10/12/13 S.E. (ETRX) Sem II CBGS

Circuit Theory

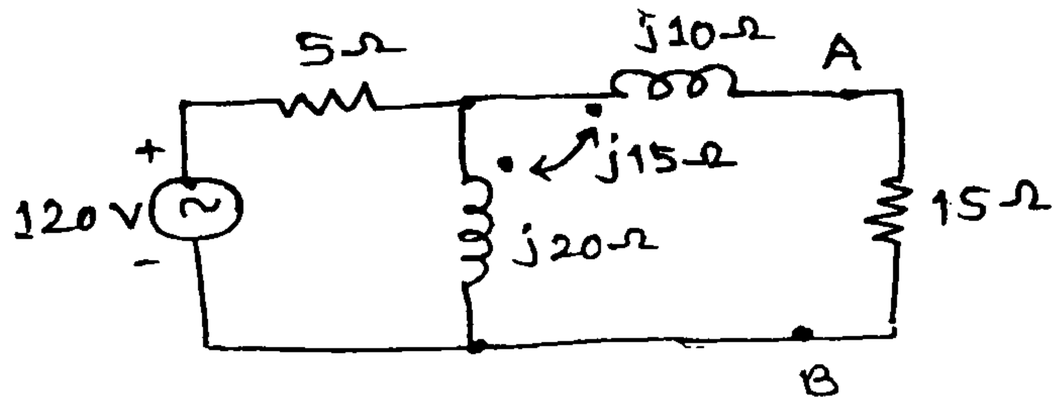
19-11-2013-DTP-P-7-RA-10

**Con. 8952-13.** **GX - 12149**

(3 Hours) **[ Total Marks : 80**

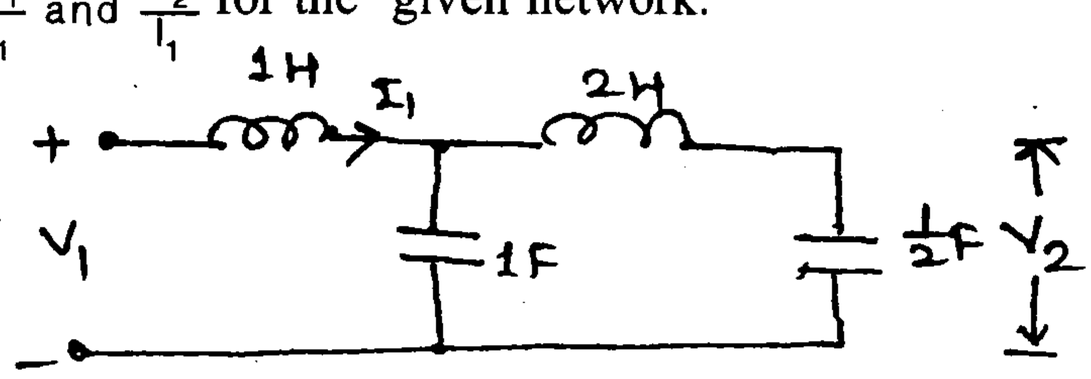
**N. B. :** (1) Question No. **1** is **compulsory**.
(2) Attempt any **three** questions from **remaining.**
(3) **Figures** to the **right** indicate full marks.
(4) Assume **suitable data** if required.
(5) Use Smith Chart for transmission line problems.

