R16

Code No: 131AC

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

B.Tech I Year I Semester Examinations, May - 2018

ENGINEERING PHYSICS

(Common to CE, ME, MCT, MMT, AE, MIE, PTM, CEE, MSNT)

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 is Diffraction grating? [2]
b) Distinguish between Fresnel and Fraunhoffer diffraction. [3]
c) Explain the phenomenon of double refraction. [2]
d) Write three important characteristics of laser. [3]
e) Define acceptance angle and Numerical aperture of an optical fibre. [2]
f) Explain the principle behind the optical fibre. [3]
g) Explain primitive cell and non- primitive cell. [2]
h) How do you obtain Miller indices for a given plane? [3]
i) Briefly explain Laue method. [2]
j) Explain the physical significance of Burger's vector. [3]

PART-B

(50 Marks)

2.a) How the fringes are obtained in diffraction pattern and why they are unequally spaced.
b) Derive an expression for intensity distribution of Fraunhoffer diffraction due to N parallel slits and obtain conditions for principal maxima, minima and secondary maxima. [5+5]

OR

3.a) Explain the Newton's ring experiment with neat diagram and show that the Diameter of the m^{th} dark ring is given by $D_m = 2\sqrt{m\lambda R}$.
b) In Newton's rings experiment, diameter of 15^{th} dark ring was found to be 0.59 cm and that of 5th dark ring was 0.336 cm. If radius of Plano-convex lens is 100 cm, calculate wavelength of light used. [5+5]

4.a) Explain the principle and working of Nicol's prism with neat diagram.
b) Write a short note on phenomena of Double Refraction. [5+5]

OR

5. Describe with suitable diagram, the principle, construction and working of He - Ne laser system. [10]

6.a) Describe the structures of different types of optical fibres along with the light ray propagation paths.

b) Calculate the fractional index change for a given optical fibre if the refractive indices of the core and cladding are 1.563 and 1.498 respectively. [5+5]

OR

7.a) Derive an expression for a Numerical aperture of an optical fibre.

b) What are the applications of optical fibres? [5+5]

8.a) Describe in detail the structure of diamond.

b) Germanium crystallizes in the diamond cubic structure with eight atoms in an unit cell. The lattice constant is 5.62 A^0. Calculate the density of Germanium. [5+5]

OR

9. Derive an expression for the interplanar spacing between two adjacent planes in an orthogonal lattice. [10]

10. Explain the powder x-ray diffraction method for the analysis of the crystal structure. [10]

OR

11. Explain in detail the different kinds of surface defects. [10]

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