USN | | | | | | | | | **15ELE15/25**

First/Second Semester B.E. Degree Examination, Dec.2016/Jan.2017
Basic Electrical Engineering

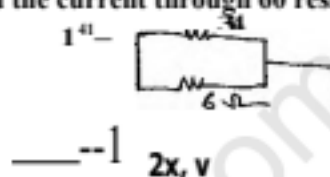Time: 3 hrs.   Max. Marks: 80

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

Module-1

1   a. Define KCL and KVL with an example.   (05 Marks)

     b. From the given below circuit, find the current through 60 resistor. [Fig.Q.1(b)].   (05 Marks)

Fig.Q.1(b)

     c. A coil of 1000 turns is wound on a ring of silicon steel, having mean diameter of 10cm and relative permeability 1200. Its cross sectional area is 12 sq.cm. When a current of 5A flows through the coil, find:
       i)   Flux in the core
       ii)   Inductance of the coil
       iii) Induced emf if the flux falls to zero in 20m sec.   (06 Marks)

OR

2   a. Derive an expression for dynamically induced emf with a neat diagram.   (05 Marks)

     b. Two coupled coils of self inductance 0.8H and 0.2H, have a coefficient of coupling 0.9. Find the mutual inductance and turns ratio.   (05 Marks)
A 10C2 resistance is connected in series with a parallel combination of 15c2 and 205 resistors. The circuit is applied with V volts. The power taken by the circuit is 150 watts. Find the total current through the circuit and power consumed in all the resistors.   (06 Marks)

Module-2

3   a. With a neat sketch, explain the construction of various parts of a DC machine.   (05 Marks)

     b. A 4-pole, lap connected DC generator has 600 armature conductors and runs at 120 0rpm. If the flux per pole is 0.06 wb, calculate the emf induced. Also find the speed at which it should be driven to produce same emf when wave connected.   (05 Marks)

     c. With a neat figure, explain the construction and working principle of dynamometer type wattmeter.   (06 Marks)

OR

4   a. Explain the construction and principle of operation of induction type single phase energy meter.   (05 Marks)

     b. 4-pole, 220V, lap connected DC shunt motor has 36 slots, each slot containing 16 conductors. It draws a current of 40A from supply. The field resistance and armature resistances are 1100 and 0.1f2 respectively. The motor develops an output power of 6kW. The flux per pole in 40m wb. Calculate: 0 Speed; ii) Torque developed by armature; iii) Shaft torque.   (05 Marks)

     c. Derive emf equation for DC generator.   (06 Marks)

Module-3

5 a. Derive an expression for power in pure capacitor circuit and draw voltage, current and power waveforms. **(05 Marks)**

    b. A series circuit with a resistor of mon, capacitor of 25µF and inductance of 0.15H is connected across 220V, 50Hz supply. Calculate impedance, current, power and p.f: of circuit. **(05 Marks)**

    C. With a neat sketch, explain 3-way control of lamp. **(06 Marks)**

OR

6 a. Define earthing. Explain any one type of earthing with a neat diagram. **(05 Marks)**

    b. Two impedances (150-157j)n and (100 + 110j)51 are connected in parallel across 200V, 50Hz supply. Find branch currents, total current and total power consumed in the circuit. Draw the phasor diagram. **(05 Marks)**

    c. Define power factor and mention its practical importance. **(06 Marks)**

Module-4

7 a. Mention the advantages of three phase system over single phase system. **(05 Marks)**

    b. Three coils each having resistance of 10Ω and inductance of 0.02H are connected in star across 440V, 50Hz, 34) supply. Calculate the line current and total power consumed. **(mmoilis Marks)**

    c. A 6-pole, 34), star connected alternator has an armature with 90 slots and 12 conductors per slot and rotates at 1000 rpm. The flux per pole is 0.5wb. Calculate emf generated, if the winding factor is 0.97 and full pitched. **(06 Marks)**

OR

8 a. With a neat sketch, explain the constructional details of alternator. **(05 Marks)**

    b. A 34), 16 pole alternator has a star connected winding with 144 slots and 10 conductor per slots. The flux per pole is 30mwb. Find the phase and line voltages, if the speed is 375rpm. **(05 Marks)**

    A 34), 400V, motor takes an input of 40kW at 0.45 p.f. lag. Find the reading of each of the two single phase wattmeters connected to measure the input. **(06 Marks)**

Module-5

9 a. Explain the working principle of single phase transformer. **(05 Marks)**

    b. Find the efficiency of 150kVA, single phase transformer at i) Full load upf; ii) 50% of full load at 0.8p.f. If the copper loss at full load is 1600 watts and iron loss is 1400 watts. **(05 Marks)**

    c. A 34), 4-pole, 400V, 50Hz induction motor runs with a slip of 4%, find rotor speed and frequency. **(06 Marks)**

OR

10 a. Explain the working principle of an 34) induction motor with a neat sketch. **(05 Marks)**

    b. A 10 pole induction motor supplied by a 6 pole alternator, which is driven at 1200 rpm. If the motor runs at slip of 3%, what is its speed? **(05 Marks)**

    c. A single phase transformer has 400 primary and 1000 secondary turns. The net cross sectional area of core is $60cm^2$. The primary winding is connected to 500V, 50Hz. Find: i) Peak value of core flux density; ii) Emf induced in the secondary winding. **(06 Marks)**