R13

Code: 13A56101

B.Tech I Year (R13) Supplementary Examinations December 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)   Why the fringes are circular in Newton's rings set-up?
  (b)   What is an optical resonator? Why it is used?
  (c)   What is the principle of an optical fibre?
  (d)   What are line defects?
  (e)   What are the drawbacks of classical free electron theory?
  (f)   What is the de-Broglie wavelength of an electron accelerated from rest through a potential difference of 100 volts?
  (g)   Is there any effect of temperature on the Fermi level of an intrinsic semiconductor?
  (h)   What is the physical significance of magnetic permeability?
  (i)   What is Meissner effect?
  (j)   Why the properties of materials are different at nano scale.

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

UNIT – I

2   (a)   What is an optical fibre? With the help of a neat sketch explain its construction.
    (b)   A parallel beam of sodium light incident on plane transmission grating having 4250 lines/cm and a second order spectral line is observed at an angle of 30°. What is the wavelength of light?

OR

3   (a)   What is interference? Write a note on colours of thin films.
    (b)   If the fractional difference between the refractive indices of the core and cladding is 0.0135 and numerical aperture is 0.2425, calculate the refractive indices of core and cladding.

UNIT – II

4   (a)   What is direct and inverse piezoelectricity? Mention few applications of ultrasonics.
    (b)   X-rays of wavelength 0.36×10^{-8} cm are diffracted by a Bragg spectrometer at a glancing angle of 4.8°. Find the interplanar separation of atomic planar in the crystal.

OR

5   (a)   Define packing fraction and Bragg's law.
    (b)   Obtain an expression for interplanar spacing in cubic crystals.

UNIT – III

6   (a)   Explain Fermi-Dirac distribution function.
    (b)   Calculate the de-Broglie wavelength of neutron of energy 28.8 eV. Given mass = 1.67×10^{-27} kg.

OR

7   Derive an expression for electrical conductivity in accordance with the classical theory.

UNIT – IV

8   (a)   Explain the principle and working of LED.
    (b)   A sample of carbon steel has a permeability of 0.01 H/m, when the magnetic intensity is 75 A/m. Find the magnetic field in the sample and the field in air.

OR

9   (a)   State and explain Hysteresis.
    (b)   Find the intrinsic resistivity of Ge at room temperature (300 K), if the carrier density is 2.15×10^{-13}. Given $\mu_n = 3900$ cm^2/Vs and $\mu_p = 1900$ cm^2/Vs.

UNIT – V

10 (a)   Explain ac and dc Josephson effects. What are its uses?
    (b)   Discuss any two properties of nanomaterials.

OR

11 (a)   Explain any one method of synthesizing nanomaterials.
    (b)   Mention few applications of superconductors.