Reg. No.										

MANIPAL INSTITUTE OF TECHNOLOGY
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V SEMESTER B.TECH. (MECH. / I. & P. ENGG.) DEGREE END SEMESTER EXAMINATIONS NOV. / DEC. - 2015

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-Iron carbide phase diagram, showing all the temperature points, compositions and phases. Also determine the composition of the Cast Iron containing 15 percentage weight as ferrite phase at room temperature. **5**

1 B. "Steel may be in austenitic or ferritic phase at room temperature." Justify the statement with suitable graphs. **3**

1 C. Explain the following defects associated with heat treatment. **2**
a) Cracks b) Soft spots

2 A. With heat treatment cycle, explain the following treatments for low carbon low alloy steels. **5**
a) Marstraining b) Plasma Nitriding

2 B. "The shape and position of TTT diagram depend upon several factors". With suitable graphs explain such factors. **3**

2 C. With suitable graph explain the effect of temperature on the time required to begin and end of austenitic formation. **2**

3 A. With heat treatment cycle explain the suitable heat treatment for Machining grade of High speed steel. Also write the composition of representative machining grade HSS. **5**

3 B. Write short notes on: **3**

i) Stainless steel ii) Structural steel

3 C. Comment on the following:

i) It is better to homogenize before spheroidizing.

ii) Air cooling is not necessarily be normalizing treatment. **2**

4 A. With heat treatment cycle explain the post carburizing treatment for coarse grained 1020 steel. **5**

4 B. Explain the following: **3**

i) Temper Embrittlement

ii) Characteristics of bainitic transformation

4 C. Give technical reasons for the following

i) Generally Aluminium alloys are subjected to age hardening treatments.

ii) Steel to be surface hardened requires critical carbon weight percentage (0.3 to 0.6). **2**

5 A. With heat treatment cycle, explain the standard heat treatment for Maraging steel. "Maraging steel has got Ultra high strength, hardness and excellent formability." Justify the statement. **5**

5 B. Name and explain three types of standard annealing treatments for grey cast iron. **3**

5 C. Write a note on Titanium alloys. **2**

6. Write short notes on the following:

a) Transformer steel

b) Spring steel

c) Malleable iron

d) Heat treatable Copper alloys **10**