Paper ID: **3 0 4 4**   Roll No. [ ][ ][ ][ ][ ][ ][ ][ ][ ][ ]

B TECH
(SEM III) THEORY EXAMINATION 2017-18
NETWORK ANALYSIS AND SYNTHESIS

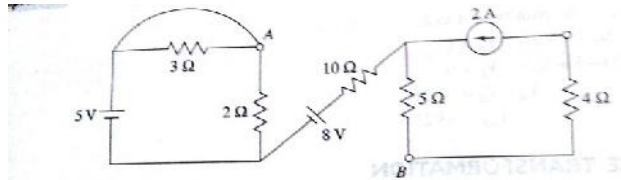*Time: 3Hours*   *Max. Marks: 100*

Note: Attempt all Sections. Assume missing data, if any.

SECTION A

1.   **Attempt *all* questions in brief.**   **2 x 10 = 20**

a) Determine the potential difference V_{AB} for the given network-

b) What is the difference between network analysis and network synthesis?

c) Define complex Frequency?

d) What is the condition for reciprocity of z-parameter and h-parameter?

e) What are the properties of Positive real function?

f) State the convolution theorem?

g) Write down the statement for Norton theorem with example?

h) Write the Z-parameter in terms of Y-parameter?

i) What is the difference between active and passive element?

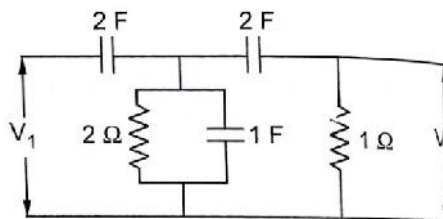j) Find the Inverse Laplace of $\dfrac{1}{s(s+4)}$ using convolution integral?

SECTION B

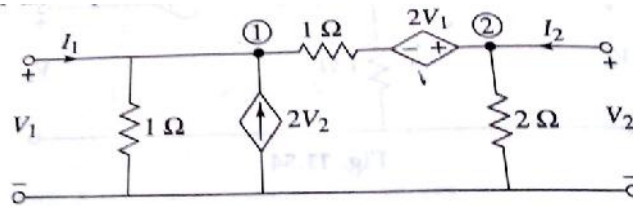**2.**   **Attempt any *three* of the following:**   **10 x 3 = 30**

a) What are the basic step functions of the network? Also derive the relationship between them?

b) Obtain Voltage ratio transfer function for the given network-

c) Synthesize $Z_{21}(s) = \dfrac{s}{s^3 + 2s^2 + 3s + 2}$ with 1   termination?

d) Find the Z-parameter for the network-

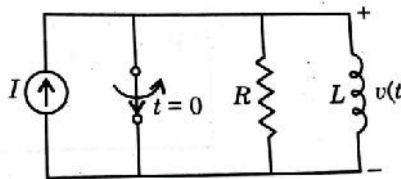**e)** Determine the range of k so that the polynomial $P(s) = s^3+3s^2+2s+k$ is Hurwitz?

SECTION C

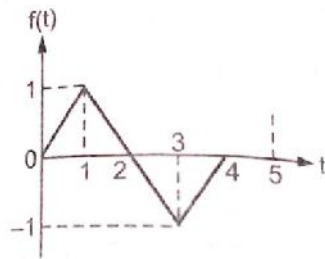**3. Attempt any *one* part of the following:**   **10 x 1 = 10**

a) The circuit shown is figure has the switch S opened at t=0. Solve for v, dv/dt and d^2t/dt^2 at t=0+, if I=1A R=100 and L=1H. Also find the expression for v(t).
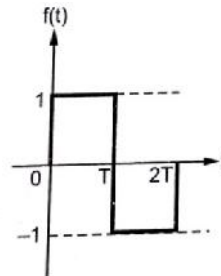

b) (i) Draw the waveform represented by the following function-

$$f_1(t)= (t-1)u(t-1) \text{ (ii) } f_2(t)=tu(t+T)$$

(ii) Write the expression for the waveform shown in the figure-
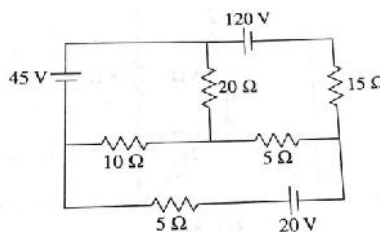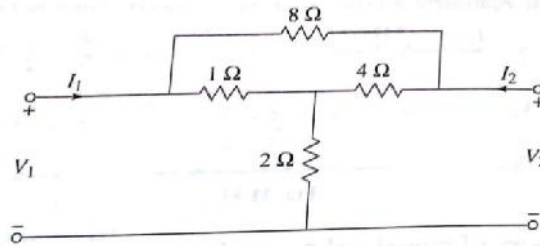

(i)   (ii)

4. Attempt any *one* part of the following: **10 x 1 = 10**

a) Find the current through 20 resistor using Thevenin theorem-

b) Find the T-parameter and Y-parameter of the given network-

5. **Attempt any *one* part of the following:**   10 x 1 = 10

   a) What are the properties of Hurwitz polynomial? Test whether the polynomial is Hurwitz or not? $F(s) = s^7 + 2s^6 + 2s^5 + s^4 + 4s^3 + 8s^2 + 8s + 4$
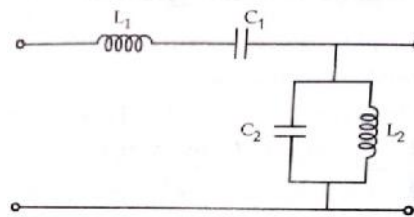
   b) Realize the Foster I-forms and Cauer-II of the following impedance function-

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

6. **Attempt any *one* part of the following:**   10 x 1 = 10

   a) Define the zeros of transmission? Identify the zeros of transmission of the given network-

   b) (i) What are the different properties of transfer function?

   (ii) Synthesize $Y_{21}(s) = \dfrac{s^2}{s^3 + 3s^2 + 3s + 2}$ with 1   termination?

7. **Attempt any *one* part of the following:**   10 x 1 = 10

   a) Design first order high pass active filter and draw its frequency response?

   b) (i) Explain the advantage of active filters over passive filter?

   (ii) State the properties of LC impedance function?