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Question Paper Code: 43504

B.E. / B.Tech. DEGREE EXAMINATION, MAY 2018

Third Semester

Electronics and Instrumentation Engineering

14UEI304 - ELECTRICAL CIRCUITS AND NETWORKS

(Common to Instrumentation and Control Engineering)

(Regulation 2014)

Duration: Three hours

Maximum: 100 Marks

Answer ALL Questions

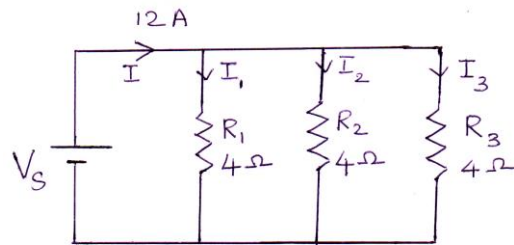
PART A - (10 x 1 = 10 Marks)

1. If a 10V battery is connected across the parallel resistors of 3 Ω , 5 Ω , 10 Ω and 20 Ω , how much voltage is there across 5 Ω resistor?
(a) 10V (b) 3V (c) 5V (d) 20V
2. Mesh analysis is applicable for
(a) Linear networks (b) Bilateral networks
(c) Both Linear and Bilateral networks (d) Neither Linear nor Bilateral networks
3. Application of Norton's theorem to a circuit yields
(a) Equivalent current source and impedance in series
(b) Equivalent current source and impedance in parallel
(c) Equivalent impedance
(d) Equivalent current source
4. Maximum power output is obtained from a network when the load resistance is equal to the source resistance of the network as seen from the terminals of the load. The above statement is associated with
(a) Millman's theorem (b) Thevenin's theorem
(c) Superposition theorem (d) Maximum power transfer theorem
5. For occurrence of resonance which of the following elements are required?
(a) R (b) L (c) C (d) both (ii) and (iii)

6. If the bandwidth of a filter increases
- (a) Q increases (b) The roll-off rate increases
(c) The half power frequency decreases (d) The center frequency decreases
7. By which of the following elements transients will not occur
- (a) R (b) L (c) C (d) all the above
8. With some initial charge at $t = 0+$, a capacitor will act as
- (a) Short circuit (b) Open circuit
(c) A voltage source (d) A current source
9. In a three-phase system, the volt ampere rating is given by
- (a) $3V_L I_L$ (b) $\sqrt{3}V_L I_L$ (c) $V_L I_L$ (d) $3\sqrt{3}V_L I_L$
10. In a balanced three-phase load, each phase has
- (a) An equal amount of power (b) One-third of total power
(c) Two-third of total power (d) A power consumption equal to $\sqrt{3VI}$

PART - B (5 x 2 = 10 Marks)

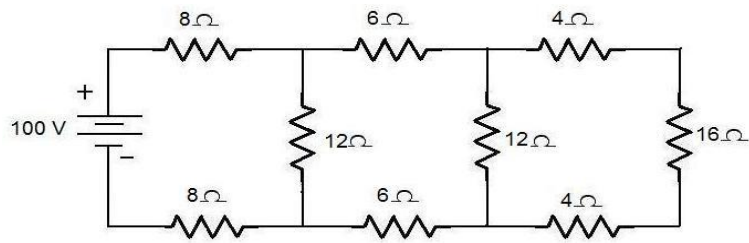
11. Determine the total current in the circuit shown in below figure.



12. State superposition theorem.
13. Define bandwidth.
14. Define transient response.
15. What are the advantages of 3 phase system over single phase system?

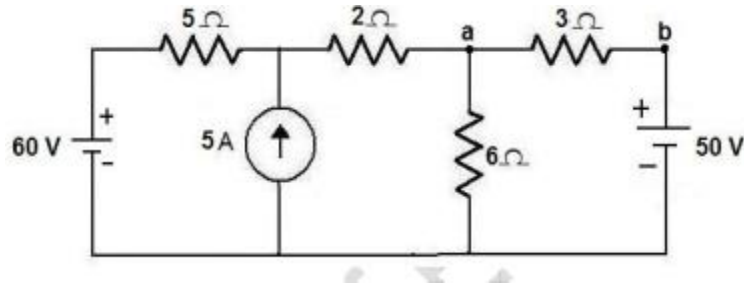
PART - C (5 x 16 = 80 Marks)

16. (a) Calculate a) the equivalent resistances across the terminals of the supply, b) total current supplied by the source and c) power delivered to 16 ohm resistor in the circuit shown in figure. (16)

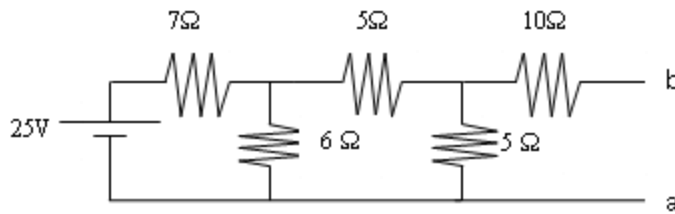


Or

- (b) Find the current through branch a-b using mesh analysis for the circuit shown below. (16)

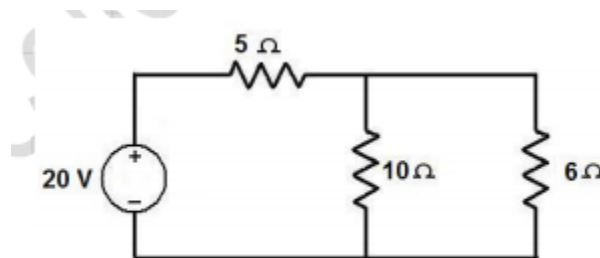


17. (a) Find the thevenin's voltage and thevenin's resistance for the circuit shown in the figure. (16)



Or

- (b) (i) State and explain maximum power transfer theorem for variable pure resistive load. (8)
- (ii) Using Norton's theorem, find the current through 6 Ohm resistance for the circuit given below. (8)



18. (a) Derive bandwidth for a series RLC circuit as a function of resonant frequency. (16)

Or

- (b) Derive the formula for mutual inductance in terms of coefficient of coupling and self inductance. (16)
19. (a) A sinusoidal voltage of $10 \sin(100t)$ V is connected in series with a switch and $R = 10\Omega$ & $L = 0.1$ H. If the switch is closed at $t = 0$, determine the transient current $i(t)$. (16)

Or

- (b) A series RC circuit with $R=100\Omega$ and $C=25\mu\text{F}$ is supplied with a source of $200 \sin(500t)$ V. Assume initial charge on the capacitor is zero. (16)
20. (a) (i) A three phase delta connected RYB system with an effective voltage of 400V, has a balanced load with impedance $(3+j4)\Omega$. Calculate the
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|-------------------------|-------------------|
| (1) phase currents | (2) line currents |
| (3) power in each phase | (4) Total power. |

Or

- (b) (i) A balanced star connected load of $4+j3$ ohm per phase is connected to a 400V, 3 phase, 50 Hz supply. Find the line current, power factor, power, reactive volt ampere and total volt ampere. (8)
- (ii) A Voltage source 100V with resistance of 10 ohms and inductance 50 mH, a capacitor 50 microfarad are connected in series. Calculate the impedance when the frequency is (i) 50HZ (ii) 500Hz (iii) the power factor at 100Hz. (8)
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