

Total No. of printed pages = 6

CAI-405/EC&M/4th Sem/2018/M

ELECTRONIC COMPONENTS AND MATERIALS

Full Marks – 70

Time – Three hours

The figures in the margin indicate full marks for the questions.

PART – A

Marks – 25

1. Determine the correct options for the following questions : $1 \times 10 = 10$

- (i) The number of valence electrons in trivalent impurity is
- | | |
|-------|-------|
| (a) 5 | (b) 4 |
| (c) 3 | (d) 1 |
- (ii) If the diameter of a wire is halved, its resistance becomes

- | | |
|----------------|----------------|
| (a) one fourth | (b) half |
| (c) twice | (d) four times |

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(iii) Material which lack permanent magnetic dipoles are known as

- (a) paramagnetic (b) diamagnetic
- (c) ferromagnetic (d) ferrimagnetic

(iv) The unit of ϵ_0 is

- (a) H/m (b) F/m
- (c) V/m (d) None of these

(v) For metals the temperature coefficient (α_0)

- (a) negative
- (b) zero
- (c) positive
- (d) may be positive or may be negative

(vi) Which of the following is a donor impurity ?

- (a) Gold (b) Indium
- (c) Boron (d) Phosphorus

(vii) Which of the following has lowest operating temperature ?

- (a) Nichrome (b) Constantan
- (c) Manganin (d) Copper

(viii) ICs with more than 10000 components fabricated on it are called as

- (a) SSI (b) MSI
- (c) LSI (d) VLSI

(ix) The units of μ_0 and μ_r are

- (a) H/m for both
- (b) H/m for μ_r and no units for μ_0
- (c) H/m for μ_0 and no units for μ_r
- (d) Wb/m for μ_0 and no units for μ_r

(x) Which of the following material is used for temperature measurement ?

- (a) Platinum (b) Silver
- (c) Gold (d) Copper

2. State whether the following statements are true or false : 1×10=10

- (i) The temperature coefficient (α_θ) of a semiconductor is positive.
- (ii) Silicon has higher melting point than Germanium.
- (iii) Piezoelectric material converts mechanical energy into electrical energy and vice versa.
- (iv) The conductivity of a material depends on length of mean free path.
- (v) Copper is used in making PCBs.
- (vi) At a very low temperature, a semiconductor becomes a conductor.
- (vii) Soft ferromagnets are used in transformer.
- (viii) Tungsten is a semiconductor.
- (ix) Hard ferromagnet remains magnetized even after removal of magnetizing force.
- (x) In hybrid ICs all components are fabricated together.

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50(B)

3. Fill in the blanks :

1×5=5

- (i) Germanium is a _____.
- (ii) If two conductors are alloyed, the resistivity _____.
- (iii) Paper is used as _____ material in capacitor.
- (iv) Dielectric loss is directly proportional to _____.
- (v) Nickel is a _____ material.

PART - B

Marks - 45

- 4. State the intrinsic and extrinsic factors affecting conductivity of a material. 10
- 5. State two applications of each of the following materials : 5
Copper, Tungsten, Nickel, Antimony, Silicon.
- 6. Give the high voltage comparison and high voltage comparison of metal/alloy- film resistor, metal oxide resistor and carbon- film resistor. 10

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7. What are the different types of core losses in transformer ? Explain. 5

8. Write short notes on any *three* : $5 \times 3 = 15$

- (a) Carbon film resistor
- (b) Packaging of IC
- (c) Magnetostriction
- (d) Ceramic materials.