

Total No. of Questions : 8]

SEAT No. :

P599

[Total No. of Pages : 2

[5869]-214

**S.E. (Common with Automation & Robotics / Automobile &
Mechanical Engineering / Mechanical Sandwich)
ENGINEERING MATERIALS AND METALLURGY
(2019 Pattern) (Semester - III) (202044)**

Time : 2½ Hours]

[Max. Marks : 70

Instructions to the candidates:

- 1) *Neat diagrams must be drawn wherever necessary.*
- 2) *Figures to the right side indicate full marks.*

- Q1)** a) With neat labels draw Iron Carbon Equilibrium Diagram? [8]
b) Discuss nucleation & crystal growth in solidification of pure metals? [6]
c) Explain process of perlite formation from austenite? [4]

OR

- Q2)** a) What is Equilibrium diagram? With diagram explain three important reactions in Iron Carbon Equilibrium diagram? [8]
b) Explain Gibbs phase rules for metallurgical application? [6]
c) Discuss Homeothermy rule for substitutional solid solutions? [4]

- Q3)** a) Draw isothermal time temperature transformation diagram? [6]
b) Define annealing and explain types of annealing? [6]
c) What is retained austenite & how it affects properties of steel? List process to remove retain austenite? [5]

OR

- Q4)** a) What is tempering process? Why tempering is carried out after hardening? List classification and application of tempering process? [6]
b) Write short note on carburizing and list its applications? [6]
c) Define hardenability? Differentiate between austempering and Martempering with diagram. [5]

- Q5)** a) Define steel? Explain classification of steel with applications. [6]
b) Write short note on tool steel? [6]
c) Explain sensitization of stainless steel? [5]

OR

P.T.O.

- Q6)** a) Define Cast Iron? Explain classification of Cast iron with applications. [6]
b) Discuss effect of alloying elements on steel? [6]
c) Write short note on stainless steel? [5]

- Q7)** a) Differentiate between brass and bronze? (Compositions, application). [6]
b) Write short note on Invar? [6]
c) What is Additive Manufacturing? List few additive manufacturing materials with their applications? [6]

OR

- Q8)** a) What is Age Hardening? Explain with example application of age hardening. [6]
b) Write short note on Satellite Alloys? [6]
c) List various properties required for bearing material? [6]

