

Total No. of Questions : 8]

SEAT No. :

P1576

[Total No. of Pages : 2

[6002]-206

S.E. (Mechanical/Automobile/Mechanical SW/Automation & Robotics)

ENGINEERING MATERIALS AND METALLURGY

(2019 Pattern) (Semester-III) (202044)

Time : 2½ Hours]

[Max. Marks : 70

Instructions to the candidates:

- 1) Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.
- 2) Figures to the right side indicate full marks.
- 3) Use Graph paper for graphical solution.
- 4) The use of an electronic pocket calculator is allowed.
- 5) Assume Suitable data if necessary.

- Q1) a)** Explain Gibbs phase rules for metallurgical application? [6]
- b) Discuss nucleation & crystal growth in solidification of pure metals?[6]
- c) With neat labels draw Iron Carbon Equilibrium Diagram? [6]

OR

- Q2) a)** Explain homogenous and heterogeneous nucleation with neat sketches.[6]
- b) List and explains all critical temperature of Iron Carbon Equilibrium Diagram? [6]
- c) Draw neat microstructures of the following. [6]
- i) 0.2% carbon steel,
 - ii) 0.8% carbon steel
 - iii) 1.2% carbon steel

- Q3) a)** What is tempering process? Why tempering is carried out after hardening? List classification and application of tempering process? [6]
- b) What is retained austenite & how it affects properties of steel? List process to remove retain austenite. [6]
- c) Define hardenability? Differentiate between austempering and Martempering with diagram? [5]

OR

P.T.O.

- Q4)** a) Define annealing and explain types of annealing? [6]
b) Draw isothermal time temperature transformation diagram? What is the importance of TTT diagrams in Heat Treatment processes? [6]
c) Differentiate between Carburizing and Nitriding. [5]

- Q5)** a) What is IS, AISI and SAE? Explain in detail. [6]
b) Define steel? Explain classification of steel with application? [6]
c) Draw the microstructure of Grey Cast Iron, White Cast Iron and Nodular Cast Iron. [6]

OR

- Q6)** a) State the composition of the following steel which is specified as per Indian Standard Designation System. [6]
i) T75W18Cr4V1
ii) Fe410K
iii) C20
iv) St 310Kv
v) 80 T11
vi) FeE 330
b) Write a short note on Grey Cast Iron and Nodular Cast Iron. [6]
c) Write short note on tool steel? [6]

- Q7)** a) Give typical composition, important properties and applications of Inconel? [6]
b) What is age hardening? Explain with example applications of age hardening? [6]
c) List important properties of aluminium? Write composition and application of duralumin? [5]

OR

- Q8)** a) Give typical composition, important properties and applications of Cartridge brass? [6]
b) Differentiate between Brass and Bronze? [6]
c) What properties are required for bearing materials? Give composition of any two nonferrous alloy used as bearing? [5]

