UNIVERSITY OF PETROLEUM AND ENERGY STUDIES

End Semester Examination, December 2017

Program/course:	**BTech – Electrical Engg.**	**Semester –**	**III**
Subject:	**Network theory**	**Max. Marks**	**: 100**
Code :	**ELEG 204**	**Duration**	**: 3 Hrs**
No. of page/s:	**2**		

SECTION – A

ANSWER ALL THE QUESTIONS **5 x 4 = 20**

Q.1(CO1) If each branch of a delta network has resistance $\sqrt{3}R$, then each branch of the equivalent star network has resistance…?

Q.2(CO1,2) A network contains linear resistor and ideal voltage sources. If values of all resistor are doubled then what would be the effect on voltage across each resistor?

Q.3(CO1,2) Two wires A and B of the same material and length L and 2L have radius r and 2r respectively. The ratio of their specific resistance will be…?

Q.4(CO4) A network has 7 nodes and 5 independent loops. What is the exact number of branches in the network?

Q.5(CO1,2) A source of angular frequency of 1 rad/s has a source impendence consisting of a 1Ω resistance in series with a 1H inductance. Find out the load which will obtain maximum power transfer.

SECTION – B

ANSWER ALL THE QUESTIONS **10 x 4 = 40**

Q.6(CO2,3) In the network of fig.1, verify the substitution theorem by replacing the 6Ω resistor by a voltage source.

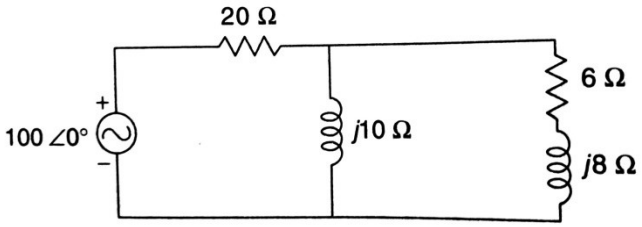

Fig. 1

Q.7(CO3,4) The Z-parameter of a two port network are Z_{11} = 2.1Ω, Z_{12} = Z_{21}= 0.6Ω, Z_{22} = 1.6Ω. 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.

Q.8(CO5) Test the following polynomial for Hurwitz property:

(i) $s^4+7s^3+6s^2+21s+8$ (ii) $s^7+3s^5+2s^3+s$

Q.9(CO4,5) Realize the given function in FOSTER I form:

$$Y(s)=\frac{(s+2)(s+5)}{s(s+4)(s+6)}$$

SECTION – C

ANSWER ALL THE QUESTIONS **20 x 2 = 40**

Q.10(CO2,4) For the network shown in fig.2 below, draw the oriented graph and obtain the tieset matrix. Use this matrix to calculate the current i.

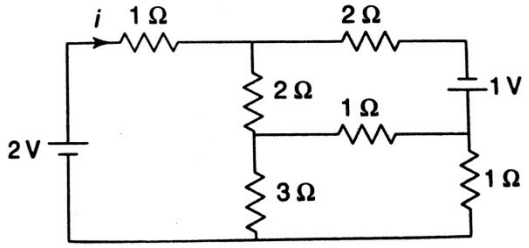

Fig.2

OR

(CO2,4) For the network shown in fig.3, write down the tieset matrix and obtain the loop currents.

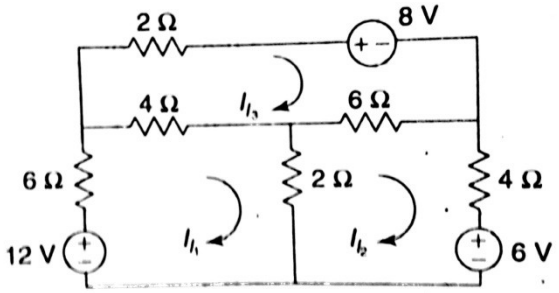

Fig.3

Q.11(CO1,2,3,4) In the network of fig.4, find V_2 which results in zero current through the 4Ω resistor.

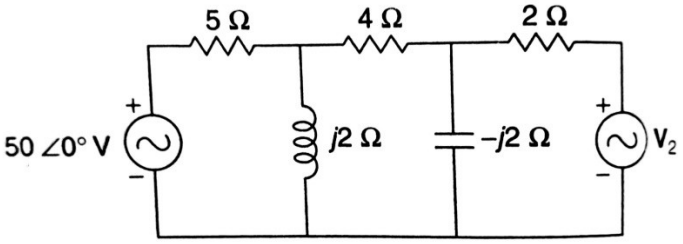

Fig.4

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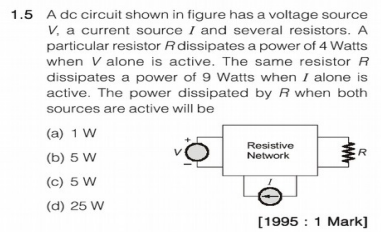
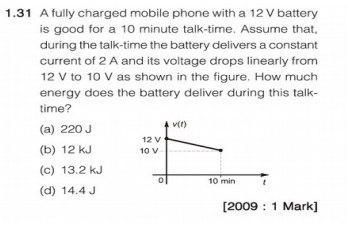
SECTION – A

ANSWER ALL THE QUESTIONS **5 x 4 = 20**

Q.1(CO1,2) A dc circuit shown in figure has a voltage source V, a current source I and several resistors. A particular resistor R dissipated a power of 4 watts when V alone is active. The same resistor R dissipates a power of 9 watts when I alone is active. What would be the power dissipated by R when both sources are active?



