

Seat No.: \_\_\_\_\_

Enrolment No. \_\_\_\_\_

**GUJARAT TECHNOLOGICAL UNIVERSITY**  
**BE - SEMESTER-1<sup>st</sup> / 2<sup>nd</sup> (SPFU) EXAMINATION- WINTER 2015**

**Subject Code: ENG007**

**Date:05/01/2016**

**Subject Name: Material Science**

**Time: 10:30am to 01:00pm**

**Total Marks: 70**

**Instructions:**

PART-1 Objective Section:

Question No. 1 to 25 carry 1 mark & 26 to 30 carry 2 marks.

- Q.1 How many lattice structures exists?  
A. 2 B. 14  
C. 7 D. 5
- Q.2 How many Bravais lattice structures exists?  
A 2 B. 14  
C 7 C 5
- Q.3 The  $c/a$  ratio in HCP structure is  
A. 1.568 B.1.633  
C. 1.856 D. 2
- Q.4 If a material is subjected to two incremental true strains namely  $\epsilon_1$  and  $\epsilon_2$ , then the total  
A.  $\epsilon_1 * \epsilon_2$  B.  $\epsilon_1 - \epsilon_2$   
C.  $\epsilon_1 + \epsilon_2$  D.  $\epsilon_1 / \epsilon_2$
- Q.5 In screw dislocation, the dislocation line is  
A. Parallel to Burger's vector B. Perpendicular to Burger's vector  
C. At an angle of thirty degree to the Burger's vector D. None of these
- Q.6 Atomic packing factor for FCC Crystal structure is  
A.0.68 B.0.74  
C.0.89 D 0.16
- Q.7 Engineering stress-strain curve and True stress-strain curve are equal up to  
A. Proportional limit B. Elastic limit  
C. Yield point D. Tensile strength point
- Q.8 Frankel and Schottky imperfections are  
A. High strength of bonds B. Weak bonds  
C. combination of bonds D. None
- Q.9 In Bauschinger effect  
A. Hysteresis loss during loading and unloading B. An elastic deformation  
C. Dependence of yield stress on path and direction D. None

- Q.10 Plastic deformation results from the following  
 A. Slip  
 C. Twinning  
 B. Slip and Twinning  
 D. None
- Q.11 the property that can not be obtained from tensile test is  
 A. Young Modules  
 C. Ultimate Tensile Strength  
 B. Yield Strength  
 D. Endurance
- Q.12 Allotropic forms of metals have the same  
 A. Physical properties  
 C. Both A and B  
 B. Crystal structure  
 D. Neither A nor B
- Q.13 An example of Mesomorphous material is  
 A. Lead  
 C. Mica  
 B. Cast Iron  
 D. None
- Q.14 Frankel and Schottky imperfections are  
 A. Dislocations in ionic crystals  
 C. Vacancies in ionic crystals  
 B. Vacancies in covalent crystals  
 D. None
- Q.15 Rule-of-mixture provides \_\_\_\_\_ bounds for mechanical properties of particulate composites  
 A. Lower  
 C. Both  
 B. Upper  
 D. None
- Q.16 Which of the following is the lightest of engineering metals?  
 A. Magnesium  
 C. Titanium  
 B. Aluminium  
 D. Tin
- Q.17 These polymers cannot be recycled  
 A. Thermoplasts  
 C. Elastomers  
 B. Thermosets  
 D. All polymers
- Q.18 Bronze is an alloy of  
 A. Ni-Sn  
 C. Pb-Sn  
 B. Cu-Zn  
 D. Cu-Sn
- Q.19 Combination of metals and ceramics are called  
 A. Metalloids  
 C. Metalloid  
 B. Cermets  
 D. Non-Crystalline Ceramics
- Q.20 Following equation is related to corrosion rate  
 A. Nernst equation  
 C. Either  
 B. Faraday's equation  
 D. Niether
- Q.21 Major ingredients of traditional ceramics  
 A. Silica  
 C. Feldspar  
 B. Clay  
 D All
- Q.22 Fullerenes consists of  
 A 20 Carbon atoms  
 C. 60 Carbon atoms  
 B. 40 Carbon atoms  
 D. None of these
- Q.23 Which of the following can be used for cathodic protection:  
 A. Al  
 C. Cu  
 B. Cd  
 D. Either

- Q.24 Substitution solid solution forms, when the  
 A. Solute atoms are very small compared to solvent atoms  
 B. Solute and solvent atoms possess almost equal diameters  
 C. Solvent atoms are very small compared to solute atoms  
 D. None of these
- Q.25 Elastic deformation in polymers is due to  
 A. Slight adjust of molecular chains  
 B. Slippage of molecular chains  
 C. Straightening of molecular chains  
 D. Severe of Covalent bonds
- Q.26 Above the Curie temperature, a magnetic material becomes  
 A. Ferromagnetic  
 B. Paramagnetic  
 C. Diamagnetic  
 D. None of these
- Q.27 11. Sky looks blue because the sun light is subjected to \_\_\_\_\_.  
 A. Rayleigh scattering  
 B. Compton scattering  
 C. Both  
 D. None
- Q.28 14. Electro-luminescence occurs in \_\_\_\_\_.  
 A. Electrical conductors  
 B. Electrical insulators  
 C. p-n junctions  
 D. all
- Q.29 Permanent magnets are made of  
 A. High-energy hard magnetic materials  
 B. Permalloy  
 C. commercial Iron  
 D. None of these
- Q.30 When Pt and Co are electrically connected, which one gets corroded  
 A. Pt  
 B. Co  
 C. None  
 D. Can't decide

**Instructions:** (1) Attempt any **Five** questions.  
 (2) Each question carries **Seven** marks.  
 (3) Assume suitable data, if necessary.

- Q.1 Compare Only Physical, Mechanical, Electrical, Thermal & Chemical Properties of Metallic, Polymeric, Ceramic & Composite Materials. 07
- Q.2 Differentiate Between Engineering Stress Strain Curve & True Stress Strain Curve. Which curve is normally referred & Why? 07
- Q.3 Define and explain following terms 07  
 1. Bravais Lattice 2. Space lattice 3. Unit cell 4. Burger vector 5. Miller Indices 6. Crystal Imperfection. 7. Atomic Packing factor
- Q.4 Distinguish between 07  
 1. Slip and Cross slip  
 2. Edge Dislocation & Screw Dislocation
- Q.5 What is composite? Explain comparison between metal matrix and ceramic matrix composite 07
- Q.6 Write classification of refractory and discuss the general requirements of a Refractory material with examples 07
- Q.7 Discuss about Any Two of the following in Brief. (1) Superconducting materials (2) Polymerization Mechanism (3) Glass transition Process. 07