UNIVERSITY OF PETROLEUM AND ENERGY STUDIES
End Semester Examination, December 2018

Course: Network Theory, ECEG2006   **Semester: III**
Programme: B.Tech. - Electrical
Time: 03 hrs.   **Max. Marks: 100**
Instructions: All questions are compulsory

SECTION A

S. No.		Marks	CO
Q 1	List the properties of RL impedance function.	4	CO2
Q.2	Differentiate between dependent and independent sources.	4	CO1
Q.3	Derive Laplace Transform of saw tooth triangular pulse of unity height and duration T.	4	CO3
Q.4	A circuit consists of two parallel resistances R1 and R2 in series with R3. The total circuit current is I. What is the current passing through R2?	4	CO1
Q.5	State Thevenin's and Millman's theorem with their equivalent circuit diagram.	4	CO1,2

SECTION B

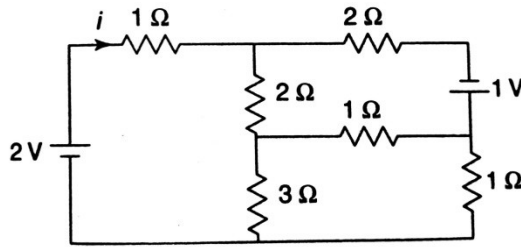|			
Q.6	How is two terminal pair network characterized in terms of input output variables? Also mention various two port parameters and write equations in terms of these parameters with their equivalent circuit diagram.	10	CO4
Q.7	Using Nodal analysis, find current through branch AB of the network shown.	10	CO2,3
Q.8	Find the FOSTER form of the function given below $$Z(s)=\frac{2(s+2)(s+5)}{(s+4)(s+6)}$$	10	CO4
Q.9	Determine whether the following functions are positive real (i) $\dfrac{2s^2+2s+1}{s^3+2s^2+s+2}$ (ii) $\dfrac{s^3+2s^2+2s+1}{s^2+s+2}$	10	CO4

SECTION-C

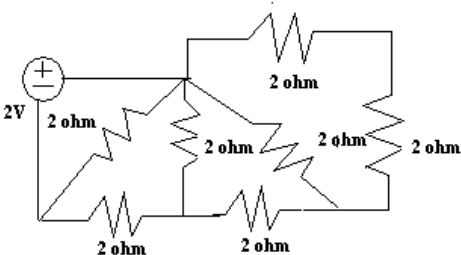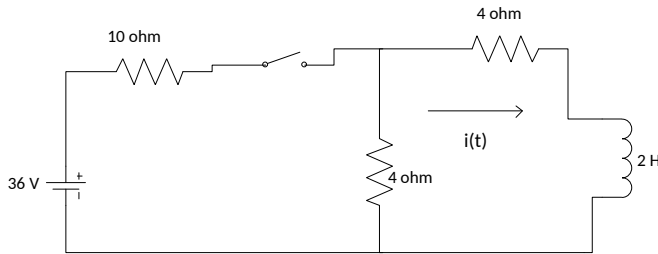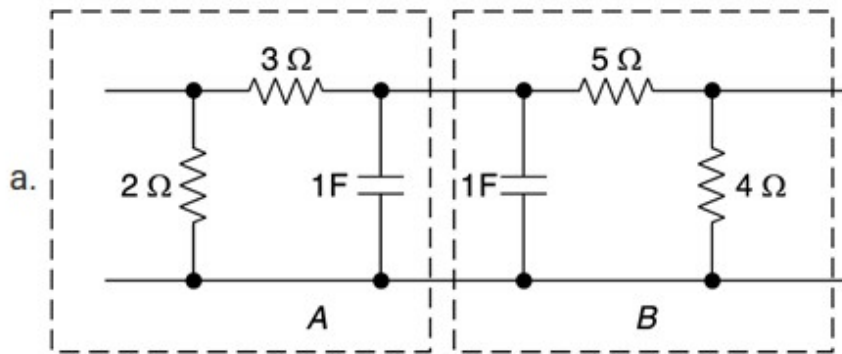| Q.10	(a)Test the following polynomial for Hurwitz property: (i) $s^4 + 7s^3 + 6s^2 + 21s + 8$ (ii) $s^7 + 3s^5 + 2s^3 + s$	8	CO5
	(b) For the network shown in fig. below, draw the oriented graph and obtain the tieset matrix. Use this matrix to calculate the current i. 	12	CO2
Q.11	(a) The network shown in figure has acquired steady state with the switch closed for $t < 0$. At $t = 0$, the switch is opened. Obtain i(t) for $t>0$. 	10	
	(b) Calculate the ABCD parameters for the block A and B separately and then using these results, calculate the ABCD parameters of the whole circuit shown in the figure. Prove any formula used. 	10	CO5