Q.2(CO2,3) A fully charged mobile phone with 12V battery is good for a 10 minute talk-time. Assume that, during the talk time the battery delivers a constant current of 2A and its voltage drops linearly from 12 V to 10V as shown in figure given below. How much energy does the battery deliver during this talk-time?



Q.3(CO1) Define real, reactive and apparent powers.

Q.4(CO5) How you can describe transmission parameters in network theory?

Q.5(CO1) Why grounding plug in 3-pin have more cross sectional area?

SECTION – B

ANSWER ALL THE QUESTIONS **10 x 4 = 40**

Q.6(CO4,5) Determine whether the following functions are positive real

(i) $\frac{2s^2+2s+1}{s^3+2s^2+s+2}$ (ii) $\frac{s^3+2s^2+2s+1}{s^2+s+2}$

Q.7(CO5) Realize the given function in Cauer I form

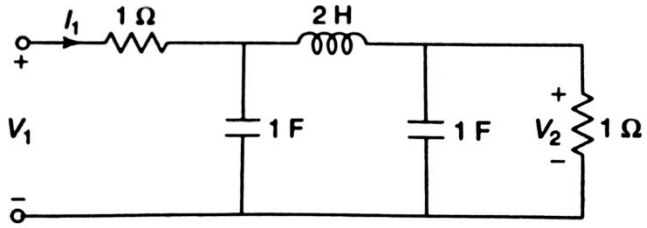
$$F(s)=\frac{2(s+2)(s+3)}{(s+2)(s+6)}$$

Q.8(CO2,3) The incidence matrix is given as follows:

	Branches →						
1	2	3	4	5	6	7	8
−1	−1	0	0	0	0	1	0
0	1	1	0	1	0	0	0
0	0	−1	−1	0	1	0	0
1	0	0	1	0	0	0	1

Draw oriented graph and write tieset matrix.

Q.9(CO4,5) Find network functions V_2/V_1 and V_1/I_1 for the network shown in fig. below and plot poles and zeros of $V_2(s)/V_1(s)$.



SECTION – C

ANSWER ALL THE QUESTIONS **20 x 2 = 40**

Q.10(CO2,4,5) Find Y parameters for the network shown in fig.4. Hence find h-parameter using interrelation property.

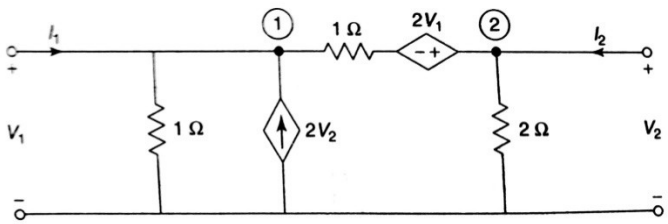


Fig.4

Q. 11(CO1,2,4) Find the voltage V_x in the network shown in fig. 5

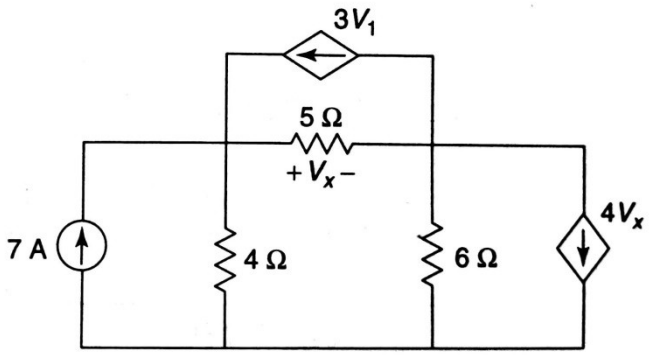


Fig.5

OR

(CO1,2,4)Find the voltage V_y in the network shown in fig.6

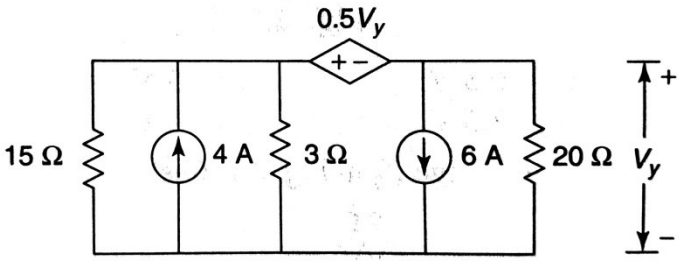


Fig. 6