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

Autonomous Institute Affiliated to VTU

September / October 2023 Supplementary Examinations

Programme: B.E.   Semester: I / II
Branch: Common to all Branches   Duration: 3 hrs.
Course Code: 18EE1ESELE / 18EE2ESELE   Max Marks: 100
Course: Elements of Electrical Engineering   Date: 22.09.2023
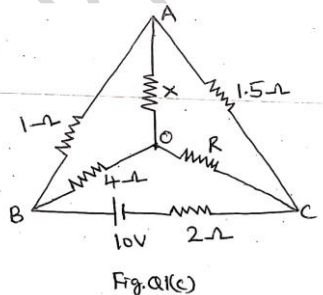
Instructions: 1. Answer any FIVE full questions, choosing one full question from each unit.
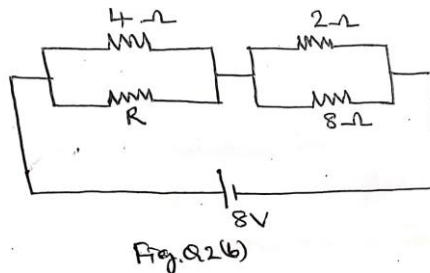2. Missing data, if any, may be suitably assumed.

UNIT - I

1 a) State and explain ohm's law, mention its limitations. **06**

   b) Derive the expression for the torque developed in a dc motor. **06**

   c) Find the value of R and the current flowing through it in the network shown in figure Q1(C), when the current is zero in the branch OA. **08**

Fig.Q1(c)

OR

2 a) What is back EMF in a dc motor? Explain its significance? **06**

   b) The total power consumed by the network shown in figure Q2 (b) is 16 Watts. Find the value of R and the total current. **06**

Fig.Q2(b)

   c) A 440v dc shunt motor takes an armature current of 20A and runs at 500 rpm. The armature resistance is 0.6Ω. If the flux is reduced by 30% and torque is increased by 40%. Calculate the new values of armature current and speed. **08**

UNIT - II

3 a) Derive the expressions for RMS value and average value of a sinusoidal varying alternating current. Hence prove that its form factor is 1.11. **07**

   b) A resistor of 100Ω is connected in series with a 50μF capacitor to a supply of 200V, 50Hz. Find (i) the impedance (ii) the current (iii) the power factor (iv) the phase angle (v) the voltage across resistor and capacitor. **06**

   c) Two circuits A and B are connected in parallel across a 220V, 50Hz supply. Circuit A consists of 100Ω resistor in series with an inductance of 0.1H, circuit B consists of 100μF capacitor in series with resistor of 200Ω.Find current in each branch and total current. **07**

UNIT - III

4 a) Explain the working principle of synchronous generator. **05**

   b) Derive the relation between line and phase quantities of a balanced star connected three phase system. **08**

   c) A 3-phase, 16 pole alternator has a star connected winding with 144 slots and 10 conductors per slot. The flux per pole is 0.03wb and the speed is 375 rpm. Find the frequency and phase and line electromotive force. Given winding factor Kd=0.96, pitch factor Kc=1.0 **07**

OR

5 a) With sketch, explain the construction of salient pole synchronous generator. **05**

   b) With relevant vector diagram, prove that two wattmeter's are sufficient to measure power in a three phase balanced star connected circuit. **08**

   c) Three similar resistors are connected in star across a 400V, three phase supply. The line current is 10A. Calculate (i) the value of each resistor (ii) the line voltage required to give the same line current if the resistors are connected in delta. **07**

UNIT - IV

6 a) Derive EMF equation of transformer. **05**

   b) What are the losses occurring in a transformer? Explain in detail. **07**

   c) A 600kVA single phase transformer has an efficiency of 92% both at full - load and half-load at UPF. Determine its efficiency at 70% of full load at 0.8 power factor lag. **08**

UNIT - V

7 a) With relevant vector diagram, explain the concept of rotating magnetic field in a three-phase induction motor. **08**

   b) What is the necessity of earthing? With a neat diagram explain pipe earthing. **08**

   c) Write a short note on Miniature Circuit Breaker. **04**

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