Reg. No.										

MANIPAL INSTITUTE OF TECHNOLOGY

MANIPAL

(A constituent unit of MAHE, Manipal)

VII SEMESTER B. TECH (MECHANICAL/IP ENGG.) END SEMESTER MAKE-UP EXAMINATIONS, DECEMBER 2018

SUBJECT: COMPOSITE MATERIALS [MME 4005]

REVISED CREDIT SYSTEM

Time: 3 Hours MAX. MARKS: 50

Instructions to Candidates:

- Answer **ALL** the questions.
- Missing data if any may be suitably assumed.

1A. Define composite materials. Classify & explain composite materials on the basis of matrix material. **05**

1B. Cite four reasons that makes glass a popular fiber reinforcement material. Also state the disadvantages and applications of fiberglass. **05**

2A. Sketch and explain vacuum bag molding. Also state its advantages, disadvantages and applications. **05**

2B. Differentiate between thermoset and thermoplastic polymers. Give atleast 3 examples for each. **05**

3A. With necessary sketches explain the cold die compaction and hot isostatic pressing stages involved in powder metallurgy process of fabricating metal matrix composites. **05**

3B. Sketch and explain the liquid silicon infiltration process of fabricating SiC matrix composites. Also state its advantages and disadvantages. **05**

4A. Discuss the application of fiber reinforced polymer composites in automobiles. **05**

4B. Derive the 'rule of mixtures' expressions for Iso-stress and Iso-strain models of continuous & aligned fiber composites. **05**

5A. Explain the different toughening mechanisms for ceramic matrix composites. **05**

5B. A continuous and aligned fibrous reinforced composite having a cross-sectional area of 970 mm^2 is subjected to an external tensile load. If the stresses sustained by the fiber and matrix phases are 215 Mpa and 5.38 MPa, respectively, the force sustained by the fiber phase is 76,800 N, and the total longitudinal composite strain is then determine (a) the force sustained by the matrix phase (b) the modulus of elasticity of the composite material in the longitudinal direction, and (c) the moduli of elasticity for fiber and matrix phases. **05**