Reg. No.										

MANIPAL INSTITUTE OF TECHNOLOGY

MANIPAL

(A constituent unit of MAHE, Manipal)

III SEMESTER B.TECH. (AUTOMOBILE ENGINEERING)

END SEMESTER EXAMINATIONS, NOV/DEC 2018

SUBJECT: MATERIAL SCIENCE AND METALLURGY [AAE-2153]

REVISED CREDIT SYSTEM
(29/12/2018)

Time: 3 Hours MAX. MARKS: 50

Instructions to Candidates:

- Answer **ALL** the questions.
- Missing data may be suitable assumed.
- (Kindly specify any chart, tables and any other information permitted to use. Else delete the current line)

1A. Two metals 'A' & 'B' are used to form an alloy containing 70%A & 30%B. 'A' melts at 610^0c and 'B' at 410^0c.When alloyed together, these metals form no compound or solid solution but forms eutectic at 40%A & 60%B. The eutectic solidifies at 260^0C Find **(04)**

i. The temperature at which the alloy will begin to crystallize from the melt and at which the melt will be completely solid.

ii. The percentage of eutectic in the alloy at room temperature and 300^0c.

1B. Sketch and explain Hand layup and spray layup process. Discuss their advantages and limitations. **(04)**

1C. Illustrate the phenomenon and mechanisms of Diffusion. **(02)**

2A. Define composite material. Give the classification based on matrix and reinforcement. **(03)**

2B. List the properties of Ceramics. **(02)**

2C. With a neat sketch explain the eutectic reaction coming across in Iron carbon equilibrium diagram. Explain the solidification process at eutectic point. **(05)**

3A. What are shape memory alloys? List the applications of shape memory alloys. Discuss the term "shape memory effect". **(03)**

3B. Explain the effect of common alloying elements on steel. **(02)**

3C. Sketch and explain the eutectoid reaction in Iron carbon equilibrium phase diagram. Draw the cooling curve for the 0.83% carbon. **(05)**

4A. Discuss any two surface hardening methods with suitable applications. **(04)**

4B. Explain the factors governing the formation of substitutional solid solutions. **(03)**

4C. Distinguish between pearlite, Bainite, and martensite. **(03)**

5A. Write short notes on smart materials used as implants in human body. **(03)**

5B. What are Imperfections? Explain how imperfections are helpful in engineering materials? **(03)**

5C. With a neat sketch explain the constructional procedure of T-T-T diagrams **(04)**