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Question Paper Code: 51232

B.E. / B.Tech. DEGREE EXAMINATION, JUNE 2016

Second Semester

Electrical and Electronics Engineering

15UEE209 - ELECTRIC CIRCUITS

(Regulation 2015)

Duration: Three hours

Maximum: 100 Marks

Answer ALL Questions

PART A - (10 x 1 = 10 Marks)

- Four 4 ohm resistors are connected in parallel. Its equivalent resistance is
(a) 1 (b) 2 (c) 3 (d) 4
- Which one is considered as active element?
(a) Resistor (b) Inductor (c) Capacitor (d) Battery
- A Thevenin model has 10 V source and 10 ohm resistor. Its equivalent Norton model contains
(a) 10 A, 10 ohm (b) 1 A, 10 ohm
(c) 10 A, 1 ohm (d) 1 A, 1 ohm
- A thevenin resistance of a circuit is $2 + j3$. What will be the value of load resistance for maximum power to be transferred?
(a) $3 + j2$ (b) $2 + j3$ (c) $2 - j3$ (d) $3 - j2$
- What is the condition for resonance to occur?
(a) $XL > XC$ (b) $XL < XC$ (c) $XL = XC$ (d) $XL = 0$
- At resonant condition, RLC circuit behaves as pure
(a) resistive circuit (b) inductive circuit
(c) capacitive circuit (d) none of these

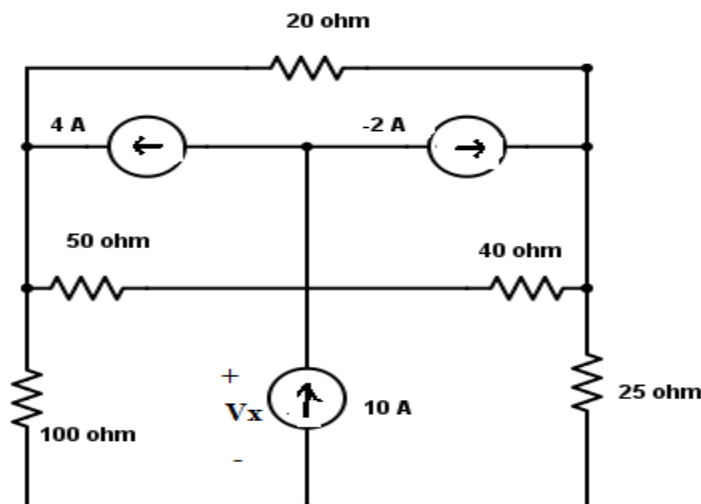
7. A 10 V battery is connected to series RC circuit with $R = 10 \text{ ohm}$ and $C = 1 \text{ F}$. What is the current at the time of switching?
- (a) 10 A (b) 1 A (c) 100 A (d) 0.1 A
8. When the damping ratio is equal to one, the circuit is said to be in
- (a) Damped (b) Under damped
(c) Critical damped (d) Over damped
9. In a pure inductive circuit, the active power consumed is
- (a) Infinite (b) Zero
(c) Unity (d) Depend upon source
10. In two wattmeter method, when two wattmeters indicates equal reading, it indicates that the power factor is
- (a) 0 (b) 0.5 (c) 1 (d) 2

PART - B (5 x 2 = 10 Marks)

11. State Kirchoff's voltage law.
12. State Thevenin's theorem and mention its equivalent model.
13. Define the term quality factor.
14. How a capacitor does behave at the instant of switching and how does it behave after a very long time after switching?
15. What do you mean by reactive power? Mention its significance.

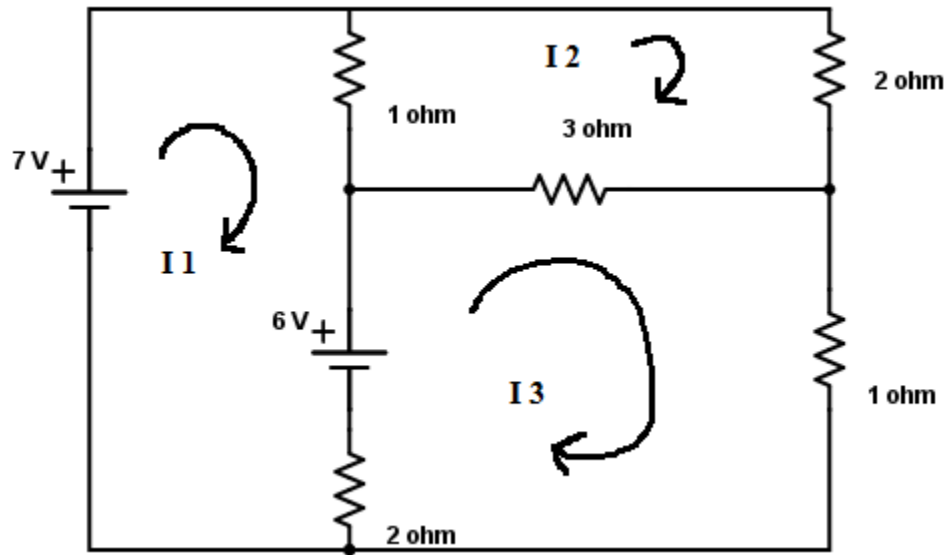
PART - C (5 x 16 = 80 Marks)

16. (a) Use nodal analysis to find V_x in the circuit.



