Reg. No.										

MANIPAL INSTITUTE OF TECHNOLOGY
Manipal University, Manipal – 576 104

V SEMESTER B.TECH. (MECH. AND I. & P. ENGG.) DEGREE END SEMESTER (MAKE UP) EXAMINATIONS DEC. 2015 / JAN. 2016

SUBJECT: HEAT TREATMENT AND ENGINEERING ALLOYS
PROGRAMME ELECTIVE - 1 [MME 345]

REVISED CREDIT SYSTEM

Time: 3 Hours. MAX.MARKS: 50

Instructions to Candidates:
- Answer **ANY FIVE FULL** questions.
- Missing data, if any, may be suitably assumed.
- Use graph sheets if required.

1 A. Sketch neatly the ideal Iron-Carbon phase diagram, showing all the temperature points, composition and phases. From the diagram determine the composition of steel containing 90 weight percentage pearlite phase. **4**

1 B. Explain the following heat treatment defects. **3**
i) Oxidation ii) Quench cracks

1 C. Explain the following treatments. **3**
i) Isothermal annealing ii) Ferritising annealing

2 A. With heat treatment cycle explain the following thermomechanical treatments. **4**
i) Marstraining ii) Isoforming

2 B. Name and explain different plain carbon steels. **3**

2 C. Why IT diagram is important for heat treatment? Explain. **3**

3 A. Differentiate between: **4**
i) Thermomechanical and Thermochemical treatments ii) Super critical treatment and HTMT

3 B. Explain the standard heat treatment for white cast iron with heat treatment cycle. **3**

3 C. Write short notes on: **3**
i) Valve steel ii) Electrical steel

4 A. Explain the following heat treatment processes **4**
i) Ion nitriding ii) Electron beam hardening.

4 B. With suitable graphs explain characteristics of martensite formation. **3**

4 C. Give technical reasons for the following **3**

i) It is better to give post carburizing treatment for the solid carburized components.

ii) Thermomechanical annealing is the substitute for conventional spheroidising.

5 A. Explain the principle of surface hardening. Also explain laser beam hardening. **4**

5 B. With standard graphs explain the effect of alloying elements on the eutectoid temperature and composition. **3**

5 C. Write a note on age hardenable nonferrous alloys. **3**

6. Write short notes on the following: **10**

a) Alloy cast iron
b) Partial annealing
c) Vacuum carburising
d) Carbide formers