1. (a) Find the current through 15Ω resistor. **4**




(b) Obtain the voltage response of series R-L circuit. **4**

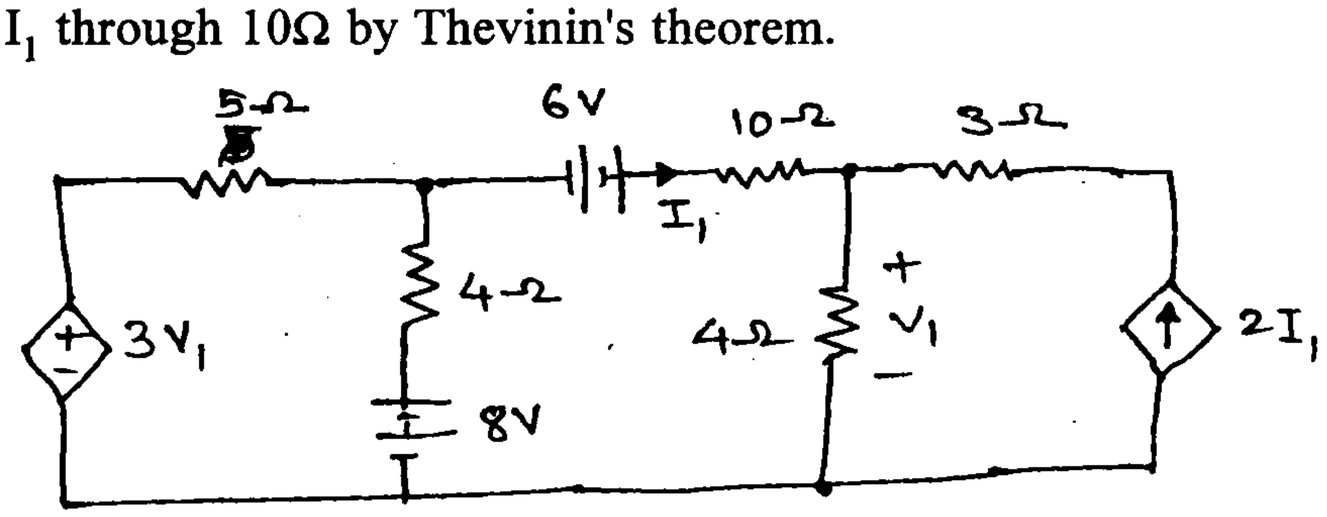
(c) Determine $\frac{V_1}{I_1}$ and $\frac{V_2}{I_1}$ for the given network. **4**




(d) What are standing waves ? Define reflection coefficient and VSWR of a transmission line. **4**

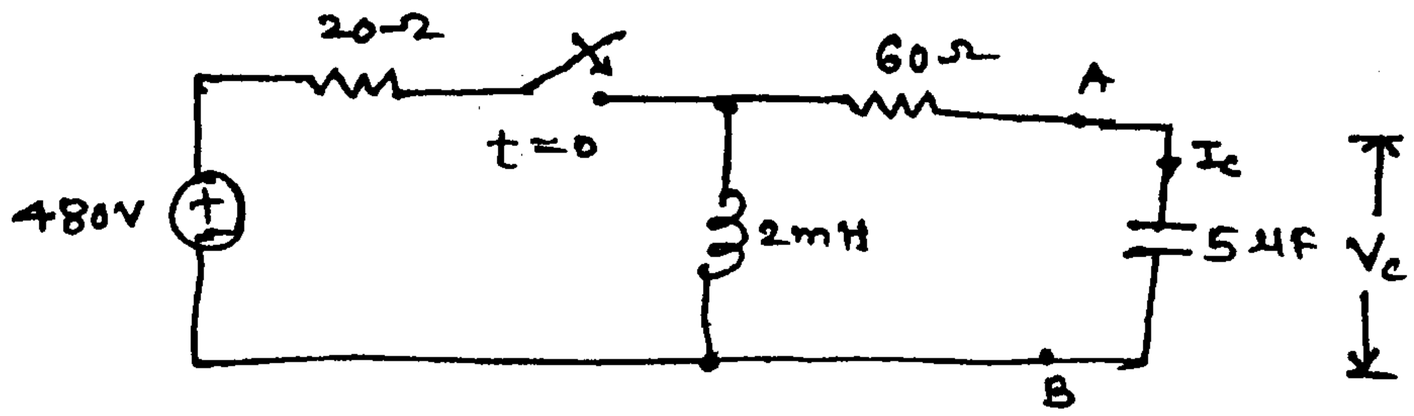
(e) A ∏–section filter network consists of a series arm conductor of 20 mH and two shunt arm capacitors of 160 nF each. **4**
Calculate : (i) cut off frequency (ii) attenuation (iii) Phase shift at 15kHz.
Also obtain the nominal impedance in pass-band.

