B.Tech. Degree IV Semester Examination in Marine Engineering May 2019

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

Time: 3 Hours

Maximum Marks: 100

(5 × 20 = 100)

I. (a) Define atomic packing factor. Determine the atomic packing factor for BCC, FCC and HCP structures.

    (b) Write brief note on Miller indices for planes and directions.

OR

II. (a) Explain point defect and line defect.

    (b) Explain twist and twin boundaries.

    (c) Explain solidification process of metals in detail.

III. (a) Explain cutectic, peritectic and peritectiod reactions.

    (b) Describe the factors which affect the formation of Solid Solutions between two metals. Show how these factors operate in the case of the metals Copper and Nickel and how the resulting properties of the alloys suit them for a particular application.

OR

IV. (a) Draw and explain all the regions of Fe-C diagram.

    (b) Explain Gibbs phase rule.

V. (a) Explain TTT diagram in detail.

    (b) Discuss the various alloys of Aluminium.

OR

VI. (a) Write short notes on:
        (i) Nitriding
        (ii) Carburizing
        (iii)Cyaniding

    (b) Explain the different types of cast iron.

VII. (a) Explain with sketch the mechanism of slip and twinning.

    (b) Explain work hardening and grain boundary hardening.

OR

VIII. (a) Explain the mechanism of creep.

    (b) Write short note on fatigue failure and S-N curves.

IX. Discuss destructive and non destructive tests with a suitable example.

OR

X. Explain the characteristics and applications of the following materials in shipboard
        (i) Polytetra flouroethylene
        (ii) Titanium

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