KUMARAGURU
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B.E/B.TECH DEGREE EXAMINATIONS: NOV/DEC 2024

(Regulation 2018)

Fourth Semester

ELECTRICAL AND ELECTRONICS ENGINEERING

U18EET4004 Networks and Systems

COURSE OUTCOMES

CO1: Understand the basic concepts of graph theory and apply them to electrical networks.

CO2: Analyze the transient behavior of DC and AC circuits.

CO3: Model networks in the S-domain and determine their equivalent two-port network parameters.

CO4: Design various types of filters and attenuators and observe their frequency response.

CO5: Categorize the different types of signals and systems.

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

Answer all the Questions:-
**PART A (10 x 2 = 20 Marks)**
(Answer not more than 40 words)

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1.	Differentiate between a planar and non-planar graph.	CO1	[K_2]
2.	Define the terms "tree" and "co-tree" in network topology.	CO1	[K_1]
3.	What is the time constant in an RL circuit, and why is it significant?	CO2	[K_2]
4.	Describe how the capacitor's behavior changes between transient and steady states in an RC circuit.	CO2	[K_2]
5.	What is meant by the term "transform impedance"?	CO3	[K_1]
6.	Define poles and zeros in the network function.	CO3	[K_1]
7.	What is the role of cutoff frequency in a filter design?	CO4	[K_2]
8.	What are the classifications of filter?	CO4	[K_1]
9.	Discuss the key differences between a periodic and an aperiodic signal.	CO5	[K_2]
10.	List some examples for continuous signals.	CO5	[K_1]

Answer any FIVE Questions:-
PART B (5 x 16 = 80 Marks)
**(Answer not more than 400 words)**

11.	a)	What are the properties of a tree in network topology?	04	CO1 [K_2]
	b)	Write down the fundamental loop matrix of the network shown in below figure and find the loop current using tie set matrix method.	12	CO1 [K_3]
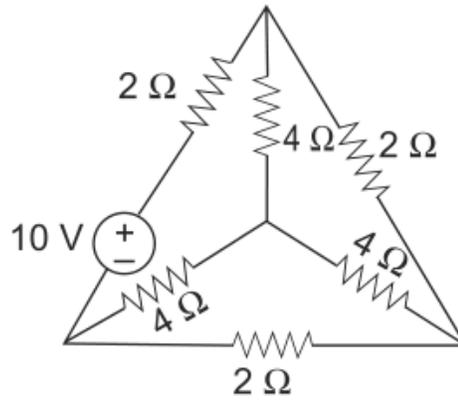
12. a) The switch in the circuit of below figure has been closed for a long time. At t=0, the switch is opened. Calculate i(t) for t>0.   08   CO2   [K₃]
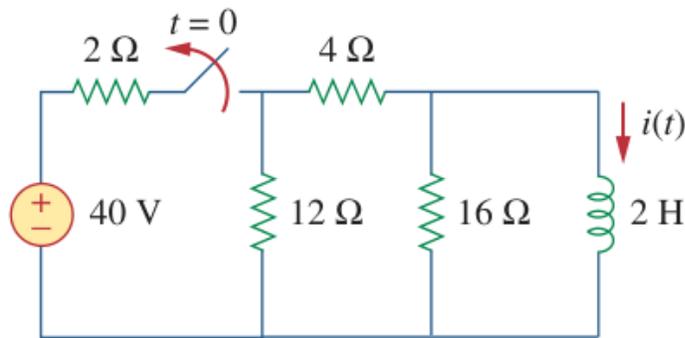
b) Derive the expressions for the transient current and voltage across the components of a series RC circuit when it is connected to a DC voltage source, assuming that the capacitor initially has no charge.   08   CO2   [K₂]

13. a) For the network shown in figure, find the Short Circuit Admittance Parameters.   06   CO3   [K₃]
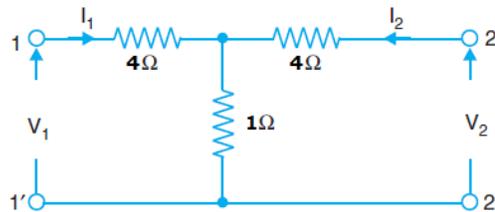
b) For the given network function, draw the pole zero diagram and obtain its time response.   10   CO3   [K₃]

$$I(S) = \frac{3S}{(S+1)(S+3)}$$

14. a) Design a T-pad attenuator to give an attenuation of 60 dB and to work in a line of 500 Ω impedance. Sketch the final circuit.   06   CO4   [K$_3$]

    b) Derive the design parameters for a constant K high-pass filter and provide a diagram of the final circuit.   10   CO4   [K$_2$]

15. a) Check the stability of the system defined in the equation below.   10   CO5   [K$_3$]

$$h(n) = (1/4)^n \, U(n)$$

    b) Check whether the given system is time invariant or time variant.   06   CO5   [K$_3$]

$$y(n) = x(2n)$$

16. a) Draw the graph corresponding to the given incidence matrix.   08   CO1   [K$_3$]

$$A = \begin{bmatrix} -1 & 0 & 0 & 0 & +1 & 0 & +1 & 0 \\ 0 & -1 & 0 & 0 & 0 & 0 & -1 & +1 \\ 0 & 0 & -1 & -1 & 0 & -1 & 0 & -1 \\ 0 & 0 & 0 & 0 & -1 & +1 & 0 & 0 \\ +1 & +1 & +1 & +1 & 0 & 0 & 0 & 0 \end{bmatrix}$$

    b) Check the linearity of the system.   08   CO5   [K$_3$]

$$y(n) = x(n) + C$$

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