Register Number:……..

KUMARAGURU
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GENERAL INSTRUCTIONS TO THE CANDIDATES

1. Candidates are instructed to answer the questions as per Bloom's Taxonomy knowledge level (K_1 to K_6)
2. Candidates are strictly instructed not to write anything in the question paper other than their roll number.
3. Candidates should search their pockets, desks and benches and handover to the Hall Superintendent/ Invigilator if any paper, book or note which they may find therein as soon as they enter the examination hall.
4. Candidates are not permitted to bring electronic watches with memory, laptop computers, personal systems, walkie-talkie sets, paging devices, mobile phones, cameras, recording systems or any other gadget / device /object that would be of unfair assistance to him / her.
5. Corrective measures as per KCT examination policies will be imposed for malpractice in the hall like copying from any papers, books or notes and attempting to elicit the answer from neighbours.

B.E. DEGREE EXAMINATIONS: JUNE 2015

(Regulation 2014)

Second Semester

U14ECT201: CIRCUIT THEORY

(Common to ECE & EIE)

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

Answer all the Questions:-

PART A (10 x 1 = 10 Marks)

1. Consider the following statements, [K_2]

   i) In a series circuit, sum of voltage drop is zero.

   ii) In a series circuit, current through all components is equal.

   iii) In a series circuit, total equivalent resistance is lesser than the lower value.

   iv) In a series circuit, sum of power dissipations is equal to zero.

   Which of these statements are correct?

a) i , ii, iii
b) i, iii, iv
c) ii, iii, iv
d) i, ii, iv

2. Match List I with List II [K_1]

List I	List II
A. Unit of current	i) J/C
B. Unit of voltage	ii) J/s
C. Unit of power	iii) C/s
D. Unit of energy	iv) J

	A	B	C	D
a)	ii	i	iii	iv
b)	iv	iii	ii	i
c)	iii	i	ii	iv
d)	iv	i	ii	iii

3. Consider the following steps, [K_1]

i) Disconnect load resistance at output terminals.

ii) Find voltage at open circuited output terminals which is Thevenin voltage.

iii) Replace all the independent voltage sources with short circuit and all current sources with open circuit.

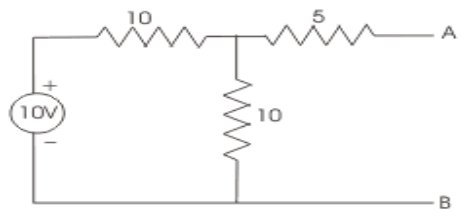
iv)Find equivalent resistance at open circuited output terminals which is Thevenin resistance.

v) Thevenin equivalent circuit is formed by connecting Thevenin voltage in series with Thevenin resistance.

Thevenin equivalent circuit is determined by the following sequence of steps:

a) v,i,ii,iii,iv
b) ii, iii,iv,v,i
c) i,ii,iii,iv,v
d) i, ii,v,iii,iv

4. For the circuit given in the figure, the Thevenin's voltage as seen at AB is [K_2]



a) 10 V b) 2.5 V

c) 0 V d) 5 V

5. The power factor at resonance in RLC parallel circuit is [K_2]

a) Zero b) 0.8 lagging

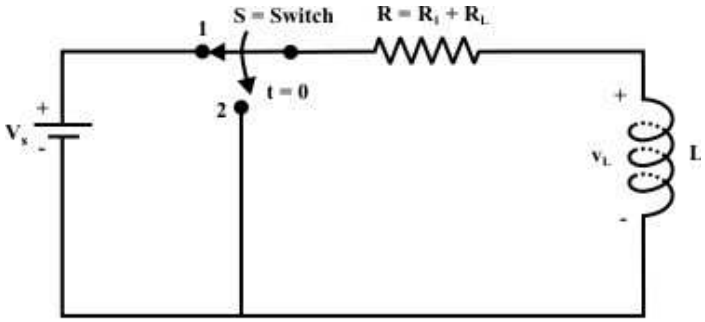
c) 0.8 leading d) unity

6. If $E_1 = A\sin(\omega t)$ and $E_2 = A\sin(\omega t - \theta)$, then [$K_2$]

a) E_1 lags E_2 by $\theta/2$. b) E_1 leads E_2 by θ.

