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**SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY:: PUTTUR**  
(AUTONOMOUS)

**B.Tech I Year I Semester Regular & Supplementary Examinations May 2022**

**APPLIED PHYSICS**

(Common to CSE, CSM, CIC, CAD, CCC & CSIT)

Time: 3 hours

Max. Marks: 60

(Answer all Five Units the Questions 5 x 12 = 60 Marks)

**UNIT-I**

- 1 a Describe the formation of Newton's ring with necessary theory with relevant diagram and derive the expressions for dark and bright fringes. L3 9M
- b In a Newton's rings experiment the diameter of the 8<sup>th</sup> ring was 0.35cm and the diameter of the 18<sup>th</sup> ring was 0.65cm. If the wavelength of the light used is 6000Å then find the radius of curvature of the plano-convex lens. L4 3M

OR

- 2 a Explain the theory of Fraunhofer diffraction due to single slit. L4 8M
- b Obtain conditions for bright and dark fringes in single slit diffraction pattern and draw intensity distribution. L4 4M

**UNIT-II**

- 3 a What are the salient features of classical free electron theory? Derive an expression for electrical conductivity in a metal? L4 8M
- Find relaxation time of conduction electron in metal if its resistivity is L1 4M
- b  $1.54 \times 10^{-8} \Omega\text{-m}$  and it has  $5.8 \times 10^{28}$  conduction electron/ $\text{m}^3$ .  
Given  $m = 9.1 \times 10^{-31} \text{ kg}$ ,  $e = 1.6 \times 10^{-19} \text{ C}$ .

OR

- 4 a Write a significance of divergence and curl of a vector L1 8M
- b Find the temperature at which there is 1% probability that a state with energy 0.5eV is above Fermi energy. L1 4M

**UNIT-III**

- 5 a Describe the construction and working principle of NdYAG Laser with the help of a neat diagram. L3 9M
- b Calculate the wavelength of emitted radiation from GaAs which has a band gap of 1.44eV L4 3M

OR

- 6 a What is the acceptance angle of an optical fiber and derive an expression for it with suitable ray diagram. L1 8M
- b An optical fibre has a core refractive index of 1.44 and cladding refractive index of 1.40. Find its numerical aperture, Acceptance angle, critical angle and fractional refractive index change. L1 4M

**UNIT-IV**

- 7 L4 8M
- a What is Fermi level? Prove that the Fermi level  $E_F = \frac{E_C + E_V}{2}$  in intrinsic semiconductor.
- b The following data are given for an intrinsic Ge at 300K. Calculate the conductivity of the sample? ( $n_i = 2.4 \times 10^{19} \text{ m}^{-3}$ ,  $\mu_e = 0.39 \text{ m}^2\text{-V}^{-1}\text{S}^{-1}$ ,  $\mu_p = 0.19 \text{ m}^2\text{-V}^{-1}\text{S}^{-1}$ ). L4 4M

**OR**

- 8 a Describe the construction and working mechanism of LED. **L3 8M**  
b Determine the wavelength of LED fabricated by the CdS material with band gap of 2.42 eV **L3 4M**

**UNIT-V**

- 9 a Explain the Type-I and Type-II superconductors. **L4 8M**  
b What is Meissner effect? **L1 4M**

**OR**

- 10 a What are the techniques available for synthesizing nanomaterials? **L1 6M**  
b Explain ball milling technique for synthesis of nanomaterial. **L4 6M**

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