VEER SURENDRA SAI UNIVERSITY OF TECHNOLOGY (VSSUT), ODISHA

Odd Mid Semester Examination for Academic Session 2024-25

COURSE NAME:B.TECH | SEMESTER:3RD

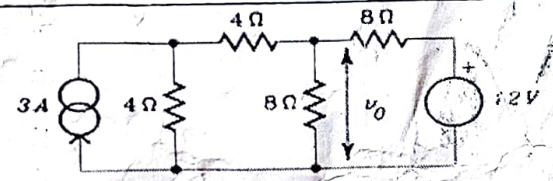
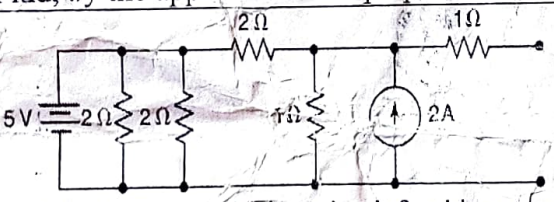
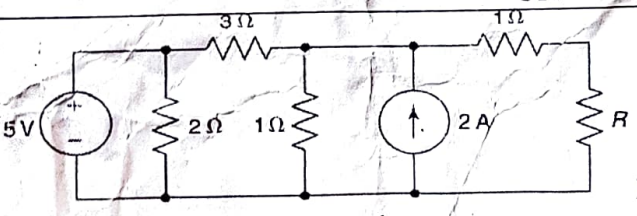
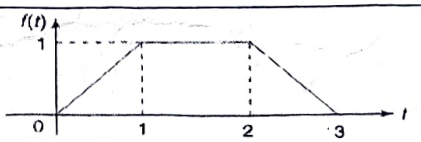
BRANCH NAME: ETC ENGINEERING

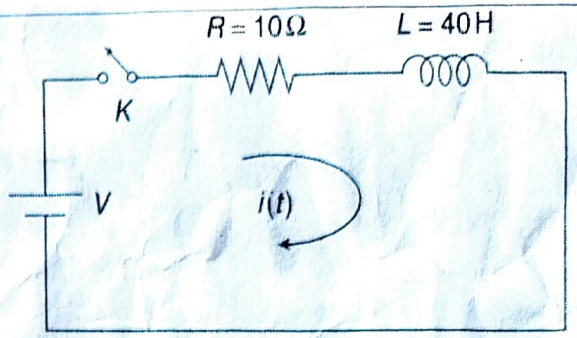
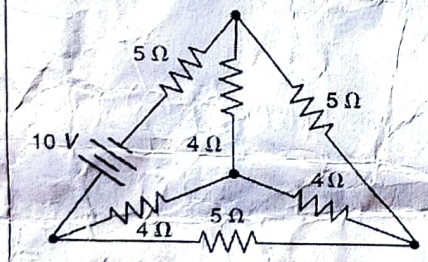
SUBJECT NAME: NETWORK ANALYSIS AND SYNTHESIS

FULL MARKS: **30** | TIME: **90 Minutes**

Answer **All** Questions.

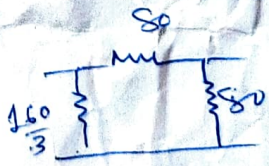
The figures in the right hand margin indicate Marks. *Symbols carry usual meaning.*

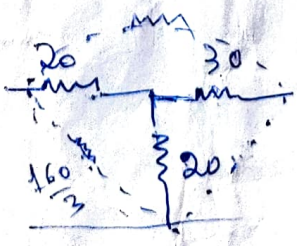
Q1.		Answer all Questions.	[2 × 3]
	a)	A delta connection contains three equal impedances of 60 Ω. Find the impedances of the equivalent star connection for each star load.	
	b)	What is the Final value of the function? $F(s) = \frac{4}{s(s^2+3s+8)}$	
	c)	If z-parameters are $z_{11} = 40$, $z_{22} = 50$ and $z_{12} = z_{21} = 20$, what would be the values of y-parameters?	
Q2.	a)	 Find, by the application of superposition theorem, the voltage v_0 in the circuit.	[4]
	b)	 Find the Norton equivalent circuit for this network.	[4]
		OR	
	a)	 Find the value of R such that maximum power transfer takes place.	[4]
	b)	Two impedances Z1 = 5 + j 10 Ω and Z2 = 10 - j 20 Ω are connected in parallel. The parallel combination is connected in series with another impedance Z3 = 10 + jX Ω. At what value of X, the circuit will produce resonance?	[4]
Q3.	a)	Derive the condition of resonance for a circuit having a RL branch in parallel with a RC branch.	[4]
	b)	Sketch the waveform that is represented by I(t)= r(t) - 2r(t−1) + 2r(t −3) − r(t−4)	[4]
		 Express following function in terms of the standard signal.	
		OR	

	a)	The values of R and L in a series R–L circuit are 10Ω and 40 H, respectively. At the instant of closing the switch, the current rises at the rate of 5 A/s. Calculate Rate of growth of current when 6A flows in the circuit. Find the energy stored in the inductor and the value of applied voltage.		[4]
	b)	What will be the impulse response of a system whose transfer function is given as $\frac{1}{(s+1)(s+2)}$		[4]
Q4.	a)	Determine [y] and [T]of a two-port network whose z parameters are $Z = \begin{bmatrix} 6 & 4 \\ 4 & 6 \end{bmatrix}$		[4]
	b)	With neat diagram explain about parallel connection of two port network. Define image impedance.		[4]
		OR		
	a)	The incidence matrix of a graph is given by $[A] = \begin{bmatrix} -1 & 0 & 0 & 1 & -1 & 0 \\ 1 & -1 & 0 & 0 & 0 & -1 \\ 0 & 1 & -1 & 0 & 1 & 0 \end{bmatrix}$ Determine the possible number of trees.		[4]
	b)		Write down the incidence matrix and cut-set matrices for the network.	[4]

$\frac{160}{3} + 80$

$\frac{160+240}{3} = \frac{400}{3}$





$80 + \frac{160}{3}$

$R_1R_2 + R_2R_3 = \frac{240+160}{3}$

$= \frac{400}{3}$

$\frac{1600}{30} = \frac{160}{3}$

$\frac{20\times30 + 20\times20 + 20\times30}{20}$

$= \frac{600+400+600}{20} = \frac{1600}{20} = 80$

$\frac{1600}{20} = 80$

$\frac{400}{3}$