**Code: 15A56101** **R15**

B.Tech I Year I Semester (R15) Regular Examinations December/January 2015/2016

**ENGINEERING PHYSICS**

(Common to CE, EEE and CSE)

Time: 3 hours Max. Marks: 70

**PART – A**

(Compulsory Question)

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1 Answer the following: (10 X 02 = 20 Marks)

(a) Distinguish between Fresnel and Fraunhofer diffraction

(b) What is population inversion? Give four applications of lasers

(c) Calculate the interplanar spacing for a (321) plane in a simple cubic lattice whose lattice constant is $4.2A^o$.

(d) Draw the crystal planes having miller indices (111), (110), (010) and (100).

(e) Show that the de Broglie wavelength for an electron is found to be $\frac{12.26}{\sqrt{V}}$ $A^o$.

(f) What are the basic assumptions of classical free electron theory?

(g) Explain drift and diffusion currents

(h) Define magnetic susceptibility and permeability. Obtain the relation between them.

(i) What is Meissner effect? Explain

(j) Write short note on 'Quantum dots'.

**PART – B**

(Answer all five units, 5 X 10 = 50 Marks)

**UNIT – I**

2 Give the relevant theory of Fresnel's biprism to determine the wavelength of monochromatic light source.

**OR**

3 Describe the construction and working of Nd:YAG laser.

**UNIT – II**

4 What are Miller indices? Find the Miller indices for a given plane. Derive the expression for interplanar distance between two consecutive planes described by Miller indices (hkl).

**OR**

5 What is piezoelectric effect? Explain the production ultrasonics using piezoelectric crystal with necessary circuit diagram.

**UNIT – III**

6 Show that the energy of an electron confined in a one dimensional potential well of length L and infinite depth is quantized.

**OR**

7 Explain the 'Kronig-Penney' model of solids and show that it leads to energy band structure of solids.

**UNIT – IV**

8 What is Hall effect? Derive the expression for Hall voltage and Hall coefficient. Mention important applications of hall effect.

**OR**

9 Distinguish between ferro, para and diamagnetic materials. Discuss the applications of soft ferrites.

**UNIT – V**

10 Explain the BCS theory of superconductors. Discuss the magnetic behavior of type-I and type-II superconductors.



**OR**

11 Define top-down and bottom-up approach. Describe various techniques of physical vapour deposition.

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