c) E_2 leads E_1 by θ d) E_2 leads E_1 by θ

7. Consider the circuit shown in Figure below. The switch 'S' is at position '1' for a long time and reaches steady state. If the switch is opened at time t =0 and kept at position '2', What is the value of inductor current just after t =0.(Vs = 10V, R = 10Ω). [K_3]



a) 1 A b) 0 A

c) 0.5 A d) 1.5 A

8. Assertion (A): A capacitor resists abrupt change in the voltage across it. [K_2]

Reason(R): A sudden jump in the voltage across a capacitor requires an infinite current.

a) Both (A) and (R) are true and (R) is not an correct explanation of (A). b) Both (A) and (R) are true and (R) is an correct explanation of (A).

c) (A) is true and (R) is false d) (A) is false and (R)is true

9. Assertion (A): An alternating voltage applied to the primary of the transformer induces voltage at secondary [K_2]

Reason(R): The alternating flux induced in the primary winding links the secondary winding.

a) Both (A) and (R) are true and (R) is not an correct explanation of (A). b) Both (A) and (R) are true and (R) is an correct explanation of (A).

c) (A) is true and (R) is false d) (A) is false and (R)is true

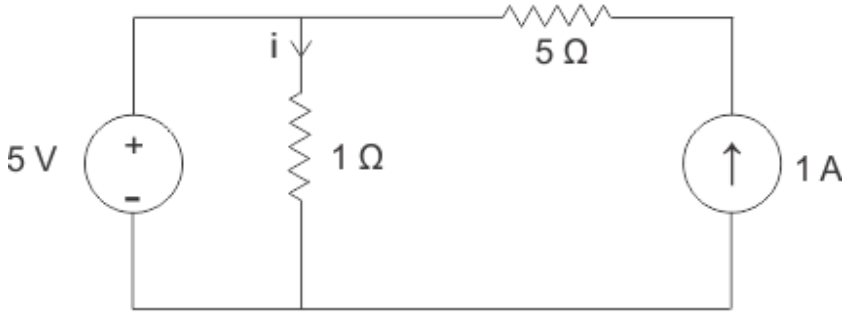
10. When two coils of identical inductance values are in parallel with zero mutual inductance, the reactance of the combination is ---------- the reactance of the each coil. [K_2]

a) One half
b) twice
c) four times
d) one fourth

PART B (10 x 2 = 20 Marks)

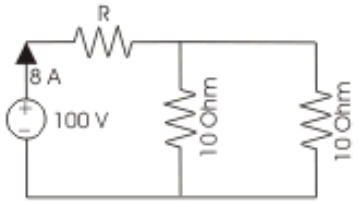
(Answer not more than 40 words)

11. Consider the following circuit. [K_2]



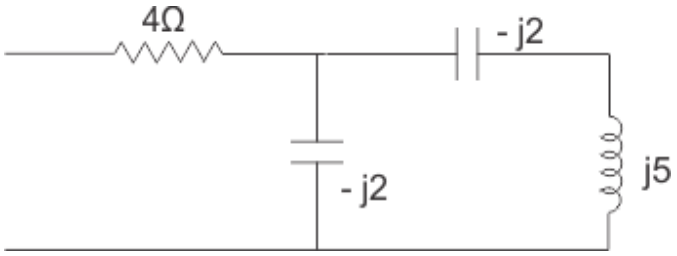
What is the value of current i?

12. What is the value of resistance R in the given circuit? [K_2]



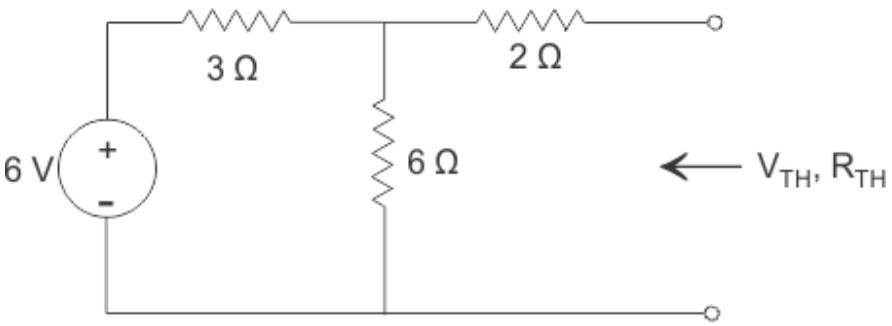
13. What is the average power delivered to an impedance (4 – j3) Ω by current 5 cos(100πt + 100) A? [K_2]

