[Time:3 Hours] **[Marks:80]**

N.B

1. Question **No.1** is compulsory.
2. Attempt **any three** questions from remaining five questions.
3. Assume **suitable data** if required.
4. Use **Smith chart** for the transmission line problem if asked.

Q.1)(a) Find the Norton's equivalent circuit across the terminal a-b for the circuit shown in Figure No.1. (5-M)

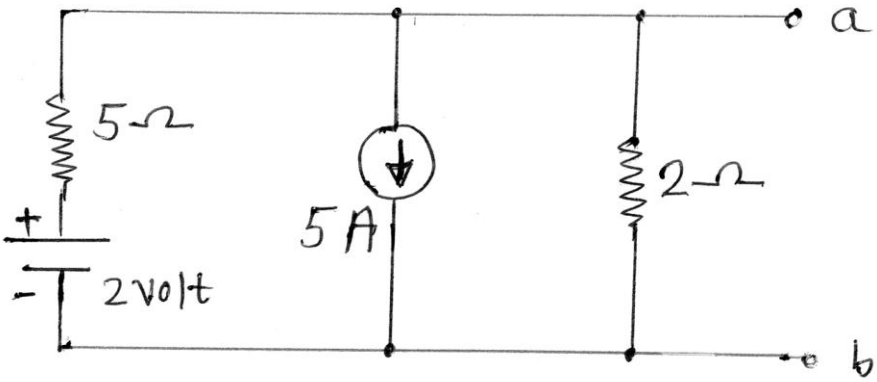

Figure No.1

(b) Obtain the instantaneous value of currents through R and L and obtain the total current in terms of RMS value for the circuit shown in Figure No.2. This circuit is energized by a sinusoidal a.c. voltage of v = 100sin (1000t+36) volt. (5-M).

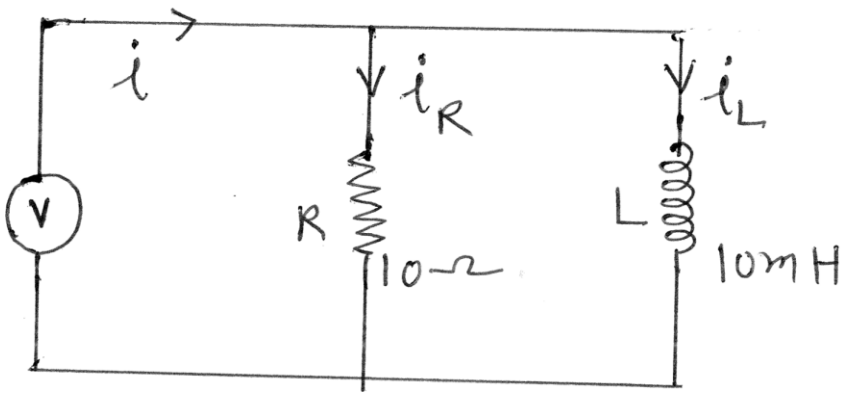

Figure No. 2

(c) Determine the Z- parameters for the circuit shown in Figure No.3. (5-M)

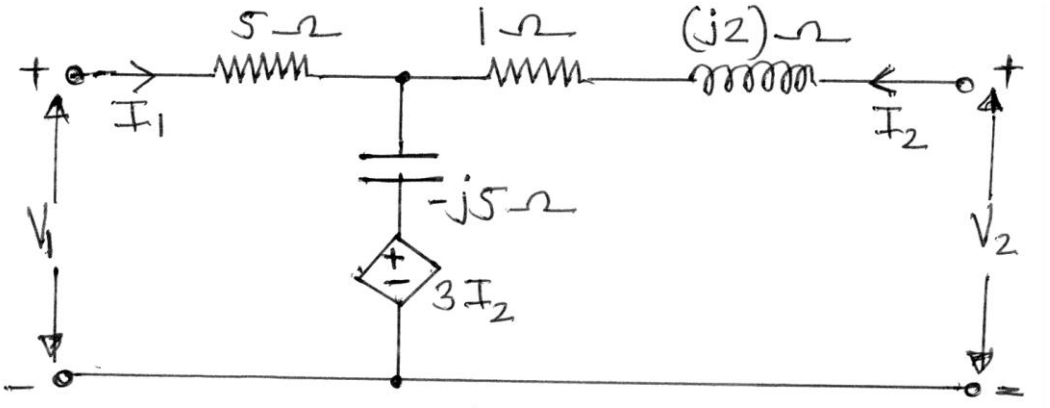

Figure No.3

(d) Differentiate between lossy transmission line and lossless transmission line with respect to (i) Equivalent circuit (ii) Propagation constant (iii) Attenuation constant (iv) Characteristics impedance (v) Input impedance. (5-M)