2. (a) Find $I_1$ through 10Ω by Thevinin's theorem. **6**




**[ TURN OVER**

(b) Find Ic and Vc for t > o **8**

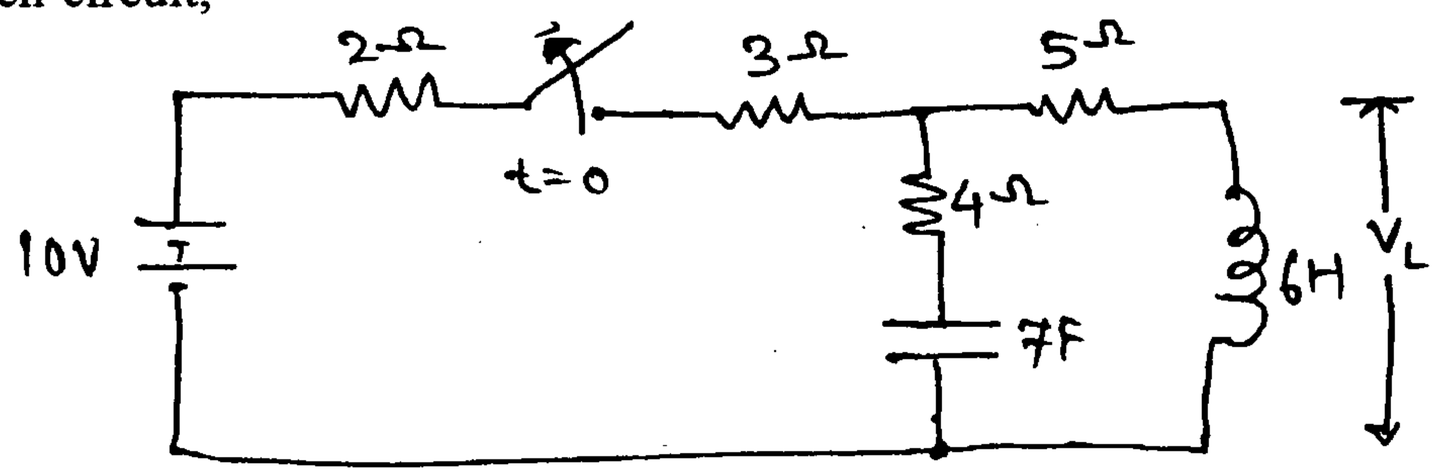



(c) Use Nodal analysis to find the voltage drop across 4 Ω and 10 Ω ref Qu. 2(a) **6**

3. (a) Design a single stub match for a load of 150 Ω + j 232.5 Ω for 75 Ω line at 500 MHz using Smith Chart. **8**
   (b) Compare foster realization with caurer realizations. **8**
   (c) State the properties of Hurwitz polynomial. **4**

4. (a) Define T-parameters and relate them to other parameter as indicated. **8**
      (i) A and C interms of z-parameters
      (ii) B interms of y-parameters
      (iii) D interms of h-parameter.
   (b) Test whether the following functions are positive real functions with proper reasons. **12**
      (i) $F_1(s) = \dfrac{2s^3 + 2s^2 + 3s + 2}{s^2 + 1}$
      (ii) $F_2(s) = \dfrac{s^2 + 1}{s(s^2 + 4)}$

5. (a) What are scattering parameters ? State their properties. **6**
   (b) Derive an expression of m-derived $\Pi$ section network starting from a constant k section. **6**
   (c) For given circuit, **8**




switch 's' is opened at t=o. Switch 's' was on for long time.
Determine $V_L(o^+)$, $\frac{dV_L}{dt}(o^+)$ and $\frac{d^2V_L}{dt^2}(o^+)$

**[ TURN OVER**

6. (a) Explain the graphical representation of series resonance circuit. **6**

   (b) Test whether following polynomials are Hurwitz **8**

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

   (ii) $P(s) = s^6 + 6s^4 + 4s^2 + 2$

   (c) Find the characteristic impedance, cut off frequency and pass band for the network shown : **6**