(c) An impulse is applied at the input of a system and the output is observed to be the time function e^{-2t}. Find the transfer function of the system.

5 Attempt any four of the following: **10×2=20**

(a) Evaluate the convolution integrals $f_1(t) * f_2(t)$ and $f_2(t) * f_1(t)$, where the functions $f_1(t)$ and $f_2(t)$ are shown in Fig.5(a) and 5(b), respectively.

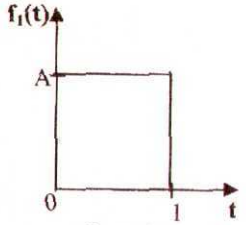

Fig.5(a)

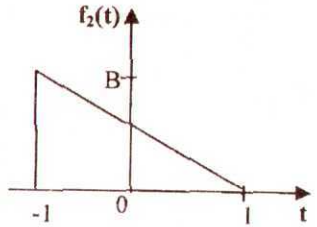

Fig.5(b)

(b) Obtain the inverse Laplace transform of following functions by convolution integral

(i) $\dfrac{(s+1)(s+3)}{(s+2)(s+4)}$ (ii) $\dfrac{(s+5)}{(s+2)^2}$

(c) Synthesize the Foster first and second forms of LC driving point impedance

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

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TEE-301 **Printed Pages : 4**

Paper ID and Roll No. to be filled in your Answer Book

Roll No.

B. Tech.

(SEM. III) (ODD SEM.) (REG./BACK) EXAMINATION, 2012-13

NETWORK ANALYSIS & SYNTHESIS

Time : **3** Hours] [Total Marks : **100**

Note : All question carry equal Marks. Attempt all five questions.

1 Attempt any four of the following : **5×4=20**

(a) List the essential properties of a linear network systems.

(b) State and explain Thevenin's Theorem. Can a Thevenin theorem be applied to linear load only? Give reasons in support of your answer.

(c) Show that the unit step function $u(t)$is Laplace transformable, and determine its Laplace transform.

(d) List the properties of the Laplace transform and its inverse, explaining time scaling and frequency scaling.

(e) Obtain the Laplace transform of hyperbolic sine and cosine function. [sinh *at and* cosh *at*].

(f) Which of the given polynomial is a Hurwitz polynomial

(i) $s^3 + 4s^2 + 5s + 2$

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

2 Attempt any two of the following **10×2=20**

(a) Write the mathematical expressions for the pulses shown in Fig. la and Fig.lb. Obtain its Laplace transform also.

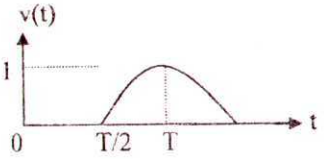

Fig la

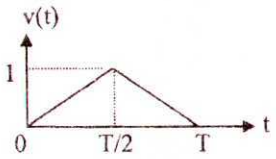

Fig 1b

(b) A triangular wave shown in Fig.2b is applied as input to a series R–L circuit shown in Fig.2a with R=2 Ω and $L = 2\ H$. Calculate the current $i(t)$ through the circuit.

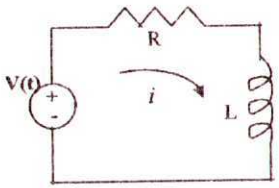

Fig 2a

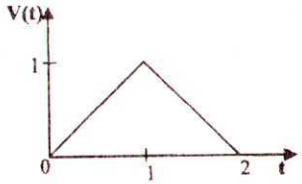

Fig 2b

(c) A voltage pulse of unit height and width T is applied to the Low Pass RC circuit as shown in Fig.3a at t = 0. Determine the voltage across the capacitance C as a function of time. Draw the output waveform.

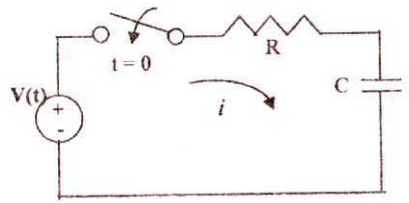

Fig 3a

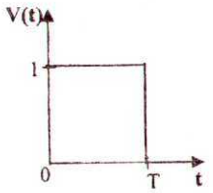

Fig 3b

3 Attempt any two of the following. **10×2=20**

(a) Find the Laplace transform of function $f(t) = t^2 \sin(wt)$.

(b) Why ABCD parameter is known as Transmission parameter? What is the condition of Reciprocity in case of ABCD parameter? Derive condition for symmetry of Transmission parameter?

(c) For the network shown below(Fig.4), Obtain the open-circuit impedance parameters and draw its equivalent circuit. In the fig, $R_1 = R_3 = R_4 = 2\Omega$ and $R_2 = 1\Omega$

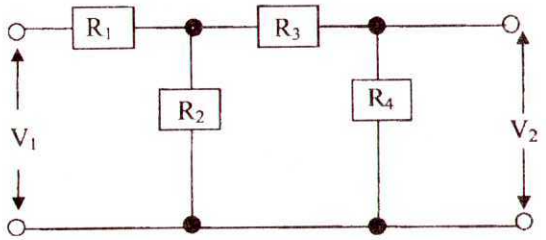

Fig.4

4 Attempt any two of the following. **10×2=20**

(a) Determine the Foster and Cauer form of realization of the given driving -point impedance function $Z(s)$

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

(b) Give the statement and explain the following theorems

(i) Superposition Theorem

(ii) Tellegen's theorem