Code No: R5100204 **R5**

B.TECH. I Year(R05) Supplementary Examinations, May/June 2010
ENGINEERING PHYSICS
(Common to Civil Engineering and Mechanical Engineering)

Time: 3 hours **Max Marks: 80**

Answer any FIVE Questions
All Questions carry equal marks

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1. (a) Obtain the condition for primary and secondary maxima in Fraunhofer diffraction due to a single slit and derive an expression for width of the central maxima.
   (b) A lens of focal length 0.4 m and slit of width 0.2 mm are used to obtain diffraction pattern. Calculate the distance of first dark band and width of central maxima, if the wavelength of light used is 500 nm. [12+4]
2. (a) What is piezo-electric effect? Explain.
   (b) How ultrasonic waves can be produced using piezo-electric crystal? Describe.
   (c) Write any four applications of ultrasonics. [4+8+4]
3. (a) Explain the salient features of BCS theory of superconductivity.
   (b) What are fluxoids?
   (c) Explain the function of a SQUID. [8+4+4]
4. (a) With neat diagrams, describe the construction and action of Ruby laser.
   (b) Write the applications of laser. [10+6]
5. (a) Explain the principle behind the functioning of an optical fibre.
   (b) Derive an expression for acceptance angle for an optical fibre. How it is related to numerical aperture?
   (c) An optical fibre has a numerical aperture of 0.20 and a cladding refractive index of 1.59. Find the refractive index of core and the acceptance angle for the fibre in water which has a refractive index of 1.33. [4+8+4]
6. (a) Compare the relative merits of soft and hard magnetic materials.
   (b) Define coercivity and retentivity.
   (c) Explain the hysteresis curve and magnetic materials. [6+4+6]
7. (a) Draw the (112) and (120) planes, and the [112] and [120] directions of a simple cubic crystal.
   (b) Derive an expression for the inter-planar spacing in the case of a cubic structure.
   (c) Calculate the glancing angle at (110) plane of a cubic crystal having axial length 0.26 nm corresponding to the second order diffraction maximum for the X-rays of wavelength 0.065 nm. [4+8+4]
8. (a) What is Frenkel defect? Explain.
   (b) Derive an expression for the concentration of Frenkel defects present in a crystal at any temperature. [6+10]

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