

Seat No.: _____

Enrolment No. _____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER-III (NEW) EXAMINATION – WINTER 2021

Subject Code:3131904

Date:19-02-2022

Subject Name:Material Science and Metallurgy

Time:10:30 AM TO 01:00 PM

Total Marks:70

Instructions:

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.
4. Simple and non-programmable scientific calculators are allowed.

- Q 1** (a) Differentiate between macro and micro examinations. **03**
(b) Define: (1) Toughness (2) Hardness (3) Hardenability (4) Malleability **04**
(c) Discuss selection criteria for materials used in engineering applications. **07**
- Q 2** (a) Explain a atomic packing factor. **03**
(b) Calculate the APF for BCC and FCC structures. **04**
(c) Discuss mechanisms of quenching of steel. State the advantages and drawbacks of water & oil as quenching media. **07**
- OR**
- (c) Explain the different methods for Grain size measurement.
- Q 3** (a) What is phase diagram? **03**
(b) Explain Lever rule. **04**
(c) What is Gibb's phase rule? Define system, phase and degree of freedom. Show that the degree of freedom at eutectic point in a binary phase diagram is zero. **07**
- OR**
- Q 3** (a) What is significance of soaking time provided in annealing or hardening? **03**
(b) What is a eutectic, eutectoid and peritectic reaction. **04**
(c) Draw iron- carbon diagram and mention all major elements. **07**
- Q 4** (a) Write in brief: Hastelloy material. **03**
(b) Give a few applications of copper alloys. **04**
(c) Describe effect of quenching media on properties of steel during heat treatment. **07**
- OR**
- Q 4** (a) What is the main objectives of NDT method? **03**
(b) Explain briefly the two methods of finding carbon percentage in steels. **04**
(c) Explain the effect of Grain size on the properties of metals. **07**
- Q 5** (a) Explain cathodic protection against corrosion. **03**
(b) Explain any one methods for production of metal powders. **04**
(c) What is powder metallurgy? State the applications of powder metallurgy. **07**
- OR**
- Q 5** (a) Draw Jominy hardenability set-up including labeling & important dimensions. **03**
(b) Explain difference between dry type and Wet type corrosion. **04**
(c) Explain the NDT method widely used for inspection of castings. **07**
