Printed Page:- 03 **Subject Code:- AMTME0202**

Roll. No:

NOIDA INSTITUTE OF ENGINEERING AND TECHNOLOGY, GREATER NOIDA

(An Autonomous Institute Affiliated to AKTU, Lucknow)

M.Tech

SEM: II - THEORY EXAMINATION (2022-2023 **)**

Subject: Composite Materials

Time: 3 Hours **Max. Marks: 70**

General Instructions:

IMP: *Verify that you have received the question paper with the correct course, code, branch etc.*

1. *This Question paper comprises of* **three Sections -A, B, & C.** *It consists of Multiple Choice Questions (MCQ's) & Subjective type questions.*

2. *Maximum marks for each question are indicated on right -hand side of each question.*

3. *Illustrate your answers with neat sketches wherever necessary.*

4. *Assume suitable data if necessary.*

5. *Preferably, write the answers in sequential order.*

6. *No sheet should be left blank. Any written material after a blank sheet will not be evaluated/checked.*

SECTION A **15**

1. Attempt all parts:-

1-a. Which of the following is correct dimensional of flake composites? (CO1) 1

(a) 1-Dimensional

(b) 2-Dimensional

(c) 3-Dimensional

(d) 4-Dimensional

1-b. Which of the following is an application of glass-fiber reinforced composites? (CO2) 1

(a) Adhesives

(b) Conveyor belts

(c) Design of ships

(d) Automotive parts

1-c. Why do we use thickeners? (CO3) 1

(a) To increase the viscosity of the compound without curing

(b) To make the compound look appealing

(c) No specific reason

(d) None of these

1-d. Which of the following materials is/are not used to reinforce the Copper Matrix Composite? (CO4) 1

(a) Silicon Carbide

(b) Tungsten

(c) Iron

(d) Stainless steel 304

1-e. The divergence of the stress tensor is _____ (CO5) 1

(a) Scalar

(b) Vector

(c) 0

(d) 1

2. Attempt all parts:-

2.a. Mention important matrix materials. (CO1) 2

2.b. Difference between Pyrolysis, Carbonization, Graphitization in Composites. (CO2) 2

2.c. Suggest a latest nano composite material ready to use in construction industry which is not used before? (CO3) 2

2.d. Which material property plays a significant role in impact absorption? (CO4) 2

2.e. What are various failure theories? (CO5) 2

SECTION B **20**

3. Answer any <u>five</u> of the following:-

3-a. Mention important characteristics of composite material. (CO1) 4

3-b. Give examples for fiber material. (CO1) 4

3-c. Describe various basis on which composite materials classified. (CO2) 4

3-d. What are various types of Matrices used in FRP? (CO2) 4

3.e. What is the structural makeup (manufacturing process) of GFRP materials? (CO3) 4

3.f. Explain the unique characteristics of polymeric solids. (CO4) 4

3.g. Why maximum Von-mises stress of glass composite is higher than carbon composite? (CO5) 4

SECTION C **35**

4. Answer any <u>one</u> of the following:-

4-a. The compressive strength of aramid fiber is about one-eighth of its tensile stress. Estimate the smallest diameter of a rod on which the aramid fiber can be wound without causing kinks, etc., on its compression side. (CO1) 7

4-b. Aramid fiber, when fractured in tension, shows characteristically longitudinal splitting, i.e., microfibrillation is observed. Explain why. (CO1) 7

5. Answer any <u>one</u> of the following:-

5-a. Make a comparative note on the applications of different types of reinforcing materials. (CO2) 7

5-b. What is the primary function of reinforcements in CMCs? Write a short note on the basic characteristics, advantages, and disadvantages of CMCs. (CO2) 7

6. Answer any <u>one</u> of the following:-

6-a. Write a short note on spray co-deposition process with a neat sketch. (CO3) 7

6-b. What are the essential processing steps in any composites manufacturing method? Write a brief note giving details of their significance in the quality of the final product. (CO3) 7

7. Answer any <u>one</u> of the following:-

7-a. In a density determination test for cast epoxy resin, the following data are recorded: Weight of the cast resin sample in air: 30 g, Weight of the sample with a sinker fully immersed and wire partially immersed in water: 75 g, Weight of the sinker fully immersed and wire partially immersed in water: 70.2 g. Determine the density of cast epoxy resin. (CO4) 7

7-b. How does the chemical bonding within and between the aramid fibers affect their mechanical strength properties? (CO4) 7

8. Answer any <u>one</u> of the following:-

8-a. Give the relationship between particle size and volume fraction in a dispersion strengthened composites. (CO5) 7

8-b. Write the short notes on the following laminates: (i) Symmetric Laminates, (ii) Antisymmetric Laminate, (iii) Balanced Laminate, and (iv) Quasi-isotropic Laminates (CO5) 7