Subject: ENGINEERING MATERIALS

Time: 3 Hours **Max. Marks: 100**

DECEMBER 2010

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 half an hour 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 magnitude of emf that is developed in a thermocouple is of the order of few _____volts.

(A) micro **(B)** milli
(C) mega **(D)** kilo

b. When the dipoles are created the dielectric is said to be

(A) non polarised **(B)** polarised
(C) magnetised **(D)** none of the above

c. Ferro electric materials have a ---------- dielectric constant, which is non-linear.

(A) low **(B)** medium
(C) high **(D)** very low

d. Aluminium, boron indium is all ----------impurities.

(A) trivalent **(B)** tetravalent
(C) pentavalent **(D)** hexavalent

e. When ferromagnetic substance is magnetised there are small changes in its dimensions the phenomenon known as

(A) permeability **(B)** superconductivity
(C) permitivity **(D)** magetostriction

f. Zener diodes are used as ----------

(A) rectifiers **(B)** voltage regulators
(C) inverters **(D)** oscillators

g. Mica, glass, lowloss ceramic are used for capacitors from a few

(A) pF to a few hundred µF **(B)** µF to a few hundred µF
(C) pF to a few hundred pF **(D)** µF to a few hundred mF

h. Zone refining is used for purification

(A) conductors **(B)** insulators
(C) alloys **(D)** semiconductors

i. Rochelle salt, quartz is

(A) both ferroelectric & piezoelectric
(B) only piezoelectric
(C) only ferroelectric
(D) neither ferroelectric nor piezoelectric

j. Eureka, German silver , nichrome are all ----------elements.

(A) thermo-electric **(B)** thermo-couple elements
(C) photoelectric **(D)** thermionic

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

Q.2 a. Explain the factors affecting the resistivity of electrical materials. **(8)**

b. Explain the properties and applications of copper and aluminium electrical conducting materials. **(8)**

Q.3 a. Explain, the phenomenon of ionic and dipolar polarisation. **(8)**

b. Enumerate the effect of dielectric on the behaviour of a capacitor. **(8)**

Q.4 a. What are the important requirements of good insulating materials? Explain them. **(8)**

b. Write a short note on mica and PVC. **(8)**

Q.5 a. Explain Antiferomagnetism and ferrimagnetism, also give examples of each. **(9)**

b. What are the factors affecting permeability and hysteresis loss? **(7)**

Q.6 a. Explain the process of junction coatings. **(8)**

b. Explain the different types of semiconductors. **(8)**

Q.7 a. What is a metal semiconductor contact? Explain it with suitable energy band diagram for a metal and an n type semiconductor. **(8)**

b. What is a barrier capacitance? How does it differ from parallel plate capacitance? **(8)**

Q.8 a. Explain the construction of electrolytic capacitor and plastic capacitor. **(8)**

b. What is an inductor? Name the different types of inductor. Explain the construction of an inductor. **(8)**

Q.9 a. Explain grown junction and alloyed junction process, fabrication of Junction Transistor. **(4+4)**

b. Draw and explain the drain and transfer characteristics of JFET. **(8)**