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Question Paper Code: 43504

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

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

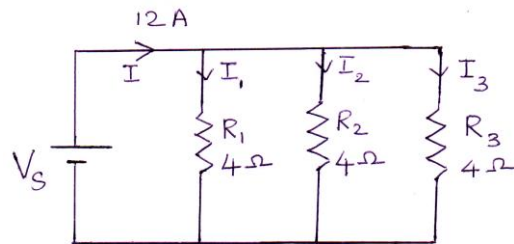
PART A - (10 x 1 = 10 Marks)

- Ohm's law is not applicable to
 - DC circuits
 - high currents
 - small resistors
 - Semi-conductors
- A circuit contains two un-equal resistances in parallel
 - current is same in both
 - large current flows in larger resistor
 - potential difference across each is same
 - smaller resistance has smaller conductance
- Thevenin resistance R_{th} is found
 - By removing voltage source along with their internal resistance
 - By short-circuiting the given two terminals
 - Between any two open terminals
 - Between same open terminals
- If the source impedance is purely resistive R_g and load impedance consists of variable R_L and fixed reactance X , then, for maximum transfer
 - $R_L = R_g$
 - $R_L = R_g^2 + X^2$
 - $R_L = X$
 - $R_L = X^2$
- For occurrence of resonance which of the following elements are required?
 - R
 - L
 - C
 - 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. Wattmeter deflection in ac circuit is proportional to
- (a) average power in the circuit (b) maximum power in the circuit
(c) instantaneous power in the circuit (d) mean power in the circuit

PART - B (5 x 2 = 10 Marks)

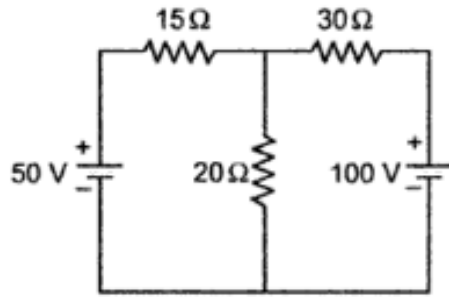
11. Determine the total current in the circuit shown in below figure.



12. State superposition theorem.
13. Define bandwidth.
14. Distinguish between natural response and forced response.
15. Draw the inter-connection between a three-phase, delta-connected source and delta-connected load.

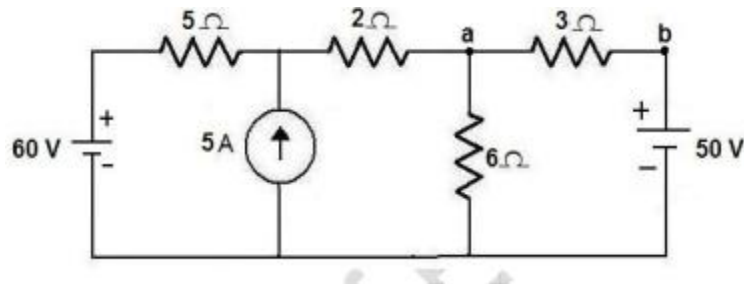
PART - C (5 x 16 = 80 Marks)

16. (a) Apply Kirchhoff's current law and voltage law to the circuit given below. Indicate the various branch currents. Write down the equations relating the various branch currents. Solve these equations to find the values of these currents. (16)

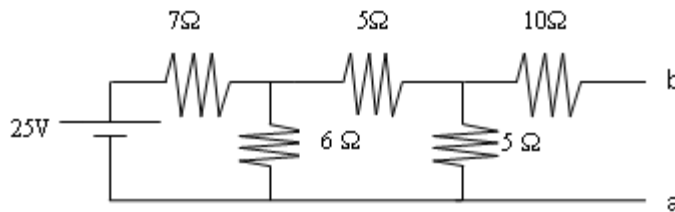


Or

- (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)



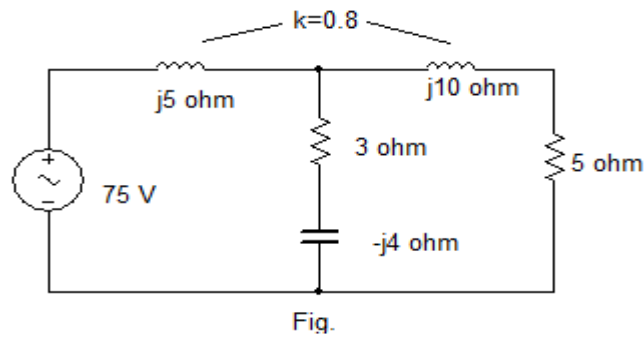
Or

- (b) A wheatstone bridge PQRS has the following details: $PQ = 1000 \text{ ohm}$, $QR = 100 \text{ ohm}$, $RS = 450 \text{ ohm}$, $SP = 5000 \text{ ohm}$. A galvanometer of resistance 500 ohm is connected between Q and S. A 4.5 V battery of negligible resistance is connected between P and R with P positive. Find the magnitude and direction of current through the galvanometer using Thevenin's theorem. (16)

18. (b) Derive the formula for mutual inductance in terms of coefficient of coupling and self inductance. (16)

Or

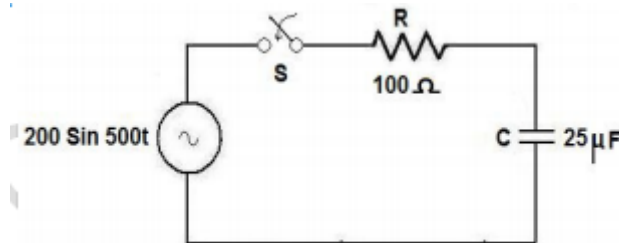
- (b) In the coupled circuit shown in Fig.. find the voltage across 5 ohm resistor. (16)



19. (a) A Series RLC circuits has $R=50$ ohm, $L= 0.2H$, and $C = 50$ microfarad. Constant voltage of $100V$ is impressed upon the circuit at $t=0$. Find the expression for the transient current assuming initially relaxed conditions. (16)

Or

- (b) In the circuit shown in figure, find the current i . Assume that initial charge across the capacitor is zero. (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) (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)