

**DiplETE – ET**

Time: 3 Hours

**JUNE 2014**

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)**

- a. Which of the following factor does not affect the resistivity of material?
- (A) Temperature (B) Age Hardening  
(C) Alloying (D) Size
- b. In ACSR conductors, the metal used for conductor is
- (A) Copper (B) Iron/Steel  
(C) Aluminium (D) Silver
- c. Polarisation (Ionic)
- (A) Decreases with temperature  
(B) Increases with temperature  
(C) It may increase or decrease with temperature  
(D) Is independent of temperature
- d. To make N-type semiconductor, the most common doping element is Si are
- (A) P (B) Sb  
(C) B (D) Bi
- e. The temperature of the anti-ferromagnetic to Paramagnetic transition is called
- (A) Anti ferromagnetic curie temp. (B) Curie-Weiss temp.  
(C) Neel temp. (D) Debye temp.
- f. Zone refining is used for purification
- (A) conductors (B) insulators  
(C) alloys (D) semiconductors

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- g. The grown single crystal generally contains
- (A) tilt boundaries
  - (B) dislocation loops due to vacancy condensation
  - (C) twin boundaries
  - (D) grain boundaries
- h. The Hall voltage across an impurity semiconductor crystal can be increased by
- (A) Increasing the concentration of impurity atoms in the crystal.
  - (B) Increasing the thickness of crystal
  - (C) Increasing the width of crystal
  - (D) None of these
- i. MOSFET can operate in
- (A) Depletion mode only
  - (B) Enhancement mode only
  - (C) Both (A) & (B)
  - (D) None of these
- j. Which of the following is used in protection of electric motors?
- (A) Capacitors
  - (B) Varistors
  - (C) PTC switching thermistors
  - (D) Sensistors

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

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- Q.2** a. What is the effect of temperature on electrical conductivity of metals? Explain in brief. (6)
- b. Explain the following: (10)
- (i) Thomson effect
  - (ii) Properties and application of copper
- Q.3** Explain the following: (16)
- (i) Dipolar Polarisation
  - (ii) Polarisability catastrophe
- Q.4** a. Discuss the following: (10)
- (i) Frequency dependence of permittivity
  - (ii) Frequency dependence of ionic polarisability
- b. Explain breakdown in solid dielectrics. (6)
- Q.5** a. What is the origin of permanent magnetic dipoles? Discuss diamagnetism and Paramagnetism. (8)

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- b. Discuss various factors which affects the permeability and hysteresis loss. (8)
- Q.6** a. Explain Einstein's relation between diffusion constant and mobility. (8)
- b. Discuss Hall effect. Derive relation for Hall voltage and Hall coefficient. (8)
- Q.7** What are the different types of junction diodes? Explain characteristics, properties and applications of any two. (16)
- Q.8** a. Write applications of the following: (8)
- (i) Ferreed relay
  - (ii) Mica dielectric capacitors
  - (iii) Ferrite core inductors
  - (iv) Carbon composition resistors
- b. Explain the working of the following: (8)
- (i) Variable resistors
  - (ii) Ceramic dielectric capacitors
- Q.9** a. Compare general properties of BJT and JFET. (8)
- b. What is Epitaxial diffused junction diode? Explain in brief. (8)