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END SEMESTER/RETEST EXAMINATION J/F 2023

Semester : 3rd

Branch : Common

Subject Code : El/Et - 304

FUNDAMENTALS OF ELECTRICAL AND ELECTRONICS ENGINEERING

Full Marks – 70

Time – Three hours

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

Instructions :

- *All* questions of PART – A are compulsory.
- Answer any *five* questions from PART – B.

PART – A

Marks – 25

1. Fill up the blanks : 1×10=10

   (a) The property of substance for which it resists the flow of electrons though it is called _____.

   (b) Conductivity is the reciprocal of _____.

[Turn over

(c) According to Ohm's law ——— is directly proportional to ———.

(d) At any junction the algebraic sum of current is ———.

(e) For an Ideal transformer VTR, k = ———.

(f) The emitter of a transistor is ——— doped.

(g) ——— is the rotating part of DC machine.

(h) The induced voltage in case of an electrical DC motor is called ———.

(i) NAND gate is the combination of NOT and ——— gate.

(j) ——— gate is also called as inverter.

2. Answer in *one* sentence/word each : 1×10=10

(i) How resistance of a conductor varies with cross-sectional area of the conductor ?

(ii) Give the unit of conductance.

(iii) Define transformer.

(iv) Define EMF.

(v) What is passive element ?

(vi) Define 1 A current.

(vii) What is the value of Indian frequency ?

(viii) How many terminals a transistor has ?

(ix) Define band gap energy.

(x) Y= A.B, which gate is represented by this Boolean expression ?

3. Match the following : 1×5=5

Column – A	Column – B
(a) One-half cycle	(i) Silicon
(b) Capacitance	(ii) OR gate
(c) Semiconductor	(iii) Henry
(d) 0+1=1	(iv) Sfety element
(e) Fuse	(v) Alternation

PART – B

Marks – 45

4. (a) What are the factors on which resistance of a conductor depends ? 3

(b) Three resistors are connected in series across a 12 V battery. The first resistor has a value of 1 Ohm, second has a voltage drop of 4V and third has a power dissipation of 12W. Calculate the value of current. 6

5. (a) What are the two types of self-excited DC generator ? Draw the circuit diagram and explain. 1+2+2=5

(b) An 8-pole DC shunt generator with 778 wave connected armature conductors and running at 500 rpm supplies a load of 12.5Ω resistance at terminal voltage of 250 volt. The armature resistance is 0.24Ω and field resistance is 250Ω. Find the armature current, induced emf and flux per pole. 1+1+2=4

6. (a) Define the terms : 1×3=3

(i) Time period,

(ii) Frequency,

(iii) Form factor.

(b) A resistance of 20Ω, an inductance of 0.2H and a capacitance of 100μF are connected in series across 220V, 50Hz mains. Calculate the current and voltage across R,L and C, impedance, power and power factor consumed by the circuit. 6

7. (a) Describe the P-N junction diode. 2

(b) Differentiate extrinsic semiconductor and intrinsic semiconductor. 3

(c) Explain the operation of PNP transistor. 4

8. (a) What is fuse ? Write the operation of fuse. 1+2=3

(b) Mention four safety precaution rules required for electrical installation. 4

(c) Name four instruments used in electrical installation. 2

9. (a) What are the basics logic gates ? Draw the circuit diagram and truth table 2+3=5

(b) What do you mean by Universal Logic gate. Write the Boolean expression and truth table of NAND gate. 1+1+2=4

10. (a) Derive the EMF equation of DC generator. 3

(b) Establish the voltage equation of transformer. 4

(c) Write the current and voltage equation for alternating current. 2