Reg. No. : | | | | | | | | | | | | |

Question Paper Code : 30135

B.E./B.Tech. DEGREE EXAMINATIONS, APRIL/MAY 2023.

Second Semester

Electronics and Communication Engineering

EC 3251 – CIRCUIT ANALYSIS

(Common to: Electronics and Telecommunication Engineering)

(Regulations 2021)

Time : Three hours | Maximum : 100 marks

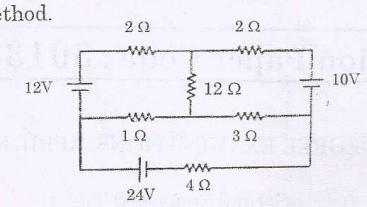
Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Define charge.
2. Write the characteristics of series connection of resistances.
3. Draw the Thevenin's equivalent circuit.
4. Define Dependent sources.
5. A resistance 100 Ω and capacitive reactance – j150 Ω are connected in series. The voltage applied is 50 V. Determine the power factor.
6. Write the expression for the total admittance of Y1 and Y2 in series and parallel combination.
7. Define resonance. What is the condition for resonance for an RLC series circuit?
8. An RLC circuit consists of a resistance of 1000 Ω, an inductance of 100 mH and a capacitance of 10 μF . Find the Q factor of the circuit.
9. Define Link.
10. What is the maximum possible mutual inductance of two inductively coupled coils, with self-inductances L1 = 25 mH, L2 = 100 mH?

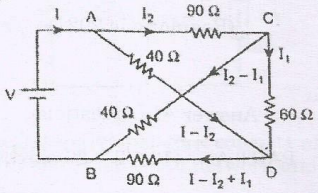
PART B — (5 × 13 = 65 marks)

11. (a) Determine the current in the 4Ω branch in the given circuit? Use mesh analysis method. (13)

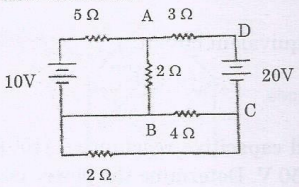


Or

(b) A network of resistors has a pair of input terminals AB connected to a d.c supply and a pair of output terminal CD connected to a load resistor of 60 Ω. The resistances of the network are AC = BD = 90Ω, AD = BC = 40Ω. Find the ratio of the current in the load resistor to that taken from supply. (13)

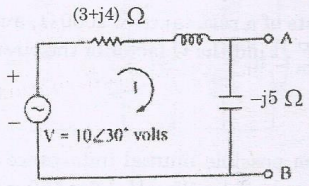


12. (a) Find the current in the 2Ω resistor between A and B for the network using superposition theorem. (13)



Or

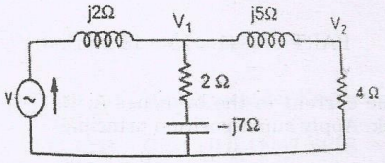
(b) A loud Speaker is connected across the terminals A and B of the network shown in figure below. What should be the value of impedance of the speaker to obtain maximum power transferred to it and what is the maximum power? (13)



13. (a) A voltage source of 100V with a resistance of 10 Ω, an inductance of 50mH and a capacitance of 50 μF are connected in series. Calculate the impedance when frequency is (i) 50Hz, (ii) 500Hz, (iii) Power factor at 100Hz. (13)

Or

(b) Solve for V1 and V2 using nodal method for the circuit in the figure. V = 100 Volts. (13)

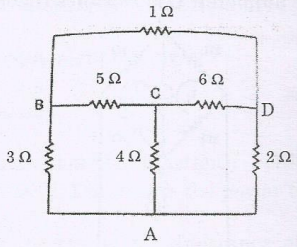


14. (a) Explain in detail about the Source Free series RLC Circuit. (13)

Or

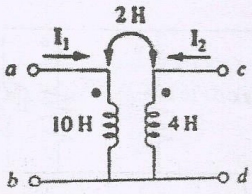
(b) A series circuit has R = 100 Ω, L = 50mH, and C = 100 μF and is supplied with 200 V, 50 Hz. Find the impedance, the current, the power factor, the power and the voltage drop across each element. (13)

15. (a) For the network given, draw the graph and a tree. Show the link currents. Write the tie-set schedule for the tree, the equations for branch currents in terms of link currents. Also write independent equations. (13)

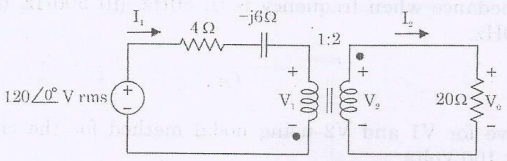


Or

(b) (i) Determine the T-equivalent circuit of the linear transformer shown. (3)

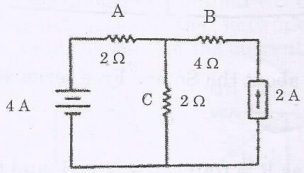


(ii) For the Ideal Transformer circuit shown here, find the source current I_1, the output voltage V_0, and the complex power supplied by the source. (10)



PART C — (1 × 15 = 15 marks)

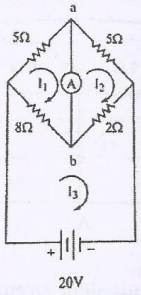
16. (a) (i) Find the current in the branches A, B, C of the following 2 source network. Apply super position principle. (12)



(ii) A Y-connected resistive network consists of 2Ω in each arm. Draw the equivalent delta-connected network and insert the values. (3)

Or

(b) (i) In the circuit of the figure, compute the current through the O resistance ammeter. Use Norton's theorem. (10)



(ii) Find the Norton's and the Thevenin's equivalent for the circuit shown. (5)