Reg. No.										

Manipal Institute of Technology, Manipal

(A Constituent Institute of Manipal University)

VII SEMESTER B.TECH (MECHANICAL ENGINEERING)

END SEMESTER EXAMINATIONS, NOV/DEC 2015

SUBJECT: COMPOSITE MATERIALS [MME 471]

REVISED CREDIT SYSTEM

Time: 3 Hours MAX. MARKS: 50

Instructions to Candidates:

- Answer **ANY FIVE FULL** the questions.
- Missing data may be suitable assumed.

1A. List any six factors influencing the behaviour of MMC **(3)**

1B. How is glass fibre manufactured? Explain with a sketch. Also, list the different types of glass fibres available. **(3)**

1C. Prove that a UD reinforced composite material is stronger when loaded along the length of the fibres when compared to transverse loading. State the assumptions made **(4)**

2A. Explain the term polymer. Write a short note on vinylester. **(3)**

2B. Discuss the standard test method for determining the fatigue properties of PMC according to ASTM D3479. **(3)**

2C. How different is Satin weave from Twill weave? Explain with sketches. What are the merits and demerits of these weave patterns? **(4)**

3A. Explain the importance of surface interaction between matrix and reinforcing phase. What can be done to improve the interaction between the two? **(3)**

3B. Explain how MMCs are designated. Give two examples. **(3)**

3C. Discuss the four loading conditions for a composite structure. What are the properties desired to sustain such loads? **(4)**

4A. Explain with illustration, the process Pultrusion used in fabricating PMC. **(3)**

4B. Explain fabrication of CMC by Sol-gel technique. Explain the steps involved in it. **(3)**

4C. A copper matrix composite is to be designed with silicon carbide fibres. The diameter of the fibre is 150 μm. The yield and tensile strengths of the matrix are 100 MPa and 250 MPa respectively. The fibre fracture is assumed to **(4)**

occur at the strain at which the matrix begins to yield. The ultimate tensile strength of the fibre is given as 2 GPa. Find the critical volume fraction. If the shear stress on the fibre surface is 60 MPa, find the critical length of the fibres.

5A. Explain any three solid state fabrication techniques used in manufacturing of MMC with sketches. **(3)**

5B. Discuss the three winding pattern available in filament winding technique with sketches. **(3)**

5C. Define the following terms: **(4)**

i. Critical length of fibre
ii. TMC
iii. Rheo-casting
iv. Eutectic composition

6A. Explain manufacturing of SMC with sketch. Also illustrate how SMCs can be used in compression moulding. **(3)**

6B. Name the ASTM standard referred for Flexural testing of PMC. Explain the testing in brief. **(3)**

6C. Explain in detail, Ultrasonic and X-ray inspection used in NDT of composite materials. **(4)**