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20/12/2023
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National Institute of Technology Hamirpur

Electrical Engineering Department
B.Tech End-Semester Examination – 2023

Semester: I
Maximum Marks: 50

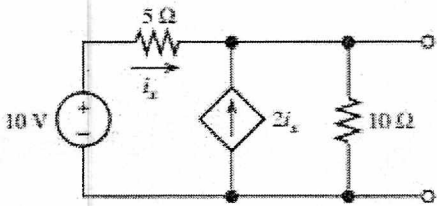
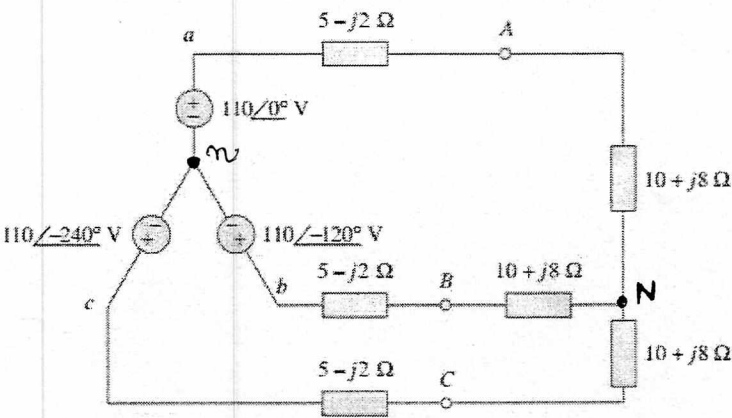
Subject: Basic Electrical Engineering

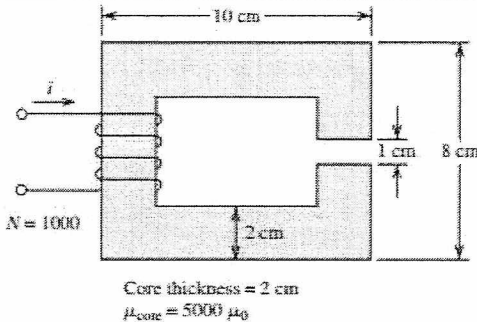
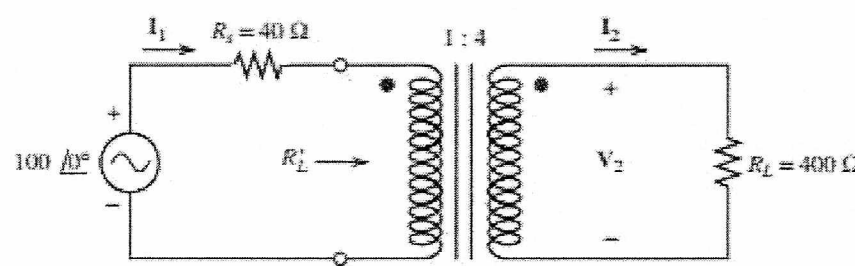
Code: EE-101
Duration: 3 Hours

(Answer All Questions)

5 × 10 = 50

Note: Attempt questions in sequence

1a	Write the voltage-current relationships of circuit elements in time-domain and phasor domain. Draw their phasor diagrams also.	3
1b	For the circuit shown below, find (i) Thevenin equivalent and (ii) Norton equivalent circuits <div style="text-align: center;">  </div>	7
2a	Derive an expression for the instantaneous power in a single-phase system.	3
2b	A three-phase balanced Y-Y system is shown below: <div style="text-align: center;">  </div> <p>Calculate: (a) the supply line voltages, (b) the line currents, (c) the complex power supplied by the source, (d) reactive power drawn by the load and (e) real power loss in the line.</p>	7

3a	Draw the B-H characteristics of (i) hard magnetic material, (ii) soft steel, (iii) ferrite core	3
3b	 <p style="text-align: center;">Core thickness = 2 cm $\mu_{\text{core}} = 5000 \mu_0$</p> <p>Determine the current required to establish a flux density of 0.5 T in the air-gap, (a) neglecting fringing, (b) considering fringing</p>	7
4a	Draw and explain the equivalent circuit of transformer.	3
4b	<p>A single-phase transformer with load is shown below:</p>  <p>Determine: (a) R'_L, the load resistance referred to primary, (b) the primary current (c) the secondary current, (d) the secondary voltage, (e) the power delivered to the load, (f) the turn ratio that would result in maximum power delivered to the load.</p>	7
5a	Moving coil of a galvanometer has 60 turns and a width of 2 cm and a depth of 3 cm. It hangs in a uniform radial field of 50 mWb/m ² . Determine the torque on the coil when it carries a current of 1 mA.	3
5b	With a neat diagram, explain the working of induction type wattmeter.	7