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: DEC 2015

(Regulation 2014)

Third Semester

ELECTRICAL AND ELECTRONICS ENGINEERING

U14EET301**:** Network Theory

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

Answer all the Questions:-

PART A (10 x 1 = 10 Marks)

1. A tree is the combination of   CO1   [K_2]

   A. Nodes   B. Twigs   C. Links   D. Graphs

   a)   A and B   b)   B and C

   c)   C and D   d)   A, B and C

2. Assertion (A):The fundamental cut sets of a graph, are independent of each other   CO1   [K_2]

   Reason (R): Each fundamental cutest contains at least one new element, which is the branch of

   a tree.

   a)   A&R are true and related   b)   A&R are true and not related

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

3. Time constant of series RC circuit is   CO1 [K_1]
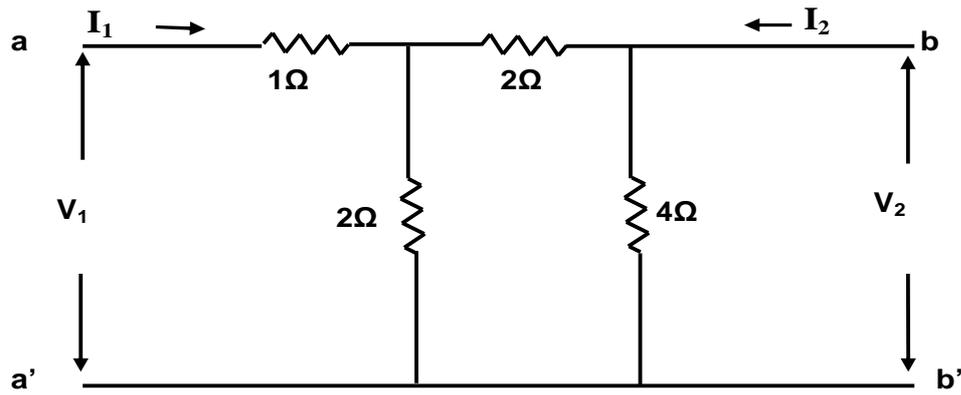
    a)   1/RC   b)   RC

    c)   R/C   d)   C/R

4. When RL series circuit is connected to sinusoidal voltage source, the current changes in   CO1 [K_2]
sequence from zero to   [A. Peak value   B. current at time constant C. steady state current]

    a)   A-B-C   b)   C-B-A

    c)   B-A-C   d)   B-C-A

5. Match the following   CO2 [K_2]

  [A. 'Z' parameter B. 'Y' parameter C. 'H' parameter D. 'ABCD' parameter];

  [1. Short circuit parameter 2. Transistor parameter 3. Transmission line parameter

  4. Open circuit parameter]

    a)   A-2, B-1, C-3, D-4   b)   A-3, B-4, C-1, D-2

    c)   A-3, B-1, C-4, D-2   d)   A-4, B-1, C-2, D-3

6. If the poles are repeated, then the function is said to be having _____ poles   CO2 [K_2]

    a)   Simple   b)   Dominant

    c)   Multiple   d)   Finite

7. Match the following   CO3 [K_2]

  [A. Series element of band pass filter B. Series element of band stop filter

  C. Series element of low pass filter D. Series element of high pass filter];

  [1. Inductor 2. Capacitor 3. Series combination of L and C 4. Parallel combination of L and C]

    a)   A-2, B-1, C-3, D-4   b)   A-3, B-4, C-1, D-2

    c)   A-3, B-1, C-2, D-4   d)   A-4, B-1, C-2, D-3

8. Assertion (A): In attenuator, the value of phase shift constant is zero   CO3 [K_2]

  Reason (R): Attenuator is a pure resistive network.

    a)   A&R are true and related   b)   A&R are true and not related

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

9. Functions with following property are called positive real functions   CO3 [K_2]

  [A. Quotients, P(s) and Q(s) are real   B. Poles and zeros lie in the left half of s-plane

