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# Manipal Institute of Technology, Manipal

(A Constituent Institute of Manipal University)



## VI SEM B.TECH AERONAUTICAL AND AUTOMOBILE ENGINEERING

### END SEMESTER EXAMINATIONS, MAY 2016

#### SUBJECT: COMPOSITE MATERIALS [AAE 374]

#### REVISED CREDIT SYSTEM

Time: 3 Hours

MAX. MARKS: 50

#### Instructions to Candidates:

- ❖ Answer **ANY FIVE FULL** the questions.
- ❖ Missing data may be suitable assumed.

- 1A. Classify the composite material on the basis of matrix material. List advantages and disadvantages of composite materials. (03)
- 1B. With neat sketch explain the fabrication process of glass fibers. (03)
- 1C. What are whiskers? With neat sketch explain the fabrication of silar whiskers. (04)
- 2A. Briefly explain the processing of Phenolic matrix system and list major applications of the same. (03)
- 2B. What would be the maximum theoretical fibre volume fraction in a unidirectional composite if the fibres were arranged in a square array? (02)
- 2C. With neat sketch explain the filament winding process used in composite fabrication process. List its advantages, disadvantages and applications. (05)
- 3A. With neat sketch explain the water jet machining of composite material. (03)
- 3B. Classify the types of adhesives and with example explain the bonding process. (03)
- 3C. Sketch and explain resin transfer moulding process and mention the advantages and disadvantages of the process. (04)
- 4A. Sketch and explain the fabrication process of polyethylene fibers. (03)
- 4B. What is shape memory alloy? Explain the effect of temperature and load on shape memory alloy. (04)
- 4C. With suitable sketch explain polymer infiltration and pyrolysis process. (03)
- 5A. Explain DIMOX process and list its advantages, disadvantages and applications. (04)

- 5B.** Explain in situ polymerization of carbon nanotube polymer composites. **(03)**
- 5C.** What is carbon-carbon composite? Explain liquid phase infiltration method for the fabrication of carbon-carbon composite. **(03)**
- 6A.** With neat sketch explain sintering process used for the fabrication of metal matrix composites. **(03)**
- 6B.** Calculate  $v_f$  and  $\rho_c$  for a composite laminate containing 30 wt% of E glass fibers in a polyester resin. Assume  $\rho_f = 2.54 \text{ g/cm}^3$  and  $\rho_m = 1.1 \text{ g/cm}^3$ . **(03)**
- 6C.** Explain the Sol Gel process used in CMC and list advantages and disadvantages. **(04)**