II B.Tech - I Semester – Regular Examinations – December 2015

METALLURGY AND MATERIAL SCIENCE
(MECHANICAL ENGINEERING)

Duration: 3 hours   Max. Marks: 70

PART – A

Answer *all* the questions.   All questions carry equal marks

$$11x\ 2 = 22\ M$$

1. a) What are Miller Indices? Give two examples.
   b) What are differences between slip and twinning?
   c) What is coring and how it is eliminated?
   d) What are the differences between steels and cast irons?
   e) What are tool steels? Give two examples
   f) What is a annealing process?
   g) What is the distinction between hypo eutectoid and hyper eutectoid steels?
   h) Describe the process case hardening.
   i) What are the methods grain refinement?
   j) What is Sintering?
   k) What is vacuum bag moulding?

PART – B

Answer any **THREE** questions. All questions carry equal marks.   3 x 16 = 48 M

2. a) Sketch BCC, FCC and HCP unit cells and indicate examples of each and calculate the packing factor of FCC unit cell.   8 M

    b) Explain crystal imperfections with neat sketches.   8 M

3. a) What are the differences between substitutional solid solutions and interstitial solid solutions. And also explain the factors influence the formation of above solid solutions?   12 M

    b) Explain phase rule with reference to water system   4 M

4. a) Explain the composition, microstructure, properties and applications of different types of cast Irons.   10 M

    b) Give compositions and properties and uses of the following alloys: 6 M
      i) Muntz metal   ii) Monel
     iii) Duralumin

5. a) Explain the procedure for construction of TTT diagram and what is the information obtained by this diagram?   10 M

b) Explain strain hardening in detail.   6 M

6. a) Write about the applications of powder metallurgy   8 M

   b) Write short notes on   8 M
        i) Metal matrix composites
        ii) Ceramic matrix composites