S.E. ETRX (III) (CBGS)

9/12/15

Circuit theory

QP Code : 5208

(3 Hours) [Total Marks :80

N.B. : (1) Question no. 1 is **compulsory.**
(2) Attempt any **three** questions out of remaining questions..
(3) **Figures** to the **right** indicate **full** marks.
(4) **Assume** suitable **data** if **required.**
(5) **Use smith chart** for **transmission** line problem.

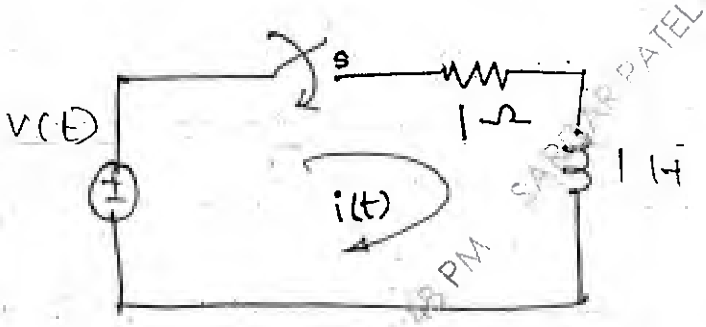
1. (a) The constants of a transmission lines are

$R = 6/km, L = 2.2mH/km$

$G = 0.25\times10^{-6}$ mho/km $C = 0.005\times10^{-5}$ F/km

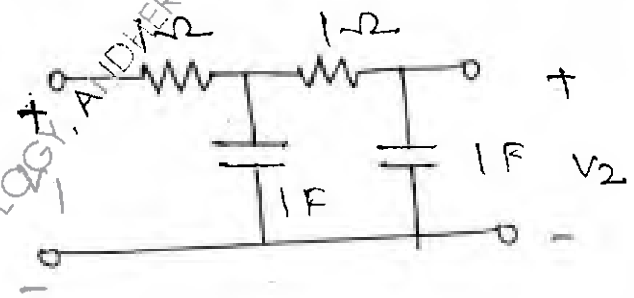
Determine the characteristic impedance propagation constant phase constant and attenuation constant at 1KHz

(b) Obtain the expression for i(t) if switch is closed at t = 0 If v(t) is v(t) = ramp signal **5**



(c) Check whether the polynomial is hurwitz or not by continued fraction method. **5**
$F(S) = S^4 + S^3 + 4S^2 + 2S + 3$

(d) Find out $\frac{V2}{V1}$ for the following n/w given below. **5**



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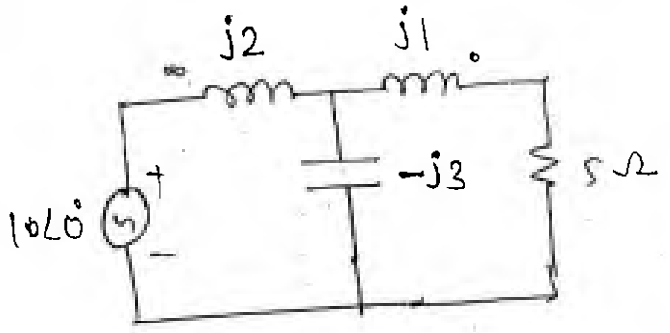
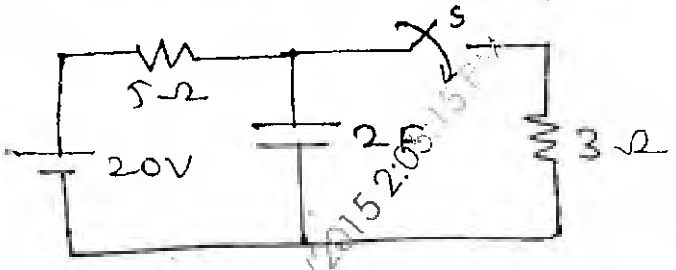
MD-Con. 10468-15.

2. (a) Find the voltage across 5 Ω resistor in the network shown below. If K = 0.8 is coefficient of coupling **8**

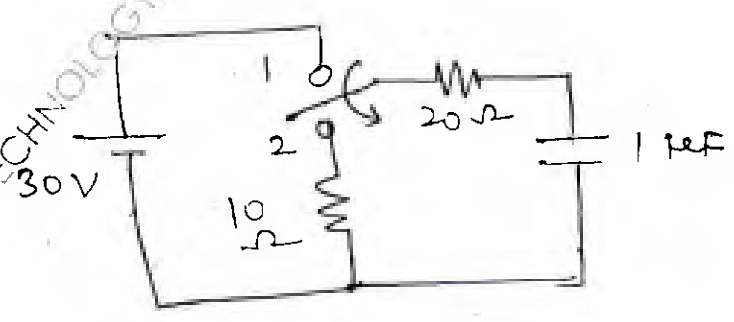


(b) In the circuit shown, find out the expression for voltage V(t) across capacitor for t > 0 At t = 0 Switch is closed. **8**



