R09

Code No: C0408

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
M.TECH I - SEMESTER EXAMINATIONS APRIL/MAY-2012
MANUFACTURING METHODS AND MECHANICS OF COMPOSITES
(CAD/CAM)

Time: 3hours **Max.Marks:60**

Answer any five questions
All questions carry equal marks
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1. Discuss about the following:
   (a) Autoclaves
   (b) Filament winding technique

2.a) Explain different configurations and characteristics of laminates used in composites.
   b) Discuss about constituent materials and properties of composites.

3. Classify the composite materials. Discuss the important characteristics of constituents of the composites.

4.a) Discuss any one method of contact moulding method and compression moulding method of producing fiber – reinforced composites.
   b) Discuss the characteristic properties of matrix materials used in fiber – reinforced composites.

5.a) Derive the elastic constants of lamina and matrix of a composite.
   b) What are constitutive relations for unidirectional laminated composites?

6.a) Explain the micromechanics of failure in composites.
   b) Discuss about the strength of a lamina under tension.

7. A graphite/epoxy fiber-reinforced composite material has the following technical constants: $E_1 = 200$ GPa, $E_2 = E_3 = 14$ GPa, $G_{12} = 10$ GPa, $G_{13} = G_{23} = 6$ GPa, $\nu_{12} = 0.3$, $\nu_{13} = \nu_{23} = 0.2$. Find the critical compressive stress σ_{11}^{0ci} acting in the fibers direction and producing the internal (structural) instability of the material.

8.a) An isotropic material is subjected to a uniaxial stress. Is the strain state also uniaxial? Write the stress and strain in matrix form.
   b) For a ceramic fiber with $\mu = 10\%$, what is the value of β? Show also that if the fiber length is changed by an order of magnitude, the corresponding drop in the average strength is about 20%.

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