

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)

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- 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-Fe<sub>3</sub>C 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?

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