First/Second Semester B.E. Degree Examination, June/July 2016
Basic Electrical Engineering

Time: 3 hrs. Max. Marks: 100

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

**Module-1**

1. a. An 8Ω resistor is in series with a parallel combination of two resistors 12Ω and 6Ω. If the current in 6Ω resistor is 5A, determine the total power dissipated in the circuit. (06 Marks)
   b. Obtain the potential difference $V_{XY}$ in the following circuit. (06 Marks)
   
   ![Diagram](image)

   c. Explain statically induced emf and dynamically induced emf with relevant diagrams and equations. (08 Marks)

   **OR**

2. a. Two coils, A of 13000 turns and B of 14000 turns lie in parallel planes so that 55% of the flux produced by coil A links coil B. A current of 6A in A produces 0.05mwb, while the same current in B produces 0.075mwb. Calculate i) Mutual Inductance and ii) the coefficient of coupling. (08 Marks)
   b. Calculate the supply voltage $V$ in the circuit shown. (06 Marks)
   
   ![Diagram](image)

   c. Derive an equation for energy stored in a magnetic field of a coil. (06 Marks)

**Module-2**

3. a. Explain the significance of Back emf in case of a DC motor. (06 Marks)
   b. Explain with a neat sketch, the constructional features and operation of an induction type single phase energy meter. (06 Marks)
   c. A 4 pole, 100V shunt generator with lap connected armature, having field and armature resistance of 50Ω and 0.1Ω respectively, supplies a load of sixty lamps each lamp rated 100V, 40W. Calculate the total armature current, the current per path and the generated emf. Allow a contact drop of 1 volt per brush. (08 Marks)

   **OR**

4. a. Derive equation of Induced EMF for DC Generator. (06 Marks)
   b. List out applications of shunt and series DC motors. (06 Marks)
   c. A series motor runs at 600Rpm when taking a current of 110A from a 230V supply. The useful flux per pole for 110A is 24mwb and that for 50A is 16mwb. The armature resistance and series field resistance are 0.12Ω and 0.03Ω respectively. Calculate the speed when the current has fallen to 50A. (08 Marks)
Module-3

5 a. Obtain an expression for the voltage across pure inductor if the current through it is i = 1m sin wt.
   (06 Marks)

   b. Explain working of two way control and three way control of lamps with neat sketch.
   (06 Marks)

   c. A choke coil takes a current of 2A lagging 60° behind the applied voltage of 200V at 50Hz. Calculate the inductance resistance and impedance of the coil. Also determine the power consumed when it is connected across 100V 25Hz supply.
   (08 Marks)

   OR

6 a. Deduce a condition at which an RLC circuit behaves like a resistive circuit. State whether the current in the circuit is minimum or maximum.
   (06 Marks)

   b. Find an expression for the current and calculate power when a voltage v = 300sin 100πt is applied to a coil having R = 60Ω and L = 0.16.
   (08 Marks)

   c. Write a short note on earthing, its objectives and mention the types of earthing.
   (06 Marks)

Module-4

7 a. Explain the advantages of rotating field type alternator.
   (06 Marks)

   b. A 3phase, 4pole, star connected alternator has 24 slots with 12 conductors per slot and flux per pole of 0.1wb. Calculate the line emf generated when the alternator is run at 1500rpm.
   Given that K_d = 0.966 and K_p = 1
   (08 Marks)

   c. During the measurement of power by two wattmeter method, the total input power to a 3phase, 440V motor running at a power factor of 0.8 was found to be 25kW. Find the readings of the two wattmeters.
   (06 Marks)

   OR

8 a. Show that two wattmeters are sufficient to measure three phase power.
   (06 Marks)

   b. Derive an emf equation of a three phase synchronous generator.
   (06 Marks)

   c. A balanced star connected 3 phase load is fed from 3 phase, 400V supply. The line current is 20A and the total power absorbed by the load is 10kW. Calculate:
   i) The impedance in each branch
   ii) The power factor and
   iii) The total power consumed if the same impedances are star connected.
   (08 Marks)

Module-5

9 a. Explain principle operation of transformer and hence deduce the emf equation of the transformer.
   (08 Marks)

   b. Explain principle operation of 3phase induction motor.
   (06 Marks)

   c. The maximum efficiency at full load and unity power factor of a single phase 25KVA, 500/1000V, 50Hz transformer is 98%. Determine its efficiency at
   i) 75% load 0.9 p.f and
   ii) 50% load 0.8 p.f
   (06 Marks)

   OR

10 a. What are the losses in a transformer and how they vary with load? Deduce a condition for maximum efficiency.
   (06 Marks)

   b. Explain the necessity of star – delta starter for the induction motor. With circuit diagram, explain a star delta starter.
   (08 Marks)

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

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