Name:	UPES
Enrolment No:	

UNIVERSITY OF PETROLEUM AND ENERGY STUDIES

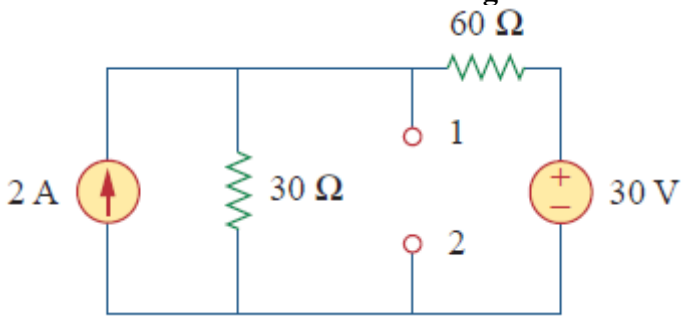
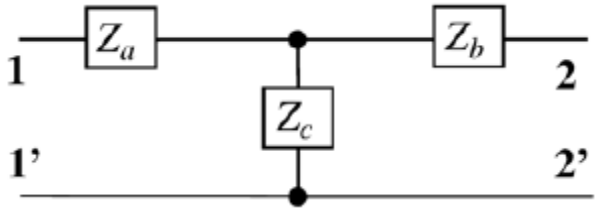
End Semester Examination, December 2018

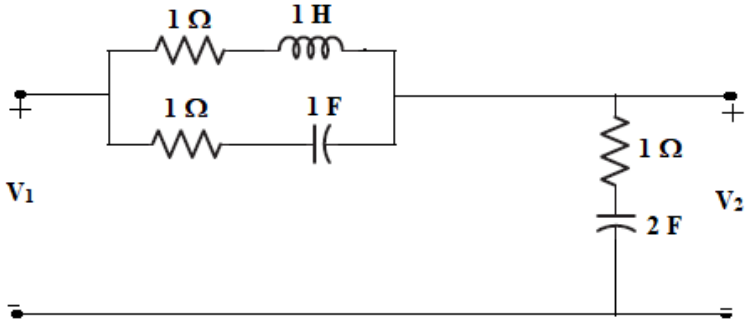
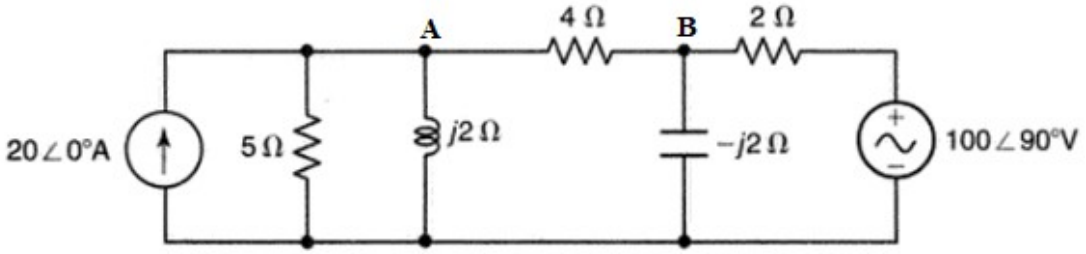
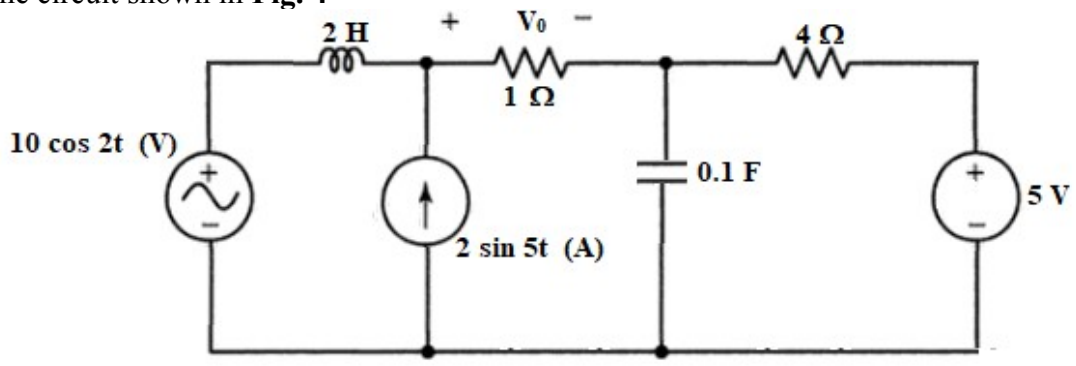
Programme Name: B Tech Mechatronics | **Semester** : VII
Course Name : Network Theory | **Time** : 03 hrs
Course Code : ELEG204 | **Max. Marks** : 100
Nos. of page(s) : 4

