

B.E. DEGREE EXAMINATIONS: APRIL/MAY 2010

Second Semester

ELECTRONICS AND COMMUNICATION ENGINEERING

U07EC201: Circuit Analysis

Time: Three Hours

Maximum Marks: 100

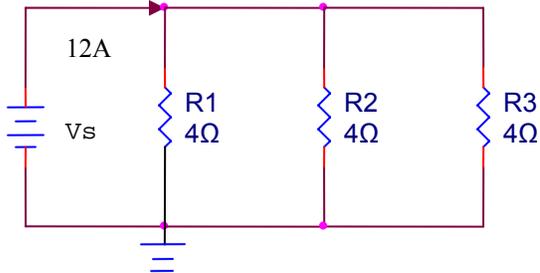
Answer ALL Questions:-

PART A (10 x 1 = 10 Marks)

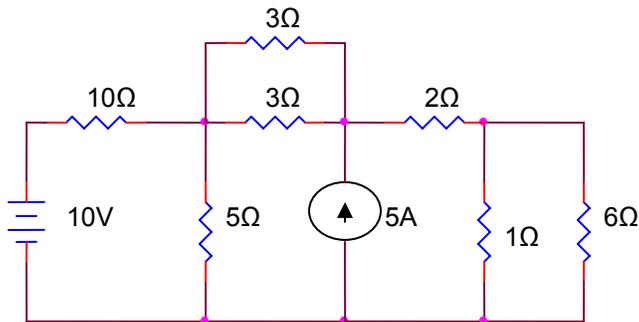
1. Identify the passive element among the following
A) Voltage source B) Current source C) Inductor D) Transistor
2. A series circuit has a 100Ω , a 270Ω and a 330Ω resistor in series. If the 270Ω resistor is removed, the current
A) increases B) decreases C) becomes zero D) remains constant
3. The nodal method of circuit analysis is based on
A) KVL & Ohm's law B) KCL & Ohm's law
C) KCL & KVL D) KCL, KVL & Ohm's law
4. Super position theorem is used for
A) non-linear circuits B) linear circuits
C) both linear and non-linear circuits D) logic circuits
5. Maximum power is transferred when load resistance is
A) equal to source resistance B) equal to half of the source resistance
C) equal to zero D) equal to infinity
6. The current in a pure inductor
A) lags behind the voltage by 90° B) leads the voltage by 90°
C) is in phase with the voltage D) is out of phase with the voltage
7. The form factor of the DC voltage is
A) zero B) infinity C) unity D) 0.5
8. For an ideal transformer the coupling co-efficient is
A) unity B) infinity C) zero D) 0.5
9. In a series RLC circuit if capacitance is increased, the resonant frequency
A) increases B) decreases C) remains same D) zero
10. The tie-set schedule gives the relation between
A) branch currents and loop currents B) branch voltages and loop currents
C) branch voltages and loop voltage D) branch current and loop voltage

PART B (10 x 2 = 20 Marks)

11. What is dependent source? Name the four types.
12. The terminal voltage of a resistor $10\text{K}\Omega$ is 10V . Determine the following.
(a) Conductance (b) Power dissipated.
13. State Norton's theorem.
14. Three resistors R_1 , R_2 & R_3 are connected as a star network. Convert it into a delta network.
15. A coil is connected across a 200V , 50 Hz supply and takes a current of 10A . The loss in the coil is 1000W . Determine its resistance and impedance.
16. Define the following.
(a) Power factor (b) Apparent power.
17. Define Q - factor. Give its relationship with bandwidth
18. What do you mean by half power frequencies?
19. Mention the characteristics of Ideal transformer.
20. Define the following.
(a) Twigs (b) Links
21. a) (i) Determine the current through each resistor in the circuit shown in fig. (4)

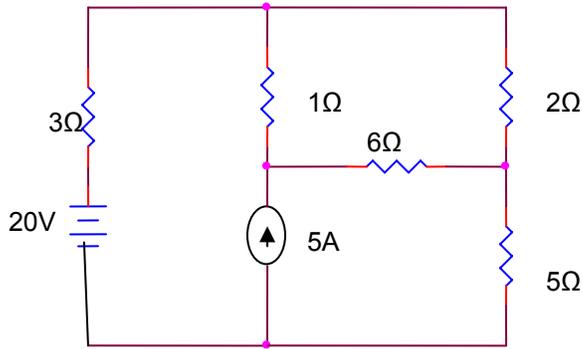


- (ii) Determine the voltages at each node for the circuit shown in fig. (10)

