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B.E./B.Tech. DEGREE EXAMINATION APRIL / MAY 2011

II SEMESTER

PH 9168 - PHYSICS FOR COMMUNICATION ENGINEERING

(Common to Electronics and Communication Engineering, Computer Science Engineering and Information Technology)

Time: 3 Hours **Maximum Marks: 100 marks**

(Answer ALL questions)

PART –A **(10x2=20 marks)**

1. Define Fermi Energy and effective mass of an electron
2. What is the significance of Band theory of solids
3. What do you mean by diffusion coefficient and drift mobility? Write the relation between them.
4. Distinguish between degenerate and nondegenerate semiconductors.
5. What is luminescence? Based on the source of excitation how are they classified.
6. An AlGaAs LED is used in local fibre network. It is designed for peak emission at 820 nm at 25 °C. What is the bandgap of AlGaAs in this LED?
7. What are hard and soft magnetic materials. Give their applications.
8. What is the basic principle of hologram recording?
9. Define masking and etching
10. What are monolithic and hybrid circuits.

PART –B **(5x16 = 80 marks)**

11. i) Explain the Czochralski method of growing a bulk single crystal. (8)

    ii) Explain the various steps involved in the fabrication of a pn junction diode. (8)

12. a) i) Derive Schrodinger's time independent wave equation. Solve it for a particle in a one-dimensional infinite well potential to find its energy values. (12)

    ii) Sodium is a monovalent metal crystallizing in the BCC structure. Its density and atomic weight are 971.2 kg/m^3 and 22.99 respectively. The drift mobility of electrons in sodium is 0.0053 $m^2V^{-1}s^{-1}$. Calculate the electrical conductivity of sodium. (4)

(or)

(P.T.O)

b) i) Define density of energy states and derive an expression for the same. Deduce the Fermi energy expression for conduction electron density. (12)

ii) The Fermi energy of electron in copper at room temperature is 7.0 eV. The electron drift mobility in copper 0.0033 $m^2V^{-1}s^{-1}$. Calculate the electrical conductivity of copper. (4)

13. a) i) Define an extrinsic semiconductor. Derive the expression for carrier concentration in both n and p-type semiconductors (12)

ii) Define recombination and minority carrier lifetime (4)

(or)

b) i) What is HALL effect and explain how it can be used to determine the carrier type in a semiconductor. (12)

ii) What are Schottky and Ohmic contacts and give their applications. (4)

14. a) i) With necessary theory explain the construction and working of a LED. (12)

ii) Briefly explain the principle of Quantum well laser. (4)

(or)

b) i) Explain the construction and working of Liquid crystal display. Give its strength and limitations. (12)

ii) Discuss the principle of plasma display. (4)

15. a) i) Explain the principle of optical data storage in a compact disc (CD) with a neat diagram. How are compact disc classified. (12)

ii) Explain magneto-optical data storage (4)

(or)

b) i) Explain the general principle of magnetic recording (6)

ii) Explain the principle of data storage in hard disk of the computers. How are the read and write heads designed. (10)