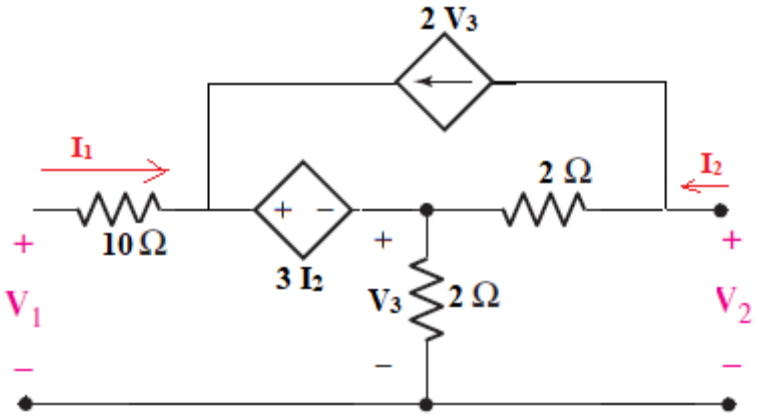
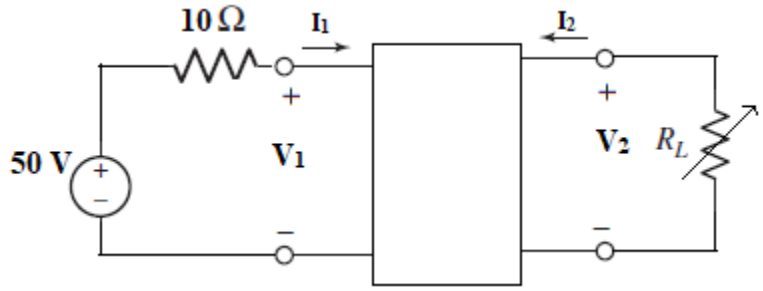
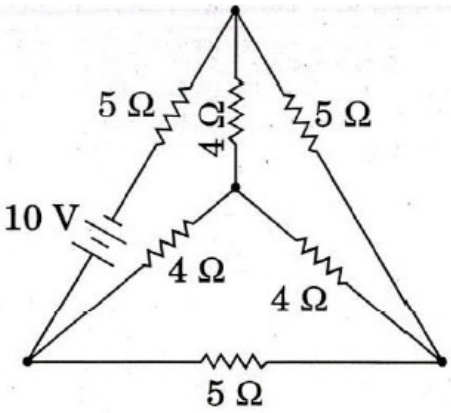
Instructions:

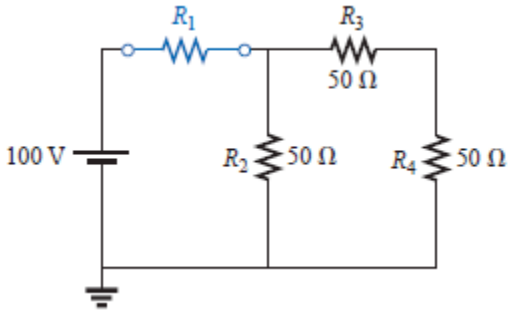
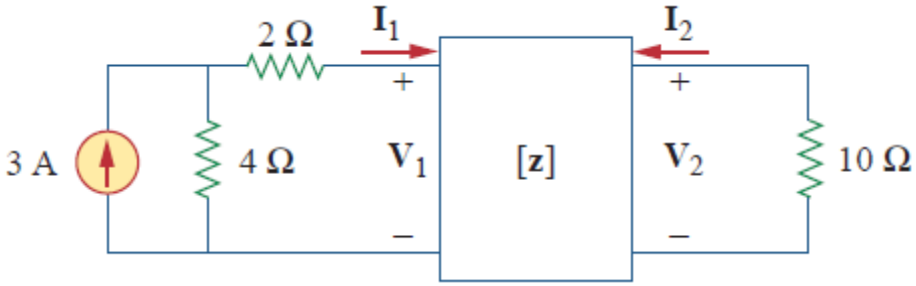
- Attempt all questions as per the requirement.
- Assume any data if required and indicate the same clearly. Unless otherwise indicated symbols and notations have their usual meanings.
- Strike off all unused blank pages

SECTION A (20 Marks)

S.No.		Marks	CO
Q1	Determine and at terminals 1-2 of circuit shown in **Fig.1**  **Fig.1**	4	CO1
Q2	The Z-parameter matrix for two port network shown in fig. is $\begin{bmatrix} j2\omega & j\omega \\ j\omega & 3+j2\omega \end{bmatrix}$ Where entries are in Ω, suppose $Z_b(j\omega)=R_b+j\omega$  Determine the value of Z_a, R_b and Z_c	4	CO2
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.2**  **Fig.2**	**4**	**CO4**
	SECTION B (40 Marks)		
Q6	**(a)** In the circuit shown in **Fig. 3**, determine the steady state current in 4 Ω resistor using Thevenin's theorem.  **Fig. 3** **Or** **(b)** By using super position theorem determine the voltage V_0 across 1 Ω resistor in the circuit shown in **Fig. 4**  **Fig. 4**	**8**	**CO1**
Q7	For the network shown in **Fig.5** determine the z and y parameters	**8**	**CO2**

	 **Fig.5** **Or** The ABCD parameters of a two-port network shown in **Fig.6** 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.  **Fig.6**		
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.7**  **Fig.7**	**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.8** such that the resistor R_4 will receive maximum power.  **Fig.8** **(b)** For a two-port network shown in **Fig.9** the z-parameters are $[Z]=\begin{bmatrix}10 & -6\\ -4 & 12\end{bmatrix}\Omega$  **Fig.9** Calculate I_1, I_2, V_1 and V_2	**10+10**	**CO2**
Q12	Synthesize the following impedance function in Foster-I and Foster- II forms of LC network: $Z(s)=8\frac{(s^2+4)(s^2+25)}{s(s^2+16)}$ **Or** A network function has poles at -2, -5 and zeros at 0, -4, -6. 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**