



COLLEGE OF ENGINEERING, PUNE

(An Autonomous Institute of Government of Maharashtra.)
SHIVAJI NAGAR, PUNE - 411 005

END Semester Examination

(MT-09004) Polymers and Composites

Course: B Tech

Branch: Metallurgical Engineering

Semester: Sem V

Year: 2014-2015

Max.Marks:60

Duration: 3 Hours Time:- **02:00 PM - 05:00 PM**

Date:- **23 NOV 2014**

Instructions:

MIS No.

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1. Figures to the right indicate the full marks.
2. Mobile phones and programmable calculators are strictly prohibited.
3. Writing anything on question paper is not allowed.
4. Exchange/Sharing of anything like stationery, calculator is not allowed.
5. Assume suitable data if necessary.
6. Write your MIS Number on Question Paper

Q.1 Answer all questions (5 marks each)

- a. What are the main property contributions of the carbon fibers in carbon fiber reinforced plastics? What are the main property contributions of the matrix plastics?
- b. Write in detail on fiber spinning-melt spinning
- c. Define specific tensile strength and specific tensile modulus. Explain in detail why fiber reinforcements should be of a thin diameter.
- d. Explain single fiber test method for measuring bond strength.
- e. Write short notes on following (any two) (10 marks)
 - Reinforcement matrix interface- wettability
 - Crack bowing, crack deflection and wake toughening mechanisms
 - Diffusion bonding and sol-gel process
- f. A unidirectional carbon-fiber-epoxy-resin composite contains 68 percent by volume of carbon fiber and 32 percent epoxy resin. The density of the carbon fiber is 1.79 g/cm^3 and that of epoxy resin is 1.20 g/cm^3 (a) what are the weight percentages of carbon fibers and epoxy resin in the composite? (b) What is the average density of the composite?
- g. Describe the sheet-molding compound (SMC) process for producing a fiber-reinforced-plastic part. Also state some applications for this process.

- h. What are some advantages and disadvantages of the injection-molding process for molding thermoplastics?
- i. What is an aramid fiber? What are two types of commercially available aramid fibers? What type of chemical bonding takes place within and between the aramid fibers?
- j. What do you mean by polymer degradation? What are the types of polymer degradation? Explain the factors which affect thermal stability.
- k. Describe one manufacturing method of carbon-carbon composites and also state some application of these composites (any three).