Printed Pages – 8

324453 (25)

BE (4th Semester)

Examination, Nov.-Dec., 2021

Branch : Elect.

NETWORK ANALYSIS & SYNTHESIS (NEW)

Time Allowed : Three Hours

Maximum Marks : 80

Minimum Pass Marks : 28

Note : Part (a) of each question is compulsory. Attempt any two from (b), (c), (d).

Unit-I

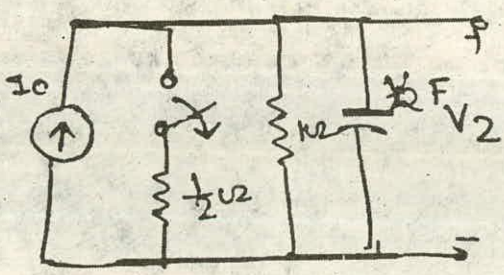
Q. 1. (a) Represent methematically and graphically the following continuous time signals : 2

(i) Unit step

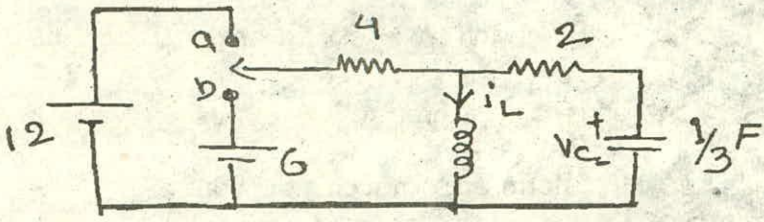
(ii) Ramp

(iii) Impulse

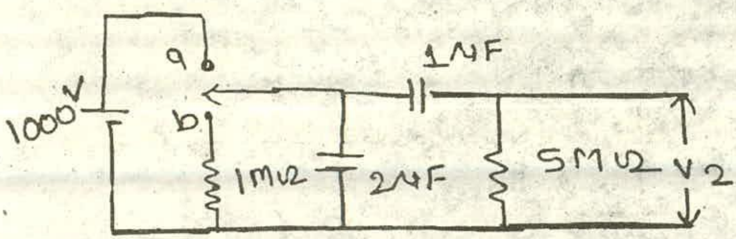
(b) For the circuit shown in fig., find the voltage across the 1 Ω resistor when the switch S is opened at t = 0. Assume there is no charge on the capacitor and no current in the inductor before switching. **7**



(c) For the fig shown below, the switch S is in position a for long time and moved to position B at t = 0. Obtain the values of i_L, V_C and their first derivatives at $t = 0^+$. **7**



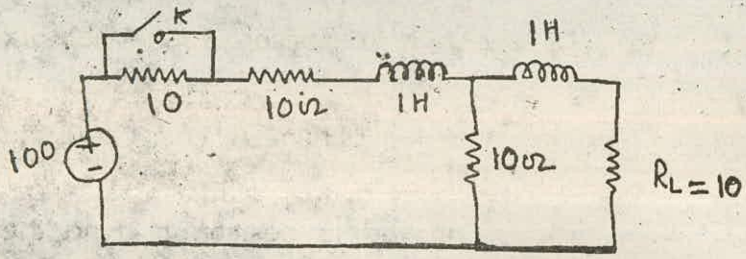
(d) With switch k in position a, the network shown attain equilibrium. At time t = 0, the switch is moved to position b. Find the voltage across R_2 as a function of time. 7



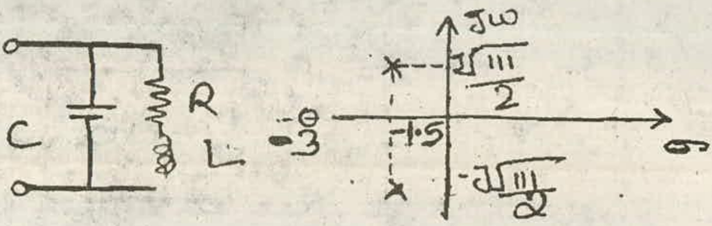
Unit-II

Q. 2. (a) Define all the transfer functions of the two port network ? 2

(b) If the switch 'k' is closed at t = 0, find the current i(t) through R_L by using Laplace transform and Thevenin's theorem. **7**



(c) The network and its pole zero plot of z(s) is shown in fig. **7**

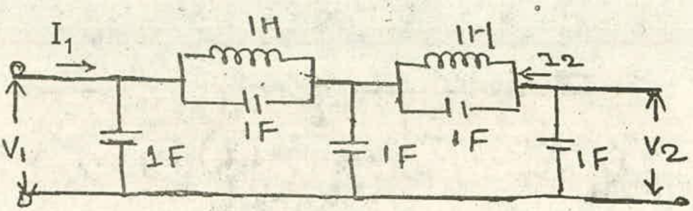


The impedance has the form

$$z(s) = \frac{k(s - z_1)}{(s - p_1)(s - p_2)}$$

If $Z(j0) = 1$, find the values of R, L and C.

