BHOPAL

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TERM END EXAMINATIONS (TEE) – May 2024

Programme	:	**B.Tech.**	**Semester**	:	**Winter Semester 2023-2024**
Course Title/ Course Code	:	**Electric Circuits and Systems /EEE1001**	**Slot**	:	**A11+A12+A13**
Time	:	**3 Hrs.**	**Max. Marks**	:	**100**

Answer ALL the Questions

Q. No.		Question Description	Marks
		PART A – (60 Marks)	
1	(a)	Find the current through R_L=7.5Ω, using superposition theorem as shown in Fig. 1	12

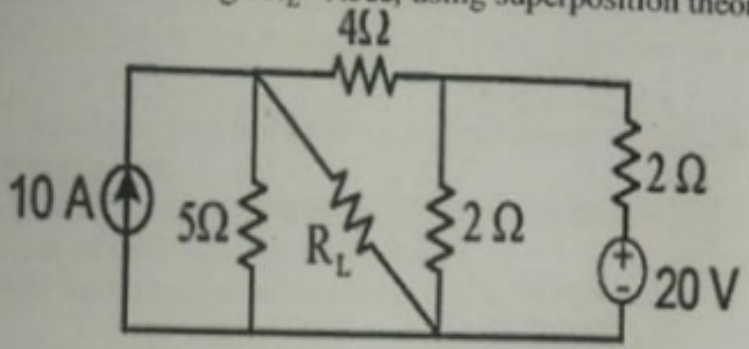


Fig. 1

OR

(b) By applying Thevenin's as well as Norton's theorem show that current flowing through the 16 Ω resistance in the following network is 0.5 A. 12

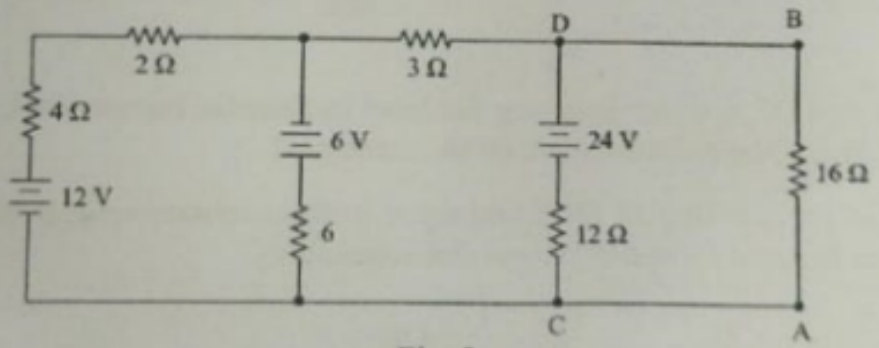


Fig. 2

2 (a) For the circuit shown in Fig. 3 calculate the total current. Draw the phasor diagram. 12

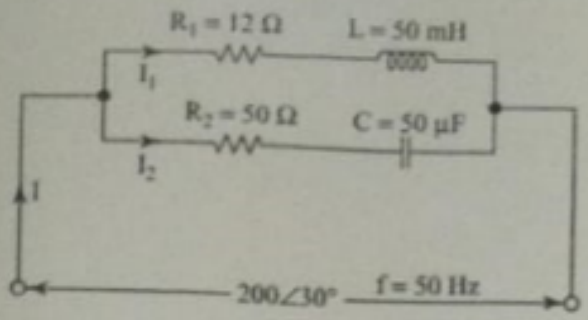
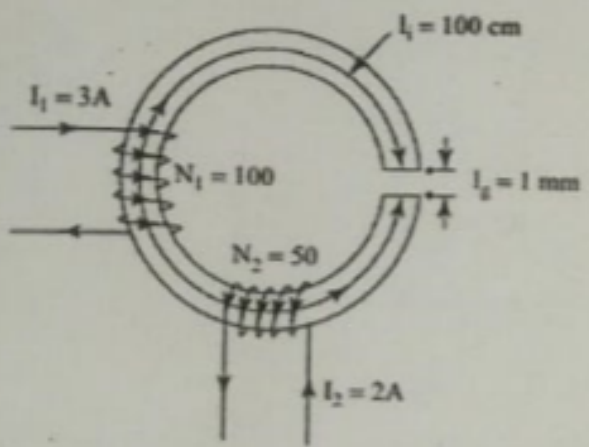


Fig. 3

OR

(b) A circuit of R = 4 Ω, L = 0.5 H, and a variable capacitance C in series is connected across a 100 V, 50 Hz supply. Calculate: (a) the value of capacitance for which resonance will occur; (b) the voltage across the capacitor at resonance and the Q-factor of the circuit 12

(a) An iron ring of mean length of an iron path of 100 cm and having a uniform cross-sectional area of 10 cm2 is wound with two magnetizing coils as shown. The direction of current flowing through the two coils are such that they produce flux in the opposite directions. The permeability of iron is 2000. There is a cut in the ring creating an air gap of 1 mm. Calculate the flux available in the air gap.



12

3

Fig. 4

OR

(b) Illustrate a DC machine in sketch and label its essential components, categorizing them according to the different types of DC machines? 12

(a) Explain the working of *NPN* transistor in the common emitter configuration. Also explain its input as well as output characteristics 12

4

OR

(b) What are the key differences between enhancement-mode and depletion-mode n-channel MOSFETs in terms of construction and operational behaviour? 12

5 (a) Sketch a block diagram illustrating the arrangement of logic gates required for the 8:1 multiplexer, considering the input data lines and select lines. 12

OR

(b) How do combinational and sequential circuits differ in their operation? Explain the working of $S\,R$ flip-flop with the help of truth table, characteristic table and excitation table. 12

PART B – (40 Marks)

6 Calculate the total current supplied by the battery in the network shown in Fig. 5. All resistances shown are in Ohms. 8

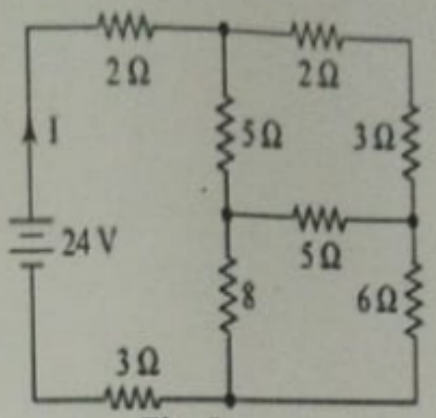


Fig. 5

7 A coil of inductance 1 mH and resistance 50 ohm connected in series with a capacitor is fed from a constant voltage, variable frequency supply source. If the maximum current of 5 A flows at a frequency of 50 Hz, calculate the value of C and the applied voltage. 8

8 What is the expression for EMF of a transformer in terms of its induced voltage with elementary diagram. 8

9 What are the different types of rectifiers, compare the performance of these rectifiers on the basis of their PIV and efficiency. 8

10 Prove with the help of Boolean laws 8

$$AB + B\,C + A\,C_{in} = (A \oplus B)\;C_{in} + A\,B$$

Design a Full Adder using two Half Adders and an OR gate.

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