

B.Tech I Year II Semester (R15) Regular & Supplementary Examinations May/June 2017

MATERIAL SCIENCE & ENGINEERING

(Mechanical Engineering)

Time: 3 hours

Max. Marks: 70

PART – A
(Compulsory Question)

- 1 Answer the following: (10 X 02 = 20 Marks)
- (a) How metallic bonds differ from covalent bonds?
 - (b) Write short notes on planimetric method of grain size measurement.
 - (c) What do you mean by peritectoid reaction?
 - (d) Write short notes on Gibb's phase rule.
 - (e) What are various properties of copper?
 - (f) What are different types of tool steels?
 - (g) What is meant by critical cooling rate?
 - (h) What is the difference between hardness and hardenability?
 - (i) Write short notes on metal matrix composites.
 - (j) How do you classify ceramics?

PART – B
(Answer all five units, 5 X 10 = 50 Marks)

UNIT – I

- 2 Define solid solution. Differentiate between substitutional and interstitial solid solutions with neat diagrams and appropriate examples.

OR

- 3 (a) Explain the crystallization of a pure metal with the help of a neat diagram.
(b) Explain Hume Rothery rules for having complete substitutional solid solution.

UNIT – II

- 4 Draw Fe-Fe₃C diagram and label various phases in it. Explain different reactions that occur in the diagram.

OR

- 5 With the help of an example, explain the eutectic system.

UNIT – III

- 6 (a) Why are cast irons preferred to steel for certain applications?
(b) Explain the difference in microstructure and properties of white and grey cast irons.

OR

- 7 Explain different tool and die steels with their microstructure, properties and applications.

UNIT – IV

- 8 Explain various surface hardening methods where there is no change in chemical composition of the steels.

OR

- 9 What do you mean by annealing? Discuss about various annealing processes.

UNIT – V

- 10 What are various methods of manufacture of composites? Explain any two of them with neat sketches.

OR

- 11 What are glasses? What are different properties of glasses that make them more useful for society? What are their limitations?
