

First/Second Semester B.E. Degree Examination, Dec.08/Jan.09
Basic Electrical Engineering

Time: 3 hrs.

Max. Marks:100

Note: Answer any FIVE full questions.

- 1
 - a. State the two Faraday's laws of electromagnetic induction and explain statically and dynamically induced emf's. (10 Marks)
 - b. Obtain the expression for the energy stored in magnetic field. (04 Marks)
 - c. Plot a sine wave with amplitude V_m and with period T . Write the function. Mark the peak value and period. What is the r.m.s. value, average value and form factor of the wave. (06 Marks)

- 2
 - a. Obtain the relation between voltage and current, the expression for power when a voltage $v(t) = V_m \sin \omega t$ is applied to the series RL circuit. Draw the circuit, waveforms and phasor diagrams. (10 Marks)
 - b. A resistance of 50Ω , inductor of 0.07 H and capacitor of $60\mu\text{F}$ are connected in series across an ac supply of 200 volts, 50 Hz. Draw the circuit. Find the impedance, current, power factor of the circuit, active power & reactive power. Draw the phasor diagram also. (10 Marks)

- 3
 - a. What are the advantages of 3-phase system. (04 Marks)
 - b. Write the star and delta connections and mark on them the line and phase quantities. Write the relation between the line and phase quantities in each case. Write the expression for power using line quantities and phase quantities. (08 Marks)
 - c. Write the expression for power in terms of the two wattmeters readings W_1 and W_2 used to measure power in a three phase circuit. Write the wattmeter readings in terms of voltage, current and power factor angle. Write the expression for power factor in terms of the two wattmeter readings. If the power indicated by the two wattmeters are 8 kW and -3 kW, find the total power and the power factor of the load. (08 Marks)

- 4
 - a. Explain the principle and construction of a single phase energy meter. Draw a neat sketch of the energy meter showing and labeling the various parts. (10 Marks)
 - b. Write the wiring diagram for a two way control of a lamp. Write the table listing lamp status (ON / OFF) for different combinations of switch position. (04 Marks)
 - c. Explain any one type of earthing with a neat circuit diagram. (06 Marks)

- 5
 - a. Derive the emf equation for a dc generator. (06 Marks)
 - b. Write the schematic diagram for the different types of generators based on field winding connection. Mark the various currents and voltages in long shunt generator. Write the reaction between armature current, field current and line current, the induced emf and terminal voltages if the currents and resistances are given. r_a = armature resistance; r_{sh} = shunt field resistance; r_{series} = series field resistance. (08 Marks)
 - c. A shunt generator has an induced voltage of 127 volts and its terminal voltage is 120 volts on full load. Find the armature current if the field resistance is 15Ω and armature resistance is 0.02Ω . Ignore armature reaction and also brush drop. (06 Marks)