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R15

B.Tech I Year I Semester (R15) Supplementary Examinations June/July 2019

ENGINEERING PHYSICS

(Common to CE, EEE & CSE)

Time: 3 hours Max. Marks: 70

PART – A

(Compulsory Question)

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

(a) Mention the conditions required for sustained interference.
(b) Explain the differences between Fresnel and Fraunhofer diffraction.
(c) What is meant by piezoelectric effect?
(d) Define packing fraction.
(e) Explain the de Broglie hypothesis.
(f) Explain the origin of energy of energy bands in solids.
(g) What an expression for Bohr magneton?
(h) Define Hall effect.
(i) A superconducting material has a critical temperature of 3.7K and a magnetic field of 0.0306 tesla at 0K. Find the critical field at 2K.
(j) Why nano materials exhibit properties differently? Explain.

PART – B

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

UNIT – I

2 (a) Describe the Fraunhofer diffraction due to single slit and deduce the positions of maxima and minima.
(b) Newton's rings formed by sodium light between a flat glass plate and a convex lens are viewed normally. What will be the order of the dark ring which will have double the diameter of 40th ring?

OR

3 (a) Derive expressions for the numerical aperture and the fractional change of an optical fibre.
(b) Draw the block diagram of an optical fibre communication system and explain the function of each block.

UNIT – II

4 (a) What is Bragg's law? Explain.
(b) What are Miller indices? Derive an expression for the inter planar spacing between two adjacent planes of Miller indices (hkl) in a cubic lattice of edge length 'a'.

OR

5 (a) Explain the powder X-ray diffraction method to determine lattice parameter of a cubic crystal.
(b) Give some applications of ultrasonics.

UNIT – III

6 (a) Discuss the de Broglie concept of matter waves.
(b) What is the importance of Schrodinger wave equation? Deduce time independent Schrodinger wave equation.

OR

7 (a) Describe the quantum free electron theory of metals.
(b) Explain Fermi-Dirac distribution function and plot this function for different temperatures.

Contd. in page 2

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UNIT – IV

8 (a) What is Hall effect? Show that Hall coefficient is independent of the applied magnetic field and inversely proportional to current density and electronic charge?

(b) What are the applications of Hall effect?

OR

9 (a) Write short note on Bohr magneton.

(b) What is ferromagnetism? Explain ferromagnetism on the basis of domain theory.

UNIT – V

10 (a) Write a note on penetration of magnetic field in a superconductor and penetration depth.

(b) Describe dc and ac Josephson effects and explain how a Josephson junction functions as a switch.

OR

11 (a) Give the classification of nanomaterials on the basis of their dimensionality with an example each.

(b) Describe the synthesis of nanomaterials using sol-gel method.

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