

Semester I

U21PH101	ENGINEERING PHYSICS (Common to all branches)	Category: BSC				
		L	T	P	J	C
		2	0	2	0	3

PRE-REQUISITES:

- Nil

COURSE OBJECTIVES:

- To understand the fundamental principles of laser and fibre optics with their applications
- To acquire the knowledge of ultrasonic waves, thermal conductivity and properties of liquids
- To understand the concepts of crystals

COURSE OUTCOMES:

Upon completion of the course, the student will be able to

CO1: Demonstrate the types of laser for various industrial and medical applications (Understand)

CO2: Apply the concepts of fibre optics in engineering (Understand)

CO3: Understand the production methods of ultrasonic waves and uses in engineering and medicine (Understand)

CO4: Apply the concepts of thermal conductivity in hybrid vehicles and viscosity of liquids in engineering applications (Understand)

CO5: Explain the basic concepts of crystals and its growth techniques (Understand)

CO-PO MAPPING:


POs COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	1	-	-	-	-	-	-	-	-	-		
CO2	3	2	1	-	-	-	-	-	-	-	-	-		
CO3	3	2	1	-	-	-	-	-	-	-	-	-		
CO4	3	2	1	-	-	-	-	-	-	-	-	-		
CO5	3	2	1	-	-	-	-	-	-	-	-	-		
CO	3	2	1	-	-	-	-	-	-	-	-	-		
Correlation levels:		1: Slight (Low)			2: Moderate (Medium)			3: Substantial (High)						

SYLLABUS:

UNIT I LASER

6

Laser characteristics – Spontaneous and stimulated emission – Pumping methods – CO₂ laser – Semiconductor laser – Material Processing – Selective laser Sintering – Hologram – Medical applications (Ophthalmology)



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UNIT II FIBER OPTICS 6

Total internal reflection – Numerical aperture and acceptance angle – Classification of optical fibers (Materials, modes and refractive index profile) – Fiber optical communication system – Displacement and temperature sensor – Medical Endoscopy

UNIT III ULTRASONICS 6

Properties of ultrasonic waves – Piezoelectric generator – Acoustic grating – Applications of ultrasonics in industry– SONAR – NDT – Ultrasonic scanning methods – Fetal heart movement

UNIT IV THERMAL PHYSICS AND PROPERTIES OF FLUIDS 6

Modes of heat transfer – Thermal conductivity – Lee's disc method – Solar thermal power generation – Hybrid vehicles – Microwave oven – Surface tension and coefficient of viscosity – Poiseuille's flow experiment

UNIT V CRYSTAL PHYSICS 6

Unit cell – Bravais lattices – SC, BCC, FCC structures – Miller indices – d spacing in cubic lattice – Crystal growth from melt: Bridgeman Technique – Silicon ingots from Czochralski method – Silicon wafers from ingots and its applications.

LIST OF EXPERIMENTS

1. Determination of the wavelength of a given laser source
2. Determination of acceptance angle and numerical aperture of an optical fibre
3. Determination of velocity of sound and compressibility of a liquid using Ultrasonic interferometer
4. Determination of thermal conductivity of a bad conductor using Lee's disc method
5. Determination of viscosity of the given liquid using Poiseuille's flow method

Contact Periods:

Lecture: 30 Periods Tutorial: - 0 Periods Practical: 30 Periods Project: - 0 Periods
Total: 60 Periods

TEXT BOOKS:

1. Bhattacharya D K and Poonam Tandon, "Engineering Physics", 2nd edition, Oxford University Press, Chennai, 2017
2. Marikani A, "Engineering Physics", 3rd edition, PHI publishers, Chennai, 2021

REFERENCES:

1. Shatendra Sharma and Jyotsna Sharma, "Engineering Physics", 2nd edition, Pearson India Education Services Private Limited, Chennai, 2018
2. Avadhanulu M N, Kshirsagar P G and Arun Murthy TVS, "A Text book of Engineering Physics", 2nd Edition, S Chand Publishing, New delhi, 2018
3. Thyagaran K, Ajoy Ghatak, "Lasers – Fundamantals and Applications", 2nd edition, Laxmi Publications Pvt Limited, New delhi, 2019
4. <https://nptel.ac.in/downloads/104104085/>
5. <https://nptel.ac.in/courses/122107035/8/>



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EVALUATION PATTERN:

Continuous Internal Assessments				End Semester Examinations	
Assessment I (Theory) (100 Marks)		Assessment II (Practical) (100 Marks)		Theory Examinations (Examinations will be conducted for 100 Marks)	Practical Examinations (Examinations will be conducted for 100 Marks)
*Individual Assignment / Case Study / Seminar / Mini Project / MCQ	Written Test	Evaluation of Laboratory Observation, Record (Rubrics Based Assessments)	Test		
40	60	75	25		
25		25		25	25
50				50	
Total: 100					



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