

B.E DEGREE EXAMINATIONS: JUNE 2010

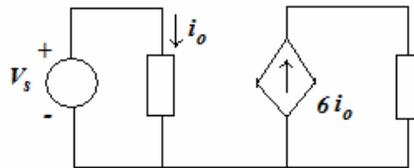
Second Semester

ELECTRONICS AND COMMUNICATION ENGINEERING

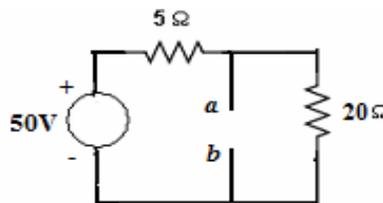
ECE101: Circuit Theory

Time: Three Hours**Maximum Marks: 100****Answer ALL Questions:-****PART A (10 x 1 = 10 Marks)**

- The voltage division principle for two resistors in series is
 - $(R_1/R_1+R_2)v$
 - $(R_1+R_2/R_1)v$
 - $(R_1/R_1+R_2)i$
 - $(R_1+R_2/R_1)i$
- The dependent source in circuit below is



- voltage - controlled current source
 - voltage - controlled voltage source
 - current - controlled voltage source
 - current - controlled current source
- The current through a branch in a linear network is 2A when the input source voltage is 10V. If the voltage is reduced to 1V and the polarity is reversed, the current through the branch is
 - 2A
 - 0.2A
 - 1.8A
 - 1.8A
 - The Thevenin resistance at terminals a and b in circuit shown below is

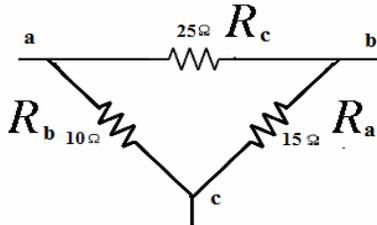


- 25 Ω
 - 20 Ω
 - 5 Ω
 - 4 Ω
- The imaginary part of impedance is called
 - resistance
 - admittance
 - reactance
 - conductance
 - A quantity that contains all the information pertaining to the power absorbed by a given load is
 - power factor
 - apparent power
 - complex power
 - reactive power
 - The difference between the half power frequencies is called
 - quality factor
 - resonant frequency
 - bandwidth
 - cutoff frequency
 - The time constant for an RL circuit with $R = 2 \Omega$ and $L = 4H$ is
 - 0.5 sec
 - 2 sec
 - 8 sec
 - 4 sec

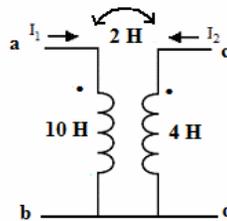
9. Which of these transformers can be used as an isolation device?
 a) linear transformer b) ideal transformer c) autotransformer d) all the above
10. In an electric circuit, the dual of resistance is
 a) capacitance b) conductance c) inductance d) open circuit

PART B (10 x 2 = 20 Marks)

11. State Kirchoff's current law. Give an example.
 12. Convert the delta network to an equivalent wye network.



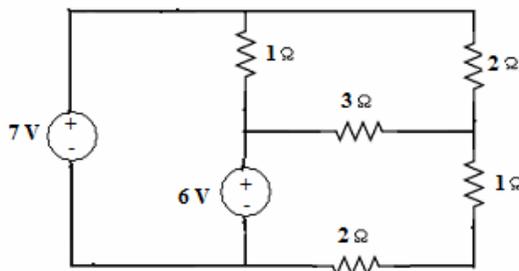
13. Three resistors R_1 , R_2 and R_3 are connected in parallel. If $R_1 = 10 \text{ k}\Omega$, $R_2 = 5 \text{ k}\Omega$ and equivalent resistance is $1.82 \text{ k}\Omega$, find R_3 .
14. State Norton's theorem.
15. Define Power factor.
16. If $V_1 = -10 \sin(\omega t + 30^\circ)$ and $V_2 = 20 \cos(\omega t - 45^\circ)$, find $V_1 + V_2$.
17. Define Quality factor.
18. Define coefficient of coupling.
19. Determine the T-equivalent circuit of the linear transformer shown below.



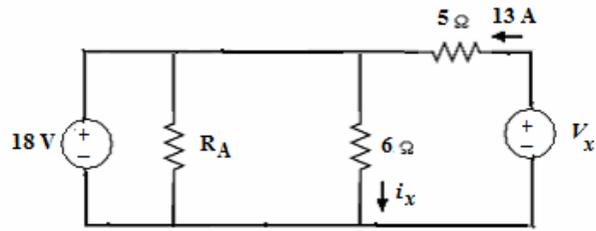
20. Give the application of resonance circuits.

