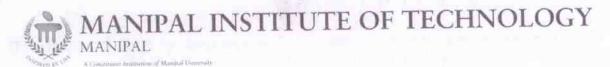
Perpored by Dr. Ashok R



IV SEMESTER B.TECH. (Open Elective)

END SEMESTER EXAMINATIONS, 23 June 2017

SUBJECT: PHYSICS OF MATERIALS [PHY 3282]

REVISED CREDIT SYSTEM

Make-up Exam

Time: 3 Hours MAX. MARKS: 50

Instructions to Candidates:

- Instructions to candidate
- Missing data may be suitable assumed.

Answer ALL the questions.

- 1A. Explain the construction and working of Transmission Electron Microscope. How is it different from Scanning Electron Microscope?
 1B. What are nano-materials? Discuss any two methods of preparation of nanomaterials. What are the applications of nano-materials?
 1C. What is fullerene? Describe the special features of fullerene. [2]
 2A. What is reinforcement material in the context of composites? What are the
- important characteristics of high performance reinforcement materials?
 Discuss the properties of glass and carbon fibers.

 2B. What are polymers? Classify polymers in terms of curing process and different chain configurations.

 2C. For a composite material, the mass fractions of matrix and fiber are 60% and 40%. The densities of fiber and matrix are given as 2.6 and 1.5 g/cm³.
 Estimate the density of the composite.
- 3A. Consider a composite material with masses of fiber and matrix as m_f and m_m. Let the volumes of fiber, matrix and voids are v_f, v_m and v_v respectively. Derive the expression for the volume of the composite made from the matrix and fiber. The densities of the fiber, matrix and composite are respectively ρ_f, p_m and ρ_c.
 [4]
- 3B. Consider a unidirectional reinforced glass fiber/epoxy composite. The fibers are continuous and 50% by volume. It is given that the specific heat of the fiber and matrix are respectively 0.65 and 0.5 J/K. The density of matrix and fiber are 1.1 and 2.6 g/cm³ respectively. Estimate the specific heat of the composite.

3C. What are polymer matrix composites? Give examples of three important [3] polymer matrices stating their applications. 4A. Derive the expression for contact potential in a semiconductor-semiconductor [4] junction. 4B. Using the concept of Fermi energy, calculate the probability of Fermi energy [2] level to be occupied by an electron. 4C. In two long n- and p-type Si bars each cross sectional area 0.4 cm2, the mobility of holes (at p-side) and electrons (in n-side) is 480 cm²/V-s and 1350 cm²/V-s respectively at 300 K. Calculate the diffusion coefficient and diffusion length. It is given that the carrier life time of electrons and holes are respectively 10⁻¹⁰ sec 10⁻⁹ sec. [4] 5A. Discuss any two methods of crystal growth. [4] 5B. Consider a semiconductor with an energy gap of 0.67eV. Compute the number of conduction electrons at 300 K and 350 K. [3] 5C. What are quantum dots? Discuss any one method of preparation of quantum [3]