

# CRASH COURSE

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10AE52

## Fifth Semester B.E. Degree Examination, May 2017 Introduction to Composite Material

Time: 3 hrs.

Max. Marks: 100

**Note: Answer any FIVE full questions, selecting atleast TWO questions from each part.**

### PART – A

- 1 a. Define composite materials and give the classification of composite materials. (10 Marks)  
b. Explain the characteristics of fibrous composite and laminated composite. (10 Marks)
- 2 a. Explain hand lay-up technique with neat sketch. (10 Marks)  
b. Explain vacuum bag molding technique with neat sketch. (10 Marks)
- 3 Discuss the following techniques of processing composites and list the merits and demerits:  
(i) Pultrusion (ii) Pulforming (iii) Filament winding (iv) Injection moulding (20 Marks)
- 4 a. Write a note on drilling of composite. (10 Marks)  
b. Write a note on :  
(i) Mechanism fasteners (ii) Adhesive bonding (iii) Machining. (10 Marks)

### PART – B

- 5 a. Derive an expression of stress-strain relation for an orthotropic lamina. (12 Marks)  
b. Explain : (i) Maximum stress-failure criterion (ii) Maximum strain-failure criterion (08 Marks)
- 6 a. Determine the longitudinal modulus  $E_1$  and transverse modulus  $E_2$ . (08 Marks)  
b. A glass epoxy lamina consists of 70% fiber volume fraction. Determine (i) Density of lamina, (ii) mass fraction of glass & epoxy, (iii) volume of composite if the mass of the lamina is 4 kg (iv) Volume & mass of glass and epoxy.  
Given : Density of the fiber  $\rho_f = 2500 \text{ kg/m}^3$  : Density of the matrix  $\rho_m = 1200 \text{ kg/m}^3$ . (12 Marks)
- 7 Derive the following matrices with respect to a laminated composite material:  
(i) [ A ] (ii) [ B ] (20 Marks)
- 8 a. Discuss any one technique of producing metal matrix composites. (10 Marks)  
b. List some important applications of MMC's and FRP's. (05 Marks)  
c. Discuss some of the common base metals and reinforcement materials used in MMC's. (05 Marks)

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Important Note - 1 On completing your answers compulsorily draw diagonal cross lines on the remaining blank space. Any remaining space will be treated as unutilized.