14. What is the impedance of the following circuit? [K_2]



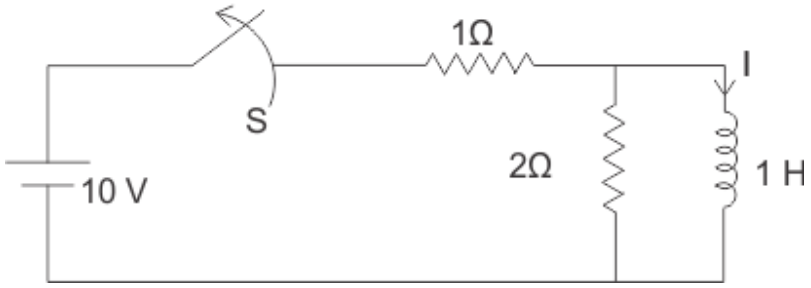
15. State superposition theorem. [K_1]

16. Find Norton current and Thevenin equivalent resistance in the following circuit. [K_2]



17. The time constant of an RL circuit is 1 second and its inductance is 8 H. Find the value of the resistance. [K_2]

18. Circuit shown below has been in steady state when switch S is opened, Find the current I. [K_3]



19. The resonant frequency of the series resonant circuit is 50 Hz. If all the values are now doubled, What is the new resonant frequency? [K_3]

20. Two coils have inductances L_1 = 1200 mH and L_2 = 800 mH. They are connected in such a way that flux in the two coils aid each other and the total inductance is to be 2500 mH then what is the mutual inductance between the coils? [K_3]

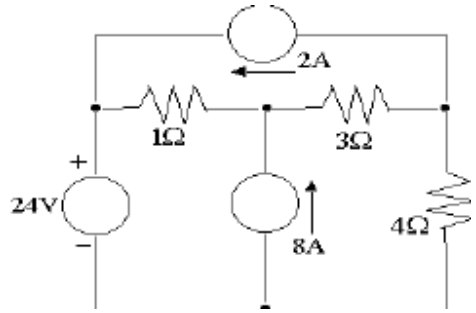
Answer any FIVE Questions:-

PART C (5 x 14 = 70 Marks)

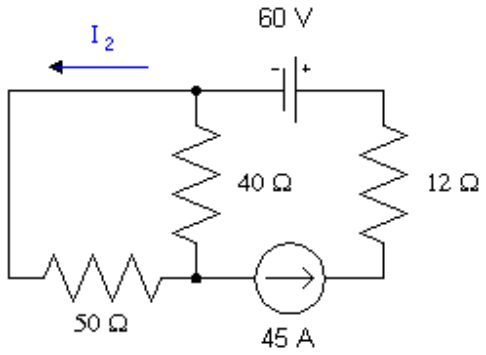
(Answer not more than 300 words)

Q.No. 21 is Compulsory

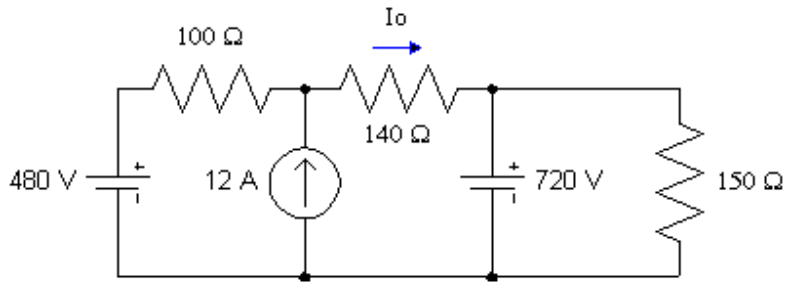
21. (i) Find the power dissipated in 4Ω resistor in the circuit shown below using loop analysis. (10) [K_3]



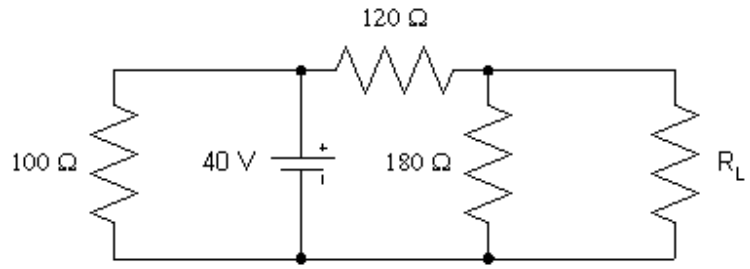
(ii) Find current I_2 (4) [K_3]



