

2063

B.E. , Second Semester  
ASP-X01: Applied Physics  
(Common with EEE, BIO, ECE, CIVIL, MECH)

Time allowed: 3 Hours

Max. Marks: 50

NOTE: Attempt five questions in all, including Question No. 1 which is compulsory and selecting two questions from each Unit.

x-x-x

I. Attempt any five of the following:-

- What is the role of inertia and elasticity in the oscillations of a system?
- What is the physical significance of bandwidth of forced oscillator?
- Why are the interfacial angles altered in the construction of Nicol prism?
- Show that the average poynting vector associated with propagating electromagnetic wave is the sum of its electric and magnetic energy densities.
- What is the role of Helium ions in the Helium-Neon laser's operation?
- How does graded index fiber aid in reducing modal dispersion?
- Give a distinctive feature between vector and phasor. (5x2)

#### UNIT - I

- Show that the damping force is neither a constant nor depends upon displacement or acceleration. On the other hand it depends upon velocity alone.
  - Consider a massive spring of mass  $m$  suspended vertically from a rigid support and at its bottom a load of mass  $M$  is suspended. It is gently pulled downwards and released so as to execute SHM. Find the time period of oscillations of this system.
  - Show that  $x = (A + Bt)e^{-\gamma t}$  is the solution of critically damped oscillations. (3,4,3)
- State and prove Poynting vector theorem. Interpret each of the term in its result.
  - Show that the work done per second against the resistive or damping force is equal to the power supplied to the oscillator by the driving agency. (2x5)
- Using Maxwell's equations, prove that in the electromagnetic waves, electric and magnetic vector oscillations are inseparable and interwoven into each other.

Contd.....P/2

What are the four fundamental communication methods that you need to master to be a good communicator? (10)

P.T.O.

(2)

- b) Discuss the propagation of EM waves in a conducting medium and discuss its important features.
- c) Show that in a conductor the magnitude of electric vector reduces to about 1% at a distance of  $0.73\lambda_c$ , where  $\lambda_c$  is the wavelength of EM waves in the conductor. (4,4,2)

### UNIT - II

- V. a) Discuss the construction and working of Nicol prism.
- b) Discuss the mechanism of polarization of light using the dichroic H-sheets. Why H-sheets are preferred over J-sheets for polarization of light. (4,4,2)
- c) What are circular polarizers. Discuss their action.
- VI. a) Show that four level laser system is easiest of achieve and sustain lasing action.
- b) Discuss various sources of light attenuation as light propagates through an optical fiber. (2x5)
- VII. a) Discuss three applications of optic fiber used as different sensing applications.
- b) Discuss sequentially various processes involved in the lasing action. (2x5)

x-x-x