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P.E.S. College of Engineering, Mandya - 571 401

(An Autonomous Institution affiliated to VTU, Belagavi)

Third Semester, B.E. - Electronics and Communication Engineering

Semester End Examination; Dec. - 2019

Network Analysis and Synthesis

Time: 3 hrs *Max. Marks: 100*

Note: i) PART - A is compulsory. **Two** marks for each question.

ii) PART - B: Answer any **Two** sub questions (from a, b, c) for Maximum of **18 marks** from each unit.

Q. No.	Questions	Marks
	I : PART - A	**10**
I a.	State Norton's theorem.	2
b.	Define the following: i) Magnitude Scaling ii) Frequency Scaling	2
c.	Find the Laplace transform of t^2.	2
d.	Define planar graph. Give an example.	2
e.	Test whether the polynomial is Hurwitz or not give reason $P(s) = s^4 + 4s^3 + 3s + 2$	2
	II : PART - B	**90**
	UNIT - I	**18**
1 a.	For the network shown in Fig.1 (a), determine the node voltages V_1, V_2, V_3 and V_4 using nodal analysis.	9
b.	Find the Thevin's equivalent network shown in Fig.1 (b).	9
c.	Determine the current in the 5Ω resistor of the network shown in Fig.1(c)	9

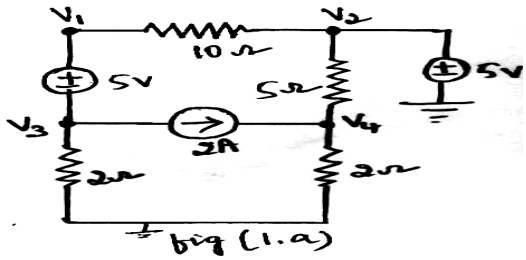

fig (1.a)

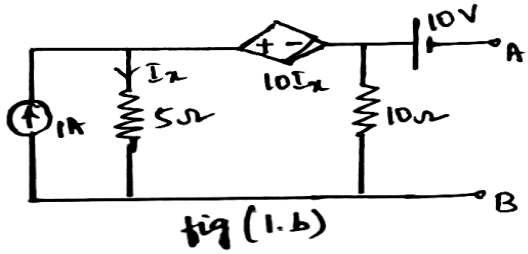

fig (1.b)

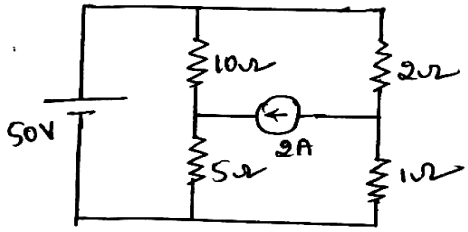

fig (1.c)

Contd…2

UNIT - II **18**

2 a. Define Q-factor and Prove that $Q = \frac{1}{WRC}$. 9

b. For the circuit shown in Fig. 2(b), determine the value of capacitance and coil resistance at resonant frequency of 500 rad/s and f_1 and f_2. 9

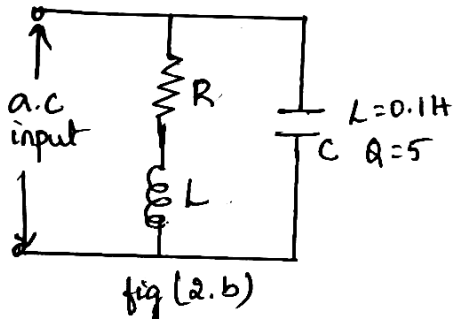

fig (2.b)

c. In the circuit shown in Fig. 2(c) the switch is moved from '*a*' to '*b*' at $t = 0$. Find the value of $i, \frac{di}{dt}, \frac{d^2i}{dt^2}, at\ t = 0^+$. 9

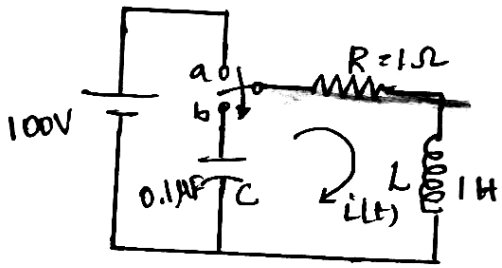

fig (2.c)

UNIT - III **18**

3 a. State and prove; i) Time Differentiation theorem ii) Time Integration theorem. 9

b. Find the Laplace transform of the following: 9

i) $e^{-at}\cos wt$ *ii)* $f(t) = \begin{cases} (t+1) & 0 \le t \le 2 \\ 3 & t > 2 \end{cases}$ *iii)* $5 + 4e^{-2t}$

c. Determine the Inverse Laplace transform of the following using Convolution method: 9

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

UNIT - IV **18**

4 a. Obtain Y-parameters for the network shown in Fig. 4(a). 9

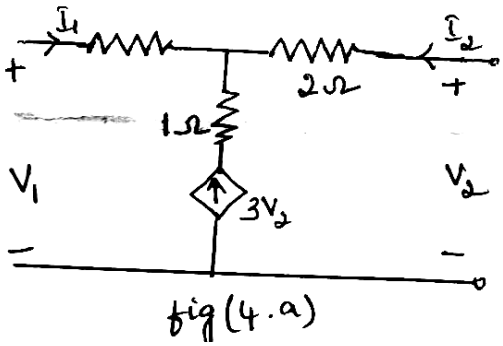

fig (4.a)

Contd…3

b. Determine hybrid parameters for the network of Fig. 4(b). 9

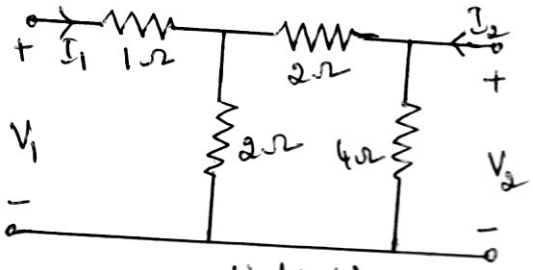

fig (4.b)

c. The graph of a network is shown in Fig.4(c). Write the, 9

i) Incidence Matrix ii) Tieset matrix iii) Cutset matrix

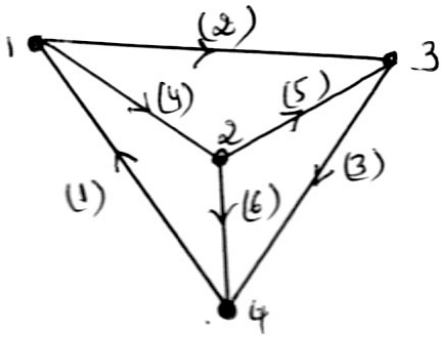

fig (4.c)

UNIT - V **18**

5 a. Define Hurwitz polynomial. Test whether the polynomial $P(s) = s^5 + 3s^3 + 2s$ is Hurwitz. 9

b. Test whether $F(s) = \dfrac{2s^3 + 2s^2 + 3s + 2}{s^2 + 1}$ is positive real function. 9

c. Realize the Foster-I form of the following impedance function, 9

$$Z(s) = \frac{4(s^2+1)(s^2+9)}{s(s^2+4)}$$

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