Hall Ticket No ☐☐☐☐☐☐☐☐☐☐   Question Paper Code: AME005

INSTITUTE OF AERONAUTICAL ENGINEERING
(Autonomous)
Four Year B.Tech III Semester End Examinations (Regular) - November, 2018
Regulation: IARE – R16
MATEALLURGY AND MATERIAL SCIENCE
Time: 3 Hours   (ME)   **Max Marks: 70**

Answer ONE Question from each Unit
All Questions Carry Equal Marks
All parts of the question must be answered in one place only

UNIT – I

1. (a) Explain the basic concepts of crystal structure.   **[7M]**
   (b) With the help of neat sketch explain the substitutial and intertitial solid solution.   **[7M]**

2. (a) Why are alloys produced? Explain why alloys find more applications than pure metals.   **[7M]**
   (b) Explain the crystallization of Metals.   **[7M]**

UNIT – II

3. (a) What is cooling curve? With the help of appropriate diagram explain the cooling curve for
      i. Pure metal   **[7M]**
      ii. Binary solid solution
      iii. Eutectic alloy system
   (b) Explain the cooling curve of 4.3% Carbon in Fe-Fe_3C system.   **[7M]**

4. (a) What is Gibb's phase rule? Apply Gibb's phase rule for eutectic alloys at solid, intermediate
      solid and liquid phase.   **[7M]**
   (b) With the help of phase diagrams explain the following: **[7M]**
      i. Peritectic reaction
      ii. Eutectoid reaction
      iii. Monotectic reaction

UNIT – III

5. (a) Explain in detail about normalizing heat treatment process with the help of a neat sketch. **[7M]**
   (b) Draw and explain continuous cooling transformation curves.   **[7M]**

6. (a) With neat sketch explain the Iron-carbon equilibrium diagram showing all the salient features.

   [7M]

   (b) Write a short note on: **[7M]**
      i. Hardening
      ii. Tempering.

UNIT – IV

7. (a) Explain in detail about beta phase titanium alloys. **[7M]**

   (b) Explain about soldering alloys? Give typical applications. **[7M]**

8. (a) What are the various copper alloys and explain in detail any four important copper alloys. **[7M]**

   (b) Draw the microstructure of white cast iron and explain. **[7M]**

UNIT – V

9. (a) What is a composite material? Compare the advantages and limitations of fiber reinforced polymer matrix and ceramic composites. **[7M]**

   (b) What are cermets? Explain carbide base and oxide based cermets in detail. **[7M]**

10. (a) Explain the terms: Matrix, Reinforcement and fibers. Write their respective functions. **[7M]**

    (b) Describe the structure, properties and applications of the following polymers: **[7M]**
       i. Polymethylmethacrylate (PMMA)
       ii. Nylons

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