PART C (5 x 14 = 70 Marks)

21. a) (i) Determine the loop current using mesh method of analysis. (10)

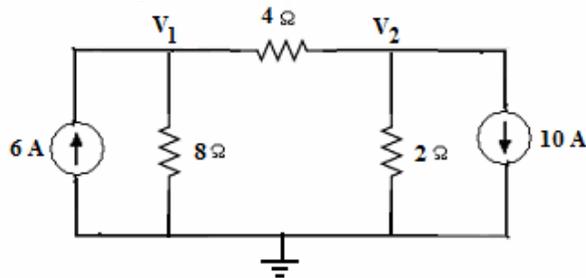


- (ii) In the circuit given below if $I_X = 3\text{ A}$ and the 18 V source delivers 8 A of current, what is the value of R_A ? Also count the number of branches and nodes. (4)

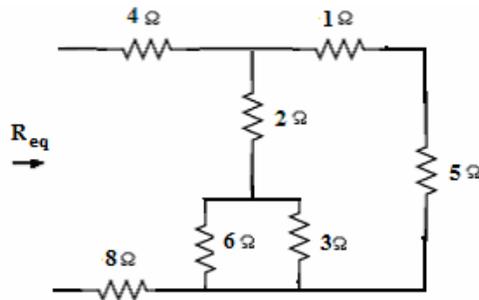


(OR)

- b) (i) Determine V_1 , V_2 and the power dissipated in all the resistors in the circuit given. (10)

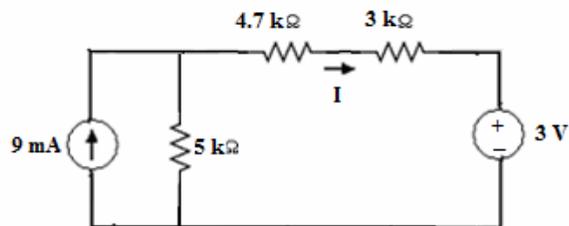


- (ii) Find R_{eq} for the circuit shown. (4)



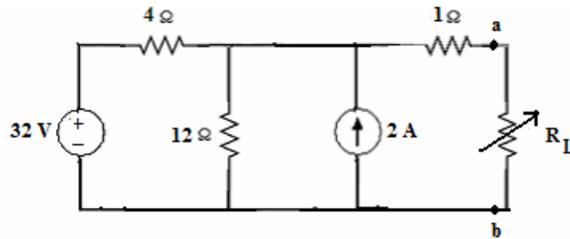
22. a) (i) State and prove the Maximum Power Transfer theorem. (10)

- (ii) Compute the current through the $4.7\text{ k}\Omega$ resistor in the circuit shown. (4)



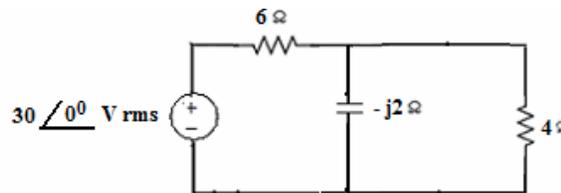
(OR)

- b) (i) Determine the Thevenin equivalent circuit. Find the current through $R_L = 36\Omega$. (10)



ii) State Superposition Theorem. (4)

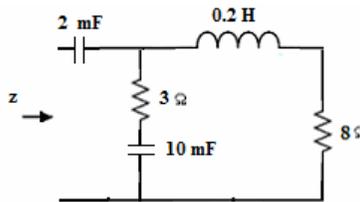
23. a) (i) Determine the power factor of the circuit given below. Calculate the average power delivered by the source. (7)



(ii) Derive the voltage-current relationship for an inductor in phasor form. (7)

(OR)

b) (i) Find the input impedance of the circuit. Assume that the circuit operates at $\omega = 50$ rad/s. (7)



(ii) Determine an expression for the average power absorbed by a resistor. (7)

24. a) Derive the Resonance frequency, Bandwidth and Quality factor for a RLC parallel circuit.

(OR)

b) Obtain the response of a source free series RLC circuit.

25. a) Discuss mutual inductance with an example.

(OR)

b) Write short note on i) Ideal transformer ii) Duality principle. (8+6)
