

B.Tech I Year (R13) Supplementary Examinations December 2019

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) What is diffraction grating?
- (b) What is a four-level lasing system?
- (c) What are lattice parameters?
- (d) What is inverse piezoelectric effect?
- (e) What are the applications of Heisenberg's uncertainty principle?
- (f) What are the limitations of free electron theory?
- (g) What are indirect band gap superconductors?
- (h) What is Bohr Magneton?
- (i) Define London penetration depth.
- (j) What is quantum confinement?

PART – B

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

UNIT – I

- 2 (a) Explain how to find the wavelength of given light by forming Newton's rings.
- (b) Calculate the thickness of a soap film ($\mu = 1.463$) that will result in constructive interference in the reflected light, if the film is illuminated normally with light whose wavelength in free space is 6000 \AA .

OR

- 3 (a) Discuss attenuation and losses in optical fibers.
- (b) Calculate the refractive indices of the core and cladding material of a fibre from the following data: $NA = 0.22$, $\Delta\mu_r = 0.012$, where NA is numerical aperture,

UNIT – II

- 4 (a) Explain the crystal structure of diamond.
- (b) Calculate the inter-planar spacing for (231) plane of an FCC structure whose atomic radius is 0.175 nm .

OR

- 5 (a) Explain how ultrasonics are produced by piezoelectric method.
- (b) Write few applications of ultrasonics.

UNIT – III

- 6 (a) Derive Schrodinger's time independent wave equation.
- (b) Evaluate the momentum and the energy of an electron confined in a box of length 1 \AA for the ground and first excited states. Find the corresponding wavelength.

OR

- 7 (a) Derive an expression for electrical conductivity in metals.
- (b) Electrons in a metal have a Fermi velocity of $1 \times 10^6 \text{ m/s}$. Calculate the Fermi energy for the electrons in a metal.

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UNIT – IV

- 8 (a) What are drift and diffusion currents? Obtain expression for drift current.
(b) Find the intrinsic resistivity of Ge at room temperature (300 K) if the carrier density is $2.15 \times 10^{-13} / \text{m}^3$. Given that electron mobility is $3900 \text{ cm}^2/\text{Vs}$ and hole mobility is $1900 \text{ cm}^2/\text{Vs}$.

OR

- 9 (a) State and explain hysteresis.
(b) A magnetizing field of 600 Am^{-1} produces a magnetic flux of 2.4×10^{-5} Weber in an iron bar of 0.2 cm^2 cross-sectional area. Compute the permeability and susceptibility of the bar.

UNIT – V

- 10 (a) Explain BCS theory of super conductivity.
(b) The critical temperature of a given superconducting sample is 1.19K with mass 26.91. Determine the critical temperature when the isotope mass changes to 32.13.

OR

- 11 (a) Explain synthesis of nanomaterials by any method.
(b) Write applications of nanomaterials.

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