

8. Write short notes on :

5 × 4 = 20

- (i) Hydration mechanism.
 - (ii) Properties of ceramics.
 - (iii) Effect of alloying elements on steel.
 - (iv) Crystal planes and directions.
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Roll No.

23397

**M. Tech. 1st Sem. Civil Engg.
(Specialization in Structural Design)**

Examination – January, 2016

MATERIAL SCIENCE

Paper : MTSD-110

Time : Three Hours]

[Maximum Marks : 100

Before answering the questions, candidates should ensure that they have been supplied the correct and complete question paper. No complaint in this regard, will be entertained after examination.

Note : Attempt any five questions. All questions carry equal marks. Assume any missing data, if required.

1. Differentiate between :

10 + 5 + 5 = 20

- (a) Steady-state and Non-steady state diffusion.
- (b) Phase and a micro constituent.
- (c) Atomic structure and crystal structure.

2. (a) Calculate the theoretical density of diamond given that C-C distance and bond angle are 0.154 nm and 109.5° resp. Compare it with measured density. 10
- (b) Calculate the composition in atom percent of an alloy that consists of 97 wt % aluminium and 3 wt % copper. 10
3. (a) Briefly describe diffusion mechanism of solid and its application. 10
- (b) Briefly describe Hume Rothery's rule for alloys system. 10
4. (a) Write a short note on properties of silicate glass. Draw its structure also. 10
- (b) Derive expression for the relative amount of phases present at equilibrium using lever rule. 10

5. What do you mean by reinforced glass ? A continuous and aligned glass fibre reinforced composite consist of 41 Vol% of glass fibre having a modulus of elasticity of 65 GPa and 60 Vol % of polyester resin displays a modulus of 3.0 GPa. Calculate the modulus of Elasticity of this composite in longitudinal direction. If the cross sectional area is 250 mm^2 and stress applied in 52 MPa in longitudinal direction. Calculate load caused by each of the fibre and matrix phase. 20
6. (a) Describe the conditions under which collusion occurs. What are the measures that may be taken to prevent or control collusion ? 10
- (b) Briefly describe the phenomena of super heating and super cooling. 10
7. (a) What do you mean by composite materials ? Explain its types also. 10
- (b) Write a short note on applications of composite materials. 10