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Question Paper Code: 43504

B.E. / B.Tech. DEGREE EXAMINATION, APRIL 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)

- When a load of low voltage is to be operated on a high voltage supplywith the load
 - fixed value of R connected in series
 - variable value of R connected in series
 - fixed value of R connected in parallel
 - variable value of R connected in parallel
- If there are n resistors each of R ohms connected in parallel, the equivalent resistance is
 - n/ R
 - R/n
 - n R
 - 1/ nR
- A current of 20 A flows through two ammeters A and B joined in series. What are the current through A and B when they are connected in parallel
 - 12A, 8A
 - 4A, 16A
 - 10A, 10A
 - 15A, 5A
- 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
 - $R_L = R_g$
 - $R_L = R_g^2 + X^2$
 - $R_L = X$
 - $R_L = X^2$
- In a series circuit of L = 15mH, C = 0.015 μ F and R = 80 Ω , What is the impedance at the resonant frequency?
 - (15mH) ω
 - 80 Ω
 - (0.015F) ω
 - 1/ (ω x 0.015)

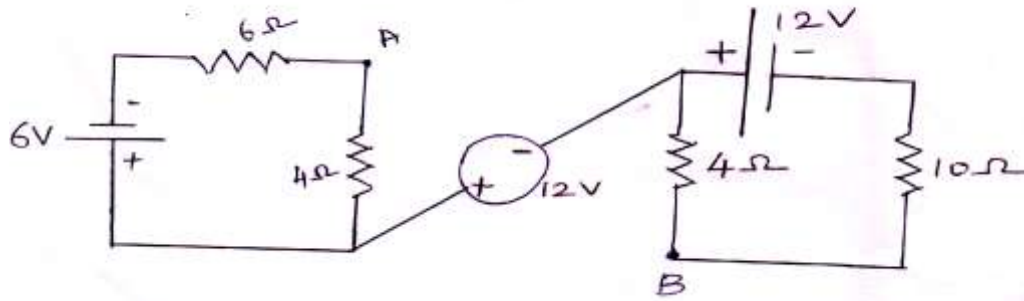
6. Dot conversion in coupled circuits is used
- (a) to determine the polarity of the self induced voltage in coils
 - (b) to determine the polarity of the mutually induced voltage in coils
 - (c) to measure the mutual inductance
 - (d) to measure the capacitance
7. By which of the following elements 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. State Kirchhoff's laws.
12. State superposition theorem.
13. Define quality factor.
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)

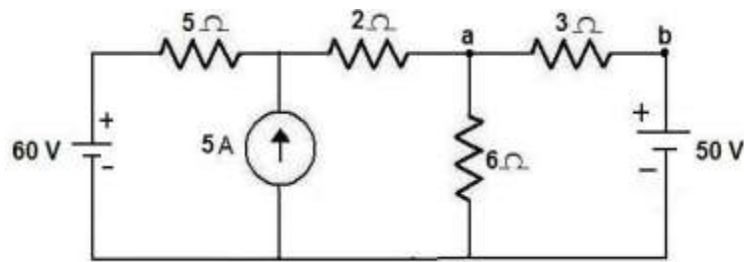
16. (a) (i) What is the voltage across A and B in the circuit shown in below figure. (16)



Or

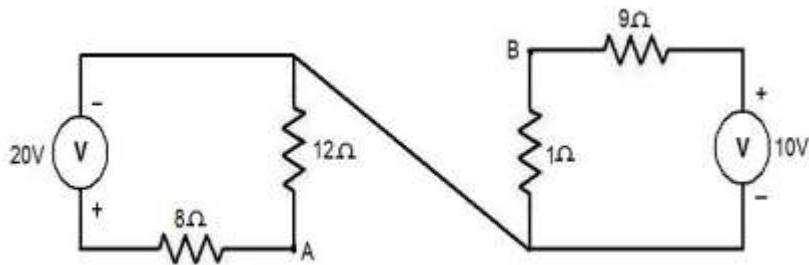
(b) Find the current through branch a-b using mesh analysis for the circuit shown below.

(16)



17. (a) Determine Thevenin's equivalent across the terminals AB for the circuit shown in figure below.

(16)



Or

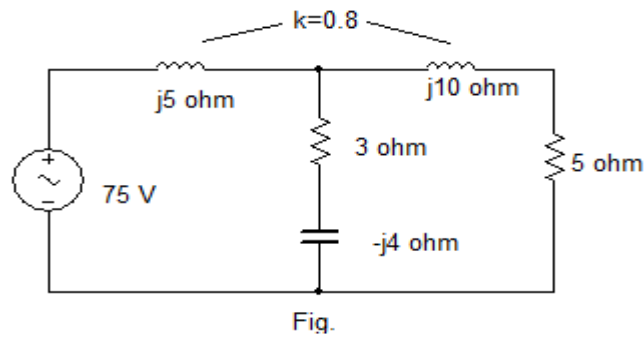
(b) A wheatstone bridge PQRS has the following details: $PQ = 1000 \text{ ohm}$, $QR = 100 \text{ ohm}$, $RS = 450 \text{ ohm}$, $SP = 5000 \text{ ohm}$. A galvanometer of resistance 500 ohm is connected between Q and S. A 4.5 V battery of negligible resistance is connected between P and R with P positive.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

(16)

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

Or

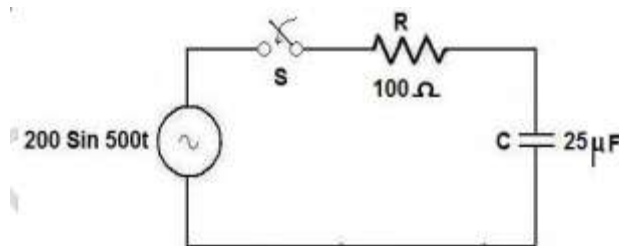
- (b) In the coupled circuit shown in Fig.. find the voltage across 5 ohm resistor. (16)



19. (a) Derive the transient response of series RLC circuit with DC input using laplace transform for over damping, critical damping and under damping with curves. (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) A 3 phase , 4 wire , 208 V , ABC system supplies a star connected load in which $Z_A = 10 \angle 0^\circ \text{ ohm}$, $Z_B = 15 \angle 30^\circ \text{ ohm}$ and $Z_C = 10 \angle -30^\circ \text{ ohm}$. Find the line currents, the neutral currents and the load power. (16)

Or

- (b) (i) A balanced star connected load of $4+j3 \text{ ohm}$ 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)