Code No: R13103 **R13** SET - 1

I B. Tech I Semester Supplementary Examinations, May/June - 2019
ENGINEERING PHYSICS
(Com. to ECE,EEE,EIE, ECom E, Agri E, Bio-Tech)

Time: 3 hours Max. Marks: 70

Note: 1. Question paper consists of two parts (**Part-A** and **Part-B)**
2. Answering the question in **Part-A** is Compulsory
3. Answer any **THREE** Questions from **Part-B**

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PART –A

1. a) Explain phenomenon of double refraction. (4M)
   b) Describe the working principle of an optical fibre. (4M)
   c) What is the principle of SQUID? Explain. (4M)
   d) A cinema has a volume of 8000 m^3. It is required to have a reverberation of 2s. What should be the total absorption of the hall? (4M)
   e) Distinguish between relaxation time & Collision time (3M)
   f) Define Fermi level in the case of semiconductors. Mention its position in intrinsic and extrinsic semiconductors at 0 K. (3M)

PART -B

2. a) Show that the radii of different dark rings in Newton's Rings are proportional to square root of natural numbers. (8M)
   b) In a Newton's rings experiment the diameters of the 4^{th} and 12^{th} dark rings are 0.4 cm and 0.7 cm respectively. Find the diameter of the 20^{th} dark ring. (4M)
   c) Write a short note on solar cell. (4M)

3. a) What are Miller indices? Find the Miller indices for a given plane. Derive the expression for interplanar distance between two consecutive planes described by Miller indices (hkl). (8M)
   b) Monochromatic x-rays of wavelength 0.82Å undergo first order Bragg reflection from a crystal of cubic lattice constant 3Å , at a glancing angle 7.85^o. Indentify the possible planes which give rise to this reflection. (4M)
   c) Distinguish between conductors, semiconductors and insulators on the basis of band theory of solids. (4M)

4. a) Explain the different types of polarization mechanisms in dielectric materials. Derive an expression for total polarization. (8M)
   b) A solid elemental dielectric with 3×10^{28} *atoms/m^3* shows an electronic polarizability of 10^{-40} *F-m^2*. Assuming the internal electric field to be a Lorentz field, calculate the dielectric constant of the material. (4M)
   c) What is the significance of reverberation time? (4M)
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5. a) Express the Maxwell's equation in both integral and differential forms. (8M)

   b) Write down the physical importance of the Maxwell's equations. (4M)

   c) What is meant by hysteresis loop and what do you infer from it? (4M)

6. a) Derive an expression for density of electron states in a metal. Hence deduce the expression for Fermi energy at 0 K. (6M)

   b) The Fermi energy for silver is 5.1 eV. If the temperature is 300 K, what is the probability that the states with energies 5.0 eV and 5.2 eV be occupied? (4M)

   c) Describe the working of Ruby laser with proper energy level diagram. (6M)

7. a) What is Hall Effect? Derive an expression for Hall coefficient. Describe an experimental setup for the measurement of the Hall coefficient. (8M)

   b) A Silicon plate of thickness 1mm, breadth 10 mm and length 100 cm is placed in a magnetic field of 0.5 Wb/m^2 acting perpendicular to its thickness. If 10^{-2} A current flows along its length, calculate the Hall voltage developed if the Hall co-efficient is $3.66x10^{-4}$ m^3 /coulomb. (4M)

   c) Derive an expression for the resolving power of plane transmission grating. (4M)