

Code: DE54

Subject: ENGINEERING MATHEMATICS

DiplETE – ET

Time: 3 Hours

JUNE 2013

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. The highest dielectric strength is possessed by
- (A) Mica (B) Transformer oil
(C) PVC (D) Polyethylene
- b. Materials which lack permanent magnetic dipoles are called
- (A) diamagnetic (B) ferromagnetic
(C) semi magnetic (D) none of these
- c. Silicon doped with phosphorous is a
- (A) intrinsic semi-conductor (B) pure conductor
(C) p-type semi-conductor (D) n-type semi-conductor
- d. Which of the following elements has maximum electrical conductivity?
- (A) Silver (B) Copper
(C) Aluminium (D) Stainless Steel
- e. The resistivity of all normal metals as temperature is lowered
- (A) tends to zero
(B) tends to a constant value
(C) at first decrease and then increase
(D) none of these
- f. The voltage dependent resistors are usually made from
- (A) Graphite (B) Charcoal
(C) Silicon carbide (D) Nichrome

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- g. A strong electric field across a P-N junction that causes covalent bond to break
- (A) it is called avalanche breakdown
 (B) it is called reverse breakdown
 (C) it is called zener breakdown
 (D) it is called low voltage breakdown
- h. An FET has
- (A) a very high input impedance
 (B) a very low input impedance
 (C) a high impedance emitter junction
 (D) a forward biased PN junction
- i. Hall effect can be used to measure
- (A) magnetic field intensity (B) average number of holes
 (C) carriers concentration (D) electrostatic field intensity
- j. With increase in temperature, the orientation polarization
- (A) increases (B) decreases
 (C) is constant (D) none of these

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

- Q.2** a. Explain the electron gas model of a metal. (8)
- b. Explain the term superconductivity. Mention its applications in electrical and electronic engineering. (8)
- Q.3** Explain the phenomena of polarization. What are the different types of polarization? (16)
- Q.4** a. What are the important requirements of good insulating material? Give two examples and their uses. (12)
- b. What is piezo electricity? Explain. (4)
- Q.5** a. Explain the following:
 (i) Magnetostriction
 (ii) Magnetic Resonance (2 × 5 = 10)
- b. What are permanent magnet materials? Explain. (6)

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- Q.6** a. Distinguish between conductor, semiconductor and insulators with the help of energy band-diagram. (8)
- b. Explain Einstein's relation between diffusion constant and mobility. (8)
- Q.7** a. Draw V-I characteristics and write applications of the following:
(i) Zener diode
(ii) Tunnel diode (8)
- b. What is junction transistor? Describe in brief working of two types of transistor. (8)
- Q.8** a. Write applications of the following:
(i) Carbon resistor
(ii) Variable capacitor
(iii) Electronic valves (6)
- b. What is a wire wound resistor? Describe different types of wire wound resistor in brief? (10)
- Q.9** a. What are the various methods by which junction are fabricated from pure single crystal semiconductor? Describe any two methods. (12)
- b. Discuss operation of JFET as pinch off. (4)