

C.U.SHAH UNIVERSITY

Winter Examination-2015

Subject Name : Advanced Material Technology

Subject Code : 5TE01AMT1

Branch : M.Tech (CAD/CAM)

Semester : 1

Date :31/12/2015

Time :10:30 To 1:30

Marks : 70

Instructions:

- (1) Questions 1 and 4 are compulsory.
 - (2) Instructions written on main answer book are strictly to be obeyed.
 - (3) Draw neat diagrams and figures (if necessary) at right places.
 - (4) Assume suitable data if needed.
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SECTION – I

Q-1 Attempt the Following questions. (7)

Give electron configuration of the following : (a, b)

- a. Copper (Cu)
- b. Zinc (Zn)
- c. Draw only elastic stress-strain diagrams for linear and nonlinear pattern.
- d. What is role of smart material in advanced engineering?
- e. Define the term “Single crystal”.
- f. Define the term “Heat capacity”.
- g. Show only with neat sketch the [100], [110] and [111] directions within cubic unit cell.

Q-2 Attempt all questions

(a) Prove the equation $\tau_r = \frac{\sigma_x}{2} \sin 2\phi \cos \theta$ (7)

(b) Define the term “thermal conductivity” and derive the equation for the Wrideman-Franz ratio. (7)

OR

Q-2 Attempt all questions

(a) Derive the Einstein’s Quantized Oscillator Model and show that when $T \rightarrow 0$ then $C_v \rightarrow 0$. (7)

(b) Discuss the atomic bonding in solids in context of (i) bonding forces and (ii) energy. (7)

Q-3 Attempt all questions

(a) Discuss with neat sketch the Anelastic deformation. (7)

(b) Write a short note on thermal expansion with neat sketches. (7)



OR

Q-3 Attempt all questions

- (a) Compare soft and hard magnetic materials. (7)
(b) Discuss the effect of any 3 factors affecting the selection of materials. (7)

SECTION – II

Q-4 Attempt the Following questions

(07)

- a. Define the term “Stiffness”.
b. Name only the fatigue loading conditions.
c. Define the term Creep.
d. What is the full name of ASTM?
e. Give the anodic and Cathodic reaction of corrosion.
f. What is fracture toughness?
g. Give the full name of LASER.

Q-5 Attempt all questions

- (a) Enlist the types of fractures in metals and describe with neat sketches ductile fracture. (7)
(b) Enlist some advanced Ceramic materials and explain how they are processed. (7)

OR

- Q-5** (a) Draw common form of ASTM standard tension test specimen and explain the tension test. (7)
(b) Composite materials are known as Tailor made materials. Evaluate the statement. (7)

Q-6 Attempt all questions

- (a) Explain with neat sketch the yielding in single crystals and derive an equation for critical resolved shear stress. (7)
(b) Discuss in detail radiation damage and recovery. (7)

OR

Q-6 Attempt all Questions

- (a) What is delayed fracture? Explain in detail cyclic fatigue in metal. (7)
(b) Explain the effect of high and low temperatures on performance of materials. (7)

