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Question Paper Code: 50535

B.E. / B.Tech. DEGREE EXAMINATION, MAY 2017

Third Semester

Electronics and Instrumentation Engineering

15UEI305 - ELECTRICAL CIRCUITS AND NETWORKS

(Regulation 2015)

Duration: Three hours Maximum: 100 Marks

Answer ALL Questions

PART A - (10 x 1 = 10 Marks)

1. Kirchhoff's laws are applicable to circuits with

   (a) Distributed parameters (b) Lumped parameters

   (c) Passive elements (d) Non-linear resistances

2. If there are 'b' branches and 'n' nodes the number of equations will be

   (a) n-1 (b) b (c) b-n-1 (d) b-n+1

3. The superposition theorem requires as many circuits to be solved as there are

   (a) Nodes (b) Sources

   (c) Nodes and Sources (d) Nodes, Sources and Mesh

4. Thevenin’s resistance Rth is found

   (a) By removing the voltage sources along with their internal resistances
   (b) By short circuiting the two terminals
   (c) Between any two open terminals
   (d) Between same open terminals as for Eth

5. Which of the following is nonlinear circuit parameter

(a) Transistor (b) Inductor
(c) Condenser (d) Wire wound resister

6. A Capacitor is generally a

(a) Bilateral and active component (b) Non-Linear component
(c) Linear and Bilateral component (d) Nonlinear active component

7. In a series-parallel circuit, any two resistance in the same current path may be connected in

(a) Series with each other (b) Parallel with each other
(c) Series with the voltage source (d) Parallel with the voltage source

8. The laplace transform of capacitor value *'c'* will be

(a) C (b) $1/S$ (c) $1/CS$ (d) CS

9. The power of a 3 phase supply systems of having V line voltage is

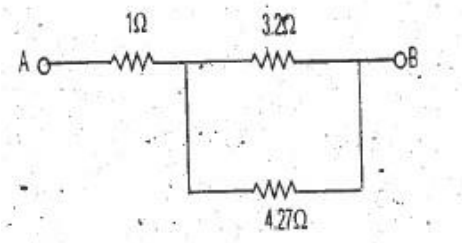
(a) VI (b) $3VI$ (c) $\sqrt{3}VI\cos\varphi$ (d) $3VI\cos\varphi$

10. For a 3 - phase load balanced condition, each phase has the same value of

(a) Impedance (b) Resistance
(c) Power factor (d) All of these

PART - B (5 x 2 = 10 Marks)

11. Determine the equivalent resistance of the given circuit



12. List the applications of Thevenin's theorem.

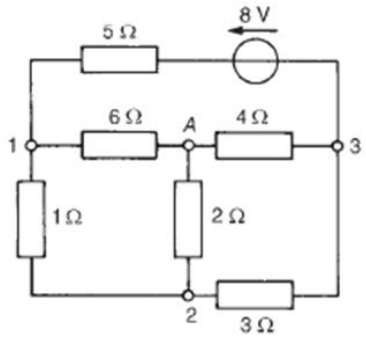
13. Define the term coefficient of coupling.

14. Write the expression for critical resistance and damping ratio of RLC series circuit.

15. Give the line and phase equation of star and delta connection.

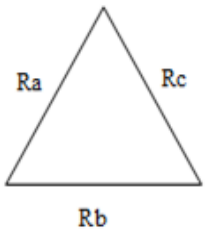
PART - C (5 x 16 = 80 Marks)

16. (a) Use nodal analysis to determine the voltages at nodes 2 and 3 in fig. and hence determine the current flowing in the 2 Ω resistor and the power dissipated in the 3 Ω resistor. (16)

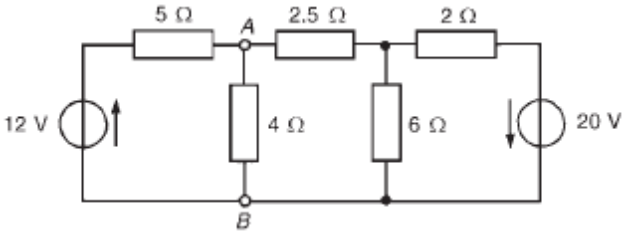


Or

(b) Derive for a given delta connected system the equivalent value in star position. (16)

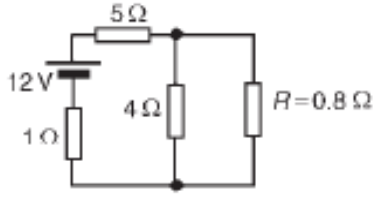


17. (a) Use the superposition theorem to determine the current in the 4Ω resistor of the network shown in Fig. (16)



Or

(b) For the network shown in Fig. Determine the current in the 0.8Ω resistor using Thevenin's theorem. (16)



18. (a) Two coils are connected in series and their effective inductance is found to be 15 mH. When the connection to one coil is reversed, the effective inductance is found to be 10 mH. If the coefficient of coupling is 0.7, determine (a) the self-inductance of each coil, and (b) the mutual inductance (16)

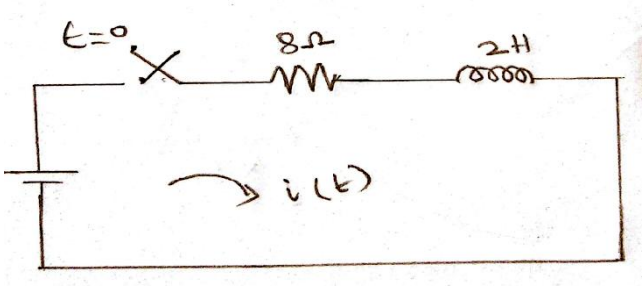
Or

(b) Two mutually coupled coils X and Y are connected in series to a 240 V d.c. supply. Coil X has a resistance of 5Ω and an inductance of 1 H. Coil Y has a resistance of 10Ω and an inductance of 5 H. At a certain instant after the circuit is connected, the current is 8 A and increasing at a rate of 15 A/s. Determine (a) the mutual inductance between the coils and (b) the coefficient of coupling. (16)

19. (a) A circuit comprises a 50 Ω resistor, a 5 mH inductor and a 0.04 μF capacitor. Determine, in the s-domain (a) the impedance when the components are connected in series, and (b) the admittance when the components are connected in parallel. (16)

Or

(b) In the circuit given below, find the transient current and the initial rate of growth of current when the switch is closed at $t = 0$. (16)



20. (a) With a neat circuit and phasor diagram explain the three-phase power measurement by two wattmeter method and also derive the expression for Power Factor. (16)

Or

(b) Three identical coils each having a resistance of 20 Ω and a reactance of 20 Ω are connected in i) Star ii) Delta across 440 V, 3 phase supply. Calculate for each case, line current and reading in each of the wattmeter connected to measure power. (16)