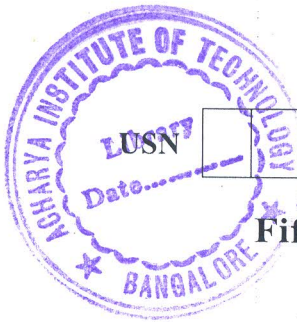


CBCS SCHEME



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 bonding 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 in terms 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 $P_f = 2500\text{kg/m}^3$ and $P_m = 1200\text{ kg/m}^3$ 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 transversely isotropic material. (08 Marks)

Module-4

- 7 Explain the following:
 - a. Maximum Stress Failure theory. (08 Marks)
 - b. Maximum Strain Failure theory. (08 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
 2. Any revealing of identification, appeal to evaluator and /or equations written eg. 42+8 = 50, will be treated as malpractice.

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)
