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Question Paper Code: 53403

B.E. / B.Tech. DEGREE EXAMINATION, NOV 2022

Third Semester

Electronics and Communication Engineering

15UEC303 - CIRCUIT THEORY

(Regulation 2015)

Duration: Three hours

Maximum: 100 Marks

Answer ALL Questions

PART A - (5 x 1 = 5 Marks)

1. The complementary set of branches of the tree is called the _____ of the graph CO1- R
(a) Co-tree (b) Twigs (c) Links (d) Chords
2. Thevenin's equivalent circuit consists of _____ with impedance. CO2- R
(a) Voltage source in parallel (b) Voltage source in series.
(c) Current source in series (d) Current source in parallel
3. In a series RLC circuit, the current _____ the applied voltage when $X_L < X_C$ CO3- R
(a) Lag behind (b) Leads (c) In phase with (d) Not related to
4. Transmission parameters are also called as _____ CO4- R
(a) ABCD parameter (b) Y- parameters (c) Z-parameters (d) H-parameters
5. A tuned amplifier uses _____ load CO5- R
(a) Resistive (b) Capacitive (c) Inductive (d) LC tank

PART – B (5 x 3= 15 Marks)

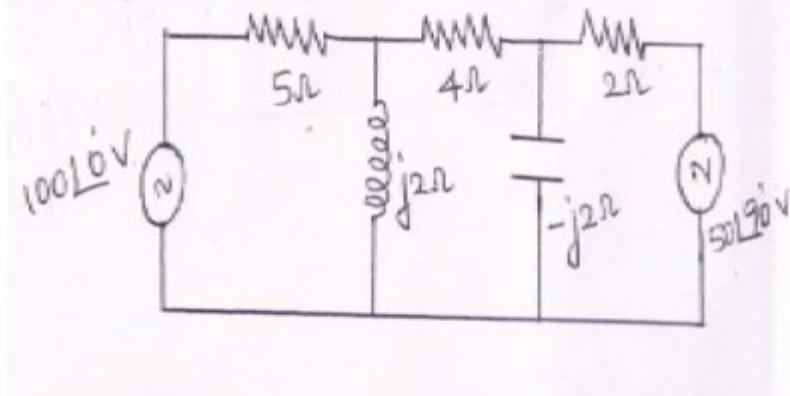
6. The resistance of 1.5Ω and 3.5Ω are connected in parallel and this parallel combination is connected in series with a resistance of 1.95Ω . Calculate the equivalent resistance value. CO1- R
7. State maximum power transfer theorem. CO2- R
8. Draw the frequency response of an RL circuit. CO3- R

9. State the difference between driving point impedance and transfer impedance. CO4- R

10. Define coefficient of coupling. CO5- R

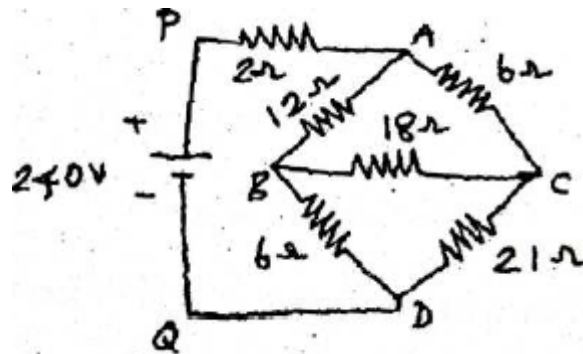
PART – C (5 x 16= 80 Marks)

11. (a) Calculate loop currents by mesh analysis CO1- App (16)

