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Question Paper Code: 53505

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

Third Semester

Electronics and Instrumentation Engineering

15UEI305 - ELECTRICAL CIRCUITS AND NETWORKS

(Regulation 2015)

Duration: Three hours

Maximum: 100 Marks

Answer ALL Questions

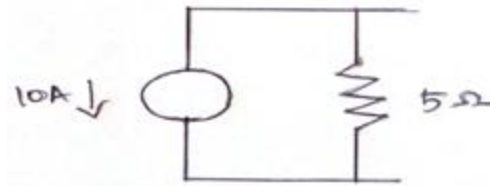
PART A - (10 x 1 = 10 Marks)

- Kirchhoff's laws are applicable to circuits with
 - Distributed parameters
 - Lumped parameters
 - Passive elements
 - Non-linear resistances
- If there are 'b' branches and 'n' nodes the number of equations will be
 - n-1
 - b
 - b-n-1
 - b-n+1
- The superposition theorem requires as many circuits to be solved as there are
 - Nodes
 - Sources
 - Nodes and Sources
 - Nodes, Sources and Mesh
- Condition for maximum power transfer theorem is
 - $R_L = 4R_S$
 - $R_L = 2R_S$
 - $R_L = R_S/2$
 - $R_L = R_S$
- Which of the following is applicable for magnetic circuits?
 - Thevenin's Theorem
 - Kirchhoff's laws
 - Maximum power transfer theorem
 - Nortons's Theorem

6. Q factor in parallel circuit is the ratio between
 (a) I_R/I_S (b) $I^2R/I^2 X_L$ (c) V_S/V_C (d) I_L/I_S
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. _____ is used to convert differential equations in time domain to S-domain.
 (a) Wavelet transform (b) Z-transform
 (c) Laplace transformed (d) Fourier series
9. A 3-phase balanced load, when connected in delta across three-phase balanced supply, the total power in 3-phase delta connected load is equal to _____ times of power in star connected load.
 (a) 10 (b) 5 (c) 6 (d) 3
10. _____ instrument is used to measure three-phase power.
 (a) Voltmeter (b) Megger (c) Wattmeter (d) Tachometer

PART - B (5 x 2 = 10 Marks)

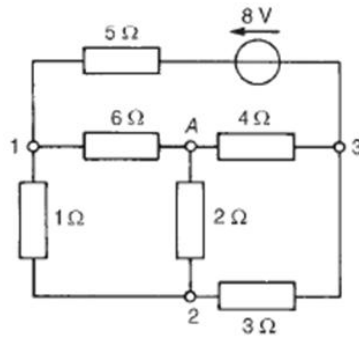
11. Draw the equivalent voltage source for the current source given



12. State superposition theorem.
13. Define the term coefficient of coupling.
14. What is transient?
15. Define power factor.

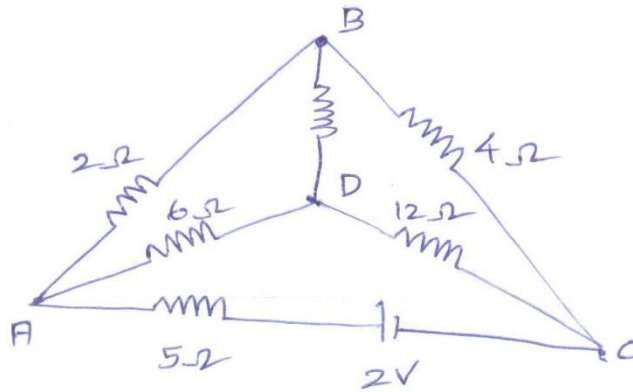
PART - C (5 x 16 = 80 Marks)

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)

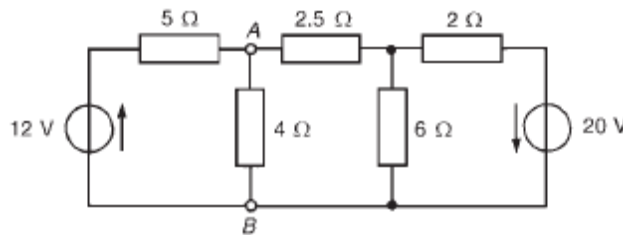


Or

- (b) For the circuit shown in Figure.2, obtain the value of current through DC of the network, when the current through the branch BD is zero. (16)

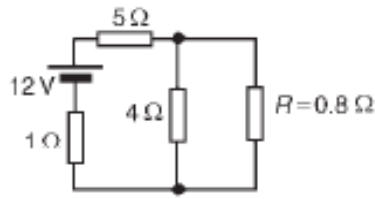


17. (a) Use the superposition theorem to determine the current in the 4Ω resistor of the network shown in Fig. (16)



Or

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



18. (a) Derive the equation for band width = $R/2\pi L$. (16)

Or

(b) (i) Explain tuned circuits and its application. (6)

(ii) Derive for the single tuned coupled circuits maximum output at resonance. (10)

19. (a) Derive the equation for RC series circuit time constant both for charging and discharging condition. (16)

Or

(b) (i) Enumerate RL transients for applying AC input. (10)

(ii) A capacitor of value 1 micro farad and a resistor of 5.45 mega ohms are connected in series across a 220 V DC supply through a switch. Calculate the time by which the capacitor will be charged to 60% of the supply voltage. (6)

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) A 400 V, 3-phase, 50 Hz power supply is connected across three terminals of a delta connected 3-phase load. The resistance and reactance of each phase is 6 ohms and 8 ohm respectively. Calculate the line current, phase current, active power, reactive power and apparent power of the circuit. (16)