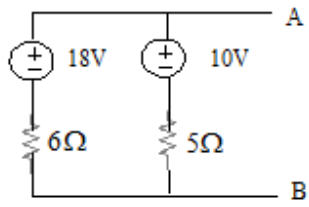
22. (i) Find the current I_0 using superposition theorem. (10) [K_3]



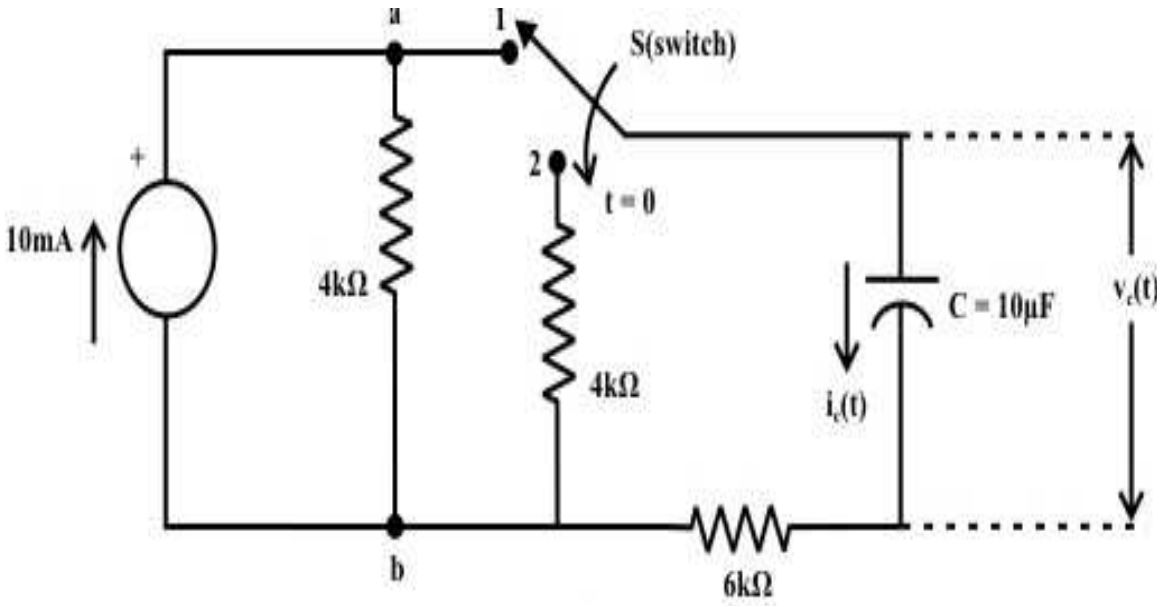
(ii) Find the maximum power delivered to the load R_L. (4) [K_3]



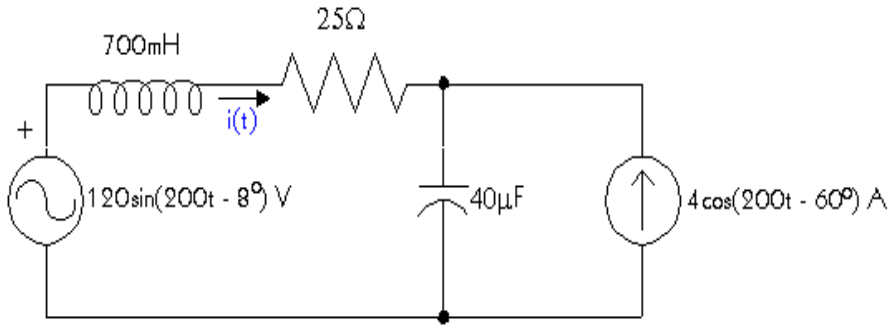
23. Find the Norton Equivalent of the circuit shown below. If a load R_L is connected at terminals A and B, what will be the value of R_L for maximum power transfer. [K_3]



24. For the circuit shown below, the switch 'S ' has been at position '1' for long time and thrown to position to '2' at t = 0. Find $i_c(t)$ and $v_c(t)$ at t =0^+, t = 0^- and t > 0. [K_3]



25. Find the voltage drop across the inductor and capacitor and power dissipated in all the components. [K_3]



26. (i) Compare the frequency response of series and parallel resonant circuits. (5) [K_3]

(ii) A transformer is required to deliver 1A current at 12 V from a 240 V RMS supply voltage. The number of turns in the primary winding is 2000. (i) How many turns are required in the secondary winding? (ii) what is the current in the primary winding? (10) [K_2]

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