

(OLD COURSE)

QP Code : 3102

(2 Hours)

[Total Marks : 75

Note:

1. Q.1 is compulsory.
2. Answer any FOUR from the Q. 2 to Q. 6.
3. Symbols have their usual meanings.
4. Assume suitable data wherever necessary.

- Q.1 Attempt any FIVE of the following
- |     |  |      |
|-----|--|------|
| (a) | Define liquid crystals. List its different phases.   | [03] |
| (b) | X rays of wavelength $0.97\text{\AA}$ are incident on the planes having inter-planer spacing $4.08\text{\AA}$ . At what glancing angle first order bragg reflection will occur?    | [03] |
| (c) | Write Fermi-Dirac distribution function and explain the meaning of each term. Define Fermi energy.   | [03] |
| (d) | Define Mobility of charge carriers. State its SI unit.   | [03] |
| (e) | Describe Meissner effect.  | [03] |
| (f) | Write down the Sabine's formula and average absorption coefficient, also explain meaning of terms in it.   | [03] |
| (g) | Calculate the length of Ni rod needed to produce ultrasonic waves of frequency 80 KHz. Density is $8900\text{ Kg/m}^3$ and Young's Modulus is $20.8 \times 10^{10}\text{ N/m}^2$ . | [03] |
- Q.2
- |   |  |      |
|---|--|------|
| A | Obtain the expression for inter-planer spacing between adjacent parallel planes in terms of Miller indices.  | [08] |
| B | Explain Hall effect. A 2 cm wide and 1mm thick copper strip is placed in a magnetic field $1.5\text{ Wb/m}^2$ . If current of 200 mA is set up in the strip, calculate Hall voltage appears across the strip. ( $R_H = 6 \times 10^{-4}\text{ m}^3/\text{sec}$ ) | [07] |
- Q.3
- |   |  |      |
|---|--|------|
| A | Describe the Type - I and Type - II superconductors.           | [08] |
| B | Draw block diagram of CRO and explain various functions of it. | [07] |
- Q.4
- |    |  |      |
|----|--|------|
| A. | Draw BCC unit cell. Obtain relation between atomic radius and lattice constant for it. | [05] |
| B  | Explain how energy bands are formed in solid.  | [05] |
| C  | State acoustic requirements of good auditorium.  | [05] |
- Q.5
- |   |  |      |
|---|--|------|
| A | Molybdenum has BCC structure. Its density is $1.02 \times 10^4\text{ Kg/m}^3$ and its atomic weight is 95.94. Determine the radius of Molybdenum atom. | [05] |
| B | With energy band diagram of unbiased P-N junction, explain the concept Barrier Potential and depletion region.   | [05] |
| C | Explain the structure of naturally occurring quartz crystal.   | [05] |
- Q.6
- |   |  |      |
|---|--|------|
| A | Describe X-ray diffraction experiment and obtain Bragg's law.  | [05] |
| B | Explain DC and AC Josephson effect.  | [05] |
| C | Find the depth of sea water from a ship on the sea surface if the time interval of 2 seconds is required to receive the signal back. Given that the temperature of sea water is $20^\circ\text{C}$ and salinity $10\text{ gm/lit}$ . | [05] |
- Q.7
- |   |  |      |
|---|--|------|
| A | Explain Schottky and Impurity defects.   | [05] |
| B | Hall of dimension $20 \times 15 \times 5\text{ cm}^3$ has the reverberation time 3.5 second. Calculate total absorption of surface and average absorption. | [05] |
| C | Explain construction and working of CRT.   | [05] |

Course: F.E.(OLD)(ALL BRANCHES)(SEM-I)(prog 568)

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Correction:

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Note: 2.

Answer any FOUR from Q. 2 to Q. 7

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