

This question paper contains 3 printed pages.

4608

Your Roll No.

B.Sc. Prog. / III

AS

PH-301 : PHYSICS

Physics of Materials & Electronics

Time : 3 hours

Maximum Marks : 75

*(Write your Roll No. on the top immediately
on receipt of this question paper.)*

*Attempt five questions in all, selecting at
least two questions from each Section.*

SECTION A

1. (a) Define Miller indices. Sketch the (100), (010) and (111) planes of a simple cubic lattice. 6
- (b) Explain the following terms :
 - (i) Primitive unit cell
 - (ii) Lattice and its basis. 4
- (c) Prove that the direct lattice is reciprocal of its own reciprocal lattice. 5

2. (a) Obtain the dispersion relation for elastic waves in a linear monoatomic chain with nearest neighbour interaction. 10
- (b) Sketch and discuss the dispersion curve. 5

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3. (a) Obtain Clausius-Mosotti relation between polarizability and dielectric constant of a solid. 10
- (b) Draw and discuss energy band diagrams for insulators, semi-conductors and conductors. 5
4. (a) Discuss classical theory of diamagnetism and obtain the expression for magnetic susceptibility. 12
- (b) Explain Meissner Effect. 3

SECTION B

5. (a) Draw the circuit diagram for a half wave rectifier and explain its working. Obtain the expressions for its (i) d.c. load current, (ii) rms load current and (iii) rectification efficiency. 10
- (b) What is the difference between a positive clipper and a negative clipper? Explain with the help of circuit diagrams. 5
6. (a) With the help of a neat sketch, describe the construction of an n -channel JFET. Explain its principle of operation. 5
- (b) Draw and discuss its characteristic curves. 8
- (c) Give an elementary idea about MOSFET. 2
7. (a) Describe the working of R-C phase-shift oscillator with the help of the circuit diagram. 6
- (b) Obtain the expression for its frequency of oscillation and the condition of oscillation. 9

8. (a) What is amplitude modulation? Show that an AM wave can be represented by a carrier and two side frequencies for each frequency of modulation. 7
- (b) Sketch the circuit of a diode detector. Explain its operation. 8