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Question Paper Code : 81227

B.E./B.Tech. DEGREE EXAMINATIONS, NOVEMBER/DECEMBER 2025.

Second Semester

Electronics and Communication Engineering

EC 3251 — CIRCUIT ANALYSIS

(Common to : Electronics and Telecommunication Engineering)

(Regulations 2021)

Time : Three hours Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Write two examples in each for active elements and passive elements.

2. Compare the specific properties of series and parallel circuits.

3. State Superposition theorem and its limitations.

4. List out the properties of dual circuits.

5. Define a phasor quantity.

6. State complex power.

7. What is meant by source-free circuit? Give an example.

8. Define quality factor.

9. Mention the properties of an ideal transformer.

10. Write the significance of graphs in network analysis.

PART B — (5 × 13 = 65 marks)

11. (a) For the circuit shown in Figure 11(a), obtain the equivalent resistance across terminals P and Q.

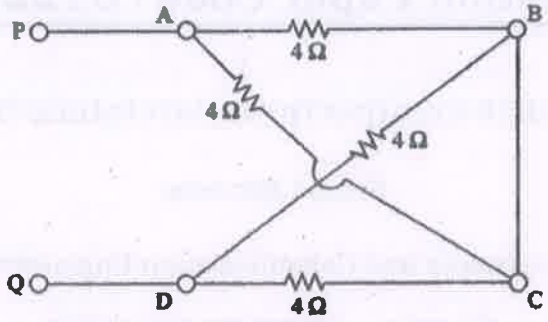

Figure 11(a)

Or

(b) For the circuit shown in Figure 11(b), find the voltage V_{ab}.

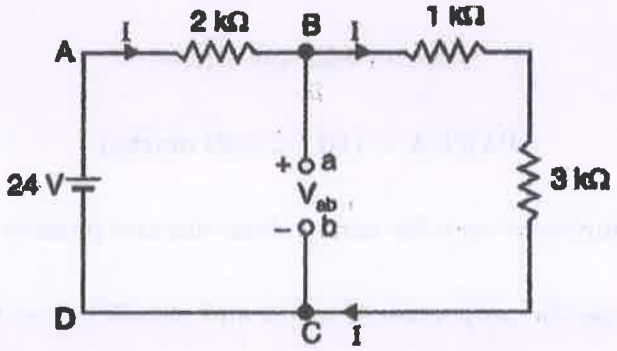

Figure 11(b)

12. (a) For the circuit shown in Figure 12(a), obtain Thevenin's equivalent circuit across terminals ab.

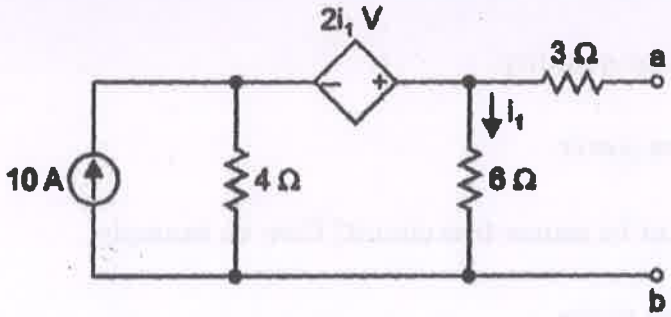

Figure 12(a)

Or

(b) For the circuit shown in Figure 12 (b), find the current delivered by the source using Delta–Wye conversion

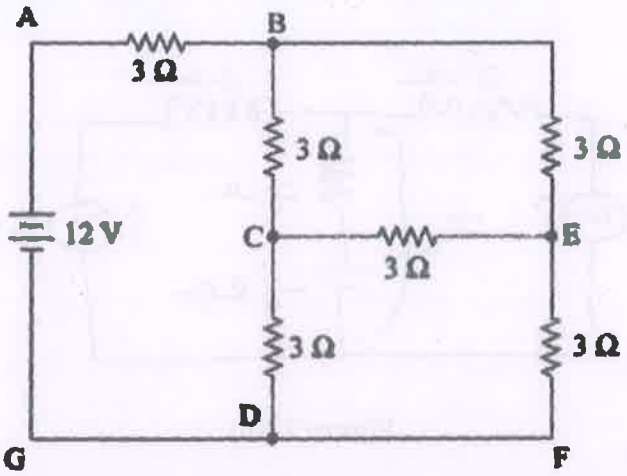

Figure 12(b)

13. (a) An inductive coil of resistance 5 Ω and inductive reactance 10 Ω is connected across a voltage of 230 V at 50 Hz as shown in Figure 13(a). Calculate the value of the capacitor which when connected in parallel with the coil will bring down the magnitude of the circuit current to a minimum. Draw the phasor diagram.

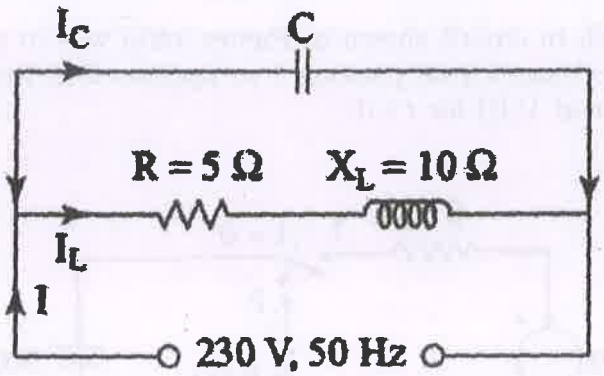

Figure 13(a)

Or

(b) For the circuit shown in Figure 13(b), find the voltage across load impedance Z_L.