Q.2) (a) Find the transmission parameters for the circuit shown in Figure No.4 (10-M)

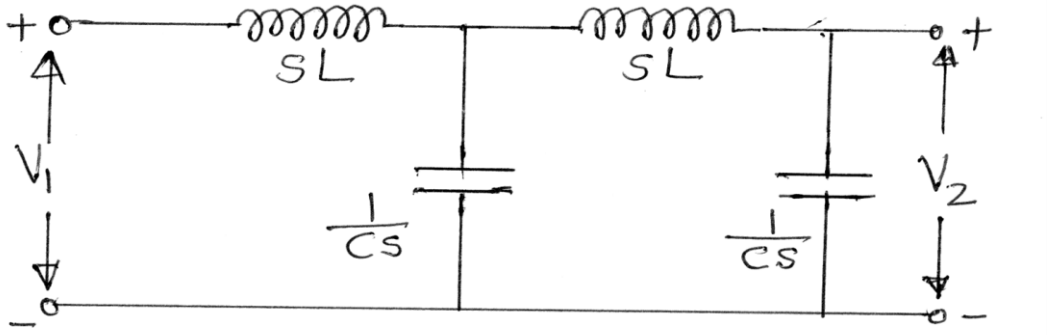

Figure No.4

(b) For network shown in Figure No.5, the switch is opened at t = 0, find v(t) for t > 0. (10-M)

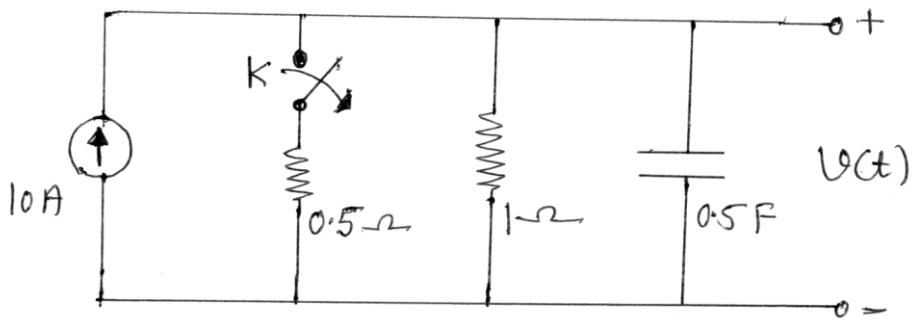

Figure No.5

Q.3) (a) Find the Thevenin's equivalent circuit for the network shown in Figure No.6 at the right of the terminal a-b. (10-M)

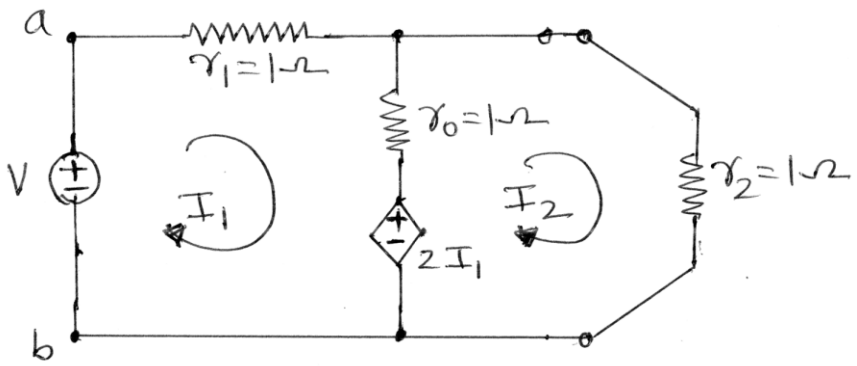

Figure No. 6

(b) A series RC combination, having an impedance of Z_L = (450-j600) Ω at 100 MHz, is connected to a 300 Ω transmission line. Calculate in meters the position and length of short circuited shunt stub designed to match this load to the line. Give any one solution and solve using **Smith chart** only. (10-M)

Q.4) (a) A driving point impedance is given by $Z_{LC}(s) = \frac{s(s^2+4)(s^2+6)}{(s^2+1)(s^2+5)}$. Obtain the first form of Cauer network. (10-M)

(b) Find the voltage drop across the capacitor and the resistor for the circuit shown in Figure No.7. (10-M)

