay S Rana
	Magnetic field due steady current in a long straight wire, Interaction between two wires	2	
	field due a Helmholtz coil, solenoid and current loop, magnetic vector potential, permeability, Energy stored in Magnetic field.	5	
UNIT V: Electromagnetic Induction and Alternating Current	Faraday's laws of induction, Lenz's law, Electromotive force, Measurement of magnetic field	2	Dr. Vijay S Rana
	Eddy current, Mutual inductance, Self-inductance. Impedance admittance and reactance,	2	
	R-C, R-L and L-C circuits with alternating e.m.f. source, series and parallel L-C-R circuits, resonance and sharpness	4	
	Quality factor, Power in A. C. circuits, Choke coil.	2	

Suggested Reading

1. Edward M. Purcell : Electricity and Magnetism
2. J.H. Fewkes & J. Yarwood : Electricity & Magnetism, Vol. I
3. D C Tayal : Electricity and Magnetism ", Himalaya Publishing House Pvt. Ltd., 2019.
4. D.J. Griffiths : Introduction to Electrodynamics .
5. Lal and Ahmed : Electricity and Magnetism
6. H. K. Malik and A.K. Singh "Engineering Physics", McGraw Hill Education (India) Private Limited, 2018.
7. Richard P. Feynman, Robert B. Leighton, Matthew Sands, "The Feynman Lectures on Physics Vol. 2", Pearson Education Limited, 2012.

Suggested Online Link:

1. **MIT Open Learning** - Massachusetts Institute of Technology, <https://openlearning.mit.edu/> 2. National Programme on Technology Enhanced Learning (NPTEL), <https://www.youtube.com/user/nptelhrd>
3. SwayamPrabha - DTH Channel, https://www.swayamprabha.gov.in/index.php/program/current_he/8

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Class Test/Assignment/ attendance- (10+10+5)

Course Prerequisites: Passed semester I, theory paper-1

Countersigned [Principal]

Sig. [Head]

Sig. [Course teacher]