

Enrollment No: \_\_\_\_\_ Exam Seat No: \_\_\_\_\_

# C.U.SHAH UNIVERSITY

## Winter Examination-2015

Subject Name : Material Technology

Subject Code : 4TE03MTE1

Branch :B.Tech(Mechanical,Automobile)

Semester : 3      Date :12/12/2015      Time :2:30 To 5:30      Marks :70

Instructions:

- (1) Use of Programmable calculator & any other electronic instrument is prohibited.
  - (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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**Q-1**

**Attempt the following questions:**

**(14)**

- 1) Which one of following is not technological property of metals and alloys?  
(a) Machinability                      (b) Castability  
(c) Weldability                        (d) Appearance
- 2) The capacity of a material to withstand deformation under compression without rupture is known as  
(a) Ductility                              (b) Impact strength  
(c) Malleability                         (d) Toughness
- 3) Tunnel segment, Machine tool structures, Ingot moulds, Piston rings etc are made from which metal?  
(a) Grey Cast Iron                      (b) White Cast Iron  
(c) Meehanite Metal                    (d) Wrought Iron
- 4) Alloy steels have the major elements in % are as below:  
(a) Mn 1.65 %, Si 0.60 %, Cu 0.60 %  
(b) C 0.35 %, Ni 1.25 %, Cr 0.60 %  
(c) C 0.55 %, Si 1.8 %, Mn 1 %  
(d) C 0.3 %, Ni 4 %, Cr 1.5 %
- 5) Which one of the following is not of Monel?  
(a) K Monel                                (b) R Monel  
(c) Constantan                          (d) S Monel
- 6) Pistons and cylinder heads are made from which of the following cast Aluminium alloy as per IS:617-1959?  
(a) A -1 - M                                (b) A - 5 - M  
(c) A - 14 - WP                          (d) A - 8 - M
- 7) Show the correct composition for Dow metal  
(a) 80 % Mg, 20 % Al, Mn 1 %  
(b) 90 % Mg, 10 % Al, Mn 0.15 % min  
(c) 70 % Mg, 0.5 % Al, Mn 0.3 % min



- (d) 30 % Mg, 20 % Al, Mn 2 %
- 8) Cobalt, Magnesium and Zinc are the example of which type of crystal structure?  
 (a) FCC (b) BCC  
 (c) BCT (d) HCP
- 9) NaCl, MgO CaF<sub>2</sub> are good examples of which of the following bond?  
 (a) Ionic (b) Covalent  
 (c) Metallic (d) Van der waals
- 10) Dislocations arise in crystals as a result of  
 (a) Phase transformations (b) Thermal stresses  
 (c) Plastic flow stresses (d) All of these
- 11) Select the correct equation of Gibb phase rule  
 (a)  $P + F = C + 1$  (b)  $P + F = C + 2$   
 (c)  $P + C = F + 1$  (d)  $P + F = C - 1$
- 12) Eutectic Mixture of austenite and cementite is known as  
 (a) Pearlite (b) Ferrite  
 (c) Ledeburite (d) Bainite
- 13) Suggest typical case hardening process for the components like Aircraft engine parts, ball races, Bushings etc.  
 (a) Nitriding (b) Cyaniding  
 (c) Carbonitriding (d) Carburizing
- 14) Atomic packing factor for a BCC structure is  
 (a) 0.68 (b) 0.74  
 (c) 0.64 (d) 0.72

**Attempt any 4 questions from Q-2 to Q-8**

**Q-2**

**Attempt all questions**

- (a) Discuss the solidification of binary system when two components are completely soluble in liquid state and completely insoluble in solid state by taking suitable example. (7)
- (b) Compare the Annealing and Normalizing processes based on (1) Heating Temp. (7)  
 (2) Soaking time for components (3) Rate of cooling and manner of cooling (4)  
 Structural changes involved (5) Machining finish (6) Mechanical properties and  
 (7) Application.

**Q-3**

**Attempt all questions**

- (a) Draw a neat and labeled Iron Carbon equilibrium diagram and explain the solidification of steels containing 0.4 % carbon. (7)
- (b) Discuss the tempering process. (7)

**Q-4**

**Attempt all questions**

- (a) Draw and explain the effect of cooling rate on the formation of different products using TTT diagram. (7)
- (b) Write a short note on Muntz metal. (5)
- (c) Enlist the various types of Cast Iron. (2)



- Q-5**                    **Attempt all questions**
- (a) Write a note on Induction hardening. (7)
  - (b) Write a short note on Phosphor Bronze. (5)
  - (c) Give the composition of Silicon bronze. (2)
- Q-6**                    **Attempt all questions**
- (a) Define the term surface defects. Explain with neat sketch the Tilt Boundaries. (5)
  - (b) Write a short note on Nodular Cast Iron showing its microstructure. (5)
  - (c) What do you mean by Technological properties of metals and alloy? Discuss the term Machinability. (4)
- Q-7**                    **Attempt all questions**
- (a) List the factors governing substitutional solubility in alloy systems and discuss any two. (5)
  - (b) Show the effect of (i) Silicon (ii) Cobalt as alloying elements on steels. (5)
  - (c) Discuss with neat sketch the Vacancies. (4)
- Q-8**                    **Attempt all questions**
- (a) Discuss with neat sketches the Gamma ray Radiography. (7)
  - (b) Write a note on compacting process in powder metallurgy process. (7)

