

PH25101	PHYSICS FOR MECHANICAL ENGINEERING (I Year B.E. MECH Engineering)	L	T	P	C
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COURSE OBJECTIVES:

- To understand the fundamental principles of mechanics.
- To gain knowledge on the mechanical effect of force.
- To demonstrate the concept of static equilibrium on particles.
- To outline the importance of quantum mechanics.
- To explain the working of laser & its application

UNIT I	FUNDAMENTAL MECHANICS	9
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Introduction – statics and dynamics – the centre of mass of a system of particles – kinetic energy of a system of particles – Theorems of the moment of inertia – moment of inertia of diatomic molecule – rotational energy levels.

UNIT II	EFFECT OF FORCE	9
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Introduction to Newtonian mechanics – Newton's law - Vector representation of Force - Parallelogram law for Addition of Forces – Lami's theorem - Triangular law of forces – Dot product & cross Product - classification of the system of forces – Problems on forces using vector representations.

UNIT III	STATICS OF PARTICLES	9
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Forces on a particle - resolution of a force- Resultant of several concurrent forces: Equilibrium of a particle - forces in space - equilibrium of a particle in space.

UNIT IV	QUANTUM MECHANICS	9
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Black body radiation (Qualitative) – Planck's hypothesis - Matter waves – de Broglie hypothesis - Electron microscope – Uncertainty Principle – The Schrodinger Wave equation (time-independent and time-dependent) – Physical significance of wave function - Degenerate energy states - Barrier penetration and quantum tunneling - Tunneling microscope.

UNIT V	LASERS	9
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Laser – characteristics – spontaneous and stimulated emission - population – inversion - Metastable states - CO₂ laser, Semiconductor laser - Industrial and medical applications - Optical Fibers – Total internal reflection – Numerical aperture and acceptance angle – Fiber optic communication.

TOTAL: 45 PERIODS
COURSE OUTCOMES:

At the end of the course, learners will be able to

CO1: Understand the fundamental principles behind the mechanics

CO2: Infer the basic mechanical principle to understand the forces on particles

CO3: Solve basic problems on particles using the concept of static equilibrium

CO4 Demonstrate the importance of quantum physics.

CO5: Know the basics of optics, lasers and its applications.

TEXT BOOKS:

1. R. K. Gaur, S. L. Gupta, “Engineering Physics”, 8th Edition, Dhanpat Rai Publication, New Delhi.
2. Beer, F.P and Johnston Jr. E.R., “Vector Mechanics for Engineers (In SI Units): Statics and Dynamics”, Eighth Edition, Tata McGraw-Hill Publishing company, New Delhi (2004)
3. Meriam J.L and Kraig L.G, ‘Engineering Mechanics-Statics and Dynamics’, 9th Edition, John Wiley & sons, 2021.
4. Vela Murali, “Engineering Mechanics”, 3rd Edition, Oxford University Press, 2017.

REFERENCES:

1. Hibbler, R.C and Ashok Gupta, “Engineering Mechanics: Statics and Dynamics”, 11th Edition, Pearson Education, 2010.
2. Irving H. Shames and Krishna Mohana Rao. G., “Engineering Mechanics – Statics and Dynamics”, 4th Edition, Pearson Education, 2006.
3. Rajasekaran S and Sankarasubramanian G., “Engineering Mechanics Statics and Dynamics”, 3rd Edition, Vikas Publishing House Pvt. Ltd., 2005.

CO-PO-PSO Mapping

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	2	1	-	-	-	-	-	-	1	-	-	1	1
CO2	2	1	-	-	-	-	-	-	1	-	-	1	1
CO3	2	1	-	-	-	-	-	-	1	-	-	1	1
CO4	2	1	-	-	-	-	-	-	1	-	-	1	1
CO5	2	1	-	-	-	-	-	-	1	-	-	1	1
Course Contribution	2	1	-	-	-	-	-	-	1	-	-	1	1

