

SET# 2

Term End Examination
Subject: Physics

M. Marks 80
Class: B. Sc Sem VI

Time Allowed: 3hrs
Session 2017-18

Note: Attempt five questions, selecting at least one question from each unit. All questions carry equal marks

Unit I

- Q1.(a) Explain the concept of Miller indices. Deduce an expression for the distance between two adjacent planes of a simple cubic lattice. (12)
(b) Draw the planes (110), (200), (001) and (111) in a simple cubic unit cell. (4)

- Q2. (a) Derive Laue's equations for X-ray diffraction by crystals and obtain Bragg's diffraction condition for them. (12)
(b) The Bragg's angle for the first order reflection from (1, 1, 1) plane in a crystal is 60° . Find the inter-atomic spacing if X-ray of wavelength 1.8 \AA is used. (4)

Unit II

- Q3. Discuss Debye model of lattice heat capacity and hence derive Debye T^3 law. (12)

- Q4. (a) Describe in detail Langevin's quantum theory of paramagnetism. (12)
(b) How type I superconductors differ from type II superconductors? (4)

Unit III

- Q5. (a) Describe frequency response curve for a R-C coupled amplifier. (12)
(b) How performance of feedback amplifier can be improved through negative feedback? (4)

- Q6 (a) State principle of Hartley oscillator. Derive expression for its frequency. (12)
(b) Explain Barkhausen criterion for sustained oscillations. (4)

Unit IV

- Q7. (a) Explain Raman effect on the basis of quantum mechanical theory. Show that $\Delta J = \pm 2$ leads to Raman scattering. (12)
(b) Discuss the origin of spectral lines. (4)

- Q8. (a) What is an optical fibre? Explain the terms critical angle, angle of acceptance and numerical aperture of an optical fibre. (12)
(b) An optical fibre has a core material of refractive index 1.55 and cladding material of refractive index 1.50. Calculate the critical angle, angle of acceptance and numerical aperture of the optical fibre. (4)

Unit V

- Q9. (a) State and explain stimulated absorption, spontaneous emission and stimulated emission. (12)
(b) Explain the characteristics of laser beam. (4)

- Q10. (a) Describe the construction and working of a ruby laser. (12)
(b) Mention important applications of lasers. (4)