Code No: 131AH **R16**

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY, HYDERABAD
B.Tech I Year I Semester Examinations, May/June - 2017
ENGINEERING PHYSICS – I
(Common to EEE, ECE, CSE, EIE, IT)

Time: 3 hours **Max. Marks: 75**

Note: This question paper contains two parts A and B.
Part A is compulsory which carries 25 marks. Answer all questions in Part A. Part B consists of 5 Units. Answer any one full question from each unit. Each question carries 10 marks and may have a, b, c as sub questions.

Part- A (25 Marks)

1.a)	What do you understand by a grating element?	[2]
b)	Sketch the neat diagram of Fraunhofer diffraction at a single slit.	[3]
c)	What is meant by optical resonator?	[2]
d)	Give some applications of lasers in medical applications.	[3]
e)	Sketch the ray propagation in multimode Graded Index optical fiber.	[2]
f)	How will you classify the optical fibers?	[3]
g)	Define atomic radius, co-ordination number?	[2]
h)	Draw the following planes of cubic structure (121), (010), (202).	[3]
i)	Sketch the neat diagram for screw dislocation.	[2]
j)	What are Frenkel and Schottky defects?	[3]

Part-B (50 Marks)

2.a) Explain spatial and temporal coherence.
b) Derive an expression for radius of curvature of Plano convex lines in Newton's rings experiment.
c) A screen is placed 2 m away from a narrow slit. Find the slit width if the first minimum lies 5 mm on either side of the central maximum when plane wave of $\lambda = 5 \times 10^{-7}$ m are incident on the slit. [3+4+3]

OR

3.a) Explain Fresnel and Fraunhoffer diffraction.
b) Briefly explain Fraunhoffer diffraction at single slit experiment?
c) Examine if two spectral lines of wavelengths 5890 A^0 and 5893 A^0 can be clearly resolved in the (i) first order and (ii) second order by a diffraction grating 2 cm wide and having 425 lines/cm. [3+4+3]

4.a) What is the difference between polarized and unpolarised light?
b) Discuss the construction and working of nicol prism.
c) What is the principle of quarter wave plates? [4+3+3]

OR

5.a) Discuss the characteristics of laser radiation.
b) Describe the construction and working of ruby laser.
c) Calculate the relative population in the laser transition levels in a ruby laser in thermal equilibrium (without pumping of atoms). The wavelength of the ruby laser light is 6943 A^0 at 300 K. [3+4+3]

6.a) Derive an expression for the numerical aperture of an optical fiber.
b) Discuss the various factors contributing to attenuation in optical fiber.
c) Explain the advantages of optical fiber in communication. [3+4+3]

OR

7.a) Explain briefly the basic principle of optical fiber.
b) Describe the structure of different types of optical fibers with ray paths.
c) Explain how the signal transmits through graded index fiber. [3+4+3]

8.a) Explain the terms (i) basis (ii) space lattice (iii) unit cell.
b) Show that FCC crystals are closely packed than BCC crystals?
c) What are Miller indices? How do you obtain for a given plane in a crystal? [3+4+3]

OR

9.a) Explain the terms (i) Atomic radius (ii) Coordination number (iii) Packing factor.
b) Find the packing factors for SC and BCC?
c) Derive an expression for the inter planar spacing between two adjacent planes? [3+4+3]

10.a) Describe the Laue method of determination of crystal structure.
b) Calculate the Bragg angle at which electrons accelerated from rest through a potential difference of 80 volts will be diffracted from the (111) planes of a FCC crystal of lattice parameter 0.35 nm.
c) Explain the various types of point defects in the crystals? [4+3+3]

OR

11.a) Give brief account of powder method for crystal structure analysis.
b) What are crystal defects in crystal? Classify the defects of crystals.
c) Explain the significance of Burger's vector. [4+3+3]

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