2008

2nd Semester Examination

ELECTRONICS

PAPER—EL-1203

Full Marks : 40

Time : 2 Hours

The figures in the right-hand margin indicate full marks.

Candidates are required to give their answers in their own words as far as practicable.

Illustrate the answers wherever necessary.

Answer Q. No. 1 and any *three* from the rest.

1. Answer any *five* questions :   5×2

    (a) Distinguish between Edge and Screw Dislocation.

    (b) What is 'Fermi Surface' ?

    (c) Give an example of semiconductor material each for :
    (i) III – V, (ii) II – VI, (iii) IV – VI and IV – VI compounds.

    (d) Define Impact ionization rate of change carriers in a Semiconductor.

    (e) What are Copper pairs in a superconductor ?

    (f) Define Quantum Efficiency of a photoconductor.

    (g) Give the chemical formula for ferrites. Mention their uses.

    (h) Define air mass 1.5 (AM 1.5).

2. (a) Explain why defects are inevitable in solids ?

    (b) Obtain an expression for Schottky defect concentration in an ionic crystal.   3+7

3. (a) What is 'electron gas' approximation as applied to electrical conduction in metals ?

(b) Explain the terms relaxation time, collision time and mean free path as applied to electric conduction.

(c) Show that the electrical conductivity of a free electron gas is $\sigma = ne^2\zeta/m$, where the symbols have their usual meanings. $1+(2+2+2)+3$

4. (a) Are the drift mobility and Hall mobility identical ? Explain your answer.

(b) How would you experimentally determine the Hall coefficient ? Mention the uses of Hall effect.

(c) A sample of Si is doped with 10^{16} phosphorous atoms/cm^3. Find the Hall voltage in the sample with length (l) = 1 cm, width (w) = 500 μm, thickness (d) = 500 μm, electric current (I) = 1 mA and magnetic flux density (B_z) = 10^{-4} Wb/cm^2. $(\frac{1}{2}+1\frac{1}{2})+(3+2)+3$

5. (a) What are 1-2-3 High T_C superconductors ?

(b) State and prove AC Josephson effect. What is inverse AC Josephson effect ?

(c) What are SQUIDS ? $2+6+2$

6. Write notes on any *two* : 5×2

(a) Piezolelectricity.

(b) Conductive polymers and

(c) Materials for solar cells.

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