

**AMIETE – ET (Current & New Scheme )**

Time: 3 Hours

**DECEMBER 2018**

Max. Marks: 100

**PLEASE WRITE YOUR ROLL NO. AT THE SPACE PROVIDED ON EACH PAGE IMMEDIATELY AFTER RECEIVING THE QUESTION PAPER.**

**NOTE: There are 9 Questions in all.**

- **Question 1 is compulsory and carries 20 marks. Answer to Q.1 must be written in the space provided for it in the answer book supplied and nowhere else.**
- **The answer sheet for the Q.1 will be collected by the invigilator after 45 minutes of the commencement of the examination.**
- **Out of the remaining EIGHT Questions answer any FIVE Questions. Each question carries 16 marks.**
- **Any required data not explicitly given, may be suitably assumed and stated.**

**Q.1 Choose the correct or the best alternative in the following: (2×10)**

- The minimum number of ions in the unit cell of an ionic crystal with FCC space lattice is  
 (A) 4 (B) 8  
 (C) 12 (D) 16
- Miller indices for Octahedral plane in cubic crystal is  
 (A) (100) (B) (110)  
 (C) (111) (D) None of these
- The imperfection in the crystal structure of metal is called  
 (A) dislocation (B) cleavage  
 (C) fractured (D) slip
- Burger's vector changes with  
 (A) Kind of dislocation  
 (B) Length of dislocation  
 (C) Both kind and length of dislocation  
 (D) None of these
- The following mechanism contributes very little to the diffusivity  
 (A) Vacancy (B) Interstitial  
 (C) Substitutional (D) Self-interstitial
- The majority charge carriers in p type Ge are  
 (A) free electrons (B) ions  
 (C) holes (D) conduction electrons
- Diamagnetic materials  
 (A) Are non-magnetic  
 (B) Cannot be magnetized  
 (C) Can be magnetized in one direction only  
 (D) Are magnetized in direction opposite to that of applied field
- Which material has the resistivity ranging from 1 to 100 ohm cm  
 (A) Insulators (B) semiconductors  
 (C) conductors (D) superconductors

- i. Which of the following constituents of steel is softest and least strong  
 (A) Austenite (B) Pearlite  
 (C) Ferrite (D) Cementite
- j. Ductility is measured in terms of  
 (A) Ultimate tensile strength (B) Percentage elongation  
 (C) Modulus of toughness (D) Modulus of resilience

**Answer any FIVE Questions out of EIGHT Questions.  
 Each question carries 16 marks.**

- Q.2** a. Draw the unit cell diagram and classify seven crystal systems in terms of a, b, c and  $\alpha, \beta, \gamma$ . Mention one material which possesses cubic crystal structure. (8)
- b. Explain ionic and covalent types of bonding with the help of suitable examples. (4)
- c. State and explain Bragg's law. (4)
- Q.3** a. What is Gibb's phase rule? Define a phase, a component and degree of freedom. (8)
- b. Differentiate between Edge and screw dislocations. (4)
- c. Differentiate between Polymorphism and isomerism. (4)
- Q.4** a. State and explain Fick's first and second law of diffusion. (8)
- b. Discuss various elements, alloys and heterogeneous mixtures which can be used as electrical contact material. (8)
- Q.5** a. What are the different types of polarization mechanism that can occur in a dielectric material? (8)
- b. Explain ferroelectricity and piezoelectricity. Give one example of the material which shows these effect. (8)
- Q.6** a. What is Curie temperature of a ferromagnetic specimen? Write the Curie-Weiss formula for ferromagnetic property of a material. (8)
- b. Write the properties of Silicon Iron alloys and Nickel Iron alloys along with examples of each. (8)
- Q.7** a. What do you mean by energy band diagram? Classify different types of materials on the basis of energy band diagram. (4+4)
- b. With respect to semiconducting materials explain with suitable diagrams the atomic model of diffusion. How does drift current differ from diffusion current? What is Einstein's relationship? (3+2+3)
- Q.8** a. What are the various breakdown phenomena that can occur in a PN junction? (8)
- b. What are Relays? Briefly discuss Dry Reed Relay and Ferreed Relay. (2+3+3)
- Q.9** a. Explain grown junction and alloyed junction process during the formation of a p-n junction. (4+4)
- b. Explain general properties of field effect devices. What are the distinguishing properties of Unipolar from Bipolars? Explain in brief. (3+5)