Name: **Enrolment No:**	UPES

UNIVERSITY OF PETROLEUM AND ENERGY STUDIES

End Semester Examination, December 2018

Programme Name: B Tech ECE **Semester : III**
Course Name : Network Analysis **Time : 03 hrs**
Course Code : ECEG2020 **Max. Marks : 100**
Nos. of page(s) : 4

Instructions:

- Attempt all questions as per the requirement.
- Assume any data if required and indicate the same clearly. Unless otherwise indicated symbols and notations have their usual meanings.
- Strike off all unused blank pages

SECTION A (20 Marks)

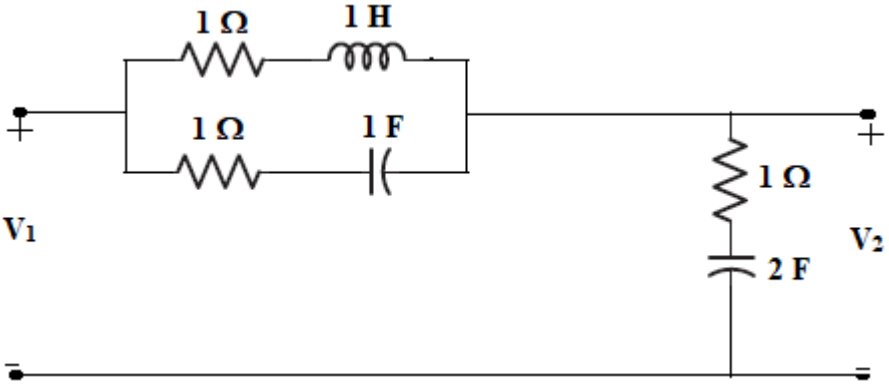
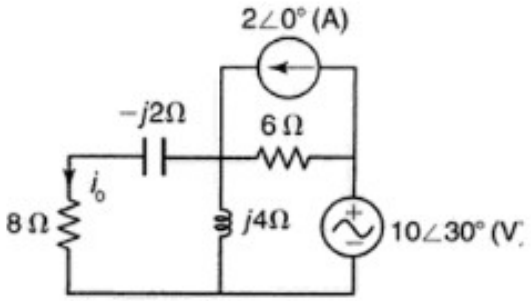
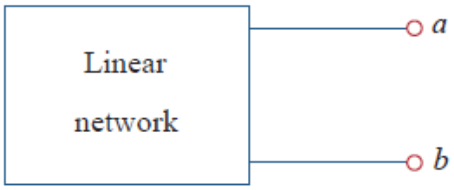
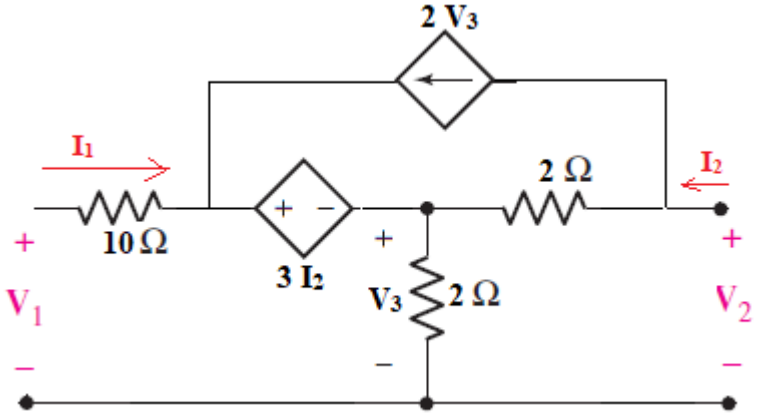
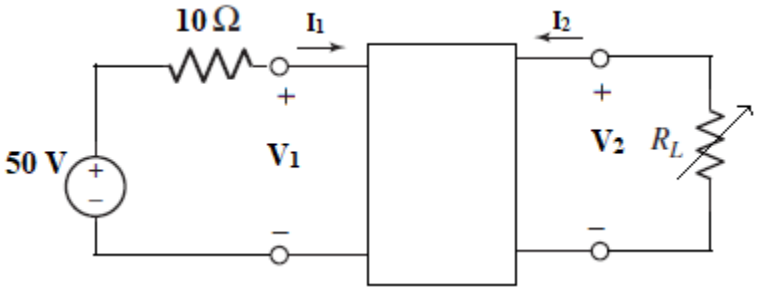
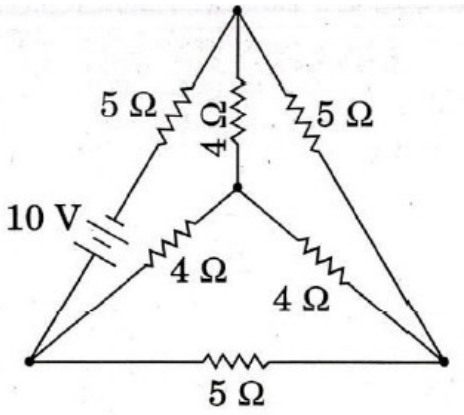
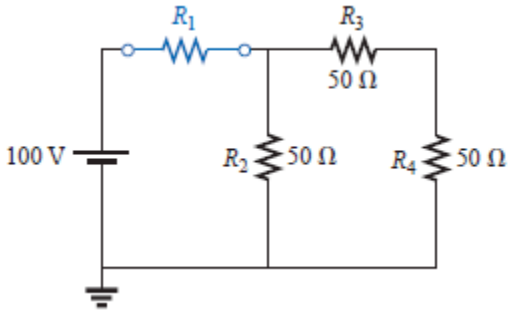
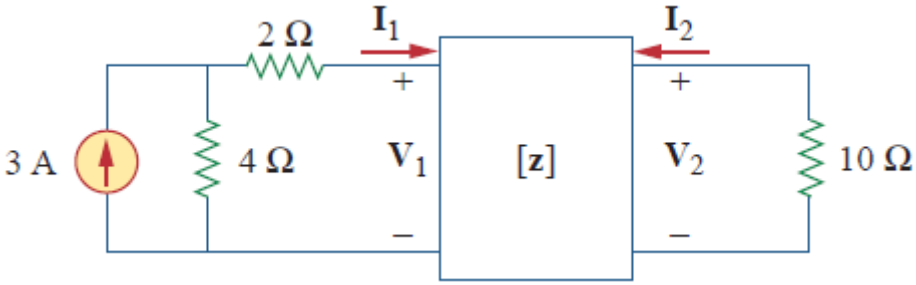
S.No.		Marks	CO
Q1	State the following network theorems: Thevenin's theorem and Tellegen's theorem.	4	CO1
Q2	Determine the number of possible trees of network represented with the following incidence matrix: 1 1 1 0 0 0 0 -1 0 1 -1 0 0 0 -1 -1 0 1 -1 0 0 0 1 -1	4	CO3
Q3	A 2-port network is represented by the following equations: $V_1 = 60\ I_1 + 20\ I_2$ $V_2 = 20\ I_1 + 40\ I_2$ Calculate the ABCD parameters for this network.	4	CO2
Q4	Write properties of Hurwitz polynomial.	4	CO4
Q5	Find the transfer function $H(s)=V_2(s)/V_1(s)$ for the given network shown in **Fig.1** 	4	CO5