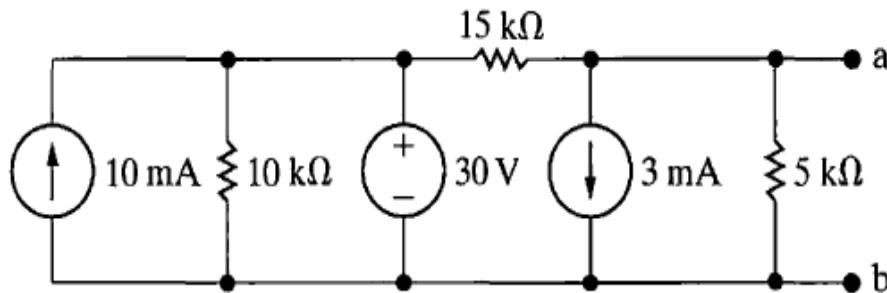


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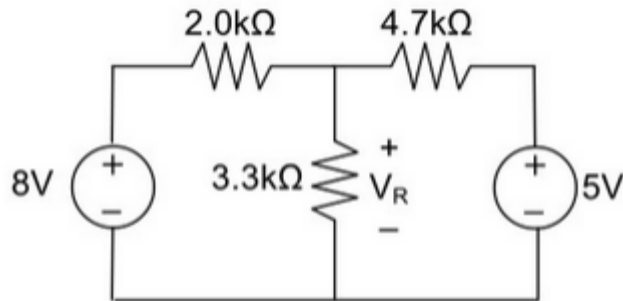
(b) Using star-delta transformation, in the following wheat stone bridge circuit of figure. Calculate (i) the equivalent resistance between P&Q (ii) the total current (iii) the current through the 18Ω resistor. CO1- App (16)



12. (a) (i) Obtain the Norton's equivalent across the terminal ab. CO2- App (8)

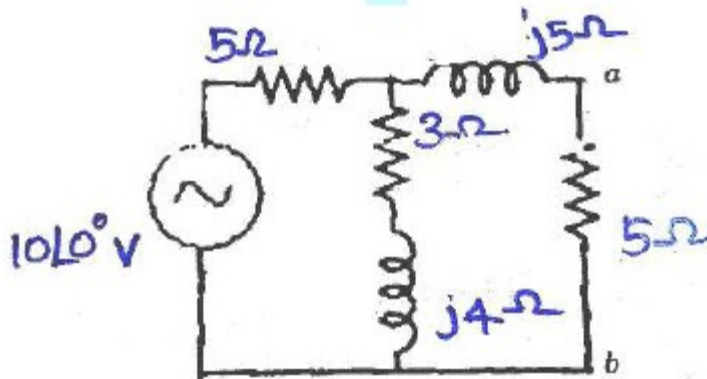


- (ii) Using the superposition theorem, determine the voltage drop and current across the resistor $3.3\text{k}\Omega$ as shown in figure below. CO2- App (8)



Or

- (b) Define Thevenin's theorem and find the current through the branch a-b of the network shown in fig CO2- App (16)

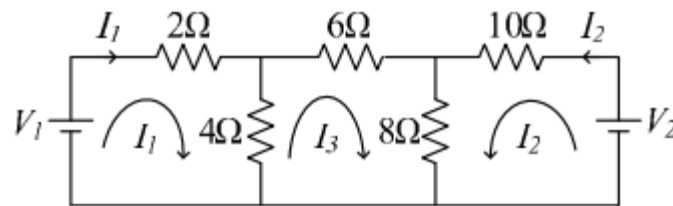


13. (a) For the series resonant circuit with $R=2\ \Omega$, $X_L=X_C=10\ \Omega$ and $E=10\text{V}$. find I , V_R , V_L and V_C at resonance. Also, if resonant frequency is 5000Hz , determine bandwidth, Q factor, half power frequencies and power dissipated in the circuit at resonance and at the half power frequencies. Derive the expression for resonant frequency. CO3- Ana (16)

Or

- (b) Impedance Z_1 and Z_2 are parallel and this combination is in series with an impedance Z_3 connected to a 100V , 50 Hz ac supply. $Z_1= (5-jX_c)$ ohm, $Z_2= (5+j0)$ ohm, $Z_3= (6.25+j1.25)$ ohm. Calculate the value of capacitance such that the total current of the circuit will be in phase with the total voltage. Find the circuit current and power. CO3- Ana (16)

14. (a) Find Z parameters for the following network. CO4- App (16)



Or

- (b) Derive the expression for hybrid parameters in terms of admittance parameters CO4- App (16)
15. (a) Derive the mutual inductance and the coupling coefficient of the transformer with necessary illustration CO5- U (16)

Or

- (b) Explain three phase power measurement by 2 wattmeter method for star and delta connected load and determine the power equation and draw the phasor diagram. CO5- U (16)