



(An Autonomous Institution - AFFILIATED TO ANNA UNIVERSITY, CHENNAI)

S.P.G.Chidambara Nadar - C.Nagammal Campus

S.P.G.C.Nagar, K.Vellakulam - 625 701, (Near Virudhunagar), Madurai District.

L	T	P	C
3	0	0	3

## REGULATION 2020

### PH1171 - ENGINEERING PHYSICS

(Common to all branches of B.E./B.Tech Programmes)

#### OBJECTIVE:

To enhance the fundamental knowledge in Physics and its applications relevant to various streams of Engineering and Technology.

#### UNIT I - ULTRASONICS

(9)

Generation of ultrasonic waves –Magnetostriction generator – Piezoelectric generator - detection of ultrasonic waves - properties – cavitation - velocity measurement – acoustic grating - Industrial applications: SONAR - Non Destructive Testing - A,B and C –scan displays.

#### UNIT II – LASER AND FIBER OPTICS

(9)

**Lasers:** population of energy levels, Einstein's A and B coefficients– Semiconductor lasers: homo junction and heterojunction.

**Fiber optics:** principle, numerical aperture and acceptance angle - types of optical fibre (material, refractive index profile and number of modes) –sensors: pressure and displacement, optical fiber communication system, endoscope.

#### UNIT III - THERMAL PHYSICS

(9)

Thermal conductivity – Forbe's and Lee's disc method- conduction through compound media (series andparallel) - thermal expansion of solids and liquids – thermalinsulation- Applications:heatexchangers,refrigerators, ovens and solar water heater.

#### UNIT IV - QUANTUM PHYSICS

(9)

Postulates of quantum mechanics - Black body radiation – Planck's theory (derivation) - wave particle duality – electron diffraction – degenerate and non-degenerate states –physical significance of wavefunction- Schrödinger's wave equation – time independent and time dependent wave equations – particle in a one-dimensional box - scanning tunneling microscope.

## **UNIT V – CRYSTAL PHYSICS**

**(9)**

Crystalline and non-crystalline solids - unit cell, crystal systems, Bravais lattices, directions and planes in a crystal, Miller indices – interplanar distances - coordination number and packing factor for SC, BCC, FCC and HCP - crystal defects: point defect and line defect - role of imperfections in plastic deformation - Bridgman and Czochralski crystal growth techniques.

**TOTAL: 45 Hours**

### **COURSE OUTCOMES:**

After completing this course, students will be able to:

- Understand the properties, generation and applications of ultrasonic waves.
- Realize the properties & principle of laser, and propagation of light in optical fibre.
- Explain the idea of heat conduction in different media and understand the real applications of heat transfer.
- Comprehend the quantum concepts in materials.
- Describe the various types of atomic arrangements and imperfections in crystal.

### **TEXT BOOKS:**

1. Bhattacharya, D.K. & Poonam, T. - Engineering Physics. Oxford University Press, 2015.
2. John Wilson, J. F. B. Hawkes, Optoelectronics: An Introduction, Prentice Hall of India, 1998.
3. Gaur, R.K. & Gupta, S.L. - Engineering Physics. Dhanpat Rai Publishers, 2012.
4. Pandey, B.K. & Chaturvedi, S. - Engineering Physics. Cengage Learning India, 2012.
5. Charles Kittel, Introduction to Solid State Physics, 7th Edition, Wiley India, 2007.

### **REFERENCES:**

1. Halliday, D., Resnick, R. & Walker, J. —Principles of Physics. Wiley, 2015.
2. Serway, R.A. & Jewett, J.W. —Physics for Scientists and Engineers. Cengage Learning, 2010.
3. Tipler, P.A. & Mosca, G. —Physics for Scientists and Engineers with Modern Physics', W.H. Freeman, 2007.
4. P.M. Mathews and Venkatesanm, A Text book of Quantum Mechanics, Tata McGraw hill, 2010.
5. Laser Fundamentals, William T. Silfvast, 2nd edn, Cambridge University press, New York (2004).
6. Fundamentals of Physics, R. Shankar, Yale University Press, New Haven and London (2014).

## WEB REFERENCES:

1. <https://nptel.ac.in/courses/122/106/122106034/> (Quantum Physics)
2. <https://nptel.ac.in/courses/115/105/115105099/> (Solid state Physics)
3. <https://nptel.ac.in/courses/115/107/115107095/> (Fiber Optics)
4. <https://nptel.ac.in/courses/113/106/113106070/> (Ultrasonic testing)