	Fig.1		
	SECTION B (40 Marks)		
Q6	State superposition theorem and determine i_0 in the circuit shown in **Fig.2** using superposition theorem.  **Fig.2**  **Fig.3** **Or** The Thevenin's equivalent at terminals of the linear network shown in **Fig.3** is to be determined by measurement. When a 10-kΩ resistor is connected to terminals *a-b*, the voltage is measured as 6 V. When a 30-kΩ resistor is connected to the terminals, is measured as 12 V. Determine: (a) the Thevenin's equivalent at terminals *a-b*, (b) when a 20-k_ resistor is connected to terminals *a-b*.	**8**	**CO1**
Q7	For the network shown in **Fig.4** determine the z and y parameters  **Fig.4** **Or** The ABCD parameters of a two-port network shown in **Fig.5** are $\begin{bmatrix} 4 & 20 \\ 0.1 & 2 \end{bmatrix}$. The output is connected to the variable load R_L for maximum power transfer. Calculate R_L and the maximum power transfer.	**8**	**CO2**

	 **Fig.5**		
Q8	**(a)** Draw pole-zero plot for $V(s)=\frac{5s}{s^2+7s+12}$. Determine the time domain expression v(t) from its transform V(s). **(b)** Write the necessary conditions for network driving point impedance function.	**5+3**	**CO4**
Q9	Write incidence matrix and cut-set matrix of network shown in **Fig.6**  **Fig.6**	**8**	**CO3**
Q10	**(a)** What is positive real functions? Write necessary and sufficient conditions for testing positive real functions. **(b)** Test whether the following polynomial are positive real or not. $F(s)=\frac{10(s+1)^2}{(s+2)(s^2-6s+5)}$	**5+3**	**CO4**

SECTION-C (40 Marks)

Q11	**(a)** Find the resistance R_1 of **Fig.7** such that the resistor R_4 will receive maximum power.  **Fig.7** **(b)** For a two-port network shown in **Fig.8** the z-parameters are $[Z]=\begin{bmatrix}10 & -6\\ -4 & 12\end{bmatrix}\Omega$  **Fig.8** Calculate I_1, I_2, V_1 and V_2	**10+10**	**CO2**
Q12	Synthesize the following impedance function in Foster-I and Causer- II forms: $Z(s)=\frac{(s^2+4)(s^2+25)}{s(s^2+9)}$ **Or** A network function has poles at 0, -4, -6 and zeros at -2, -5. Taking the scaling factor to be 1, synthesize the function (i) as an impedance function in Foster's form and (ii) as an admittance function in Cauer form.	**20**	**CO4**