

GUJARAT TECHNOLOGICAL UNIVERSITY**BE - SEMESTER– III (New) EXAMINATION – WINTER 2019****Subject Code: 2132104****Date: 3/12/2019****Subject Name: Testing of Metals and Alloys****Time: 02:30 PM TO 05:00 PM****Total Marks: 70****Instructions:**

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.

MARKS

- Q.1**
- (a) Explain the objective of testing of materials. **03**
 - (b) Derive the relation between true strain and engineering strain. **04**
 - (c) Explain engineering stress-strain curve of a ductile material and define the following: **07**
 - 1) Modulus of elasticity,
 - 2) Yield strength,
 - 3) Ultimate tensile strength,
 - 4) Toughness and
 - 5) Resilience.
- Q.2**
- (a) What information do you get from Charpy test? **03**
 - (b) In the tension test of a metal, fracture occurs at maximum load. The conditions at fracture were: $A_f = 100 \text{ mm}^2$ and $L_f = 60 \text{ mm}$. The initial values were: $A_o = 150 \text{ mm}^2$ and $L_o = 40 \text{ mm}$. Determine the true strain to fracture using change in both length and area. Comment on the results obtained. **04**
 - (c) What is calibration of instruments? Discuss the importance of calibration of testing instruments **07**
- OR**
- (c) Classify methods for testing of material. Describe the criteria for selection of a particular testing method. **07**
- Q.3**
- (a) Write a note on microhardness test. **03**
 - (b) List Rockwell Hardness Test advantages & limitations. **04**
 - (c) Explain why Vickers hardness is independent of load while Brinell hardness is not. **07**
- OR**
- Q.3**
- (a) Define and explain Creep-Rupture strength. **03**
 - (b) Schematically draw creep curves for, **04**
 - 1) Constant load test and
 - 2) Constant stress state.
 - (c) 'Testing of material is an important task for industry' – justify comment. **07**
- Q.4**
- (a) Write a note on yield point phenomena. **03**
 - (b) Give mechanism of cup and cone type fracture. **04**
 - (c) Derive the condition for necking during tensile testing (uniaxial). **07**
- OR**
- Q.4**
- (a) Discuss the effect of temperature on flow properties. **03**
 - (b) Discuss different methods to improve fatigue life of a material. **04**
 - (c) Draw S-N curve and identify the following: **07**
 - 1) LCF region,
 - 2) HCF region and
 - 3) Fatigue limit.

- Q.5 (a) Describe the Bauschinger effect. www.FirstRanker.com 03
(b) Write the formula for Brinell and Knoop hardness along with symbol description. www.FirstRanker.com 04
(c) Explain Izod impact test. Mention factors affecting Test. 07
- OR**
- Q.5 (a) Differentiate between ductile and brittle fracture. 03
(b) Explain mechanism of brittle fracture propagation. 04
(c) What is ductile to brittle transition behavior and its significance? 07
Draw suitable diagram.

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