Code: 13A56101

R13

B.Tech I Year (R13) Supplementary Examinations June 2017

ENGINEERING PHYSICS

(Common to all branches)

Time: 3 hours Max. Marks: 70

PART - A

(Compulsory Question)

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1 Answer the following: (10 X 02 = 20 Marks)

(a) In Newton's rings set-up, the fringes formed at the point of contact is bright or dark. Why?

(b) What is an active medium?

(c) How the optical fibres are classified? What are they?

(d) What are point defects?

(e) Define Fermi level.

(f) An electron, proton and α-particle have the same de-Broglie wavelength. Which one moves faster?

(g) State Hall effect.

(h) How an atom constitutes a magnetic dipole?

(i) What are high T_c superconductors?

(j) What is a carbon nanotube?

PART - B

(Answer all five units, 5 X 10 = 50 Marks)

UNIT - I

2 (a) Explain the terms spontaneous emission, stimulated emission and population inversion.

(b) How many principal orders are possible with a diffraction grating having 30,000 lines per inch and using a source of light of wavelength 600 nm?

OR

3 (a) Explain optical fibre communication system with the help of a block diagram.

(b) The numerical aperture of an optical fiber is 0.39. If the difference in the refractive indices of the material of its core and the cladding is 0.05, calculate the refractive index of the material of the core.

UNIT - II

4 (a) What are ultrasonic waves? Write its properties.

(b) The Bragg angle corresponding to 1^{st} order selection from (111) plane in a SC crystal is 30° when X-rays of wavelength 1.57A° are used. Calculate interatomic spacing.

OR

5 Write a short note on Miller indices and line defects.

UNIT - III

6 (a) What are the salient features of classical free electron theory? Mention its drawbacks.

(b) Calculate the de-Broglie wavelength associated with a proton with a velocity equal to $\left(\frac{1}{20}\right)^{th}$ velocity of light.

OR

7 Derive an expression for energy of a particle confined in one dimensional potential box using Schrodinger wave equation.

Contd. in page 2

UNIT - IV

8 (a) Derive an expression for Hall coefficient.

(b) A solenoid is wound with 20 turns/em carrying a current of 0.1 A. Find H and B inside the solenoid.

OR

9 (a) Distinguish soft and hard magnetic materials.

(b) An n-type specimen has a Hall coefficient of 3.66×10^{-11} m^3/AS. The conductivity of specimen is 112×10^{-15} m^3/AS. Calculate the charge carrier density n and mobility.

UNIT - V

10 (a) Explain BCS theory of superconductivity.

(b) Discuss mechanical and magnetic properties of nanomaterials.

OR

11 (a) State and explain Meissner effect.

(b) Mention few applications of nanomaterials.

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