FACULTY OF ENGINEERING

B. E. 4/4 (M/P) I Semester (Suppl.) Examination, July 2012

Subject: **Composite Materials (Elective – I)**

Time: 3 Hours Max. Marks: 75

Note: Answer all questions from Part-A. Answer any *Five* questions from Part-B.

PART – A (25 Marks)

1. Write the properties fibre and matrix.
2. Classify matrix materials and their properties.
3. What is curing cycle?
4. Sketch the Resin Transfer Molding process.
5. Explain volume and mass fraction.
6. What is stress partitioning parameter?
7. Write Halpin-Tsai equation.
8. Differentiate between lamina and laminate.
9. What are edge effects?
10. Explain truncated – maximum strain criterion?

PART – B (50 Marks)

11. Describe FRP, PMC, MMC composites with their fibres and matrix materials and their properties.

12. Describe prepreg lay up, compression molding and resin transfer molding composite manufacturing process.

13.(a) Explain stress partitioning parameter. 4

(b) Derive the equation to determine the transverse modulus of elasticity using the equation determine E_2 for a composite with the following properties. 6

E_{2f} = 380 GPa; E_m = 85 GPa, ν_m = 0.3; V_f = 0.35

14. Calculate [A], [B], and [D] for [+45 / -45] laminate with the following lamina properties 10

E_1 = 160 GPa; E_2 = 20 GPa; $E_6 = G_{12}$ = 5 GPa

ν_{12} = 0.3 ; d = 0.125 mm.

15. An angle-ply lamina made of s-glass / epoxy has the following properties in the principal fibre direction 10

F_{1T} = 1280 MPa; F_{1C} = 650 MPa; F_{2T} = 52 MPa

F_{2C} = 265 MPa; F_6 = 72 MPa

E_1 = 40 GPa; E_2 = 10 GPa; E_6 = 4 GPa; ν_{12} = 0.3

A tensile load of σ_x = 3 MPa is applied at an angle 45° to the principal fibre direction. Check the safety of the laminate as per failure theories.

16.(a) Explain the various fracture modes in composites. 4

(b) Explain about first-ply failure in determining the laminate strength. 6

17.(a) Explain about hygrothermal effects in composites. 5

(b) Describe the fibre and matrix tests, in-plane shear test and interlaminar 5