CBCS SCHEME

USN | | | | | | | | | | |

17ELE15

First Semester B.E. Degree Examination, Dec.2017/Jan.2018
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. State Ohm's law. Mention its limitations. **(05 Marks)**

b. State and explain Kirchoff's laws as applied to D.C circuits. **(08 Marks)**

c. A coil of 150 turns is linked with a flux of 0.01 weber when carrying a current of 10 A. Calculate the inductance of the coil. If the current is uniformly reversed in 0.01 sec, calculate the induced electromotive force. **(07 Marks)**

OR

2 a. Define dynamically induced e.m.f and statically induced e.m.f with examples. **(06 Marks)**

b. Two resistors connected in parallel across 100V D.C supply. The total current from the supply source is 10 A. The power dissipated in one resistor is 600 W. What is the current drawn when they are connected in series across the same supply. **(08 Marks)**

c. Define the co-efficient of coupling and find its relation with L_1, L_2 and M. **(06 Marks)**

Module-2

3 a. With a neat sketch, explain the construction of the various parts of a D.C generator. **(08 Marks)**

b. What is the significance of back EMF in a D.C motor? **(06 Marks)**

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

OR

4 a. Derive the EMF equation of D.C generator. **(06 Marks)**

b. Find the useful flux per pole of a 250V, 6 pole shunt motor (D.C) having a two circuit connected armature winding with 220 conductors. At normal working temperature, the overall armature resistance including brushes is 0.2 Ω. The armature current is 13.3 A at the no-load speed of 908 rpm. **(08 Marks)**

c. Describe with a neat sketch, the constructional details and operation of a single phase induction type energy meter. **(06 Marks)**

Module-3

5 a. Derive an expression for power in pure capacitor circuit and draw voltage, current and power waveforms. **(07 Marks)**

b. A series circuit with a resistor of 100 Ω, capacitor of 25 μF and inductance of 0.15 H is connected across 220 V, 50 Hz supply. Calculate impedance, current, power and power factor of the circuit. **(08 Marks)**

c. With a neat sketch, explain 3-way control of Lamp. **(05 Marks)**

OR

6 a. Define earthing. Explain any one type of earthing with a neat diagram. **(06 Marks)**

b. Two impedances $(150 - 157j)\Omega$ and $(100 + 110j)\Omega$ are connected in parallel across 200 V, 50 Hz supply. Find branch currents, total current and total power consumed in the circuit. Draw the phasor diagram. **(08 Marks)**

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

Module-4

7 a. In a three phase star connection, find the relation between line and phase values of currents and voltages. Also derive the equation for three phase power. **(06 Marks)**

b. Show that the two wattmeters are sufficient to measure three phase power. Also derive an expression for the power factor in terms of wattmeter readings. **(06 Marks)**

c. A 6 pole, 3 phase, stars connected alternator has an armature with 90 slots and 12 conductors per slot. If revolves at 1000 rpm, the flux per pole being 0.5 web. Calculate the emf generated, if the winding factor is 0.97 and all the conductors in each phase are in series. The coil is full pitched. **(08 Marks)**

OR

8 a. Mention the advantages of three phase system over single phase system. **(06 Marks)**

b. With neat sketches, explain the construction of salient pole alternator. **(07 Marks)**

c. A three phase load of three equal impedances connected in delta across a balanced 400 V supply takes a line current of 10 A, at a power factor of 0.7 lagging. Calculate
(i) The phase current, (ii) Total power, (iii) The total reactive volt Amperes. **(07 Marks)**

Module-5

9 a. Derive EMF equation of transformer. **(06 Marks)**

b. The maximum efficiency at full load and upf of a single phase 25 kVA, 500/1000 V, 50 Hz transformer is 98%. Determine the efficiency at (i) 75% load 0.9 p.f (ii) 50% load 0.8 p.f (iii) 25% load 0.6 p.f. **(07 Marks)**

c. A three phase 6 pole 50 Hz induction motor has a slip of 1% at No-load and 3% at full load. Determine (i) synchronous speed (ii) No-load speed (iii) Full load speed (iv) Frequency of rotor current at stand still (v) Frequency of rotor of rotor current at full load. **(07 Marks)**

OR

10 a. Derive the condition for which the efficiency of a transformer is maximum. **(06 Marks)**

b. Define slip. Derive an expression for frequency of Rotor current. **(06 Marks)**

c. A single phase, 20 kVA transformer has 1000 primary turns and 2500 secondary turns. The net cross-sectional area of the core is 100 cm^2. When the primary winding is connected to 550 V, 50 Hz supply. Calculate (i) The maximum value of the flux density in the core (ii) the voltage induced in the secondary winding and (iii) The primary and secondary full load currents. **(08 Marks)**

* * * * *