

**Model Question Paper**

**Fourth Semester B. Tech. Degree Examination  
( 2013 Scheme )**

**13.404 : Metallurgy and Material Science ( MNPU )**

Time: 3 Hours

Max. Marks : 100

Answer **ALL** questions from PART- A and **ONE full question** from **each Module** of PART- B.

**PART – A** (10 X 2 marks each = 20marks)

- 1) What are Engineering Materials? Classify .
- 2) Explain the terms Slip and Twinning.
- 3) What is Etching? What are the different methods of Etching?
- 4) What do you meant by Ductile to Brittle transition? Explain.
- 5) Define and differentiate Fatigue and Creep.
- 6) What is a solid solution? Briefly classify them.
- 7) What are CCT and TTT diagrams? Differentiate.
- 8) What is heat treatment? Explain how annealing differs from normalising.
- 9) What are Stainless steels and how they are different other steels?
- 10) What are smart materials?

**PART– B** (4 X 20 marks each = 80marks)

MODULE - I

- 11) What are crystal defects? Explain in detail with sketches.

**OR**

- 12) What are Strengthening mechanisms? Explain the different types of mechanisms.

MODULE – II

- 13) A) Explain Grtiffith Theory of brittle fracture.

B) Explain Hume Rothery's rule.

C) Explain Gibb's Phase rule.

**OR**

- 14) A) What are invariant Phase reactions? Name the different types of phase reactions.

B) What are Isomorphous Systems? Explain Cu-Ni phase diagram with neat sketch.

**( P.T.O )**

### MODULE - III

15) With an Iron –Carbon equilibrium diagram explain the developments of different microstructures and phases.

**OR**

- 16) A) Define and Differentiate hardness and hardenability.  
B) Differentiate austempering and martempering.  
C) Explain with neat sketch Jominy end quench test.

### MODULE – IV

17) What is alloying? What are the various elements used for steel alloying? Explain the effect of them on steels.

**OR**

- 18) A) What are composites? Classify.  
B) Describe the various methods of fabrication of composites.  
C) What are Nano materials? What are their advantages?

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