

## DipIETE – ET (OLD SCHEME)

---

Code: DE04  
Time: 3 Hours

Subject: ENGINEERING MATERIALS  
Max. Marks: 100

**JUNE 2011**

**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. Hard magnetic materials are used for making
- (A) Permanent magnets                      (B) Conductors  
(C) Temporary magnets                      (D) Insulators
- b. Number of Terminals in a MOSFET are
- (A) Two    (B) Three  
(C) Four    (D) Five
- c. Insulators have
- (A) A full valence band                      (B) An empty conduction band  
(C) A large energy gap                      (D) All the above
- d. Tick off the material, which is different from the group?
- (A) Constantan                                      (B) Manganin  
(C) Nichrome                                      (D) Brass
- e. Which of the following property of PVC is of prime importance?
- (A) Strength                                      (B) Appearance  
(C) Colour                                      (D) Non inflammability
- f. Barrier potential in a p-n Junction is caused by
- (A) Thermally generated electrons and holes  
(B) Diffusion of majority carriers across the junction  
(C) Migration of minority carriers across the junction  
(D) Flow of drift current

- g. The property due to which the resistance of some metal or compound vanishes under certain condition is
- (A) semi conductivity                      (B) super conductivity  
(C) curie point                                (D) magnetostriction
- h. Dielectric materials are
- (A) Insulating materials                      (B) Semi conducting materials  
(C) Magnetic materials                      (D) Ferro electric materials
- i. The property of materials by which it can be rolled into sheets is called?
- (A) Plasticity                                    (B) Elasticity  
(C) Malleability                                (D) Ductility
- j. A transistor has
- (A) one p-n junction                          (B) two p-n junction  
(C) four p-n junction                          (D) five p-n junction

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

- Q.2** a. Differentiate between diamagnetic, paramagnetic and ferromagnetic Materials, give one example of each. (8)
- b. Draw B-H curve for magnetic materials used in electric machines and explain (i) Hysteresis loop (ii) Permeability (8)
- Q.3** a. Explain the following:  
(i) Permanent magnetic materials  
(ii) Thermocouples. (4+4)
- b. What is a p-n junction? Draw and Explain V-I characteristic of a p-n junction diode. (8)
- Q.4** Define Polarization of a dielectric material. Explain the different types of polarization and the effect of frequency of applied electric field on them. (2+8+6)
- Q.5** Explain the energy bands in Solids. Also classify the materials based on the energy bands and explain their properties. (8+8)
- Q.6** a. Explain the suitability of copper and aluminium that is used as electrical conducting materials. (8)
- b. Explain the electron gas model of a metal. (8)

- Q.7** a. Explain the terms  
(i) Mobility  
(ii) Doping  
(iii) Diffusion  
(iv) Ferro electricity (8)
- b. Explain various magnetic materials with examples. (8)
- Q.8** a. Explain properties and application of polymers. (8)
- b. What are the important requirements of a good insulating material? (8)
- Q.9** Write short notes on any **FOUR**
- (i) Effect of electric field on super conductor
  - (ii) MOSFET
  - (iii) Hall Effect
  - (iv) Einstein relation (between diffusion constant and mobility)
  - (v) Applications of carbon and graphite. (4×4)