

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)

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

- Why the fringes are circular in Newton's rings set-up?
- What is an optical resonator? Why it is used?
- What is the principle of an optical fibre?
- What are line defects?
- What are the drawbacks of classical free electron theory?
- What is the de-Broglie wavelength of an electron accelerated from rest through a potential difference of 100 volts?
- Is there any effect of temperature on the Fermi level of an intrinsic semiconductor?
- What is the physical significance of magnetic permeability?
- What is Meissner effect?
- Why the properties of materials are different at nano scale.

PART – B

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

UNIT – I

- What is an optical fibre? With the help of a neat sketch explain its construction.
 - 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

- What is interference? Write a note on colours of thin films.
 - 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

- What is direct and inverse piezoelectricity? Mention few applications of ultrasonics.
 - 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

- Define packing fraction and Bragg's law.
 - Obtain an expression for interplanar spacing in cubic crystals.

UNIT – III

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

OR

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

UNIT – IV

- Explain the principle and working of LED.
 - 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

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

UNIT – V

- Explain ac and dc Josephson effects. What are its uses?
 - Discuss any two properties of nanomaterials.

OR

- Explain any one method of synthesizing nanomaterials.
 - Mention few applications of superconductors.