

# CBCS SCHEME

USN

15ELE15/25



## First/Second Semester B.E. Degree Examination, June/July 2023 Basic Electrical Engineering

Time: 3 hrs.

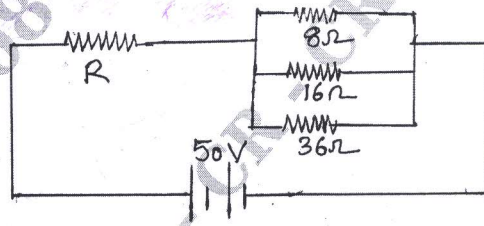
Max. Marks: 80

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

### Module-1

- 1 a. State and explain Kirchhoff's laws. (06 Marks)
- b. Derive the expression for Energy stored in magnetic field. (04 Marks)
- c. Find the value of 'R' if power dissipated in 160 ohm resistor is 36 watts for the circuit shown in Fig. Q1(c). (06 Marks)

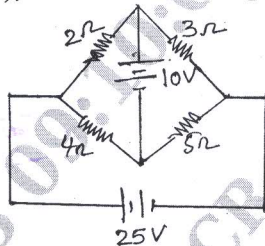
Fig. Q1(c)



OR

- 2 a. Two coupled coils self inductances 0.8 Henry and 0.2 Henry have a co-efficient of coupling 0.9. Find the mutual inductance and turns ratio. (05 Marks)
- b. For the circuit shown in Fig. Q2(b), find current through 10V source and 3Ω. (06 Marks)

Fig. Q2(b)



- c. State and explain Faraday's and Linz laws. (05 Marks)

### Module-2

- 3 a. With a neat diagram, explain the construction and working of a d.c. generator. (06 Marks)
- b. Derive the torque equation of a d.c. motor. (04 Marks)
- c. A 4 pole DC shunt motor takes 22 Amps from 220V supply. The armature and field resistances are 0.5Ω and 100Ω respectively. The armature is lap connected with 300 conductors. If flux / pole is 20 milli webers, calculate speed and gross torque. (06 Marks)

OR

- 4 a. With neat diagram, explain the principle of operation of dynamo meter type Wattmeter. (07 Marks)
- b. An 8 - pole lap connected armature has 40 slots with 12 conductors per slot generates a voltage of 500V. Determine the speed at which it is running if flux / pole is 50 milli weber. (05 Marks)
- c. Explain the significance of back emf and necessity of a starter for a d.c. motor. (04 Marks)

**Module-3**

- 5 a. Derive RMS value for a sinusoidal voltage. Also define Form factor. (05 Marks)  
 b. With neat diagram, explain Plate type Earthing. (04 Marks)  
 c. In a series R – L circuit with  $R = 10\Omega$  and  $L = 1$  Henry,  $I = 10$  Ampere. Find the Power, Power factor of the circuit. Also write equation for voltage in the form  $V = V_m \sin(\omega t + \theta)$ . Take frequency as 50 Hertz. (07 Marks)

**OR**

- 6 a. What is Electric Shock and mention precautions to be taken against Electric Shock. (05 Marks)  
 b. Two circuit comprising of i)  $R = 10\Omega$  in series with inductor of 0.05 Henry.  
 ii) A pure capacitor of  $100\mu\text{f}$  are connected in parallel across 200V, 50Hz supply. Calculate the Total supply current, Power of circuit. (07 Marks)  
 c. Prove in a R – C series circuit current leads voltage by an angle  $\phi$ . (04 Marks)

**Module-4**

- 7 a. With a neat circuit diagram, vector diagram, derive the relationship between line and phase current in a 3 – phase delta connected system. (07 Marks)  
 b. Explain with neat diagram, salient and non – salient pole rotors. (05 Marks)  
 c. Each phase of a Three phase star connected circuits consists of  $R = 10\Omega$  in series with capacitance of  $50\mu\text{ farads}$ . Find the power and power factor of circuit when connected across 400V, 50Hz 3 – phase supply. (04 Marks)

**OR**

- 8 a. A certain balanced 3 – phase load takes 20 kW at 25 KVA. Find the readings of two watt meters connected to measure power. (06 Marks)  
 b. A Three phase star connected synchronous generator driven at 900 RPM is required to generate a line voltage of 460V at 60Hz on open circuit. The stator has two slots per pole per phase and 4 conductors per slot. Calculate i) Number of poles ii) Useful flux per pole. (07 Marks)  
 c. Derive the expression for frequency of an alternator. (03 Marks)

**Module-5**

- 9 a. Explain with neat diagram the construction and working of core and shell type transformer. (06 Marks)  
 b. With neat diagram, explain the working of a Star – Delta Starter. (06 Marks)  
 c. A 250 KVA, 11000/415V, 50Hz single phase transformer has 80 turns on secondary. Calculate i) Primary and Secondary currents ii) The maximum value of flux. (04 Marks)

**OR**

- 10 a. A 12 pole, 3 – phase alternator is coupled to an engine running at 500 RPM. It supplies an induction motor which has a full load speed of 1440 RPM. Find the percentage slip and number of poles of motor. (04 Marks)  
 b. Write the equation for efficiency of an transformer at any load. Also derive the condition for maximum efficiency in a transformer. (06 Marks)  
 c. Describe the construction and working principle Squirrel cage induction motor. (06 Marks)

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