Reg. No.										

MANIPAL INSTITUTE OF TECHNOLOGY

A Constituent Institute of Manipal University, Manipal

VI SEMESTER B.TECH (MECHANICAL/IP ENGG.) END SEMESTER EXAMINATIONS, APRIL/MAY 2017

SUBJECT: HEAT TREATMENT OF METALS AND ALLOYS

PROGRAMME ELECTIVE-III [MME 4006]

REVISED CREDIT SYSTEM

Time: 3 Hours **29/04/2017** MAX. MARKS: 50

Instructions to Candidates:

- Answer **ALL** the questions.
- Missing data may be suitable assumed

1A.	Neatly sketch Iron-Iron carbide equilibrium diagram. Name and write the invariant reactions involved. Also find the relative amounts of ferrite and cementite in a steel containing 0.8% C.	**05**
1B.	With a neat sketches explain the mechanism of Pearlitic and Bainitic phase transformation.	**05**
2A.	Explain the following heat treatment cycles. i) Diffusion annealing ii) Spheroidise annealing.	**04**
2B.	With a neat sketch explain the Grossman's critical diameter method for the determination of hardenability.	**04**
2C.	With a suitable heat treatment process explain martempering.	**02**
3A.	Explain Post carburizing treatment for coarse grained steels.	**04**
3B.	Explain the following i)Plasma nitrinding ii) Pack carburizing.	**04**
3C.	Discuss the advantage and dis-advantages of electron and laser beam hardening over other heat treatment process.	**02**
4A.	With a suitable heat treatment cycle explain precipitation hardening treatment for non-ferrous material.	**04**
4B.	Write a note on i)Titanium alloy ii) Magnesium alloy.	**04**
4C.	Explain the following defects associated with heat treatment. i)Cracks ii) Soft spots.	**02**
5A.	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.	**05**
5B.	Write a note on i)Gray cast iron ii) White cast iron.	**05**