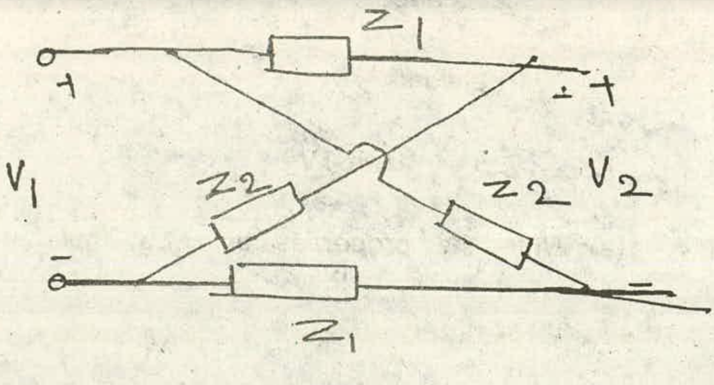
(d) For the network shown, find the voltage gain. **7**



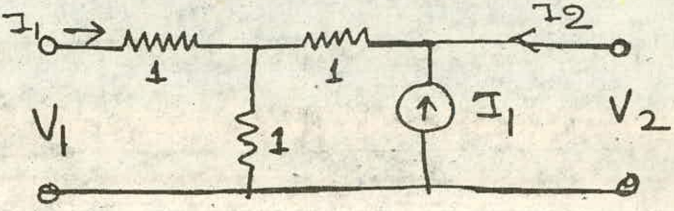
Unit-III

Q. 3. (a) Draw the equivalent circuit of a 2-port network in terms of z parameters. **2**

(b) Find z parameter for the reciprocal and symmetric two-port network shown below. **7**



(c) Find 'y' parameters. State whether the network is symmetrical and reciprocal. 7



(d) (i) For a network to be reciprocal show that AD–BC = 1. Where A, B, C and D are the transmission parameters. 3

(ii) Derive the condition (or result) for cascaded connection of two port networks. 4

Unit-IV

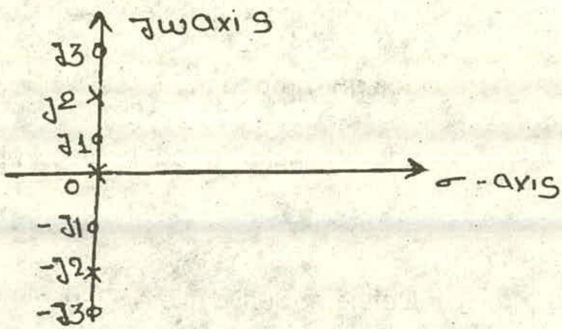
Q. 4. (a) Write the properties of R-Lb impedance functions. 2

(b) (i) Determine the range of β such that the polynomial **4**

$P(s) = s^4 + s^3 + 4s^2 + \beta s + 3$ is Hurwitz.

(ii) Define the positive real function and mention its properties. **3**

(c) An impedance function has the pole zero pattern shown below. If $z(-2) = -\frac{130}{16}$, synthesize the impedance in Foster II forms. **7**



(d) An impedance function is given by $Z(s) = \frac{s(s+2)(s+5)}{(s+1)(s+4)}$. Find the R-L presentation of Cauer-I and II forms. **7**

Unit-V

Q. 5. (a) Define all the parameters of a filter. 2

(b) A T-section low pass filter has series inductance 80 mH and shunt capacitance .022 μF. Determine the cut-off frequency and nominal design impedance. Also design on equivalent π-section. 7

(c) Design a T-section constant k-high pass filter having cutoff frequency of 10 kHz and design impedance of 600 Ω. Find its characteristic impedance and phase constant at 25 kHz. 7

(d) Define m-derivd filters. Derive the expressions of m-derived band-pass filters. 7