Roll No. ☐☐☐☐☐☐☐☐☐☐☐☐ **Total No. of Pages : 02**

Total No. of Questions : 09

B.Tech.(ECE / Electronics & Computer Engg. / ETE) (2011 Onwards)
B.Tech. (Electronics Engg.) (2012 Onwards) (Sem.–3)

NETWORK ANALYSIS AND SYNTHESIS

Subject Code : BTEC-303

Paper ID : [A1127]

Time : 3 Hrs. **Max. Marks : 60**

INSTRUCTIONS TO CANDIDATES :

1. **SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.**
2. **SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.**
3. **SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.**

SECTION-A

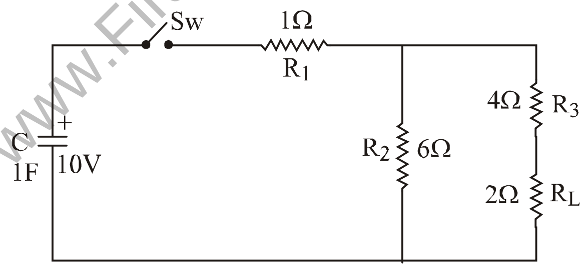
1) Write briefly :

a) State Norton's theorem.

b) Find the voltage at the terminals of a coil having R = 10Ω and L = 15H at the instant when the current is 10A and increasing @ 5A/sec.

c) Obtain the Laplace transform of $f(t) = e^{-\theta t} \cos\omega t$, θ being a constant.

d) Find the expression of discharging voltage of the capacitor at t = 0+ following switching at t = 0.



e) State Routh Hurwitz criterion of stability of Network function.

f) Differentiate between active and passive filters.

g) Discuss the disadvantages of constant-k filters in detail.

h) Explain the additive property of superposition theorem.

i) Give the basic principle of driving point synthesis.

j) Find the equivalent T network for the given ∏ network

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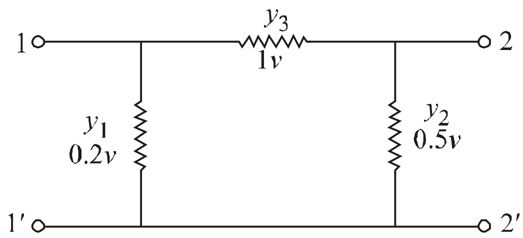

SECTION-B

2) The driving point impedance of a one port LC network is given by

$Z(s) = (6s^3 + 2s)/(12s^4 + 8s^2 + 1)$

For this impedance function, find equivalent first and second Cauer network.

3) Design T and ∏ sections of m- derived high pass filter having nominal characteristic impedance of 600 Ω, cut off frequency of 4KHz and infinite attenuation at 3.6 KHz.

4) Give the restriction on the locations of poles and zeros in the driving point functions.

5) State and Prove Maximum Power Transfer Theorem.

6) Apply Routh Criterion to the following equation and determine the number of roots

a) with positive real parts

b) with zero real parts

c) with negative real parts.

$s^6 + 6s^5 + 8s^4 + 38s^3 + 47s^2 + 52s + 30 = 0$

SECTION-C

7) What is a filter? Give the properties of filter. Classify the filters depending upon the relationship between the arm impedances. Derive the expressions for β, α and characteristic impedance of a low pass filter in the pass band and stop band.

8) Discuss the conditions under which a passive two port network is reciprocal and symmetrical. Let the transform current I(s) in a network be given by I(s) = 9s / {(s+3)(s+4)}. Plot the poles and zeros in the s-plane and hence obtain the time domain response.

9) What is the Power loss in the 1Ω resistor (R_L) of circuit given? Use Norton's theorem.