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SECTION A

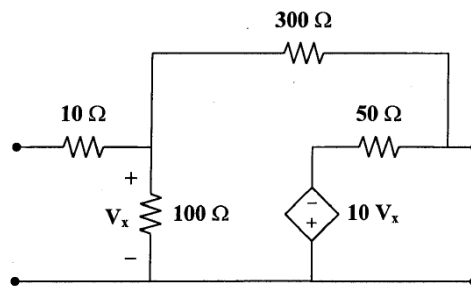| S. No.		Marks	CO
Q 1	List the necessary and sufficient conditions for positive real function.	4	CO2
Q.2	A resistance of 10 ohm is connected across a supply of 200V. if a resistance R is now connected in parallel with a 10 ohm resistance, the current drawn from the supply gets doubled. Find the value of unknown resistance.	4	CO1
Q.3	Derive Laplace Transform of square pulse of unity height and duration T.	4	CO3
Q.4	Differentiate RL and RC impedance function.	4	CO2
Q.5	State Norton's and Reciprocity's theorem with their equivalent circuit diagram.	4	CO1

SECTION B

Q.6	The Z-parameter of a two port network are $Z_{11} = 2.1\Omega$, $Z_{12} = Z_{21} = 0.6\Omega$, $Z_{22} = 1.6\Omega$. A resistor of 2Ω is connected across port 2. What voltage must be applied at port 1 to produce a current of 0.5 A in the 2Ω resistor.	10	CO2
Q.7	Determine the cut-sets of the graph shown in figure and write network equilibrium equation using cut set matrix.	10	CO3
Q.8	Realize the given function in Cauer I form $$F(s) = \frac{2(s+1)(s+3)}{(s+2)(s+6)}$$	10	CO4
Q.9	The switch in the network shown in figure is closed at t = 0. Determine the voltage $V_c(t)$ across the capacitor.	10	CO5
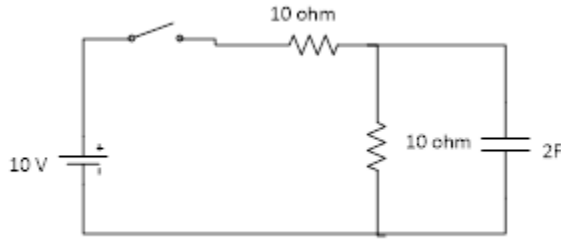
SECTION-C

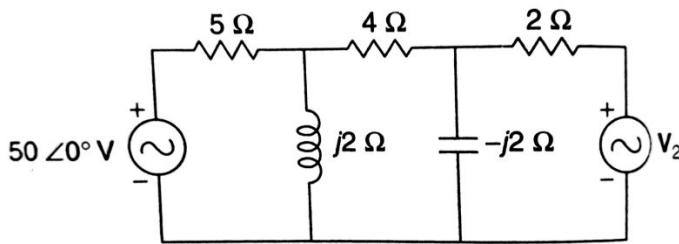|			
Q.10	(a) Obtain the h-parameter of the two port network shown in figure 	10	CO3,4
	(b) State and explain the importance of the maximum power transfer theorem. Why maximum power transfer criterion is never considered in Power system. And show that efficiency of power transfer is 50 %.	10	CO2
Q.11	(a) In the network given below, find V_2 which results in zero current through the 4Ω resistor. 	8	CO1,2
	(b) Measurements were made on a two- port network shown in the figure. (i) With port -2 open, a voltage of 100 angle 0 volt is applied to port – 1, resulted in I_1= 10 angle 0 amp and V_2 = 25 angle 0 volt. (ii) With port – 1 open a voltage of 100 angle 0 volt is applied to port -2, resulted in I_2= 20 angle 0 amp and V_1 = 50 angle 0 volt. **a.** Write the loop equations for the network and also find the driving point and transfer impedance. **b.** what will be the voltage across a 10 ohm resistor connected across port-2 if a 100 angle 0 volt source is connected across port -1.	12	CO3,4