COLLEGE OF ENGINEERING, PUNE

(An Autonomous Institute of Government of Maharashtra.)
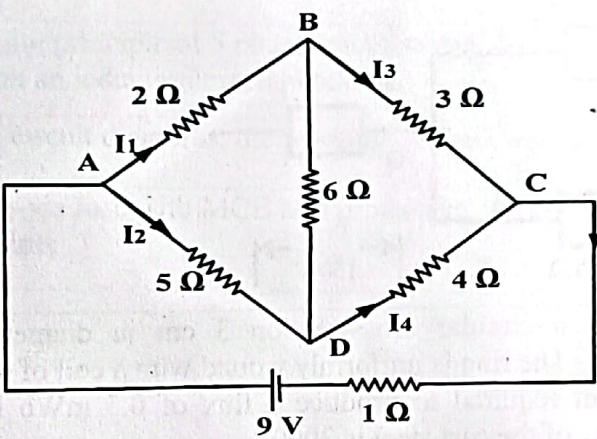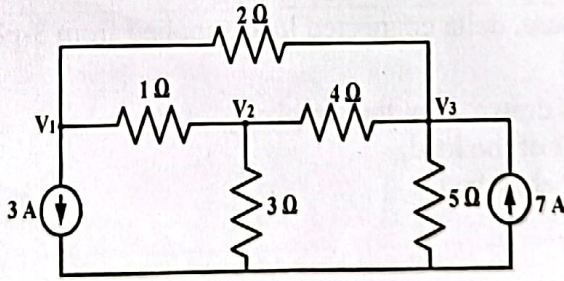
END Semester Examination

Programme: B. Tech

Course Code: EE-19002

Branch: All E-Group

Duration: 3 Hrs

Student PRN No:

Semester: II

Course Name: Basic Electrical Engineering

Academic Year: 2021-22

Max Marks: 60

Instructions:
1. Figures to the right indicate the full marks.
2. Mobile phones and programmable calculators are strictly prohibited.
3. Writing anything on question paper is not allowed.
4. Exchange/Sharing of stationery, calculator etc. not allowed.
5. Write your PRN Number on Question Paper.
6. All questions are compulsory.
7. Assume suitable data wherever necessary.

			Marks	CO
Q 1	a	Calculate the current through 6 ohm resistance in the circuit shown in Fig 1A, using Norton's theorem.	6	A
		Fig 1A		
	b	Find V_1, V_2 and V_3 for the circuit shown in Fig 1B, by Nodal Analysis.	6	A
		Fig 1B		

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Q 2	a	Use the superposition theorem to find current I in the circuit shown in Figure 2A (without using source transformation).	6	A

Figure 2 A

	b	In the given series-parallel circuit shown below, the two parallel branches A and B are in series with the branch C. The impedances in Ω are, $Z_A = 5+j6$, $Z_B = 6-j8$, and $Z_C = 10+j8$. The voltage across the branch, C is $(150+j0)$ V. Find the branch currents, I_A and I_B, and the phase angle between them. Find also the input voltage. Draw the phasor diagram.	6	A

$Z_A = (5+j6)\ \Omega$

$Z_C = (10+j8)\ \Omega$

$Z_B = (6-j8)\ \Omega$

150 V

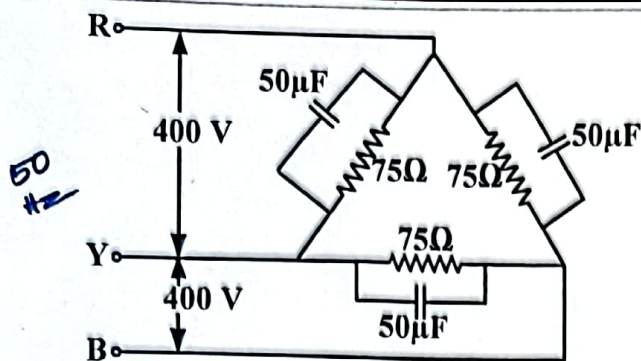| Q 3	a	A cast steel ring has a circular cross-section 3 cm in diameter and mean circumference of 80 cm. The ring is uniformly wound with a coil of 600 turns a) Estimate the current required to produce a flux of 0.5 mWb in the ring if relative permeability of the cast steel is 3000. b) If a saw-cut 2 mm wide is made in the ring, find approximately the flux produced by the current found in (a). c) Find the current value which will give the same flux as in (a). Assume the gap density to be the same as in the iron and neglect fringing.	6	B

	b	Fig. 3B shows 3-phase, delta connected load supplied from 3-phase, 400V, 50 Hz mains. Calculate:
		   a) Line current drawn from the supply.
		   b) Power factor of the load,
		   c) Total power absorbed.
			6	A

Fig 3B

Q 4	a	The primary and secondary windings of a 500-kVA, 11-kV/415-V, single-phase transformer have resistances of 0.42 Ω and 0.0019 Ω, respectively. Its core losses are 2.9 kW. Assuming the power factor to be 0.8, calculate its efficiency on (a) full load, and (b) half load.	6	B
	b	A 200 kVA, 50 Hz, single phase transformer has primary voltage of 2000V and secondary voltage 500V. The supply frequency is 50 Hz. The total effective resistance and reactance referred to the primary are 0.5 Ω and 2 Ω respectively. Calculate the voltage regulation of the transformer at full load and 0.8 power factor lagging.	6	B
Q 5	a	Explain working principle of 3 phase Induction Motor. Define 'slip' in an induction motor working.	4	C
	b	Explain, with circuit diagrams, the working of Buck and Boost converters	4	C
	c	Compare vis-a-vis fuse with MCB as a protecting device in electric installation. Give any 3 points.	4	D

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