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**END SEMESTER REGULAR
EXAMINATION, MAY/JUNE – 2025**

Semester : 2nd (NEP)

Course Code : ES-204

**FUNDAMENTALS OF ELECTRICAL
AND ELECTRONICS ENGINEERING**

Full Marks – 60

Pass Mark – 24

Time – Three hours

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

Instruction :

- *All* questions are compulsory.

1. Choose the correct answer from the following :
1×3=3

(a) The unit of power is

(i) kWh

(ii) Watt

(iii) Watt-sec

(iv) All of these

(b) High skilled labour is required in

(i) Conduit wiring

(ii) CTS wiring

(iii) Casing-caping wiring

(iv) Both (i) and (iii)

[Turn over

- (c) A semiconductor is formed by ___ bonds.
 (i) Covalent (ii) Electrovalent
 (iii) Co-ordinate (iv) None of these.

2. Fill in the blanks : 1×3=3

- (a) In an N-type material, minority carries would be _____.
- (b) The basic principle of transformer is based on _____ induction.
- (c) The full form of MCB is _____.

3. Match the following Columns : 1×3=3

Column – A	Column – B
(a) An electronic component that stores energy	(i) Monolithic
(b) Commonly used IC	(ii) Insulating layer
(c) The SiO ₂ layer in an IC acts as	(iii) Capacitor.

4. Write True or False : 1×3=3

- (a) Flip-flops are used in digital electronics for memory storage.
- (b) The unit of inductance is the Henry(H).

- (c) The armature winding is placed in the stator of a DC machine.

5. Answer the following questions in one sentence each : 1×3=3

- (a) Name three basic gates.
- (b) Write the equation for AC power in a resistive circuit.
- (c) Give one example of an ideal voltage source.

6. Answer any *twelve* questions : 2×12=24

- (a) Write the names of two conventional and two non-conventional energy sources.
- (b) Define self-inductance and mutual inductance and write the relation between them.
- (c) Define Peak value and RMS value of AC signals.
- (d) What is the difference between emf and potential difference ?
- (e) What is meant by step-up and step-down transformer ?

- (f) Write down the emf equations of a transformer.
- (g) What are the various methods of house wiring ?
- (h) What are the causes of electrical accidents ?
- (i) Draw the symbols of
- (i) Constant voltage source
 - (ii) Constant current source.
- (j) What is the difference between active and passive components ?
- (k) Write the differences between p-type and n-type semiconductor.
- (l) What is rectifier circuit ? Why filter circuit is required in rectifier output ?
- (m) Name two types of flip-flops used in digital electronics.
- (n) Write a truth table for a 2-input exclusive OR gate (XOR gate).
- (o) Draw the symbols of two input NAND and NOR gate showing their output.
- (p) Write down two relative advantages and two disadvantages of I.Cs over discrete assembly.

7. Answer any *four* questions : 4×4=16
- (a) A circuit is made of a 0.4Ω wire, a 150 bulb and a 120 rheostat connected in series. Determine the total resistance of the circuit.
- (b) Make a comparison between magnetic circuit and electric circuit.
- (c) A sinusoidal voltage $V = 200 \sin (314t)$ is applied to a purely resistive circuit of resistance 20Ω . Find :
- (i) RMS value of voltage
 - (ii) Maximum value of voltage
 - (iii) Frequency of supply
 - (iv) Power consumed in the circuit.
- (d) Describe with sketches the construction of a DC machine.
- (e) In an AC system, define the following terms :
- (i) Amplitude
 - (ii) Cycle
 - (iii) Time period
 - (iv) Frequency Instantaneous value.

(f) Construct AND gate, NAND gate and OR gate with the help of only NOR gate and only NAND gate.

8. Answer any *one* question : $5 \times 1 = 5$

(a) (i) Draw the energy band diagram for

(1) Conductor

(2) Insulator

(3) Semiconductor.

(ii) Give two applications of LEDs.

$3 + 2 = 5$

(b) (i) Draw CE, CB and CC configuration of transistor.

(ii) Give two applications of LEDs.

$3 + 2 = 5$