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Question Paper Code: 43403

B.E. / B.Tech. DEGREE EXAMINATION, NOV 2019

Third Semester

Electronics and Communication Engineering

14UEC303 - CIRCUIT THEORY

(Regulation 2014)

Duration: Three hours

Maximum: 100 Marks

Answer ALL Questions

PART A - (10 x 1 = 10 Marks)

- The number of independent loops for a network with n nodes and b branches is
 - $n-1$
 - $b-n$
 - $b-n+1$
 - independent for the number of nodes
- Mesh analysis makes use of the basic equation
 - $[V] = [Z] [I]$
 - $[I] = [Z] [V]$
 - $[V] = [Y] [I]$
 - $[I] = [Y] [V]$
- Superposition theorem is not applicable to networks containing
 - nonlinear elements
 - dependent voltage source
 - dependent current source
 - transformers
- Maximum power gets transferred to the load when the load impedance is
 - equal to zero
 - equal to one
 - equal to source impedance
 - none of the above
- What is the Q (Quality factor) of a series circuit that resonates at 6 kHz , has equal reactance of 4 kilo-ohms each, and a resistor value of 50 ohms ?
 - 0.001
 - 50
 - 80
 - 4.0
- The Q -factor in a series R-LC circuit at resonance is
 - $\frac{1}{R} \sqrt{\frac{C}{L}}$
 - $\frac{1}{L} \sqrt{\frac{C}{R}}$
 - $\frac{1}{R} \sqrt{\frac{L}{C}}$
 - $\frac{1}{R^2} \sqrt{\frac{C}{L}}$

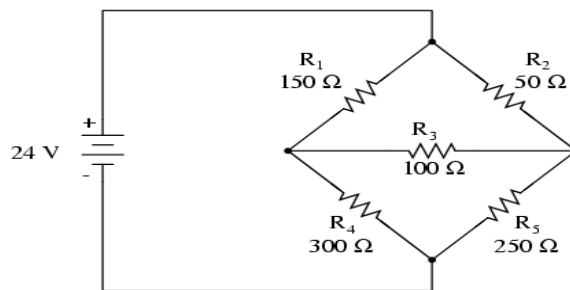
7. Self-inductance of a magnetic coil is proportional to
 (a) N (b) $1/N$ (c) N^2 (d) $1/N^2$
8. In two wattmeter method of power measurement, when the power factor of load is zero leading or lagging the two wattmeter will give _____ reading.
 (a) Zero (b) equal
 (c) equal and opposite (d) not equal
9. Which parameters are widely used in transmission line theory?
 (a) Z parameters (b) Y parameters
 (c) ABCD parameters (d) h parameters
10. The number of possible combinations generated by four variables taken two at a time in a two port network is
 (a) Four (b) Two (c) Six (d) Zero

PART - B (5 x 2 = 10 Marks)

11. A 10 A current source has a source resistance of 100 *ohm*. What will be the equivalent voltage source?
12. State Norton's theorem.
13. Give the expressions for series and parallel resonance frequency.
14. Define mutual inductance.
15. What is low pass filter?

PART - C (5 x 16 = 80 Marks)

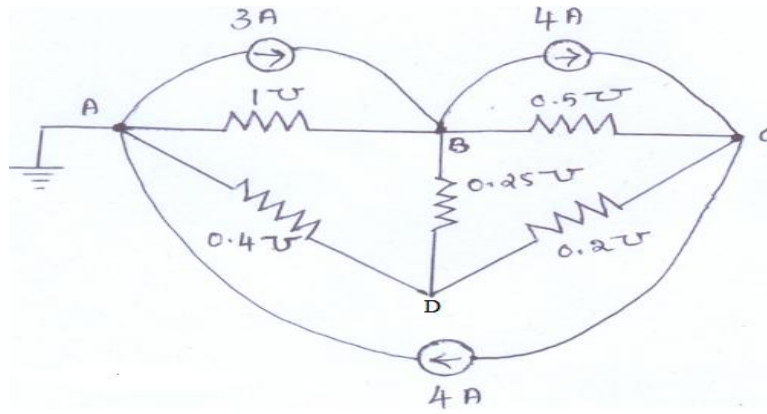
16. (a) Find the mesh currents for the following electric circuit shown in Figure (16)



