Reg. No.										

MANIPAL INSTITUTE OF TECHNOLOGY

MANIPAL

(A constituent unit of MAHE, Manipal)

VI SEMESTER B.TECH. (MECHANICAL/IP ENGINEERING)

END SEMESTER EXAMINATIONS, APRIL/MAY 2019

SUBJECT: HEAT TREATMENT OF METALS AND ALLOYS [MME 4006]

REVISED CREDIT SYSTEM
(03/05/2018)

Time: 3 Hours MAX. MARKS: 50

Instructions to Candidates:

- Answer **all** questions.
- Missing data may be suitably assumed.

1A. Draw the neat labelled iron carbide equilibrium diagram and show all invariant reactions. **(3)**

1B. Calculate the relative amount of austenite and ledeburite in a cast iron containing 3 % carbon. **(3)**

1C. With neat sketches explain the kinetics of formation of austenite. Write the conclusions for the effect of temperature on the time required for start and completion of pearlite to austenite. **(4)**

2A. What are the characteristics of Bainitic transformation? **(4)**

2B. Why air cooling not necessary be the normalizing treatment? **(2)**

2C. With neat sketches write a short note on controlled rolling and hot cold working. **(4)**

3A. Explain gas carburizing process with an example of chemical reaction. **(3)**

3B. Explain solubility requirements for Precipitation hardening with a neat figure. **(3)**

3C. With neat sketches explain any four post carburizing treatments and their influence on the case and core of a carburized steel. **(4)**

4A. Write a short note on dual phase steel and Hadfield steel. **(4)**

4B.	Explain with a neat sketch, the heat treatment cycle for high speed steel.	**(3)**
4C.	Differentiate white cast iron and gray cast iron. (minimum six points)	**(3)**
5A.	With neat sketch, explain the process of malleableization of white cast iron.	**(4)**
5B.	Write a short note on the following heat treatment defects, their causes and remedies. i. Warping ii. Soft spots iii. Burning iv. Black fracture.	**(4)**
5C.	Write a short note on allotropic behavior of iron.	**(2)**

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