

Engineering Physics

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)
 - a. Mechanical Oscillation: Introduction
 - b. Free oscillation
 - c. Damped oscillation
 - d. Forced mechanical oscillation
 - e. EM Oscillation: Free, Damped and Forced Electromagnetic oscillation
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2. Wave motion(2 hours)
 - a. Waves and particles
 - b. Progressive wave
 - c. Energy, power and intensity of progressive wave
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3. Acoustics(3 hours)
 - a. Reverberation
 - b. Sabine's Law
 - c. Ultrasound and its applications
4. Physical Optics(12 hours)
 - a. Interference
 - i. Intensity in double slit interference
 - ii. Interference in thin films
 - iii. Newton's rings
 - iv. Hadinger fringes
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 - b. Diffraction
 - i. Fresnel and Fraunhofer's diffraction
 - ii. Intensity due to a single slit
 - iii. Diffraction grating
 - iv. X-ray diffraction, X-ray for material test
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 - c. Polarization
 - i. Double refraction
 - ii. Nichol prism, Wave plates
 - iii. Optical activity, Specific rotation
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5. Geometrical Optics(3 hours)
 - a. Lenses, combination of lenses
 - b. Cardinal points
 - c. Chromatic aberration

6. Laser and Fiber Optics(4 hours)

- Laser production
 - He-Ne laser
 - Uses of laser
- Fiber Optics
 - Self focusing
 - Applications of Optical fiber

7. Electrostatics(8 hours)

- Electric charge and Force
- Electric field and Potential
- Electrostatic potential energy
- Capacitors, Capacitor with dielectric
- Charging and Discharging of a capacitor

8. Electromagnetism(11 hours)

- Direct Current: Electric current
 - Ohm's law, Resistance and Resistivity
 - Semiconductor and Superconductor
- Magnetic Fields:
 - Magnetic force and Torque
 - Hall effect
 - Cyclotron, Synchrotron
 - Biot-Savart law
 - Ampere's circuit law, Magnetic fields straight conductors
 - Faraday's laws, Induction and Energy transformation, Induced field
 - LR circuit, Induced Magnetic field
 - Displacement current

9. Electromagnetic Waves(5 hours)

- Maxwell's equations
- Wave equations, Speed
- E and B fields
- Continuity equation
- Energy transfer

10. Photon and Matter Waves(5 hours)

- Quantization of energy
- Electrons and Matter waves
- Schrodinger wave equation
- Probability distribution
- One dimensional potential well
- Uncertainty principle
- 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
2,3	5	5
4	12	15
5	3	5
6	4	5
7,8	19	30
9	5	5
10	5	5
Total	60	80

***Note: There may be minor deviation in mark distribution.**