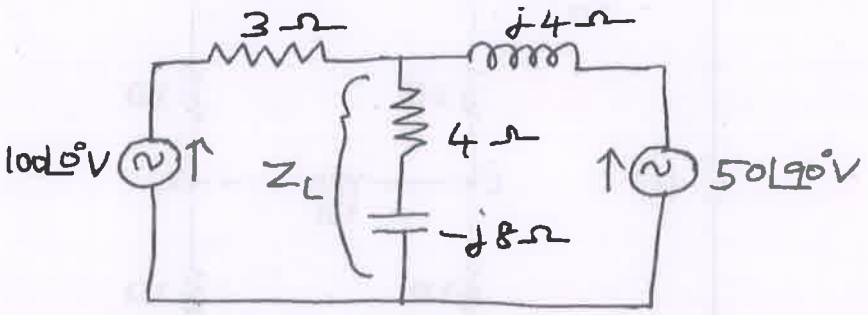

Figure 13(b)

14. (a) An R–L–C series circuit has R = 10 Ω, L = 0.1 H and C = μF. Calculate the following :

(i) resonant frequency; (3)

(ii) Q-factor of the circuit at resonance; (3)

(iii) half-power frequencies and (3)

(iv) bandwidth. (4)

Or

(b) The switch in circuit shown in Figure 14(b) was in position 1 for a long time. It is moved from position 1 to position 2 at time t = 0. Sketch the wave form of $V_C(t)$ for $t > 0$.

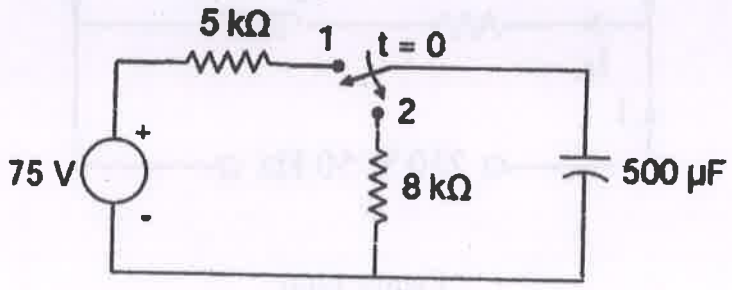

Figure 14(b)

15. (a) For the circuit shown in Figure 15(a), calculate the voltage across 10 Ω resistor, $V_{10\Omega}$.

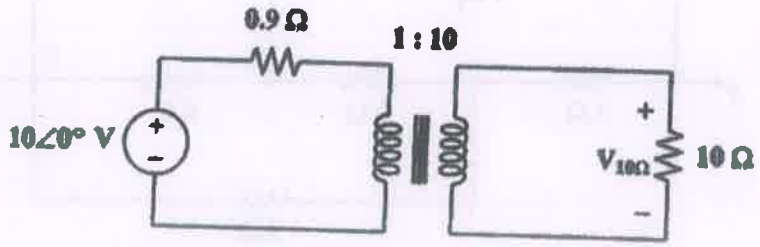

Figure 15(a)

Or

(b) Explain the procedure for formation of graph, trees and links with an example.

PART C — (1 × 15 = 15 marks)

16. (a) For the circuit shown in Figure 16(a), verify Norton's Theorem by finding the current through the load resistor R_L.

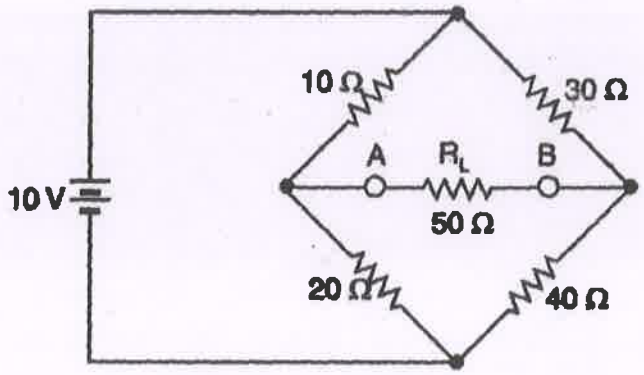

Figure 16(a)

Or

(b) For the circuit shown in Figure 16(b), Calculate the equivalent resistance of the network across terminals P and Q.

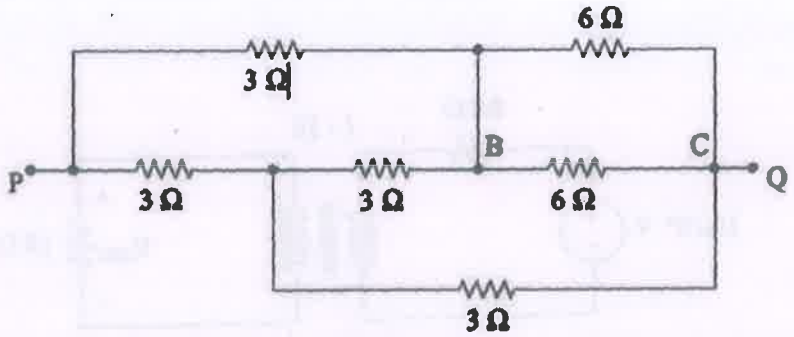

Figure 16(b)