solution MEPA 11184B. P118-154 CT1

SOLUTION AND MARKING SCHEME

OCTOBER 2018 / IN - SEM (T1)

F. Y. M. TECH. (DESIGN ENGINEERING) (SEMESTER - I)
COURSE NAME: MECHANICS OF COMPOSITE MATERIALS
COURSE CODE: MEPA11184B, (PATTERN 2018)

Q.1) Explain the following terms **(2 Marks Each)**
a) Lamina b) Laminate c) Micromechanics of lamina d)Macromechanics of lamina e) Volume Fraction

OR

Q.2) State various manufacturing methods: **4 Marks**
Explain any one with neat sketch : **4 marks**
state its advantages and limitations: **1 mark each (two points each)**

Q.3) 1. Theoretical volume fraction of fiber and matrix: **2 mks**
2. Theoretical density of composite : **2 mks**
3. Experimental density: **2 mks**
4. Weight fraction of fiber and matrix: **2 mks**
5. Void fraction **: 2 mks**

OR

Q.4) For a graphite/epoxy unidirectional lamina, find the following
1. Compliance matrix: **3 mks**

$$S_{11}=\frac{1}{181\times10^{9}}=0.5525\times10^{-11}\,Pa^{-1},\ S_{12}=-\frac{0.28}{181\times10^{9}}=-0.1547\times10^{-11}\,Pa^{-1},$$

$$S_{22}=\frac{1}{10.3\times10^{9}}=0.9709\times10^{-10}\,Pa^{-1},\qquad S_{66}=\frac{1}{7.17\times10^{9}}=0.1395\times10^{-9}\,Pa^{-1}.$$

2. Minor Poisson's ratio: **1 mks**

$$\nu_{21}=\frac{0.28}{181\times10^{9}}\times(10.3\times10^{9})=0.01593.$$

3. Reduced stiffness matrix: **3mks**

$$\begin{bmatrix}181.8\times10^{9} & 2.897\times10^{9} & 0\\ 2.897\times10^{9} & 10.35\times10^{9} & 0\\ 0 & 0 & 7.17\times10^{9}\end{bmatrix}Pa$$

4. Strains in the 1–2 coordinate system if the applied stresses are : **3mks**

$$\begin{bmatrix}\varepsilon_1\\ \varepsilon_2\\ \gamma_{12}\end{bmatrix}=\begin{bmatrix}15.69\\ -294.4\\ 557.9\end{bmatrix}(10^{-6}).$$