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***B.Tech. Degree IV Semester Examination in Marine Engineering
May 2018***

MRE 1403 METALLURGY AND MATERIAL SCIENCE

(2013 Scheme)

Time : 3 Hours

Maximum Marks : 100

(5 × 20 = 100)

- I. (a) Explain the following : (i) Space lattice and unit cell (ii) Miller indices (10)
(iii) Polymorphism (iv) Point defect and line defect.
- (b) Sketch the following planes and directions in a cubic crystal $(2\ 2\ 2)$, $(1\ 0\ 1)$, $[2\ 3\ 4]$, $[1\ 0\ 0]$. (10)
- OR**
- II. (a) Describe processes of solidification of metals. (10)
(b) What are dislocations? Explain different types. (10)
- III. (a) Explain the method of construction of equilibrium diagrams from cooling curves. (10)
(b) Define atomic packing factor and obtain expressions for SC, FCC and BCC structures. (10)
- OR**
- IV. (a) Draw Fe-C equilibrium diagram and show eutectic, eutectoid, peritectic and peritectoid points. (10)
(b) Describe different types of solid solutions. (10)
- V. (a) Draw TTT diagram explain its use. (10)
(b) Explain Jominy test. (10)
- OR**
- VI. (a) What are the different types of cast irons? Mention properties and use of each. (10)
(b) What are the different types of commercial alloys of copper? Mention composition, properties and use of each. (10)
- VII. (a) Explain hot working and cold working with examples. (10)
(b) Discuss different strengthening mechanisms. (10)
- OR**
- VIII. (a) What is brittle fracture? Explain Griffith's theory. (10)
(b) What is fatigue? Explain S-N curve. (10)
- IX. (a) What is destructive test? Explain any two in detail. (10)
(b) Explain two methods of non destructive tests. (10)
- OR**
- X. (a) Explain the selection criteria for materials for marine engineering. (10)
(b) What are the materials used for propellers and rudders? Explain their compositions. (10)