Figure

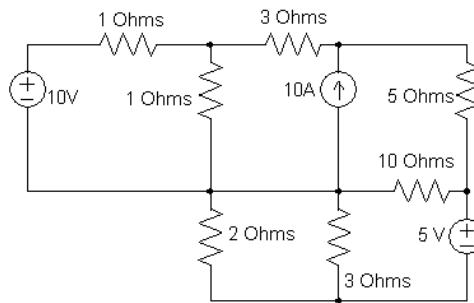
Or

- (b) (i) Find V_{BD} by nodal analysis for the circuit shown in the figure (10)



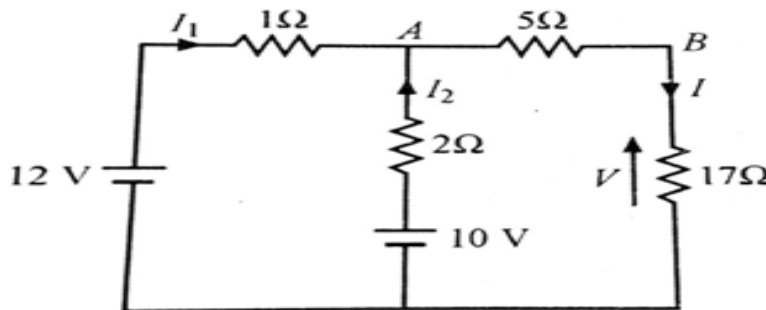
(ii) Obtain the expression for star-delta transformation. (6)

17. (a) Determine the current in 2 ohm resistor for the electric circuit shown in Figure using superposition theorem. (16)



Or

(b) (i) Using Thevenin's theorems find V and I for the circuit shown in figure (14)



Figure

(ii) State reciprocity theorem. (2)

18. (a) Obtain the resonant frequency, Q-factor, band width and the voltage across the capacitor at resonance for the series RLC circuit having $R = 7.5\Omega$, $L = 6\mu H$ and $C = 40pF$, with a supply voltage of 0.5 volts. (16)

Or

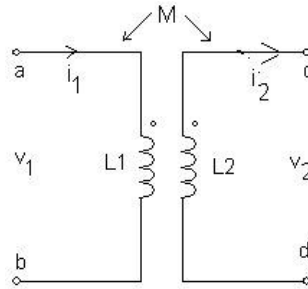
(b) (i) Derive the equation for transient response of RLC circuit for DC input. (12)

(ii) Draw the pole –zero diagram of the given network function

$$I(s) = \frac{5s}{(s+1)(s^2+4s+8)} \quad (4)$$

19. (a) For the circuit shown in figure, $L1 = 4H$, $L2 = 9H$, $K = 0.5$, $i_1 = 5 \cos(50t-30^\circ)A$, $i_2 = 2 \cos(50t-30^\circ)A$. Find

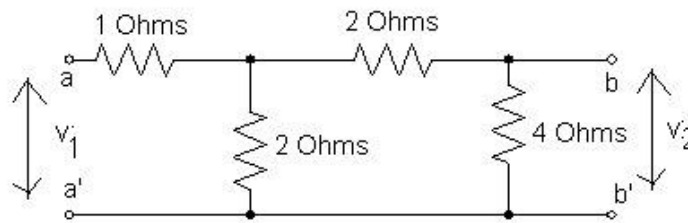
(i) V_1 (ii) V_2 (iii) total energy stored in the system at $t = 0$. (16)



Or

(b) Illustrate the power measurement by two wattmeter method in a three phase system. (16)

20. (a) Find the h parameters for the network shown in figure-6. (16)



Or

(b) (i) Design a low pass filter having cut – off frequency of 2 KHz , to operate with a terminal load resistance of 500Ω . (8)

(ii) Design a high pass filter having a cut-off frequency of 1 KHz with a load resistance of 600Ω . (8)