

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.

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**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) permittivity (D) magetostriktion
- f. Zener diodes are used as -----
- (A) rectifiers (B) voltage regulators  
(C) inverters (D) oscillators

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

- (A) pF to a few hundred  $\mu\text{F}$                       (B)  $\mu\text{F}$  to a few hundred  $\mu\text{F}$   
(C) pF to a few hundred pF                      (D)  $\mu\text{F}$  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

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

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- 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 Antiferromagnetism 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)

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- 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)