

Subject Code: R13103/R13

Set No - 1

I B. Tech I Semester Supplementary Examinations May/June - 2016

**ENGINEERING PHYSICS**

(Common to ECE, EEE, EIE, BioTech, EComE, Agri.E)

Time: 3 hours

Max. Marks: 70

Question Paper Consists of **Part-A** and **Part-B**  
Answering the question in **Part-A** is Compulsory,  
Three Questions should be answered from **Part-B**

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**PART-A**

1. (a) Distinguish between a polarized light and an unpolarized light.
- (b) State Bragg's law for X-ray diffraction. What is its limiting condition?
- (c) What are polar and non-polar dielectrics?
- (d) Define magnetization and show that  $B = \mu_0(H+M)$ .
- (e) What are matter waves and list out their properties?
- (f) Describe the principle behind working of a photoconductor.

[4+4+4+4+3+3]

**PART-B**

2. (a) Describe and explain the formation of Newton's rings in reflected light. Deduce expressions for getting bright and dark rings in terms of the diameters.
  - (b) A grating of width 2 inches is ruled with 15000 lines per inch. Find the smallest wavelength separation that can be resolved in second order at a mean wavelength of 500nm.
  - (c) Discuss any four applications of Hall Effect.
- [8+4+4]
3. (a) Define acceptance angle of an optical fibre and derive an expression for it in terms of refractive indices of the core and cladding.
  - (b) X-rays of wavelength 0.12nm are found to undergo second order reflection at a Bragg angle of  $28^\circ$  from a lithium fluoride crystal. What is the inter-planar spacing of reflecting planes in the crystal?
  - (c) Explain the terms relaxation time, drift velocity and mean free path as applied to electric conduction.
- [8+4+4]
4. (a) Explain the behavior of a dielectric material in an alternative electric field. Discuss various causes for dielectric break down.
  - (b) A solid elemental dielectric with density  $3 \times 10^{28}$  atoms/m<sup>3</sup> shows an electronic polarizability of  $10^{-40}$  Fm<sup>2</sup>. Calculate the  $\epsilon_r$  of the material.
  - (c) What are Miller indices? Explain.
- [8+4+4]
5. (a) What are the factors affecting the architectural acoustics of a building? Explain remedies.
  - (b) State Gauss divergence and Stokes theorems.
  - (c) What is a SQUID? Explain its functioning.
- [8+4+4]



6. (a) Explain quantum free electron theory. Derive an expression for current density based on this theory.  
(b) A particle is moving in a one-dimensional potential box of infinite height and of width 2.5nm. Calculate the probability of finding the particle within an interval of 0.5nm at the centre of the box when it is in its state of least energy.  
(c) Distinguish between spontaneous and stimulated emission. [8+4+4]
7. (a) What is Hall Effect? Deduce an expression for Hall coefficient.  
(b) Find the resistivity of intrinsic germanium at 300K, if the intrinsic carrier density is  $2.5 \times 10^{19}/\text{m}^3$  and mobility of electron and hole is  $0.39\text{m}^2\text{V}^{-1}\text{s}^{-1}$  and  $0.19\text{m}^2\text{V}^{-1}\text{s}^{-1}$  respectively.  
(c) State and explain Rayleigh's criterion for resolution. [8+4+4]

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