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Question Paper Code : 11234

B.E./B.Tech. DEGREE EXAMINATIONS, APRIL/MAY 2026.

Second Semester

Electronics and Communication Engineering

EC3251 – CIRCUIT ANALYSIS

(Common to Electronics and Telecommunication Engineering)

(Regulations 2021)

Time : Three hours

Maximum : 100 marks

Answer ALL questions.

PART A — ($10 \times 2 = 20$ marks)

1. List out the active and passive components of electric circuits.
2. Write the properties of series circuits.
3. Define Linearity and Superposition principle.
4. Define Duality.
5. List out the specific characteristics of sinusoid.
6. Define Power Factor in AC circuit analysis.
7. Define the Unit-Step Function.
8. Write the significance of Quality Factor in resonance.
9. Define Mutual Inductance.
10. What is a "Tree" in network topology?

PART B — ($5 \times 13 = 65$ marks)

11. (a) Determine the power delivered by the source Figure 11(a).

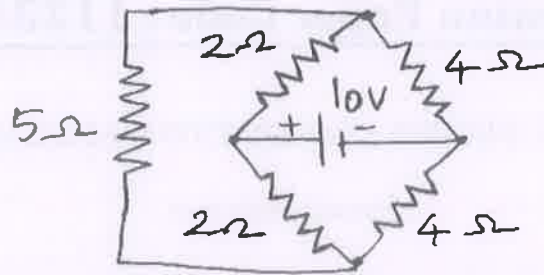


Figure 11 (a)

Or

- (b) Find the R_{eq} for the circuit shown in Figure 11(b) and calculate the current delivered by the source.

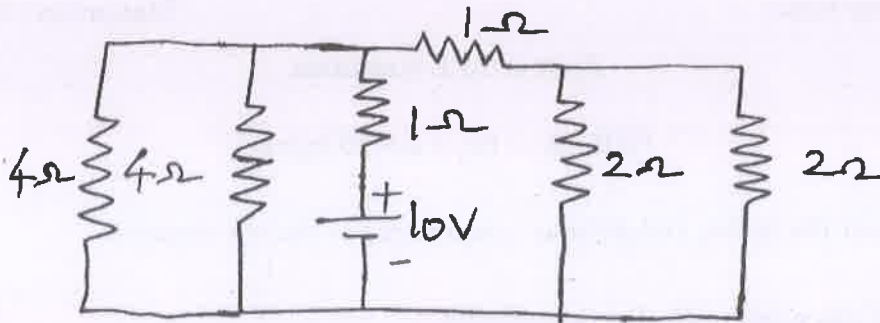


Figure 11 (b)

12. (a) Explain the detailed steps to find the Norton equivalent of a linear network shown in Figure 12 (a).

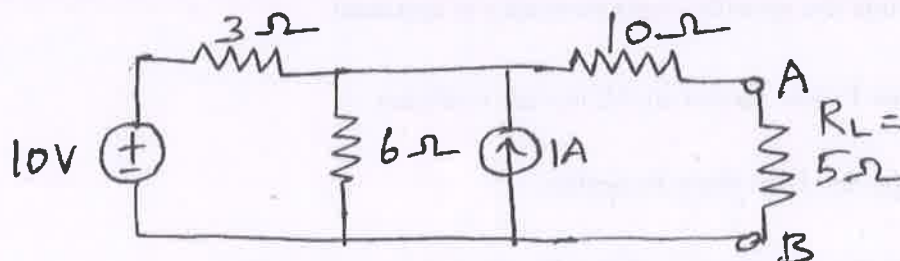


Figure 12(a)

Or

- (b) Verify Superposition theorem for the current I_L marked in the branch AB for the circuit shown in Figure 12 (b).

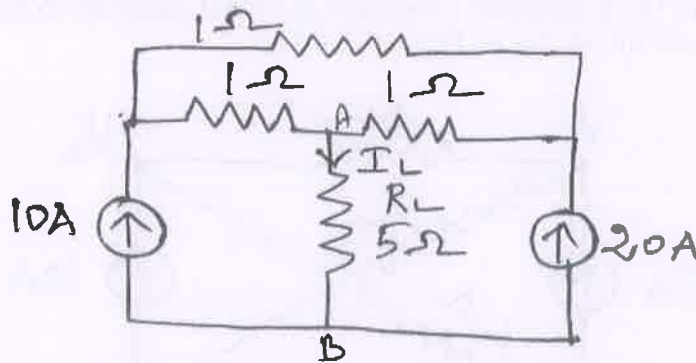


Figure 12 (b)

13. (a) Describe the Step Response of a series RL circuit and provide the mathematical expression for current growth.

