KUMARAGURU
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Register Number: …….

B.E DEGREE EXAMINATIONS: JUNE 2015

(Regulation 2013)

Second Semester

U13ECT201: CIRCUIT THEORY

(Common to ECE/EIE)

Time: Three Hours **Maximum Marks: 100**

Answer all the Questions:-

PART A (10 x 1 = 10 Marks)

1. The voltage across a resistance of 21Ω is – 2.4V. The power absorbed by the resistor is
   a) +0.27W b) -0.27W
   c) 2.7J d) 2.7W
2. Two resistors of 10kΩ each are connected in parallel. The equivalent resistance is ……..
3. The maximum power transferred to a load by a source of 5V with a source resistance of 10Ω is
   a) 2.5W b) 25W
   c) 0.625W d) 6.25W
4. A voltage source of +7V has a resistance of 5Ω connected in series. The Norton equivalent current is ……..
5. The energy stored in a 1000μF capacitor at t= 50μs when the voltage applied across it is $1.5\cos(10^5 t)$ volts is
   a) 90.52J b) 90.52mJ
   c) 9.52μJ d) 90.52μJ
6. An AC voltage given by $v(t) = 5\sin(2\pi 50t)$ is applied across an inductor of 10mH. The phasor diagram is ……..
7. A resistance of 10Ω is connected in series with an inductance of 5mH. The time constant of the circuit is
   a) 50 b) $5x10^{-2}$
   c) 2 d) 0.5
8. Signals which are discontinuous or have discontinuous derivatives are called ……..
9. A series resonant circuit has a bandwidth of 100Hz and contains 20mH inductance and 2μF capacitance. The resonant frequency is
   a) 1000Hz b) 796Hz
   c) 79.6Hz d) 100Hz

10. When the voltage and current in a circuit containing R, L and C is in phase, the circuit is in ……..

PART B (10 x 2 = 20 Marks)

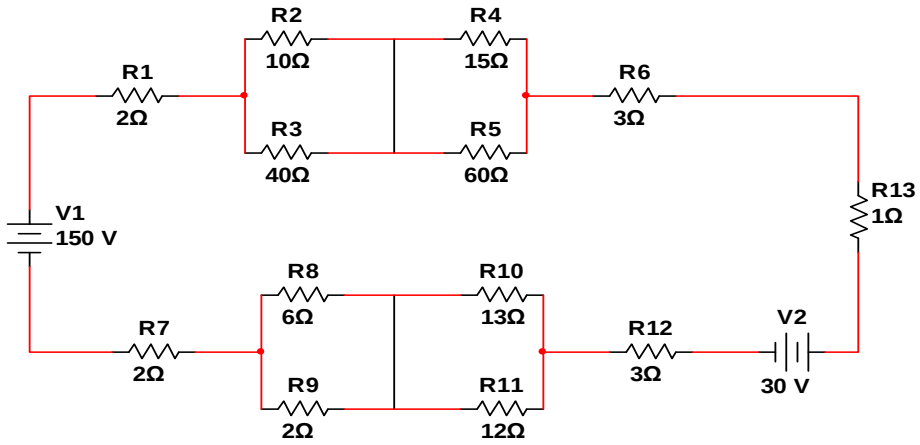
(Not more than 40 words)

11. A closed loop circuit contains 10V DC in series with three resistors of 5kΩ each. What is the voltage across each of the resistors?
12. What is a super mesh?
13. How to find the Thevenin equivalent voltage across the output terminals of a circuit?
14. Enumerate the functions that can be implemented in PSPICE.
15. Distinguish between impedance, admittance and susceptance.
16. Express the given impedance in polar form : (4.255 + j4.929)Ω
17. What is the power absorbed in an RC circuit?
18. An AC current $i(t) = 5 \angle 90^o$ flows through an inductor of value 7H. Find the voltage across the inductor.
19. Define Q-factor.
20. Explain dot rule in linear transformer.

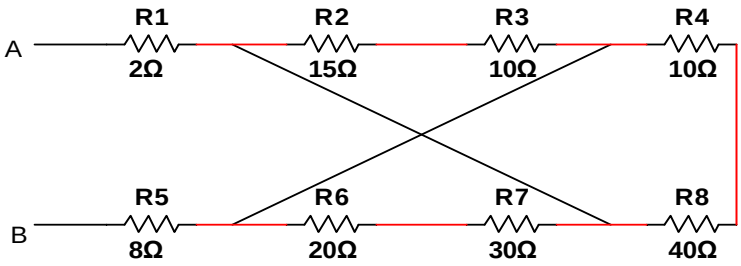
PART C (5 x 14 = 70 Marks)
(Not more than 400 words)

Q.No. 21 is Compulsory

21. Find the Thevenin equivalent circuit for output taken across R13.

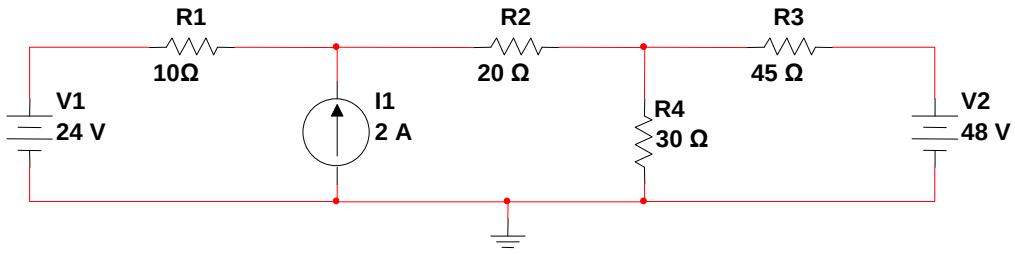


22. a) If a DC voltage source with V = 50 volts is connected across terminals AB, prove that Kirchoff's voltage and current laws are satisfied.

