Scheme – G

Sample Question Paper

Course Name : Electronics Engineering Group

Course Code : DE/ED/EI/EJ/EN/ET/EV/EX/IC/IE/IS/IU/MU

Semester : Third **17318**

Subject Title : Electrical Engineering

Max. Marks : 100 **Time: 3 Hrs**

Instructions:

1. All questions are compulsory.
2. Illustrate your answers with neat sketches wherever necessary.
3. Figures to the right indicate full marks.
4. Assume suitable data if necessary.
5. Preferably write the answers in sequential order.

Q1. A) Attempt any SIX of the following. **12 Marks**

(a) Define RMS value and Average value of an electrical quantity.
(b) State the meaning of the term phase difference.
(c) State the concept of phase sequence.
(d) State Lenz's law.
(e) State the Faraday's laws of electromagnetic induction.
(f) State the types of three-phase Induction motor.
(g) Define: slip and slip speed.
(h) State the expansion of the terms- i) MCCB ii) ELCB.

Q1. B) Attempt any TWO of the following. **08 Marks**

(a) What are the advantages of A.C. over D.C. quantity?
(b) What are the advantages of three-phase system over single-phase system?
(c) Draw the schematic representation and state the principle of working of split-phase Induction motor.

Q2. Attempt any FOUR of the following. **16 Marks**

(a) Define: (i) Time period (ii) Form factor and (iii) Peak factor for a sinusoidal waveform. Also state the numerical values for Form Factor and Peak factor.
(b) Represent the following circuit current graphically:
$I_1=I_m\sin\omega t$; $I_2=I_m\sin(\omega t-30)$; $I_3=I_m\sin(\omega t+30)$
(c) Explain the phenomenon of resonance in R-L-C series circuit.
(d) Define power factor and state the effect of high power factor on energy consumption.
(e) Draw a star connection for three-phase power supply and show line current, line voltage, phase current and phase voltage on it and state the relation between currents and voltages.(Phase values & line values)
(f) Compare core type and shell type single-phase transformer on the basis of:
(i)Cost (ii) Size (iii) mean length of coil turn (iv) Application

Q3. Attempt any FOUR of the following. **16 Marks**

(a) Explain the generation of alternating voltages and alternating currents with the help of suitable diagram.

(b) Draw the schematic diagram of A.C. flowing through pure ohmic resistance. Write the expression for voltage and current. Also draw the waveforms and write expression for power.

(c) The coil having a resistance of 10Ω and an inductance of 0.2 Hendry is connected to a 100 V, 50 Hz supply. Calculate (i) the impedance of the coil (ii) the reactance of the coil (iii) the current drawn and (iv) the phase difference between the current and the applied voltage.

(d) Explain the difference between statically induced emf and dynamically induced emf.

(e) i) State Fleming's Right Hand Rule ii) State the expression for energy stored in magnetic field.

(f) Explain the working principle of single-phase transformer.

Q4. Attempt any FOUR of the following. **16 Marks**

(a) A series circuit has the following characteristics:
R=10 Ω L=100/π mH C= 500/π μf
Find (i) the current flowing when the applied voltage is 100 V at 50 Hz.
(ii) The power factor of the circuit (iii) what value of supply frequency would produce series resonance.

(b) State the various losses taking place in a single-phase transformer?

(c) Explain the torque-speed characteristics of three-phase Induction motor.

(d) State what is the necessity of starter in case of three-phase Induction motor?

(e) What are the advantages and disadvantages of polyphase Induction motor?

(f) Draw the schematic representation and state the principle of working of universal motor.

Q5. Attempt any FOUR of the following. **16 Marks**

(a) A 110 V, 40 W lamp is connected to a 240 V, 50 Hz supply with a capacitor in series with the lamp so that it operates at its normal voltage. Determine the capacitance of the capacitor used and power factor of the circuit.

(b) Three coils each of resistance 6 Ω and inductive reactance of 8 Ω are joined in delta across 400 V, three-phase lines. Calculate the line current and the power absorbed.

(c) Iron loss of a 100 kVA, single-phase transformer is 1.5 kW and full load Cu loss is 1.0 kW. Calculate transformer efficiency at full load unity power factor.

(d) Explain the general principle and construction of three-phase Induction motor.

(e) State the various methods of speed control of Induction motor?

(f) Give any two applications each of the following motors (i) 1-phase Induction motor (ii) Universal motor (iii) stepper motor (iv) servo motor

Q6. Attempt any FOUR of the following. **16 Marks**

(a) Three similar coils, each having a resistance of 5 Ω and an inductance of 0.021 H, are connected in star to a 440 V, three-phase 50 Hz supply. Calculate the line current and the total power absorbed.

(b) A 3000/200V, 50Hz, single-phase transformer is built on a core having an effective cross sectional area of 150cm^2 and has 80 turns in the low voltage winding. Calculate (i) the value of maximum flux density in the core (ii) the number of turns in the high voltage winding.

(c) The number of turns in the low voltage winding of a 200 kVA, 50 Hz, 2000/250V, 1-phase transformer is 25. Calculate (i) peak value of the magnetic flux in the core (ii) the full load current in the low voltage winding and (iii) the full load current in the high voltage winding.

(d) Explain the principle of working of stepper motor.

(e) Draw the schematic representation and state the principle of working of servo motor.

(f) List the types of earthing and explain the necessity of the same.