First/Second Semester B.E Degree Examination

Basic Electrical Engineering "18ELE13"

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

Note:Answer any FIVE full questions, choosing one full question from each module.

Module-1

1. a) State and explain Ohm's law and mention its limitations. (6 Marks)

   b) Explain the generation of single phase A.C induced EMF with suitable diagrams. (6 Marks)

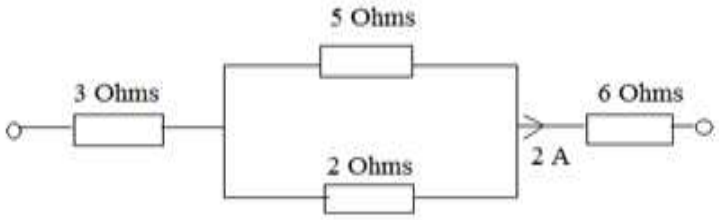
   c Two 12 V batteries with internal resistance 0.5 Ω and and 1 Ω respectively are joined in parallel and a resistance of 2 Ω is placed across the terminals. Find the current supplied by each battery. (8 Marks)

OR

2. a) State and explain Kirchoff's laws. (6 Marks)

   b)Define RMS value of alternating current ,show that its value is proportional to maximum value. (6 Marks)

   c)Calculate currents in each resistors, total power and power dissipated in each resistors for below shown circuit diagram. (8 Marks)



Module-2

3. a) Show that current 'i' lags the applied voltage 'v' by 90^0 for a pure inductance A.C circuit and also power consumed is zero (6 Marks)

   b)Derive the voltage and current relations in a balanced 3 phase star connected load with suitable circuit and vector diagrams. (7 Marks)

   c) A series RLC circuit with 100Ω, 25μF and 0.15H is connected across 415V,50Hz AC supply. Calculate i) impedance ii) current iii) power factor iv) voltage drop across inductor and capacitor. (7 Marks)

OR

4. a) Show that two wattmeters measure three phase power with suitable circuit diagram and vector diagrams. (8 Marks)

b) A 318 µF capacitor is connected across a 230 volts, 50 Hz system. Determine i) capacitive reactance ii) RMS value of current iii) voltage and current expressions. (6 Marks)

c) Three arms of a 3 phase, delta connected load, each comprises of a coil having 25Ω resistance and 0.15 inductance in series with a capacitor of 120µF across 415V, 50 Hz supply. Calculate i) line current ii) power factor iii) power consumed. (6 Marks)

Module-3

5. a) Explain the working principle of transformer and list the applications of transformer. (6 Marks)

b) A 40KVA, single phase transformer has core loss of 450 Watts and full load copper loss 850 Watts. If the power factor of the load is 0.8. Calculate i) Full load efficiency ii) Maximum efficiency at UPF iii) Load for maximum efficiency. (8 Marks)

c) Explain 2 way control and 3 way control of lamp with suitable circuit diagrams and working table. (6 Marks)

OR

6. a) Derive an EMF equation of transformer with usual notations. (6 Marks)

b)List different types of loss in transformer and explain each one in brief. (8 Marks)

c) Explain the term equipment earthing and explain any one type earthing with a neat diagram. (6 Marks)

Module-4

7. a) Explain the working principle of D.C motor with suitable diagrams. (6 Marks)

b) Derive an EMF equation for D.C generator with usual notations. (6 Marks)

c) A 4 pole, DC shunt motor takes 22.5 A from a 250 V supply . The armature resistance is 0.5 Ohms and field resistance is 125 Ohms. The armature is wave wound with 300 conductors. If the flux pet pole is 0.02 Wb. Calculate i) Speed ii) Torque developed iii) Power developed. (8 Marks)

OR

8.a) Discuss the following characteristics for i) series motor ii) shunt motor with relevant plots.
i) T_a v/s Ia ii) N v/s I_a (6 Marks)

b) Explain the function of following parts of D.C machine. (6 Marks)
i) Yoke ii) Field winding iii) Commutator iv) Pole shoe v) Pole core vi) Brush

c) A 4 pole, lap wound DC shunt generator delivers 200 A at terminal voltage of 250 Volts. It has a field and armature resistance of 50 Ohms and 0.05 Ohms respectively. Neglecting brush drop determine i) Armature current ii) Current per parallel path iii) EMF generated iv) Power developed. (8 Marks)

Module-5

9.a) Explain the working principle of 3 phase synchronous generator. (6 Marks)

b) A 6 pole, 3 phase, 50 Hz, alternator has 12 slots per pole and 4 conductors per slot. A flux of 25mWb is sinusoidally distributed along the air gap. Determine the i) phase EMF ii) Line EMF . Assume coils are full pitched and winding factor as 0.96. (6 Marks)

c) Explain the concept of rotating magnetic field and show that resultant EMF remains same at different instants of time. (8 Marks)

OR

10. a) Derive an EMF equation for 3 phase synchronous generator with suitable considerations. (6 Marks)

b) Describe the constructional features of 3 phase induction motor with suitable diagrams. (8 Marks)

c) An 8 pole 3 phase alternator runs at 750RPM and supplies power to 6 pole 3 phase induction motor which runs at 970 RPM. What is the slip of the induction motor? (6 Marks)