

M.Sc. (Physics) Semester-III

Program	Subject	Year	Semester
M.Sc.	Physics	2	III
Course Code	Course Title		Course Type
PHY-620	Physics for society		Elective
Credit	Hours Per Week (L-T-P)		
	L	T	P
2	2	1	0
Maximum Marks	CIA		ESE
100	30		70

Learning Objective (LO):

The objective of this course is to understand the basic physics principle which is applicable in the activities which is prevalent in society such as sports, use of house hold devices, optical devices etc.

Course Outcomes (CO):

CO No.	Expected Course Outcomes At the end of the course, the students will be able to:	CL
1	Understand the concepts of motion and its various types. Explain mass, inertia, force, and linear momentum. Comprehend torque, angular momentum, and Newton's laws of motion. Analyze work and energy, distinguishing between kinetic and potential energy. Explore the conservation law of angular momentum and its applications in gymnastics. Understand the effects of gravity and the concept of center of mass in sports like high jump, diving, and gymnastics. Differentiate between static and dynamic equilibrium and their roles in weightlifting, gymnastics, running, and sprinting. Analyze projectile motion in sports like javelin throw and shot put, as well as the Magnus effect in baseball, soccer, and cricket.	Ap
2	Understand heat, temperature, entropy, pressure, heat capacity, and specific heat. Explain the laws of thermodynamics and the Celsius temperature scale. Comprehend thermocouples and their applications. Explore the Seebeck and Peltier effects. Understand phases of matter, phase transitions, and working principles of heat engines and refrigerators. Analyze the functioning of air conditioners (ACs).	An
3	Understand the behavior of fluids, including gases and liquids. Differentiate between steady flow, laminar flow, and turbulent flow. Explain Bernoulli's principle and its applications in aircraft flight and wind turbines. Analyze the continuity equation and its implications in pipe flow. Understand the design and applications of nozzles and diffusers. Explore Pascal's law and its applications in hydraulic systems like presses, lifts, and brakes.	An
4	Understand optical phenomena, including reflection, refraction, interference, polarization, diffraction, and dispersion. Identify and describe types of mirrors and their applications. Identify and describe types of optical lenses and their applications. Analyze the principles and applications of telephoto lenses and polarizers. Understand the functioning of optical devices such as microscopes and telescopes. Explore the biological optical device – the eye, and understand conditions like short-sightedness, far-sightedness, and their treatments.	U

CL: Cognitive Levels (R-Remember; U-Understanding; Ap-Apply; An-Analyze; E-Evaluate; C-Create).

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CO-PO/PSO Mapping for the course:

PO \ CO	Pos											PSO				
	1	2	3	4	5	6	7	8	9	10	11	1	2	3	4	5
CO1	3	3	1	3	1	1	3	2	1	2	3	3	3	3	3	1
CO2	3	3	1	3	1	1	3	2	1	2	3	3	3	3	3	1
CO3	3	3	1	3	1	1	3	2	1	2	3	3	3	3	3	1
CO4	3	3	1	3	1	1	3	2	1	2	3	3	3	3	3	1

"3" – Strong; "2" – Moderate; "1" – Low; "-" No Correlation

Detail Syllabus

Unit 1: Mechanics and Dynamics in Sports

Motion and its types, Mass, Inertia, Force and linear momentum, Torque and angular momentum, Newton's law of motion, Work, Energy: kinetic and potential Energy; Conservation law of angular momentum and its role in gymnastics, Gravity, Center of mass and its role in various sports- High jump, diving and gymnastics; Equilibrium: static and dynamic equilibrium and its role various sports- Weightlifting, gymnastic, running; Projectile motion: Javelin throw and Shot put, Magnus effect: in relevance to baseball, soccer and cricket.

Unit 2: Thermodynamics and Heat Applications

Heat, Temperature, Entropy, Pressure, Heat capacity and specific heat, Laws of thermodynamic, Celsius temperature scale, Thermocouple and its applications, Seebeck and Peltier effects, Phases of matter and phase transition, Working principles of Heat engines and Refrigerators, Air conditioners (ACs).

Unit 3: Fluid Mechanics and Applications

Fluids: Gases and Liquids, steady flow, laminar flow and turbulent flow, Bernoulli's principle and its application in aircraft flight and wind turbines, continuity equation and its implication in pipe flow, Nozzle and diffuser designing, Pascal's law, Hydraulic Press machine, hydraulic lifts, hydraulic brakes.

Unit 4: Optics and Optical Devices

Light, Optical phenomena: reflection, refraction, interference, polarization, diffraction, dispersion, Types of Mirror and applications, Types of optical lenses and applications, telephoto lens and applications, polarisers, polarised sunglasses, Microscope, telescopes, Biological optical device: Eye, short-sightedness, far-sightedness and their treatments.

References:

1. "Concepts of Physics" by H. C. Verma
2. "The Physics of Everyday Phenomena: A Conceptual Introduction to Physics" W. Thomas Griffith
3. "Biomechanics in Sport: Performance Enhancement and Injury Prevention" by Vladimir M. Zatsiorsky.
4. NCERT Physics 11th
5. NCERT Physics 12th