

B.Tech I Year (R13) Supplementary Examinations December/January 2015/2016

ENGINEERING PHYSICS

(Common to all branches)

Time: 3 hours

Max. Marks: 70

PART – A

(Compulsory Question)

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

- (a) In Newton's rings experiment, why the central fringe is dark in reflected light?
- (b) What is the role of optical resonator in lasers?
- (c) Define coordination number. What is its value for simple cubic crystal?
- (d) What is piezoelectric effect?
- (e) Define Heisenberg's uncertainty principle.
- (f) Write any two drawbacks of classical free electron theory.
- (g) What is the difference between drift and diffusion current?
- (h) What is ac Josephson effect?
- (i) Why surface area to volume ratio is large in nanomaterials?
- (j) What is Bohr magneton?

PART – B

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

UNIT - I

2 Discuss the Fraunhofer diffraction pattern shown by double slit.

OR

- 3 (a) Explain the characteristics of laser.
- (b) Write the classification of optical fibers.

UNIT - II

4 Write a short note on: (a) Miller indices. (b) Point defects.

OR

- 5 (a) What are ultrasonic waves? Write their properties.
- (b) X-rays of unknown wavelength give first order Bragg reflection at glancing angle 20° with (212) planes of copper having FCC structure. Find the wavelength of X-rays, if the lattice constant for copper is $3.615 \text{ \AA}$.

UNIT - III

- 6 (a) What are the properties of matter waves?
- (b) Derive Schrodinger's time independent wave equation.

OR

- 7 (a) Using the free electron model derive an expression for electrical conductivity in metal.
- (b) Find the relaxation time of conduction electrons in a metal if its resistivity is $1.54 \times 10^{-8} \Omega\text{m}$ and it has 5.8×10^{28} conduction electrons/ m^3 .

UNIT - IV

8 Explain the principle, construction and working of LED.

OR

- 9 (a) State and explain hysteresis.
- (b) The susceptibility of paramagnetic FeCl_3 is 3.7×10^{-3} at 27°C . Find the susceptibility at 200°K and 500°K .

UNIT - V

- 10 (a) What is Meissner effect? Show that superconductor is a very good diamagnetic material.
- (b) Calculate the critical current for a wire of lead having a diameter of 1 mm at 4.2 K. The critical temperature for lead is 7.18 K and $H_c(0) = 6.5 \times 10^4 \text{ A/m}$.

OR

11 Explain the physical properties of nanomaterials.
