Seat No. : 12673

MI-110

December-2016

B.Sc., Sem.-III

CC-201 : Physics

Time : 3 Hours] **[Max. Marks : 70**

Instructions : (1) Attempt **all** questions.
(2) Symbols used have their usual meanings.

1. Explain hexagonal close packed structure. Find the position of other atom in the basis for HCP structure. Find the $\frac{c}{a}$ ratio for HCP structure. **14**

OR

(a) What are the symmetry operations ? Discuss the different types of symmetry operations and corresponding symmetry elements with proper examples. **10**

(b) Discuss the covalent bond in detail. **4**

2. (a) What is amplifier ? Draw the circuit diagram for common base amplifier with NPN transistor and discuss CB amplifier. Draw its input and output characteristic. Establish the relation between α and β. **7**

OR

Draw and discuss the CE amplifier circuit of a PNP transistor. Draw the input and output curves and explain how a dc load line is drawn and the position of the Q point is determined.

(b) Draw the reverse bias characteristics of zener diode and explain the zener break down. Explain the use of zener diode as a voltage regulator with circuit diagram. **7**

OR

Draw the construction of Uni Junction Transistor. Draw the circuit diagram of UJT as Relaxation Oscillator and explain its working. Write the equation of frequency of oscillation for it. **7**

3. (a) Obtain the Schrodinger's equation for a free particle in one dimension.

OR

Explain Compton effect and derive the equation for the wavelength of scattered radiation.

P.T.O.

(b) Write Frank – Hertz experiment in detail. 7

OR

Define non-normalizable wave function and give the method of box normalization for a wave function $\psi = e^{i(\vec{k}\cdot\vec{r})}$

4. (a) Write a detailed note on zone plate and derive the equation for focal length of a zone plate. 7

OR

Explain the construction of a plane transparent diffraction grating and obtain the expression for the resolving power of a plane diffraction grating.

(b) What is resolving power ? Discuss Rayleigh's criterion of resolution with necessary figures. 7

OR

Explain Fresnel's half period zone. Derive the necessary equation for the area of half period zone.

14

5. Answer the following questions :

(1) Draw the structure of CsCl.

(2) Define cohesive energy.

(3) Draw a plane for Miller indices (1 1 1).

(4) Write an expression for Bragg's law.

(5) Write the relation between α and β. Find β when $\alpha = 0.98$.

(6) Define efficiency of an amplifier.

(7) Write uses of uni-junction transistor.

(8) Write the Schrodinger equation in three dimensions.

(9) What is normalized wave function ?

(10) State the types of diffraction.

(11) Find the number of lines in a plane grating capable of resolving the sodium doublet (5890 Å and 5896 Å) in the second order.

(12) When the zone plate is negative ?

(13) Find the I_{CEO} for a given transistor when $\alpha = 0.98$ and $I_{CO} = 10\ \mu A$.

(14) Draw a plane for (1 0 0).
