Engineering Physics | Syllabus | Marking Scheme | First Year | 2066

ENGINEERING PHYSICS

SH 402

Theory   : 4
Year   : I
Tutorial : 1
Part   : I/II
Practical : 2

Course objectives: To provide the concept and knowledge of physics with the emphasis of present day application. The background of physics corresponding to Proficiency Certificate Level is assumed.

1 Oscillation: (7 hours)

1.1 Mechanical Oscillation: Introduction
1.2 Free oscillation
1.3 Damped oscillation
1.4 forced mechanical oscillation
1.5 EM Oscillation: Free, damped and Forced electromagnetic oscillation

2 Wave motion   (2 hours)

2.1 Waves and particles,
2.2 Progressive wave,
2.3 Energy, power and intensity of progressive wave

3 Acoustics   (3 hours)

3.1 Reverberation,

3.2 Sabine' Law

3.3 ultrasound and its applications

4 Physical Optics   (12 hours)

4.1 Interference,

4.1.1 Intensity in double slit interference,

4.1.2 Interference in thin films,

4.1.3 Newton's rings,

4.1.4 Hadinger fringes

4.2 Diffraction,

4.2.1 Fresnel and Fraunhoffer's diffraction,

4.2.2 intensity due to a single slit;

4.2.3 diffraction grating,

4.2.4 x-ray diffraction, x-ray for material test

4.3 Polarization,

4.3.1 double refraction,

4.3.2 Nichol prism, wave plates,

4.3.3 optical activity, specific rotation

5 Geometrical Optics (3 hours)

5.1 Lenses, combination of lenses,

5.2 cardinal points,

5.3 chromatic aberration

6 Laser and Fiber Optics (4 hours)

6.1 Laser production,

6.1.1 He-Ne laser,

6.1.2 Uses of laser

6.2 Fiber Optics,

6.2.1 self focusing,

6.2.2 applications of optical fiber

7 Electrostatics (8 hours)

7.1 Electric charge and force,

7.2 electric field and potential,

7.3 electrostatic potential energy,

7.4 capacitors, capacitor with dielectric,

7.5 charging and discharging of a capacitor

8 Electromagnetism (11 hours)

8.1 Direct current: Electric current,

8.1.1 Ohm's law, resistance and resistivity,

8.1.2 semiconductor and superconductor

8.2 Magnetic fields:

8.2.1 Magnetic force and Torque,

8.2.2 Hall effect,

8.2.3 cyclotron, synchrotron,

8.2.4 Biot-savart law,

8.2.5 Ampere's circuit law; magnetic fields straight conductors,

8.2.6 Faraday's laws, Induction and energy transformation, induced field,

8.2.7 LR circuit, induced magnetic field,

8.2.8 displacement current

9 Electromagnetic waves (5 hours)

9.1 Maxwell's equations,

9.2 wave equations, speed,

9.3 E and B fields,

9.4 continuity equation,

9.5 energy transfer

10 Photon and matter waves (5 hours)

10.1 Quantization of energy;

10.2 electrons and matter waves;

10.3 Schrodinger wave equation;

10.4 probability distribution;

10.5 one dimensional potential well;

10.6 uncertainty principle;

10.7 barrier tunneling

References:

Fundamentals of Physics: Halliday, Resnick, Walker (Latest Edition)

A text book of Optics: Brij Lal and Subrahmanyam (Latest edition)

Modern Engineering Physics: A. S. Basudeva

Engineering Physics: R. K. Gaur and S. L. Gupta

Waves and Oscillation: Brij Lal and Subrahmanyam

Evaluation Scheme:

There will be questions covering all the chapters in the syllabus. The evaluation scheme for the question will be as indicated in the table below:

Chapter	Hours	Mark distribution[*]
1.	7	10
2.	5	5
3.	12	15
4.	3	5

5.	4	5
6.	19	30
7.	5	5
8.	5	5
Total	**60**	**80**

* There may be minor deviation in mark distribution.