

SECTION—B

5. (a) Derive Bragg's law of crystal diffraction. 2
(b) Discuss briefly the methods of crystal structure determination. 3
6. Find the reciprocal lattice in case of :
(a) Body centred cube
(b) Face centred cube. 5
7. Explain atomic form factor with mathematical expression. 5
8. What is Brillouin zone ? Explain Brillouin zone for square lattice. 5

SECTION—C

9. Attempt any *five* questions carrying 2 marks each :
(i) Define reciprocal lattice.
(ii) What is advantage of rotating crystal method in diffraction ?
(iii) What is a space lattice ?
(iv) Draw Diamond structure.
(v) Draw NaCl structure.
(vi) What is geometrical structure factor ? Write its expression.
(vii) What is coordination number for hcp structure ? $5 \times 2 = 10$

Roll No.

Total No. of Pages : 2

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CS/2111

CONDENSED MATTER PHYSICS—I, Paper—A

Semester—V

Time Allowed : Three Hours]

[Maximum Marks : 30

Note :- The candidates are required to attempt *two* questions each from Sections A and B. Section C will be compulsory.

SECTION—A

1. (a) Distinguish between primitive and non-primitive unit cell with the help of two dimensional diagram. 3
(b) How is Wigner Seitz primitive cell drawn ? 2
2. Draw the crystal structure of Diamond and describe fully. Hence calculate its packing fraction. 5
3. (a) Find expression for spacing of planes in crystal lattice. 3
(b) The interplanar spacing between (100) planes in BCC crystal system is 0.24 nm. Find out the atomic radius in the given crystal system. 2
4. (a) In an orthorhombic crystal a crystal plane makes intercepts 2 mm, 4 mm and 2 mm along the three axes. Crystallographic axes and corresponding primitive vectors are $3A^\circ$, $6A^\circ$ and $4A^\circ$. Find out the Miller Indices for the intercepting plane. 3
(b) Draw (110) (200) (100) planes. 2