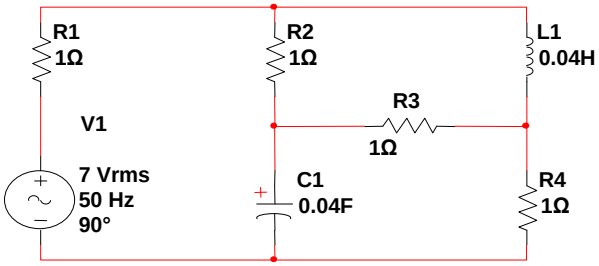


(OR)

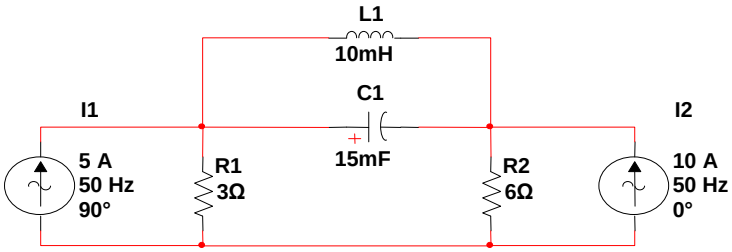
b) (i) Find the power dissipated by each of the resistors in the circuit below:



23. a) (i) Write the node equations for the circuit given below: (4)

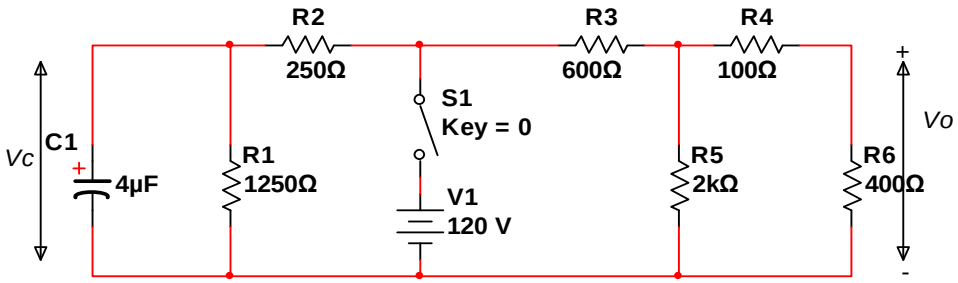


(ii) Compute the power dissipated by each of the elements in the circuit below: (10)



(OR)

b) Using mesh analysis, find the voltage V_o, assuming the switch S1 closes at t=0.



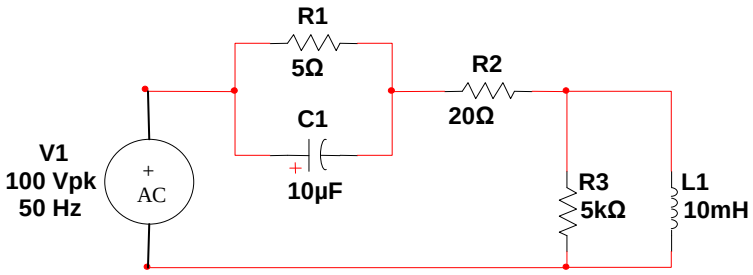
24. a) (i) Given a series RLC circuit with L = 10 H, R = 3 kΩ, C = 4 μF, i(0) = 1mA, $v_c(0)$ = 0V, find i(t). (7)

(ii) Draw the source free RC circuit and find its response to $i = 50 \angle 45^o$ (7)

(OR)

b) Given a parallel RLC circuit with L = 3 H, R = 5 Ω, C = 2 μF, v(0) = 5 V, i(0) = 10A, find the step response.

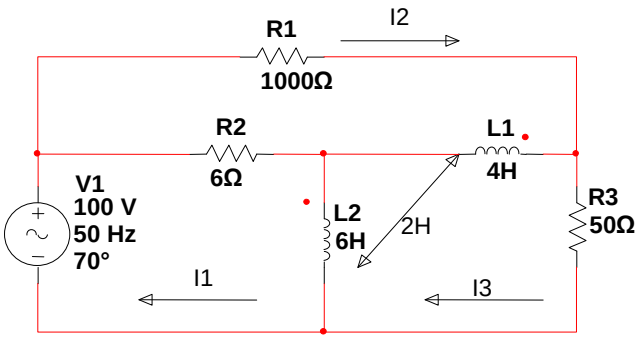
25. a) (i) Find the average power absorbed by each of the passive elements in the circuit below: (10)



(ii) Draw the T and π equivalent circuits of a linear transformer. (4)

(OR)

b) (i) Write the mesh equations for the circuit given : (7)



(ii) With a neat diagram, explain the working of an ideal transformer. (7)

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