Code.No: R05010103 | R05 | SET-1

I B.TECH – EXAMINATIONS, JUNE - 2011
ENGINEERING PHYSICS
(COMMON TO CE, ME, CHEM, MCT, AE, AME)

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

Answer any FIVE questions
All questions carry equal marks

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1.a) What is diffraction of light? Distinguish between Fresnel and Fraunhofer diffractions.
b) Explain the phenomena of Fraunhofer diffraction at a single slit.
c) Find the aperture of the objective of a telescope to resolve two stars separated by 2.44×10^{-6} radian for light of wavelength 600 nm. [6+6+4]

2.a) How do you use the phenomenon of double refraction to produce a plane polarized light? Explain in detail.
b) Describe the construction of a Nicol prism, and show how this can be used as a polarizer and as an analyzer.
c) Calculate the thickness of a half-wave plate of quartz for a wavelength of 500 nm, $\mu_0 = 1.544$ and $\mu_e = 1.553$. [6+6+4]

3.a) Distinguish between D.C. Josephson effect and A.C. Josephson effect.
b) What is BCS theory of superconductivity? Explain.
c) The critical temperature T_c for Hg with isotopic mass 199.5 is 4.185 K. What will be its critical temperature when its isotopic mass is increased to 203.4? [6+6+4]

4.a) Explain the terms:
i) Spontaneous emission, ii) Stimulated emission,
iii) Optical Pumping and iv) Population inversion.
b) What are Einstein's coefficients of radiation? Derive relation between them.
c) Write the applications of lasers in the medical field. [6+6+4]

5.a) Describe, in detail, the working of an optical communication system and discuss its advantage over conventional communication system.
b) Describe the structure and working of different types of optical fibers.
c) Calculate the refractive indices of core and cladding of an optical fiber with a numerical aperture of 0.33 and their fractional difference of refractive indices being 0.02. [6+6+4]

6.a) Explain the terms relating to crystal structure:
i) Coordination number,
ii) Number atoms per unit cell and
iii) Packing fraction.
b) Explain different types of Bravais lattices in three dimensions.
c) Describe the structure of ZnS. [4+8+4]

7.a) Derive Bragg's law of crystal diffraction.
b) Describe, in detail, Debye-Scherrer method for the determination of crystal structure.
c) Monochromatic X-rays of wavelength 0.15 nm are incident on a crystal face having an interplanar spacing of 0.16 nm. Find the highest order for which Bragg's reflection maximum can be seen. [5+7+4]

8.a) Derive the expression for the concentration of Frenkel defects in a metallic crystal.
b) What is Burger's vector? What is Burger's circuit? Explain. [8+8]

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Code.No: R05010103 | R05 | SET-2

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ENGINEERING PHYSICS
(COMMON TO CE, ME, CHEM, MCT, AE, AME)

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Code.No: R05010103 | R05 | SET-3

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(COMMON TO CE, ME, CHEM, MCT, AE, AME)

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