JULY-2023

FUNDAMENTALS OF ELECTRICAL & ELECTRONICS ENGINEERING

Time Allowed-2.5 Hours *Full Marks: 60*

Answer to Question No. 1 is compulsory and Answer any Five (05) Questions from the rest.

1. Answers any **five** question from the following :- (3×5=15)
a) What do you mean by capacitance of a capacitor? What is its unit?
b) State Fleming's left hand rule and its application.
c) What is power factor? Write the value of power factor for purely resistive circuit.
d) What do you mean by voltage transformation ratio of a transformer?
e) Draw the symbols of PNP and NPN transistor with proper notation.
f) Draw the pin diagram of IC741 op-amp with proper leveling. What is virtual ground?
g) What is the full form of SOP and POS form of logic gates? Draw the symbol of two input Ex-NOR gate.

2. a) Define ideal current source and ideal voltage source with proper symbol.
b) What are active and passive components? Give examples for each.
c) How can you convert a voltage source into current source and vice –versa? (2+3+4)

3. a) State and explain Faraday's Laws of Electromagnetic Induction.
b) Write down the similarities between magnetic & electric circuit.
c) What do you mean by permeability? (4+4+1)

4. a) Define **(any four):** i) RMS value, ii) Frequency, iii) Flux density, iv) Form factor v) MMF vi) Reluctance vii) Hysteresis loss.
b) A series RLC circuit having resistance of 10 Ω, inductance of 0.1 H and capacitance of 150 μF are connected in series across 230 V, 50 Hz AC supply. Calculate: i) Impedance ii) current, iii) power factor, iv) Active power, v) Voltage drop across inductor. (4+5)

5. a). Write down the working principle of two winding transformer.
b) A 100 KVA single phase transformer has 300 turns in primary side and 30 turns in secondary side. The primary is connected to a 11 kV, 50 Hz AC supply. Calculate: i) secondary emf, ii) primary and secondary full load current and iii) maximum flux in the core.
c) Write four main parts of DC motor.
d) Give the applications of DC series motor. (2+4+2+1)

6. a) State and explain De- Morgan's theorem.
b) Draw the NOR gate and write down its truth table.
c) What are universal logic gates? Gives examples. (4+3+2)

7. a) What are the characteristics of an ideal OP- AMP?
b) Draw the circuit diagram of an inverting amplifier and derive the expression for output voltage.
c) Explain the op-amp acts as a adder circuit. (2+4+3)

8. a) Explain energy level diagram of insulator, conductor and semi – conductor.
b) Draw and explain the forward and reverse biased characteristics of P-N junction diode. (4+5)