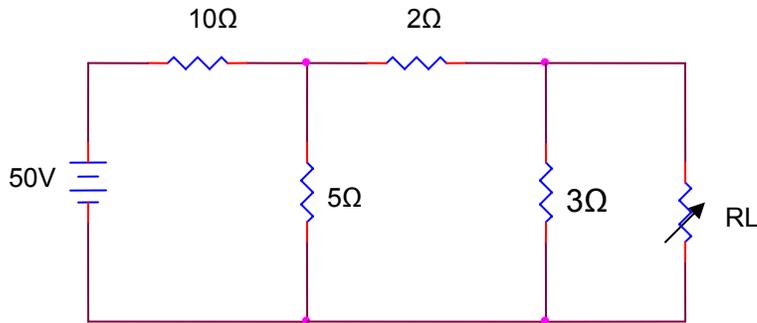


(OR)

- b) Use nodal analysis to find the power dissipated in the 6Ω resistor for the circuit shown in fig.



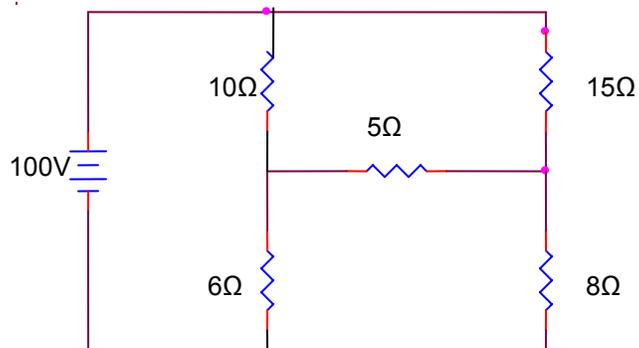
22. a) (i) State Maximum power transfer theorem. (4)
 (ii) Determine the maximum power delivered to the load in the circuit shown in the fig.



(10)

(OR)

- b) (i) State Thevenin's theorem. (4)
 (ii) Use Thevenin's theorem to find the current through the 5Ω resistor in fig. shown below.



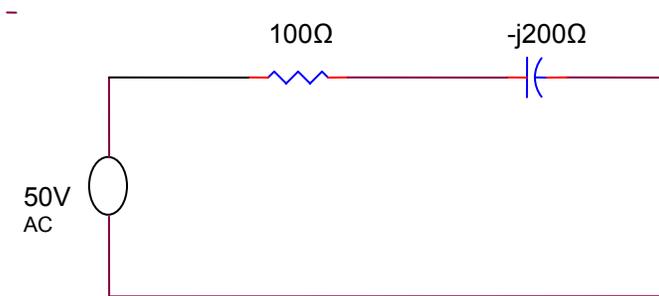
(10)

23. a) (i) Discuss the following. (6)
 (1) Phase relation in pure Inductor. (6)
 (2) Phase relation in pure Capacitor. (6)
 (ii) What is form factor? Determine the form factor of the half-wave rectified sine wave. (8)

(OR)

b) (i) Derive the equation for reactive power. (6)

(ii) Determine the power factor, true power, reactive power and apparent power in the circuit shown in fig. (8)



24. a) (i) A series RL circuit with $R = 100 \Omega$ and $L = 20\text{H}$ has a DC voltage of 200V applied through a switch at $t = 0$. Find (a) the equation for the current and voltages across the different elements (b) the current at $t = 1$ sec. (7)

(ii) A capacitor of $2\mu\text{F}$ with an initial charge $Q_0 = 200 \times 10^{-6}$ coulomb, is connected across the terminals of a 500Ω resistor at $t = 0$. Calculate the time in which the transient voltage across the resistor drops from 60 to 20 volts. (7)

(OR)

b) (i) Draw the frequency response characteristics of series RLC circuit and derive the expression for bandwidth. (6)

(ii) Determine the quality factor of a coil for the series circuit consisting of $R = 10\Omega$, $L = 0.1 \text{ H}$ and $C = 10 \mu\text{F}$. (8)

25. a) (i) Derive the expression for Co-efficient of coupling. (6)

(ii) Discuss the DOT convention in coupled circuits. (8)

(OR)

b) (i) Two coils connected in series have an equivalent inductance of 0.4 H when connected in aiding, and an equivalent inductance 0.2 H when the connection is opposing. Calculate the mutual inductance of the coils. (6)

(ii) Derive the equation for L_{eq} in parallel connection of coupled circuits. (8)
