

Exam.Code:0905
Sub. Code: 6191

2074
B.E., First Semester
ASP-X01: Applied Physics
(Common with CSE, Biotech, IT ECE, Civil, EEE)

Time allowed: 3 Hours

Max. Marks: 50

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

x-x-x

Question I. Attempt any five parts of the following:

- (a) What are two pre-requisites for a body or system to oscillate.
- (b) When are LCR circuit oscillation under-damped. Justify.
- (c) What is the significance of logarithmic decrement in the assessment of quality of under-damped oscillators.
- (d) Qualitatively justify the Maxwell's second equation.
- (e) Give one application of crossed polaroids.
- (f) Why is it easiest to achieve lasing action in four level lasers.
- (g) What is the physical significance of numerical aperture of an optical fiber.

(5x2)

SECTION A

Question II

- (a) A uniform rod of length L is nailed to a post such that two thirds of its length is below the nail. What is the time period of oscillations of the rod. (5)
- (b) Show that the damping force is neither a constant nor depends upon displacement or acceleration. On the other hand it depends upon velocity alone. (5)

Question III

- (a) State and prove Poynting vector theorem. Interpret each of the term in its result. (5)
- (b) Show that the fractional change in resonant frequency of a damped oscillator over that of undamped oscillator is approximately equal to $1/8Q^2$, where Q is the quality factor. (5)

Question IV

- (a) Using Maxwell's equation, prove that the electromagnetic waves have electric and magnetic vector oscillations are inseparable and interwoven into each other. (5)

Contd. ... P/2

(2)

- (b) Discuss the propagation of EM waves in a dielectric medium and show that electric and magnetic waves are interwoven into each other. (5)

SECTION B

Question V

- (a) Discuss the construction and working of Nicol prism. (5)
- (b) What are different sources of dispersion of light signal while propagating through an optical fiber. (5)

Question VI

- (a) Show that three level laser system can be sustained only pumping of energy is at high intensity. (5)
- (b) Discuss two application of optical fiber used as an amplitude based sensor. (5)

Question VII

- (a) Discuss the working of a helium-Neon laser. (5)
- (b) Discuss how light gets polarized by reflection. (5)

x-x-x