ROLL NO. _____

Code: DE54 / DE104 **Subject: ENGINEERING MATERIALS**

DipIETE – ET (Current & New Scheme)

Time: 3 Hours **DECEMBER 2015** **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. Poorest conductor of electricity is
(A) Aluminium **(B)** Steel
(C) Carbon **(D)** Silver

b. Thermocouple work on which of the following effects
(A) Thomoson effect **(B)** Seeback effect
(C) Peltier effect **(D)** Joule effect

c. The electric breakdown strength of a material depends on its
(A) Composition **(B)** thickness
(C) moisture content **(D)** all of these

d. Materials which lack permanent magnetic dipoles are called
(A) diamagnetic **(B)** ferromagnetic
(C) semi magnetic **(D)** none of these

e. Ferrite is associated with
(A) ferromagnetic **(B)** paramagnetic materials
(C) diamagnetic materials **(D)** ferrimagnetic materials

f. Which type of electron pair occurs in a semi-conductor?
(A) ionic **(B)** non-ionic
(C) homopolar **(D)** hetropolar

g. dielectric loss due to polarization occur in
(A) bipolar dielectric **(B)** non-metallic dielectric
(C) liquid dielectric **(D)** all of these

h. Variable resistors are generally
(A) carbon resistor **(B)** thin film resistor
(C) thick film resistor **(D)** wire wound resistor

i. In a reverse biased P-N junction, the current through the junction increases abruptly at
(A) zero voltage **(B)** 1.2V
(C) 0.72 V **(D)** breakdown voltage

j. A bipolar transistor is a _____ Controlled device whereas a FET is a _____ controlled device.

(A) current, voltage **(B)** current, current

(C) voltage, current **(D)** voltage, voltage

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

Q.2 a. Explain the effect of temperature on electrical conductivity of metals. **(4)**

b. What are the factors which affect the resistivity of Electrical materials? **(12)**

Q.3 a. Explain effects of internal fields in solids and liquids. **(12)**

b. Explain the effect of dielectric on the behaviour of a capacitor. **(4)**

Q.4 a. Explain properties and application of polymers. **(10)**

b. Explain the term dielectric losses and dielectric constant. **(6)**

Q.5 Discuss the following: **(4×4)**

(i) Paramagnetism

(ii) Ferromagnetism

(iii) Hysteresis loop

(iv) Magnetic resonance

Q.6 a. Discuss the following: **(5+5)**

(i) Diffusion in semi conductors

(ii) Einstein Relation in semi conductors

b. Explain the term mobility, doping and ferroelectricity. **(6)**

Q.7 a. Describe the atomic structure of silicon and germanium. **(8)**

b. What is a PN junction? Draw and Explain V-I characteristic of a PN junction diode. **(8)**

Q.8 a. What is Metal Oxide film resistor? Explain in brief. **(6)**

b. Write the properties of ceramic dielectric capacitor and electrolytic capacitors. Write at least two applications of each. **(10)**

Q.9 a. Give general properties of Field Effect Transistor (FET). **(8)**

b. Discuses epitaxial diffused junction diode and its application. **(8)**