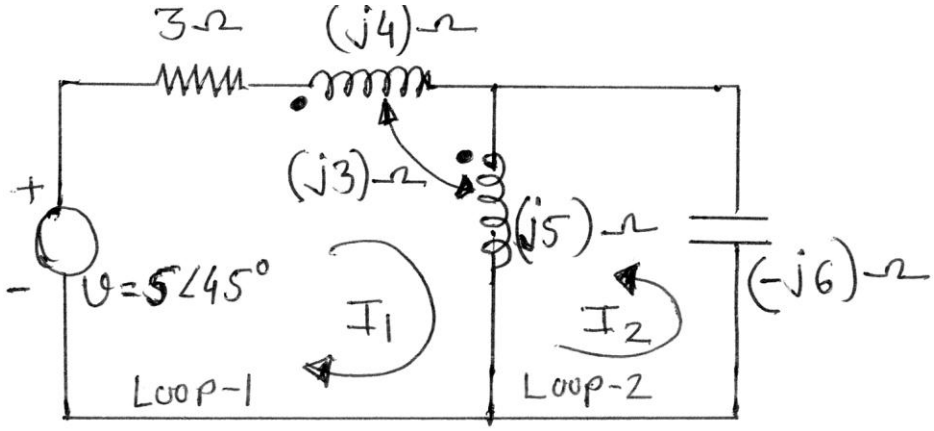

Figure No. 7

Q.5) (a) Find the Z parameters for the network shown in Figure No.8 (10-M)

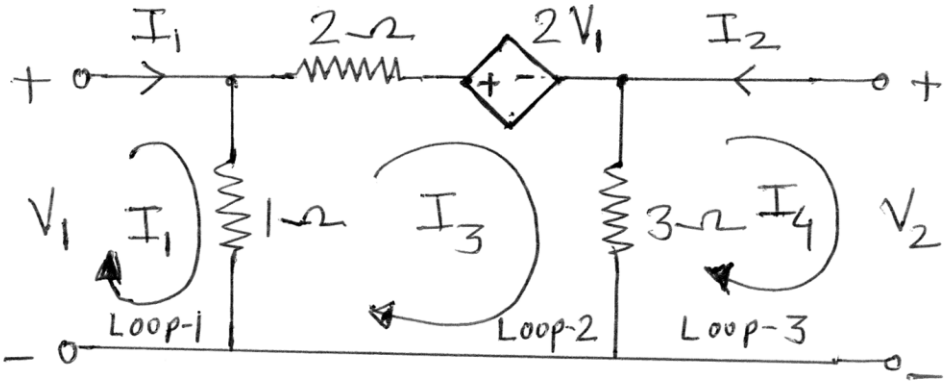

Figure No.8

(b) (I) State properties of the positive real function (PRF). (5-M)

(II) Check positive realness of the function $Y(s) = \frac{S^2+2S+20}{S+10}$ with proper reason. (5-M)

Q.6) (a) Find $V_C(t)$ and $I_L(t)$ in the circuit shown in Figure No.9 assuming zero initial conditions. (10-M)

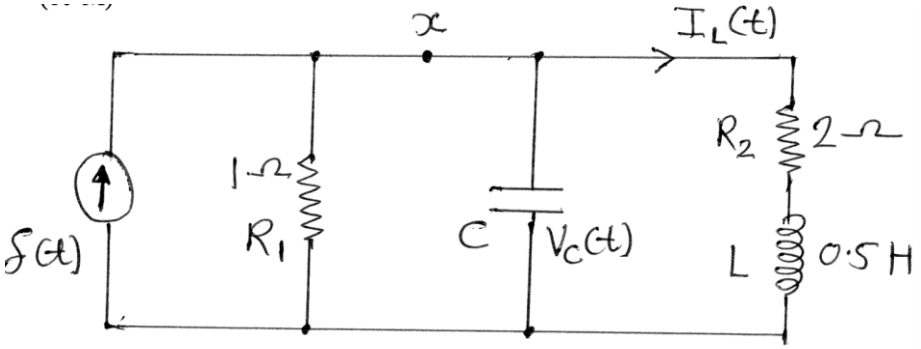

Figure No.9

(b) A load impedance of Z_L = (40+j70) Ω terminates 100 Ω transmission line of length 0.3λ long. Use formulas and determine following parameters. (10-M)

(i) Find load admittance at the load end of transmission line. (2-M)
(ii) Find input impedance at the input port of transmission line. (4-M)
(iii) Find reflection coefficient at the load end of transmission line. (2-M)
(iv) Find voltage wave standing ratio (VSWR) along the transmission line. (2-M)

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