

# CBCS SCHEME

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17ELE15/25

## First/Second Semester B.E. Degree Examination, Dec.2023/Jan.2024 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 and explain KCL and KVL applied to DC circuits. (07 Marks)  
b. For the circuit shown in Fig.Q1(b). Find unknown value of resistance 'x' and total resistance between A and B.

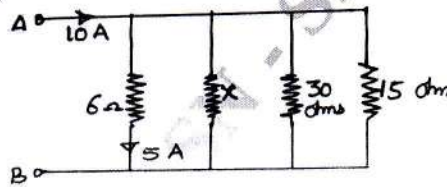


Fig.Q1(b)

(07 Marks)

- c. Define coefficient of coupling and obtain expression for coefficient of coupling when two coils are placed adjacent to each other. (06 Marks)

OR

- 2 a. Define the following :  
i) Fleming's right hand rule  
ii) Fleming's left hand rule  
iii) Lenz's law  
iv) Faraday's law's. (08 Marks)  
b. For the circuit shown in Fig.Q2(b) applying KCL and KVL find the currents in all branches of the circuit.

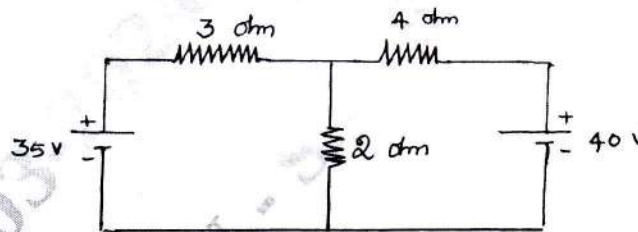


Fig.Q2(b)

(07 Marks)

- c. Obtain possible expressions for self inductance of a coil. (05 Marks)

### Module-2

- 3 a. With a neat sketch explain the construction and uses of the following parts of DC generator :  
i) Armature  
ii) Magnetic poles  
iii) Commutation. (07 Marks)  
b. With a neat sketch explain the construction and working principle of dynamometer type wattmeter. (07 Marks)  
c. A 4-pole, Lap wound DC generator has useful flux of 0.07wb/pole calculate the generated emf when it is rotated at a speed of 900rpm with the help of Prime mover. Also calculate the generated emf if lap wound armature is replaced by wave wound. (06 Marks)

OR

- 4 a. Derive the expression for torque in DC motor. (07 Marks)  
 b. Explain with neat circuit diagram working of 1- $\phi$  energy meter. (07 Marks)  
 c. Explain the following performance characteristics of DC motor writing necessary equations if any.  
 i) Torque – Armature current  
 ii) Speed – Armature current  
 iii) Speed – Torque. (06 Marks)

**Module-3**

- 5 a. Prove that single phase AC power in an R – L circuit is  $V I \cos \phi$ . (07 Marks)  
 b. An 8 ohm resistance 16ohm inductive reactance and unknown capacitor are connected in series across 100V, 50Hz supply. If the current drawn is 12.5A find the value of capacitor. (07 Marks)  
 c. Define Earthing and with neat circuit diagram any one type of Earthing. (06 Marks)

OR

- 6 a. With neat circuit diagram explain 3-way control of lamp. (07 Marks)  
 b. Write the phasor diagram in each of the following cases when DC voltage is applied across on R – L – C circuit connected in series.  
 i)  $V_L > V_C$   
 ii)  $V_L < V_C$   
 iii)  $V_L = V_C$  and comment on phase angle. (07 Marks)  
 c. The resistance, inductance and capacitor are connected in series and the voltage drops across resistance is 150V, that across inductance is 100V that across capacitor is 80V. Find the power factor of the circuit. (06 Marks)

**Module-4**

- 7 a. Find the relationship between line and phase values voltage and currents in Delta connection. (07 Marks)  
 b. Discuss the effect of power factor on wattmeter readings. (06 Marks)  
 c. A 3- $\phi$ , 16-pole alternator has a star connected winding with 144 slots and 10 conductors per slot. The flux per pole is 0.03wb sinusoidally distributed. Find phase and line values of voltages take  $K_p = 0.96$  and  $K_d = 1$ . (07 Marks)

OR

- 8 a. Show that two watt meters are sufficient to measure 3- $\phi$  power. (08 Marks)  
 b. Give comparison between salient-pole and non-salient pole alternator. (05 Marks)  
 c. An impedance of  $(3 + j4)$ ohm is connected in each phase. First in star then in Delta across 415V, 50Hz supply calculate in each case :  
 i) Impedance/ph  
 ii) Current per phase  
 iii) Power factor per phase  
 iv) Total power. (07 Marks)



**Module-5**

- 9 a. What are the losses that occur in 1- $\phi$  transformer and how to overcome them? (07 Marks)
- b. A 250 KVA, 11000/415V, 50Hz single phase transformer has 80 turns on the secondary calculate the following :
- Rated Primary and Secondary currents
  - Number of primary turns
  - Max value of flux in the core
  - Voltage induced per turn. (07 Marks)
- c. A 3 -  $\phi$ , 4-pole, 440V, 50Hz induction motor runs with a slip of 4%. Find its rotor speed and frequency of induced currents. (06 Marks)

**OR**

- 10 a. Explain with phasor diagram the rotating magnetic field produced in the 3 -  $\phi$  stator coils of induction motor in revolving in nature. (07 Marks)
- b. A single phase, 25KVA 1000/2000 volts, 50Hz transformer has a maximum efficiency of 98% at full load unity power factor. Determine its efficiency
- $3/4^{\text{th}}$  full load upf
  - 1.25 full load 0.9 power factor. (07 Marks)
- c. Define slip and synchronous speed and explain briefly significance of slip in induction motor. (06 Marks)

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