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END SEMESTER EXAMINATION - 2019

Semester : 4th

Subject Code : CAI-405

**ELECTRONIC COMPONENTS
AND MATERIALS**

Full Marks - 70

Time - Three hours

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

Instructions :

1. *All* questions of PART-A are compulsory.
2. Answer *all* the questions from PART-B.

PART - A

Marks - 25

1. Fill in the blanks : 1×5=5
 - (i) From functional point of view ICs can be classified as _____ and _____ .
 - (ii) Alloying _____ resistivity.

[Turn over

(iii) Ceramics are _____ material.

(iv) Dielectric loss is directly proportional to _____.

2. Write true or false : $1 \times 10 = 10$

(i) Mean free path is an intrinsic factor for resistivity.

(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 changes when it is rolled.

(v) Copper is used in making PCBs.

(vi) At a very low temperature, a semiconductor becomes a conductor.

(vii) Soft ferromagnets lack permanent magnetic dipole.

(viii) Nickel is a semiconductor.

(ix) Hard ferromagnet remains magnetized even after removal of magnetizing force.

(x) In SSI ICs number of components are more than 1000.

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3. Choose the correct answer : $1 \times 10 = 10$

(i) Which of the following is used for N-type semiconductor ?

(a) Gold (b) Indium

(c) Boron (d) Phosphorus

(ii) If the diameter of a wire is halved, its resistance becomes

(a) one-fourth (b) half

(c) twice (d) four times

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

(a) paramagnetic (b) diamagnetic

(c) ferromagnetic (d) ferrimagnetic

(iv) The unit of ϵ_r is

(a) H/m (b) F/m

(c) V/m (d) None of these

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(v) For semiconductors the temperature coefficient (α_0)

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

(vi) Which of the following is an acceptor impurity?

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

(vii) Which of the following is used in PCB fabrication?

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

(viii) ICs in which all the components are fabricated together on a single chip are called as

- (a) Digital
- (b) Hybrid
- (c) Monolithic
- (d) Linear

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(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

PART - B

Marks - 45

4. State the intrinsic and extrinsic factors affecting conductivity of a material. 10

5. A conducting wire with length 2 metre and area of cross-section 4 cm^2 has a resistance of 5Ω at a temperature of 300 K and 20Ω at 350 K . Determine the temperature coefficient. 4

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6. How ICs can be classified ? Explain. 7
7. Explain the following terms :
- (a) Dielectric constant
 - (b) Dielectric loss
 - (c) Dielectric strength. $2 \times 3 = 6$
8. Write short notes on any *three* : $6 \times 3 = 18$
- (a) Carbon film resistor
 - (b) Ganged capacitor
 - (c) Transformer core losses
 - (d) Ceramic materials.

