R10

SET - 1

I B. Tech I Semester Supplementary Examinations, November - 2020
ENGINEERING PHYSICS-I
(Com. to All Branches)

Time: 3 hours   Max. Marks: 75

Answer any **FIVE** Questions
All Questions carry **Equal** Marks
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1. a) Derive an expression for the diameter of nth dark ring in Newton's rings viewed under reflected system. (10M)

   b) Describe the interference pattern obtained due to superposition of coherent waves. (5M)

2. a) Discuss the theory of Fraunhofer diffraction due to a single slit and hence obtain the conditions for primary and secondary maxima. (10M)

   b) Monochromatic light of wavelength 6560×10^{-8} cm falls normally on a grating 2 cm wide. The first order spectrum is produced at an angle $18^0 14'$ from the normal. What is the total number of lines on the grating? (5M)

3. a) With the help of a neat diagram, explain how a nicol prism can be used as a polarizer as well as an analyzer. (10M)

   b) Calculate the thickness of a mica sheet required for making a quarter wave plate for $\lambda = 5460$ Å. The indices of refraction for the ordinary and extra-ordinary rays in mica are 1.586 and 1.592 respectively. (5M)

4. a) Define the following: (10M)
      (i) Space Lattice
      (ii) Atomic Packing factor
      (iii) Primitive Cell

   b) Iron has BCC structure with atomic radius 0.123Å. Find the lattice constant of the unit cell. (5M)

5. a) Derive an expression for the interplanar spacing for (hkl) planes of a cubic structure. (10M)

   b) Calculate the interplanar spacing for (101) plane in a simple cubic crystal whose lattice constant is 0.42 nm. (5M)

6. a) Explain the working of a semiconductor diode laser with neat diagram. (10M)

   b) Write a short note on (5M)
      (i) Pumping mechanism
      (ii) Optical activity

7. a) Explain the principle of propagation of light through an optical fibre and derive an expression for acceptance angle and numerical aperture. (10M)

   b) A fibre cable has an acceptance angle of 30^0 and a core of refractive index 1.4. Calculate the refractive index of the cladding. (5M)

8. a) What is the principle of pulse echo testing? Discuss the procedure of this inspection method. (8M)

   b) What are the objectives of NDT? Discuss basic principle of transducer. (7M)