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Question Paper Code:AEEC01

INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)
Dundigal-500043, Hyderabad

B.Tech II SEMESTER END EXAMINATIONS (REGULAR) - SEPTEMBER 2022
Regulation:UG20

BASIC ELECTRICAL ENGINEERING

Time: 3 Hours **(Common to AE | ME| CE)** **Max Marks: 70**

Answer ALL questions in Module I and II
Answer ONE out of two questions in Modules III, IV and V
All Questions Carry Equal Marks
All parts of the question must be answered in one place only

MODULE – I

1. (a) Is it possible to connect directly two current sources 5A and 3A in series? And similarly can we connect directly two voltage sources 2V and 6V in parallel? Justify your answer.
[BL: Understand| CO: 1|Marks: 7]

   (b) Find the current in the 8Ω resistor in the following circuit shown in Figure 1 using Kirchoff's laws.
[BL: Apply| CO: 1|Marks: 7]

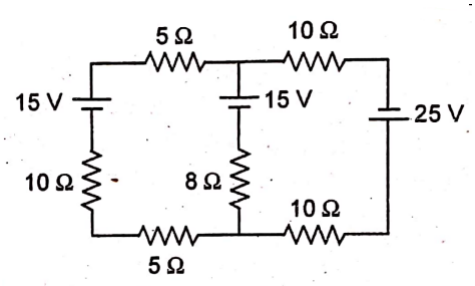

Figure 1

MODULE – II

2. (a) State Thevenin's theorem. Explain the steps to be followed to determine the equivalent circuit while applying Thevenin's theorem to DC network. [BL: Understand| CO: 3|Marks: 7]

   (b) Write the tie set matrix for the following graph shown in Figure 2: [BL: Apply| CO: 3|Marks: 7]

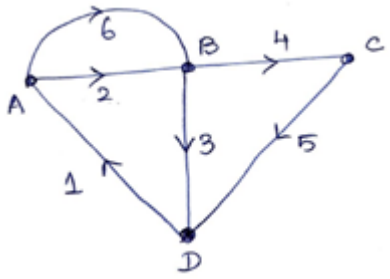

Figure 2

MODULE – III

3. (a) Write the equation for the generated emf in a DC generator. Describe various types of self excited DC generators with their circuit layout. [BL: Apply| CO: 4|Marks: 7]

   (b) A shunt generator delivers 450A at 230V and the resistance of the shunt field and armature are 50Ω and 0.03Ω respectively. Calculate the generated emf. [BL: Apply| CO: 4|Marks: 7]

4. (a) Outline the concept of back emf in DC motors. Summarize the characteristics of DC shunt motor with required equations.

   [BL: Understand| CO: 4|Marks: 7]

   (b) The power input to a 230 V D.C. shunt motor is 8.477 KW. The field resistance is 230 Ω and armature resistance is 0.28 Ω. Find the input current, armature current and back emf.

   [BL: Understand| CO: 4|Marks: 7]

MODULE – IV

5. (a) Develop an equivalent circuit of a single-phase transformer and show that the parameters of primary and secondary may be combined to give a simplified equivalent circuit referred to primary side.

   [BL: Understand| CO: 5|Marks: 7]

   (b) A single-phase, 250-kVA, 11-kV/415-V, 50-Hz transformer has 80 turns on the secondary. Calculate

   i) The approximate values of the primary and secondary currents

   ii) The approximate number of primary turns

   iii) The maximum value of the flux . [BL: Apply| CO: 5|Marks: 7]

6. (a) Draw the phasor diagram of transformer for full load lagging power factor load. Explain each component of the phasor diagram [BL: Understand| CO: 5|Marks: 7]

   (b) A 125 kVA transformer has a primary voltage of 2000 volts at 50Hz. The number of turns in primary is 182 and secondary is 40. Neglecting losses, calculate

   i) No load secondary e.m.f

   ii) Full load primary and secondary current [BL: Apply| CO: 5|Marks: 7]

MODULE – V

7. (a) Explain the operating principle of 3 phase induction motor. Can the rotor run at synchronous speed? Justify your answer. [BL: Understand| CO: 6|Marks: 7]

   (b) A 4 pole 3 phase 50Hz induction motor runs at a speed of 1470rpm. Find the synchronous speed, slip and frequency of induced emf in rotor. [BL: Apply| CO: 6|Marks: 7]

8. (a) Give the constructional details of alternator with relevant diagram.

   [BL: Understand| CO: 6|Marks: 7]

   (b) A 16 pole star connected alternator has 144 slots and 10 conductors per slot. The flux per pole is 30 mWb and the speed is 375 rpm. Find the frequency, the phase and line emf's.

   [BL: Apply| CO: 6|Marks: 7]

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