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***B.Tech. Degree IV Semester Examination in
Marine Engineering May 2017***

**MRE 1403 METALLURGY AND MATERIAL SCIENCE
(2013 Scheme)**

Time: 3 Hours

Maximum Marks: 100

(5 × 20 = 100)

- I. (a) What is 'Miller indices' of crystal planes?
(b) Differentiate between atomic structure and crystal structure.
(c) Explain atomic packing factor.
OR
- II. (a) Differentiate edge dislocation and screw dislocation.
(b) Briefly describe a twin and a twin boundary.
(c) Write notes on solidification of metals.
- III. (a) Explain Gibb's Phase Rule.
(b) Explain factors that influence diffusion.
OR
- IV. (a) Draw and explain phase equilibrium diagram of Cu – Ni.
(b) Explain eutectic, peritectic and eutectoid reactions.
- V. (a) Explain Jominy End Quench test.
(b) Briefly explain:
(i) Metal cladding.
(ii) Carburizing.
OR
- VI. (a) What is annealing?
(b) Explain TTT diagram.
- VII. (a) Differentiate between hot working and cold working processes.
(b) Write notes on deformation of metals.
OR
- VIII. (a) What is creep?
(b) Explain:
(i) Griffith crack theory.
(ii) S-N curve.
- IX. Explain non destructive tests. (Any two in detail).
OR
- X. Explain applications of chromium and ceramics in shipboard.