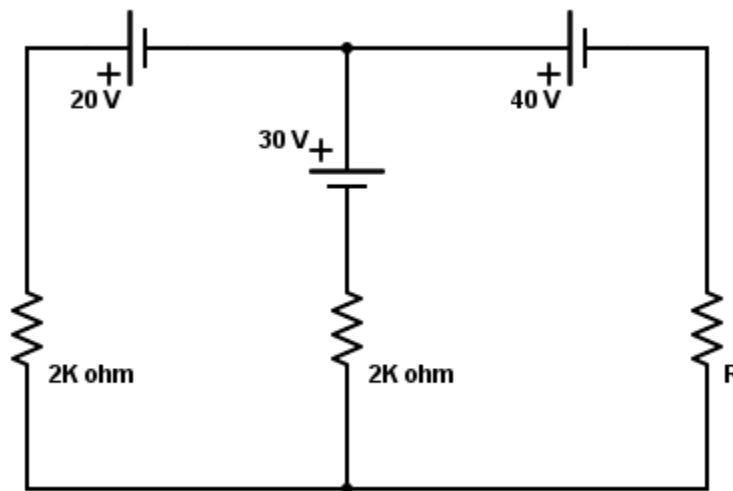
Or

(b) Use mesh analysis to determine the three mesh currents in the circuit.



(16)

17. (a) Consider the circuit.

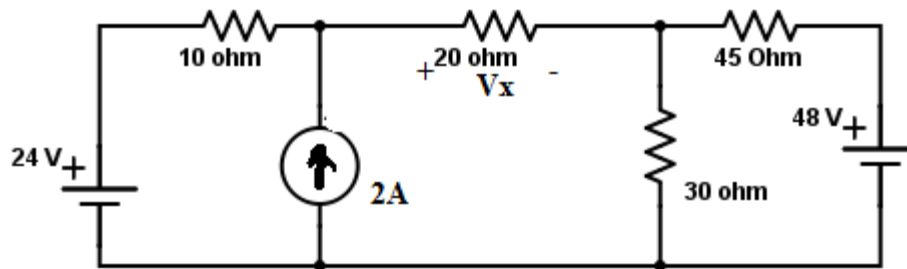


- If $R = 3K \text{ ohm}$, find the power delivered to it.
- What is the maximum power that can be delivered to any R ?
- What two different values of R will have exactly 20 mW delivered to R .

(16)

Or

(b) Use super position to find the value of V_x in the circuit.



(16)

18. (a) (i) A series RLC circuit with $R = 100 \text{ ohm}$, $L = 10\text{mH}$ and $C = 1 \text{ micro Farad}$ is connected to a 20V AC supply. Find resonant frequency, quality factor, bandwidth and current at resonant. (12)

- (ii) Write a short note on resonant frequency. (4)

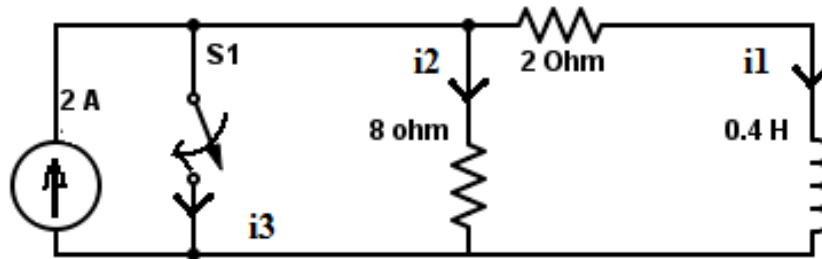
Or

- (b) Discuss the following

- (i) Co-efficient of coupling (8)

- (ii) Tuned circuit (8)

19. (a) At $t = 0.15 \text{ s}$ in the circuit, find the value of i_1 , i_2 and i_3 . (16)



Or

- (b) Derive the transient response of a series RLC circuit with sinusoidal input and comment upon the various damping. (16)

20. (a) Discuss in detail the three phase, three wire circuits with star connected balanced loads. (16)

Or

- (b) Explain the power and power factor measurements in three phase circuits by two wattmeter method. (16)