  C. Poles and zeros lie in the right half of s-plane   D. Poles and zeros are simple]

    a)   A and C   b)   A, B and D

    c)   C and D   d)   A, C and D

10. In RL network synthesis, the first Cauer form is obtained by the following sequence of process CO3 [K_2]
[A. Removing the minimum real part of Z(s)   B. Removing pole at s=0
C. Inverting the remaining function]

a) A-B-C   b) B-A-C

c) C-A-B   d) A-C-B

PART B (10 x 2 = 20 Marks)
(Answer not more than 40 words)

11. Draw two trees and their links for the given graph   CO1   [K$_2$]

12. Write the equation for unknown node voltage vector in terms of node admittance matrix and the equivalent current source vector in a network.   CO1   [K$_2$]

13. Draw the DC transient response of an RC circuit   CO1   [K$_1$]

14. Distinguish over damped response and under damped response   CO1   [K$_2$]

15. Define transfer impedance of two port network   CO2   [K$_2$]

16. Write the relationship between sending end variables and receiving end variables by using transmission matrix   CO2   [K$_2$]

17. Define 'Decibel' and 'Neper'   CO3   [K$_1$]

18. State the applications of attenuators   CO3   [K$_1$]

19. Test the positive realness of the following function   CO3   [K$_3$]

$Z(S) = (S+3) / (S+1)$

20. Draw the two types of ladder networks to realize one port network in the Cauer method   CO3   [K$_2$]

Answer any FIVE Questions:-
PART C (5 x 14 = 70 Marks)
(Answer not more than 300 words)

Q.No. 21 is Compulsory

21. Find the Z parameters and write the describing equations for the given circuit   CO2   [K$_2$]

The circuit diagram shows a two-port network with input terminals a-a' (with current I_1 and voltage V_1) and output terminals b-b' (with current I_2 and voltage V_2). The network contains a 1Ω resistor in the top branch from a, a 2Ω resistor in the top branch to b, a 2Ω shunt resistor, and a 4Ω shunt resistor.

22. Determine the node voltages and loop currents for the given circuit using graph theory   CO1 [K₃]
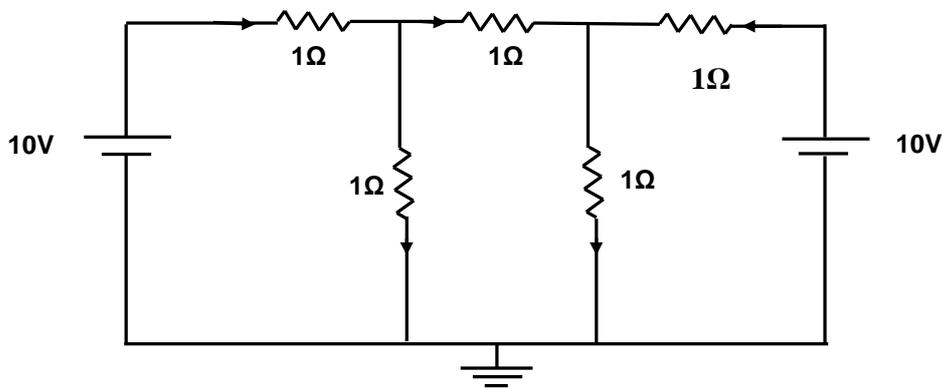
23. Derive the expression for DC transient response of an RL series circuit. A series RL circuit with **R= 30 Ω** and **L= 15H** has a constant voltage $V_S = 60$ V applied at **t = 0** by closing the switch. Determine the current, the voltage across the resistor and the voltage across inductor at **t = 0.5 sec**.   CO1 [K₃]

24. Describe the properties of driving point functions and transfer functions.   CO2 [K₂]

25. Derive the equations for the design of constant K-High Pass Filter. Design and draw the **T** and **π** sections of a high pass filter having a cut-off frequency of **1 kHz** with a load resistance of **600 Ω.**   CO3 [K₃]

26. The driving point impedance of a one port reactive network is given by   CO3 [K₃]

$$Z(S) = [5 (S^2+4) (S^2+25)] / [S (S^2+16)]$$

Obtain the first and second Foster networks.

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