BT MRE – IV – 08 – 036

B. Tech Degree IV Semester Examination in Marine Engineering, November 2008

MRE 403 METALLURGY AND MATERIAL SCIENCE

Time : 3 Hours Maximum Marks : 100

I. (a) Explain the following :
(i) Space lattice and Unit cell
(ii) Polymorphism
(iii) Heterogeneous nucleation
(iv) Planar defects. (8)

(b) Define Burger's vector. Sketch the following planes and directions in a cubic crystal (2 2 1), (1 0 1), [2 3 4], [1 0 0]. (12)

OR

II. (a) What are dislocations? Explain different types of dislocations bringing out their effects on properties of materials. (10)

(b) Define atomic packing factor and obtain an expression for SC, FCC and BCC structures. (10)

III. (a) Explain the method of construction of equilibrium diagrams from cooling curves. Discuss peritectic reaction with an example. (10)

(b) Draw and explain the equillibrium diagram for Cu – Ni. (10)

OR

IV. (a) What is Gibb's phase rule? (8)

(b) Draw and explain Fe – C equillibrium diagram. (12)

V. (a) Explain :
(i) Annealing (ii) Normalizing
(iii) Tempering (iv) Austempering. (10)

(b) What is hardenability of steel? Discuss one technique to find out the same. (10)

OR

VI. (a) What are the differences between surface hardening by diffusion methods and thermal methods? Give details of any one method in each type. (10)

(b) Discuss the composition, properties and kuse of commercial Aluminium alloys. (10)

VII. (a) Differentiate between elastic, anelastic and visco elastic behaviour of materials. (10)

(b) Explain the Griffith's theory of brittle fracture. (10)

OR

VIII. (a) Explain the mechanism of twinning and slip. (10)

(b) Explain hot working and cold working with examples. (10)

IX. (a) Discuss hardness, testing and ultrasonic testing of materials. (10)

(b) Explain the characteristics of Titanium and discuss its use in ship building applications. (10)

OR

X. (a) Write a short note about magnetic dust test. (8)

(b) Discuss the composition, strength and other are requirements for materials used in the following cases :
(i) Boilers
(ii) Pumping machinery
(iii) Propellers. (12)

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