

Total No. of Questions : 6]

SEAT No. :

P3761

[Total No. of Pages : 2

[4760] - 54

M.E. (Civil) (Structure)

MECHANICS OF MODERN MATERIALS

(2008 Pattern) (Semester - II) (Elective - IV)

*Time :4 Hours]*

*[Max. Marks :100*

*Instructions to the candidates:*

- 1) *Answer any two questions from each section.*
- 2) *Answers to the two sections should be written in separate answer books.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right side indicate full marks.*
- 5) *Use of nonprogrammable pocket calculator is allowed.*
- 6) *Assume suitable data if necessary.*

**SECTION - I**

- Q1)** a) Explain FRPC(fiber reinforced polymer composite) and its constituent structure and materials. [8]
- b) What do you understand by Piezoelectric material and its applications. [5]
- c) What is direct and converse effect. [4]
- d) Explain classification of materials used in FRC and situations where these class of materials are advantageous. [8]
- Q2)** a) Explain elasticity model for composite material. [8]
- b) Explain orthotropic, anisotropy of composite material. [8]
- c) Write compliance and stiffness matrices for plane stress and axisymmetric condition, for cross ply laminate material. [9]
- Q3)** a) Explain theories of failure applicable for FRC. [12]
- b) Explain stress strain behavior of FRC. [13]

**P.T.O.**

## SECTION - II

- Q4)** a) Obtain Naviers equation for orthotropic laminate with two opposite side simply supported. [9]
- b) Explain and sketch : [16]
- i) Orthotropic, Anisotropic laminate.
  - ii) Symmetric, balanced laminate.
  - iii) Antisymmetric and cross ply laminate.
- Q5)** a) Explain factors affecting mechanical properties of composite laminate. [10]
- b) Find coefficient of thermal expansion for a 90 degree orthotropic laminate. [15]
- $E_1 = 60 \text{ GPa}, E_2 = 14 \text{ GPa}, E_3 = 14 \text{ GPa}$
- $\mu_{12} = 0.29 = \mu_{21}$
- $\alpha_1 = 0.9 \times 10^{-6} / ^\circ\text{C}, \alpha_2 = 27 \times 10^{-6} / ^\circ\text{C}$
- Q6)** a) Explain manufacturing of composite sketch important details. [8]
- b) List tests carried out for determination of properties of composite. [9]
- c) State advances in technology for high performance of composites. [8]

