Code No: ME1511 **GEC-R14**

II B. Tech I Semester Regular Examinations, November 2015

MATERIAL SCIENCE AND METALLURGY

(Mechanical Engineering)

Time: 3 Hours **Max. Marks: 60**

Note: All Questions from **PART-A** are to be answered at one place.
Answer any **FOUR** questions from **Part-B.** All Questions carry equal Marks.

PART-A

6 × 2 = 12M

1. Define grain and grain boundary.
2. What is meant by a phase? State Gibb's phase rule
3. What is quenching? List some of the quenching medium.
4. What are the possible microstructures of iron and steel
5. What are ALPHA brass and ALPHA/BETA brass?
6. Define Matrix and Whisker

PART –B

4 × 12 = 48M

1. a) Find the atomic packing factor for BCC and FCC structure. (6M)
   b) Distinguish between intermetallic compounds, interstitial compounds and electron compounds. (6M)
2. a) Discuss in detail about critical points and critical lines in Fe – Fe_3C diagram. (4M)
   b) Explain the following (8M)
   (i) Gibb's phase rules (ii) Lever rule (iii) Eutectoid reaction
   (iv) Eutectic reaction
3. a) Explain the effect of alloying elements on Fe-Fe3C system. (6M)
   b) With neat sketches, enumerate the differences between annealing and normalizing. (6M)
4. a) Explain properties and applications of white cast iron and S. G. cast iron (6M)
   b) What is an alloy steel? How are alloy steels classified? Explain them. (6M)
5. a) Explain the importance of Titanium in the modern industrial scenario. (6M)
   b) What are the advantages of Non-ferrous metals/alloys over the Ferrous metals/alloys? (6M)
6. Enumerate the properties and applications of:
   a) Carbon-carbon composites (6M)
   b) Metal matrix composites (6M)

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