U.S.N.										

B.M.S. College of Engineering, Bengaluru-560019

Autonomous Institute Affiliated to VTU

December 2023 Supplementary Examinations

Programme: B.E. **Semester: I**
Branch: Common to all Branches **Duration: 3 hrs.**
Course Code: 22EE1ESEEE **Max Marks: 100**
Course: Elements of Electrical Engineering

Instructions: 1. Answer any FIVE full questions, choosing one full question from each unit.
2. Missing data, if any, may be suitably assumed.

UNIT - I

1 a) State and Illustrate Kirchhoff's laws as applied to DC circuits. **06**

b) Explain (Ta v/s Ia) and (N v/s Ia) characteristics of DC series Motors. **08**

c) A 500V shunt motor has 4 poles and wave connected winding with 492 conductors. The flux per pole is 0.05wb. The full load current is 20A. The armature and shunt field resistances are 0.1Ω and 250Ω respectively. Calculate the speed and gross torque. **06**

OR

2 a) Arrive at an expression for the armature torque developed in a DC motor. **07**

b) Determine the current in all branches of the network shown in figure:1. **07**

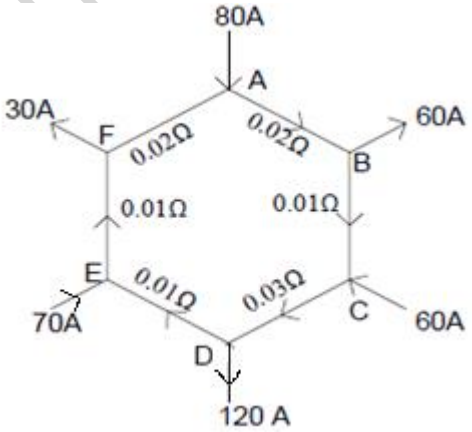

figure:1

c) A 4 Pole 250V, dc series motor has a wave connected armature with 200 conductors. The flux per pole is 25mwb when motor is taking 60A from the supply. Armature resistance is 0.15Ω, while series field winding resistance is 0 2Ω. Calculate speed of the motor under this condition. **06**

UNIT - II

3 a) With relevant waveforms and equations, show that in a Pure capacitive circuit current leads applied sinusoidal voltage by an angle of 90 degrees. **07**

	b)	A resistor of 50Ω and an inductor of 0.1H are connected in series across a 200V, 50Hz supply. Find the impedance, Power factor, current, active power and reactive power.	**07**
	c)	Define RMS value of a sinusoidal wave. Arrive at an expression for the same.	**06**

UNIT - III

4	a)	Derive the relationship between line and phase values of a three-phase star connected system.	**07**
	b)	Mention the advantages of three phase systems over single-phase systems.	**05**
	c)	A balanced star connected load is supplied from a 3ph 400V, 50 Hz supply. Current in each phase is 30A. Phase current leads phase voltage by 30°. Find the parameters of the load.	**08**

UNIT - IV

5	a)	Derive the E.M F equation of a single-phase transformer.	**07**
	b)	Explain the concept of rotating magnetic field in a three-phase induction machine.	**08**
	c)	A 3ϕ 50Hz, induction motor has 8 poles. If the full load slip is 2.5%, determine (i) N_S, (ii) N_R, (iii) rotor frequency.	**05**

OR

6	a)	Give the comparison between squirrel cage and phase wound rotor Induction motors.	**06**
	b)	A 200 kVA transformer has an efficiency of 98% at full load. If the maximum efficiency occurs at 3/4 full load, find the iron and copper losses. The pf of the load is 0.8.	**08**
	c)	Explain the types of losses that occur in a transformer.	**06**

UNIT - V

7	a)	The domestic power load in a house comprises the following: 8 lamps of 60W each, 3 fans of 70W each, 1 refrigerator of 200W, 1 heater of 1000W. a) Calculate the total current taken from the supply of 230V b) Calculate the energy consumed in a day if only a quarter of the above load persists all the time on an average. c.) Calculate the total energy consumed per month.	**06**
	b)	With a neat diagram explain pipe earthing.	**08**
	c)	With a neat block diagram explain the working of Electric vehicles.	**06**

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