

Enrollment No: _____

Exam Seat No: _____

C. U. SHAH UNIVERSITY

Winter Examination-2020

Subject Name: Material Technology

Subject Code: 4TE03MTE1

Branch: B.Tech (Mechanical)

Semester: 3

Date: 16/03/2021

Time: 11:00 To 02:00

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)**

- (a) Allotropes differ in which of the following properties:
a) Atomic Number b) Atomic Mass c) Crystal Structure d) Electro negativity
- (b) Co-ordination number of a crystalline solid is:
a) Number of particles in the unit cell
b) Number of nearest neighbors of a particle
c) Number of octahedral voids in a unit cell
d) Number of tetrahedral voids in a unit cell
- (c) Which of the following cannot be obtained using a phase diagram?
a) Melting temperatures of various phases
b) Temperature range for solidification
c) Equilibrium solid solubility
d) Purity of materials
- (d) The point at which two liquids lines meet is known as _____
a) Eutectic point b) Isothermal point c) Solvus point d) Peritectic point
- (e) The defect that occurs due to a displacement of an ion is known as _____
a) Vacancy defect b) Schottky defect c) Frankel defect d) Interstitial defect
- (f) In which of the following defect the density of the crystal is affected?
a) Schottky defect b) Frenkel defect c) Stone-Wales defect d) Antisite defect
- (g) Alloy of Ni and Fe is termed as _____
a) Brass b) Bronze c) Duralumin d) Invar
- (h) Major constituent of the Nichrome is _____
a) Copper b) Nickel c) Iron d) Zinc
- (i) Which of the following is defined as the ability of the structure to transform into martensite?
a) Hardenability b) Strength c) Toughness d) Hardness
- (j) Iron possesses FCC crystal structure above (in degree centigrade)?
a) 1539 b) 768 c) 910 d) 1410
- (k) Which of the following terms changes in the eddy current testing method for the detection of defects in the castings?



- a) Resistance b) Impedance c) Conductivity d) Capacitance
- (l) Which of the following statements is/are true for the ultrasonic test?
 a) Equipment used for ultrasonic testing is portable
 b) Complicated shapes can be easily scanned
 c) Waves generated are health hazardous
 d) Waves generated are health hazardous and complicated shapes can be easily scanned
- (m) Complex shape can be formed effectively using?
 a) Powder metallurgy b) Turning c) Sand casting d) Metal casting
- (n) Formation of metal powder to use in powder metallurgy by reducing some compound with CO or other molecules is known as?
 a) Atomization b) Reduction c) Crushing d) Electrolysis

Attempt any four questions from Q-2 to Q-8

Q-2 Attempt all questions

- (a) What is solid solution? Classify and explain Hume Rothery's Rules. (07)
 (b) Define APF and determine APF for BCC and FCC crystal structure. (07)

Q-3 Attempt all questions

- (a) Explain point defects in metal crystals with neat sketches. (07)
 (b) Draw and explain Iron- Carbon equilibrium diagram. (07)

Q-4 Attempt all questions

- (a) Classify copper alloys and discuss them in brief. (07)
 (b) Write a short note on dislocation theories. (07)

Q-5 Attempt all questions

- (a) What is the theory of tempering? Discuss the stages of tempering process. (07)
 (b) Explain gray cast iron with characteristics and applications. (07)

Q-6 Attempt all questions

- (a) What is non-destructive test? List various non-destructive tests. Explain X-Ray Radiography. (07)
 (b) Which are various surface hardening processes? Explain induction hardening process with sketch. (07)

Q-7 Attempt all questions

- (a) What is powder metallurgy? Describe various steps involved in powder metallurgy. (07)
 (b) Explain in detail, the ultrasonic testing method with its benefits and limitations. (07)

Q-8 Attempt all questions

- (a) Define the following properties: (07)
 Ductility, Malleability, Toughness, Creep, Fatigue, Resilience, Hardness.
 (b) Explain any two methods for production of metal powders. (07)

