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**ES103** Enrol. No. A2205222336

[ET]

END SEMESTER EXAMINATION : APRIL-MAY, 2024

# BASIC ELECTRICAL ENGINEERING

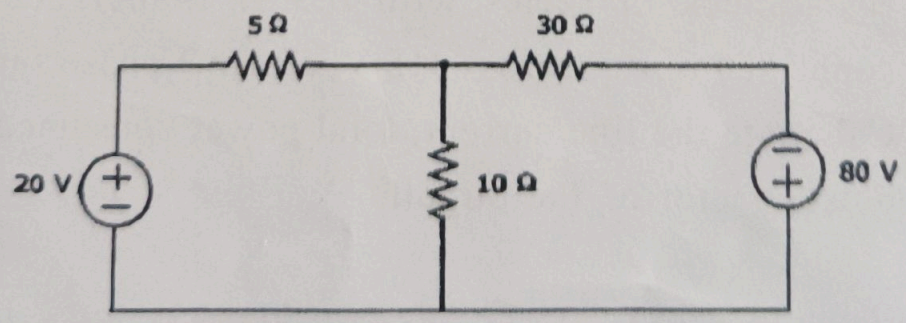
*Time : 3 Hrs.* *Maximum Marks : 60*

**Note:** ***Attempt questions from all sections as directed. Use of Scientific Calculator is allowed.***

## SECTION – A (24 Marks)

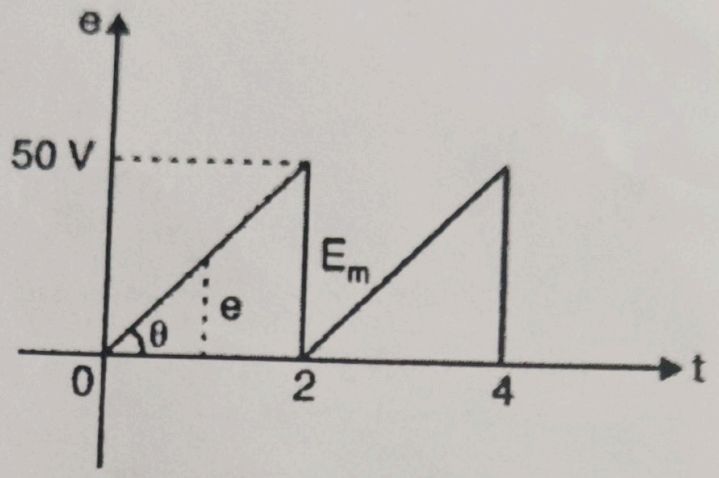
*Attempt any* **four** *questions out of* **five**.
*Each question carries* **06** *marks.*

1. Using mesh current method, determine current in 10Ω resistance for the circuit shown in Fig below




P.T.O.

2. Define Form Factor and determine the form factor of the sawtooth wave shown in Fig




3. Describe the use of shunts and multipliers in PMMC instruments. The meter element of a permanent-magnet moving coil instrument has a resistance of 5 ohms and requires 15 mA for full-scale deflection. Calculate the resistance to be connected in parallel to enable the instrument to read upto 1A.

4. Three impedances each consisting of 50 ohms resistances in series with 0.3 H inductance are connected in star across 415 V, 50 Hz 3-phase supply. Calculate the line current, total power consumed and power factor of the circuit.

5. Derive the EMF equation of transformer. Also define the term turns ratio.

## SECTION – B (20 Marks)

*Attempt any* **two** *questions out of* **three.**
*Each question carries* **10** *marks.*

6. (a) A capacitor when in series with a 145 ohm resistor has a circuit impedance of 208 ohms. Determine (i) the capacitance of capacitor (ii) the power and the (iii) power factor when the circuit is connected to a 130 V, 60 Hz source. (5)

(b) Discuss resonance for RLC series circuit. Derive the expression of resonant frequency. (5)

7. (a) Discuss all the methods for measurement of power in three phase circuit giving connection diagram of each. Why two wattmeter method is preferred among all? (5)

(b) Three coils, each having a resistance of 20 ohms and an inductive reactance of 15 ohms, are connected in star to a 400 V, 3-phase, 50 Hz supply. Calculate (i) Inductance (ii) Impedance (iii) the line current (iv) power factor and (v) power supplied. (5)

8. (a) Discuss Classification of DC Machines based on excitation giving proper diagrams. Write voltage-current equations for different types of dc motors. (6)

P.T.O.

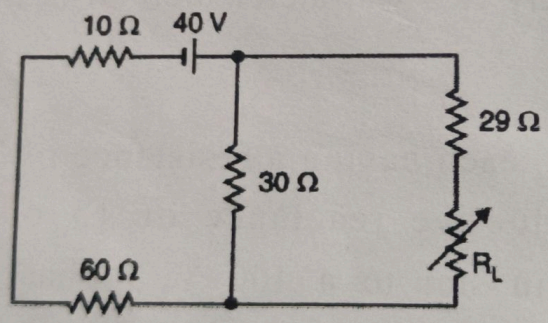
(b) A shunt generator delivers 450 A at 230 V and the resistance of the shunt field and armature are 50 Ω and 0.03 Ω respectively. Calculate the generated EMF? (4)

## SECTION – C (16 Marks)

*(Compulsory)*

9. (a) Explain construction and working of PMMC instrument. Also mention its merits and demerits over other type of instruments. (6)

(b) State Maximum Power Transfer Theorem. Using the theorem determine the value of $R_L$ and maximum Power in circuit shown in fig below.




(5)

(c) Using Norton's theorem, find current through 2Ω resistor in Fig below. (5)