

Exam.	Regular		
Level	BE	Full Marks	80
Programme	BEL, BEX, BCT, BAME, BIE, B. Agri.	Pass Marks	32
Year / Part	I / I	Time	3 hrs.

Subject: - Engineering Physics (SH402)

- ✓ Candidates are required to give their answers in their own words as far as practicable.
- ✓ Attempt All questions.
- ✓ All questions carry equal marks.
- ✓ Assume suitable data if necessary.

1. Describe L.C oscillation qualitatively by using necessary circuits and graph.

OR

Define the terms sharpness of resonance and quality factor. Derive the relation of quality factor in terms of band width.

2. Define transverse wave. Develop a differential equation of the wave in a stretched string and then find the velocity of transverse wave.
3. A reverberation time of 2.3 sec is observed in a hall of volume 5500 m^3 . The sound absorbing surface of the hall has an area of 750 m^2 . Calculate the average absorption coefficient.
4. What are constructive and destructive interference? Prove that the path difference for constructive interference is integer multiple of λ and that for destructive interference is odd integer multiple of $\lambda/2$.

OR

How can you distinguish the plane, circularly and elliptically polarized light by using nicol prised and wave plate?

5. What is diffraction of light? Explain the dispersive power and resolving power of a diffraction grating. Derive the relation and also relate them.
6. A 30 cm long polarimeter tube containing 50 cm^3 of sugar solution produces an optical rotation 14.5° when placed on a polarimeter tube. If the specific rotation of sugar solution is 65° , calculate the quantity of sugar contained in the tube.
7. Two thin converging lenses of focal lengths 30 cm and 40 cm respectively are placed co-oxially in air separated by a distance of 20 cm. An object is placed 40 cm in front of the first lens. Find the position and nature of the image.
8. What is optical fiber? Explain numerical aperture and acceptance angle. Also compare the attenuation property efficiency and cost of single mode and multimode optical fibers.
9. What is electrical dipole and dipole moment? Derive an expression of the electric field intensity at a point due to dipole at equatorial line?

10. Define the three electric vectors E, P, D and develop a relation between them.

OR

A cylindrical capacitor has radii 'a' and 'b'. Show that half the energy stored lies within the cylinder whose radius is $r = \sqrt{ab}$.

11. What will be the conductivity of sodium metal having atomic weight 22.9 and density 1.013 gm/cm^3 ? The relaxation time of sodium metal is $3 \times 10^{-14} \text{ sec}$.
12. What type of particles can be accelerated by a cyclotron? Explain the working of cyclotron and synchrotron with their differences.

OR

Differentiate between electromagnetic induction and self-induction. Develop an expression for self-inductance of a toroid.

13. Using Ampere's law, calculate the magnetic field inside, outside and on the surface of a long current carrying conductor and hence plot a graph between the magnetic field versus distance from the center of the conductor.
14. Determine the energy stored in an inductor. Also, determine the energy density in magnetic field.
15. A radio wave transmits 25 W/m^2 of power per unit area. The flat surface area is perpendicular to the direction of propagation of the wave. Calculate the radiation pressure on it and maximum electric and magnetic field associated with the wave.
16. What are the significances of wave-function? Using the wave function derive an expression for the time dependent Schrodinger wave equation.