(c) Define ABCD parameters for the two port network hence obtain condition for symmetry **4**

3. (a) Find i, $\frac{di}{dt}$ and $\frac{d^2i}{dt^2}$ at $t = 0^+$ in the circuit given below. Switch is changed from position 1 to 2 at t = 0 **6**



(b) Compare and Obtain Foster I and Foster-II of the following RC impedance function. 8

$$Z(S)=\frac{2(S+2)(S+4)}{(S+1)(S+3)}$$

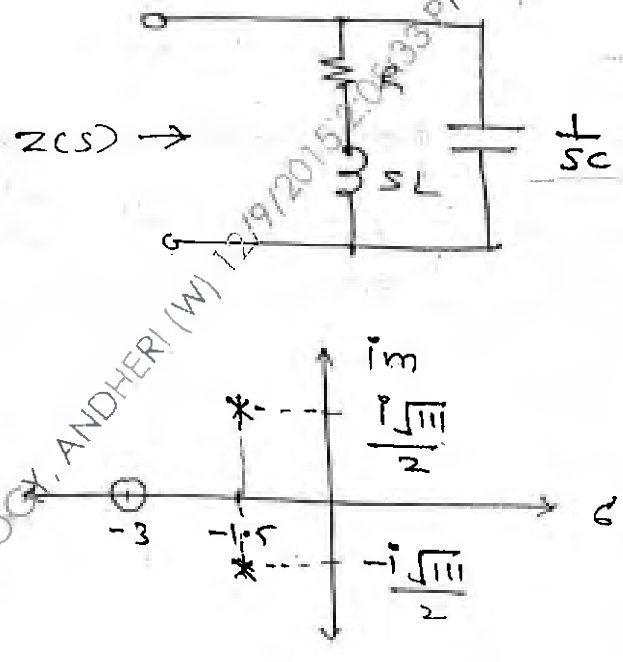
(c) Obtain cauer form I of LC network 6

$$Z(s)=\frac{\left(s^2+4\right)\left(s^2+16\right)}{s(s^2+9)}$$

4. (a) Derive the characteristic equation of a transmission line also obtain $\alpha\ \beta\ \gamma$ of the transmission line 8

(b) Derive the relation for nominal impedance and cut off frequency for a constant k low pass filter. 4

(c) A network and its pole zero diagram are shown in fig. Determine the values of R, L, C if Z(0) = 1 8



5. (a) Check whether the following functions are PRF or not 8

(i) $F(S)=\frac{S(S+3)(S+5)}{(S+1)(S+4)}$

(ii) $F(S)=\frac{S^3+6S^2+7S+3}{S^2+2S+1}$

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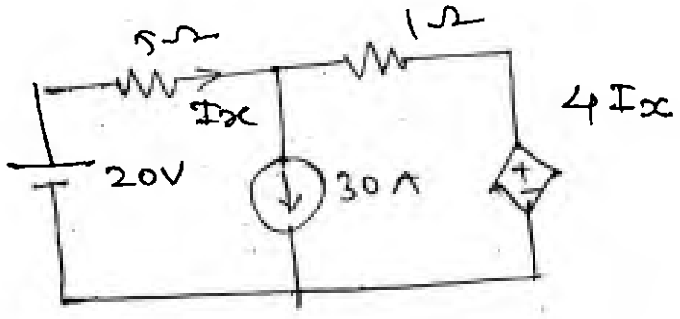
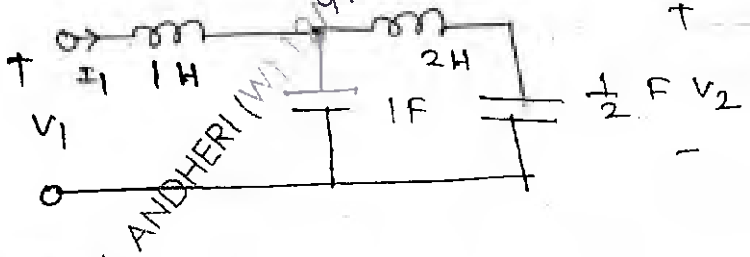
(b) Find the current I_x using superpostion theorem. 6



(c) The current $I(S)=\frac{2S}{(S+1)(S+2)}$ plot the pole zero pattern in S- plane hence obtain i(t) by finding out residues by graphical method. 6

6. (a) The characteristic impedance of a high frequency line is 100 Ω. If it is terminated by a load impedance of 100 + j100 Ω Using smith chart find out (i) VSWR (ii) Refection coefficient (iii) Impedance at $\frac{1}{10}^{th}$ of wavelength away from load (iv) VSWR minimum and VSWR maximum away from the load. 8

(b) For the network shown and find out $\frac{V_1}{I_1}$ and $\frac{V_2}{I_1}$ 6



(c) Find out Theverin's equivalent network 6