Or

- (b) A series has $R = 50 \Omega$, $L = 0.15 \text{ mH}$ and $C = 100 \mu\text{F}$ and is supplied with 230 V, 50 Hz single-phase. Find impedance, current, power, power factor of the circuit.

14. (a) Evaluate the transient behavior of a Driven RLC Circuit to determine if the system is overdamped or underdamped.

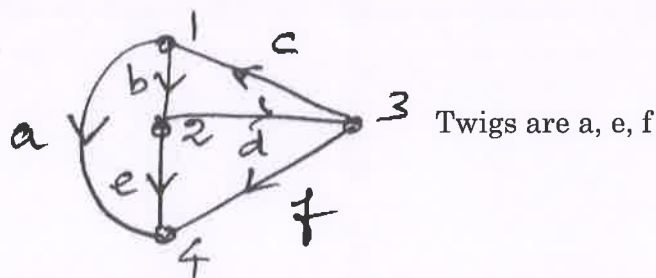
Or

- (b) Initially relaxed series RL circuit with $R = 100 \Omega$ and $L = 20 \text{ H}$ has DC voltage of 200 V applied at time $t = 0$. Find (i) the equation for current and voltages across different elements (ii) the current at time $t = 0.5 \text{ s}$ and 1.0 s (iii) the time at which the voltages across the resistor and inductor are equal.

15. (a) Explain the principle of an Ideal Transformer and derive its voltage and current transformation ratios.

Or

- (b) Describe the procedure for constructing Cut-set matrix and Tie-set matrix for a given network graph.



PART C — (1 × 15 = 15 marks)

16. (a) Explain the systematic procedure of Nodal Analysis to find node voltages in the circuit shown in Figure 16 (a).

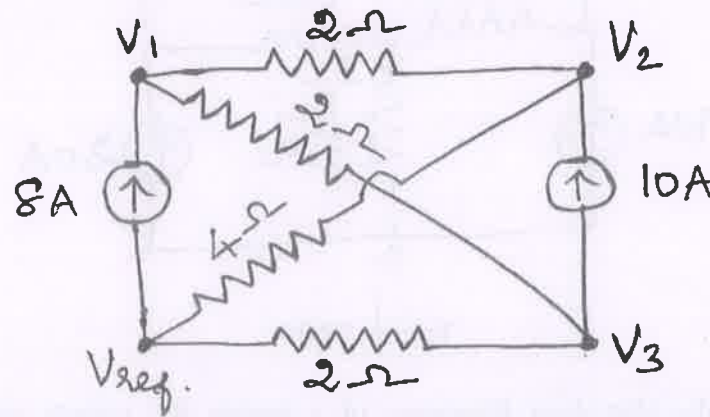


Figure 16 (a)

Or

- (b) Explain the systematic procedure of Mesh Analysis and find mesh currents in the circuit shown in Figure 16 (b).

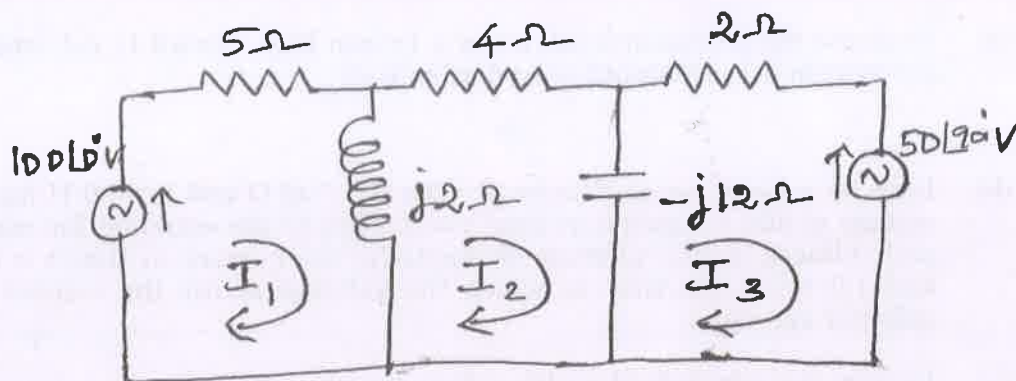


Figure 16 (b)