CBCS SCHEME

USN | | | | | | | | | | |

15AE52

Fifth Semester B.E. Degree Examination, Dec.2019/Jan.2020
Introduction to Composite Materials

Time: 3 hrs. Max. Marks: 80

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

1 a. How composite materials are classified based on Re-inforcements? Explain briefly. **(08 Marks)**

b. Differentiate thermoplastic composites from thermoset composites. **(08 Marks)**

OR

2 a. With neat sketch, explain squeeze casting method of composite manufacturing. **(08 Marks)**

b. List the application of Ti Based and Al based MMCs. **(08 Marks)**

Module-2

3 a. What are the advantages of filament winding process? Explain its principle with neat sketch. **(08 Marks)**

b. With neat illustration, explain the working principle of extrusion process. **(08 Marks)**

OR

4 a. Explain about autoclave method of composite manufacturing. **(08 Marks)**

b. List the necessity of post processing of composites and explain about adhesive boding and cutting process. **(08 Marks)**

Module-3

5 a. Define the term rule of mixture and obtain the relationship for density of composite using rule of mixture. **(08 Marks)**

b. Obtain the relationship for stress-strain interms of compliance for an orthotropic lamina. **(08 Marks)**

OR

6 a. A glass/Epoxy lamina consist of a 70% fibre volume fraction. Assume the density of fibre and matrix are $P_f = 2500 kg/m^3$ and $P_m = 1200 kg/m^3$ respectively. Determine the:

i) Density of composite
ii) Volume of composite lamina if the mass of the lamina is 4kg.
iii) Mass fractions of glass and epoxy
iv) Volume and mass of fibre and epoxy. **(08 Marks)**

b. Derive Hooke's law for transversly isotropic material. **(08 Marks)**

Module-4

7 Explain the following:

a. Maximum Stress Failure theory. **(08 Marks)**

b. Maximum Strain Failure theory. **(08 Marks)**

OR

8 a. Derive the expression for [A], [B] and [D] matrices for a laminate using fundamentals. **(12 Marks)**

b. Write short notes on Tsai-Wu Failure theory. **(04 Marks)**

Module-5

9 a. List various NDT methods and explain any one in detail. **(08 Marks)**

b. List the application of composites electronic and marine industries. **(08 Marks)**

OR

10 a. List the application of composites in automobile industries. **(08 Marks)**

b. Explain about ultrasonic material testing with neat sketch. **(08 Marks)**

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