

**B. TECH. SEM - III (ELECTRONICS) 2014 COURSE) (CBCS) :**  
**WINTER - 2017**  
**SUBJECT: CIRCUIT THEORY**

Day: Monday  
 Date: 22/01/2018

Time: 10.00 AM TO 01.00 PM  
 Max. Marks: 60

**W-2017-2040**

**N.B:**

- 1) All questions are **COMPULSORY**.
- 2) Figures to the right indicate **FULL** marks.
- 3) Use of non-programmable **CALCULATOR** is allowed.
- 4) Neat diagram must be drawn **WHEREVER** necessary.
- 5) Assume suitable data **WHEREVER** necessary.

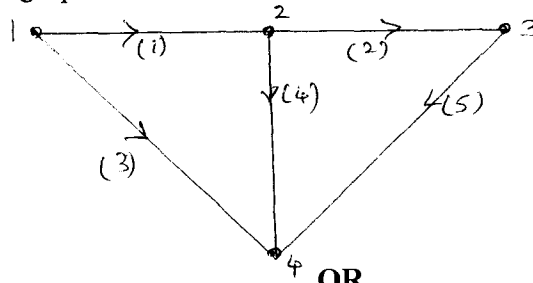
**Q.1** What is node analysis? Explain node analysis and super node with appropriate networks. (10)

**OR**

**Q.1** State and explain Norton's theorem. Write steps to be followed in Norton's theorem. (10)

**Q.2 a)** Draw any network consisting of passive elements and its associated graphs. (05)  
 (Undirected and directed graph).

**b)** Fig. shows a graph of the network. Show all the trees of this graph. (05)



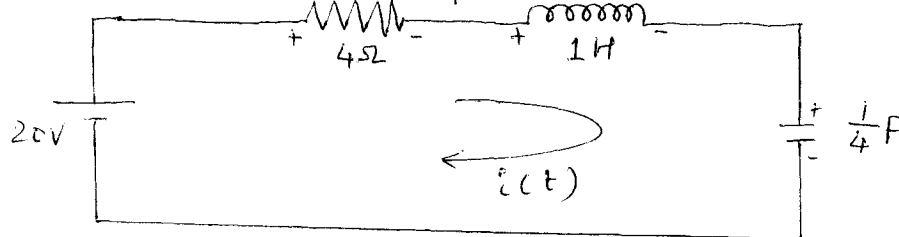
**OR**

**Q.2** Explain the principle of duality with suitable example. Write down the steps involved in constructing the dual of a network. (10)

**Q.3** Derive an expression for undriven series RLC circuit. (10)

**OR**

**Q.3** Find expression for the current in a series RLC circuit fed by a d.c. voltage of 20V with  $R = 4 \Omega$ ,  $L = 1H$  and  $C = \frac{1}{4} F$ . Assume initial conditions to be zero. (10)



**Q.4 a)** Derive an expression for series resonance circuit. (05)

**b)** Define the following terms with respect to series resonance. (05)

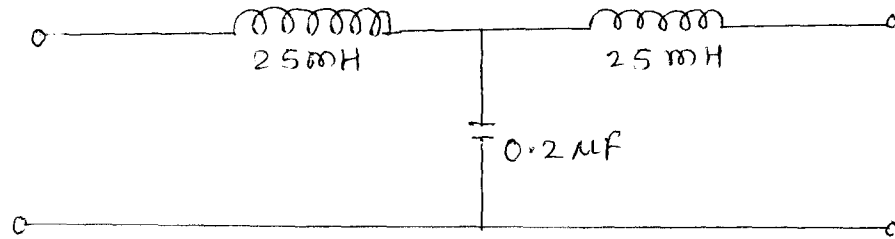
- i) Power factor
- ii) Voltage of resonance

**OR**

**Q.4** A Series RLC circuit has  $R = 25 \Omega$ ,  $L = 0.04H$  and  $C = 0.01 \mu F$ . Calculate the resonant frequency. If a 1V source of same frequency of resonance is applied to this circuit, calculate the frequencies at which the voltage across L and C are maximum. Calculate the voltages. (10)

**P.T.O.**

- Q.5 a)** Find the nominal impedance, cut-off frequency and pass band for the network shown in Fig. (06)



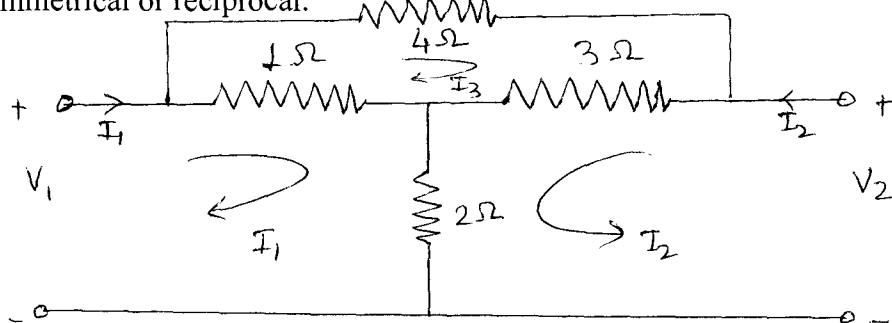
- b)** Draw T-section and  $\pi$ -section of Band Pass Filter and write the formulae for  $C_1, L_1, C_2$  and  $L_2$ . (04)

**OR**

- Q.5** A HPF section is constructed from two capacitors of  $1 \mu\text{F}$  each and  $15 \text{ mH}$  inductance. Find: (10)

- Cut-off frequency
- Infinite frequency characteristic impedance
- Characteristic impact  $200 \text{ Hz}$  and  $2000 \text{ Hz}$
- Attenuation at  $200 \text{ Hz}$  and  $2000 \text{ Hz}$
- Phase Constant at  $200 \text{ Hz}$  and  $2000 \text{ Hz}$

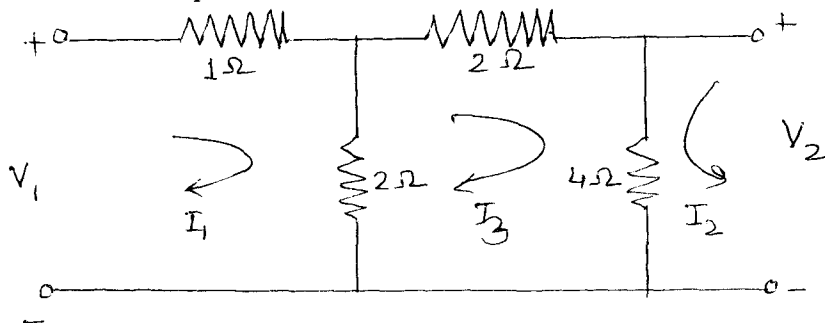
- Q.6 a)** Find Z-parameters for the network shown in Fig. Determine the network is symmetrical or reciprocal. (06)



- b)** What are transmission parameters? Write the equation for transmission parameters. (04)

**OR**

- Q.6 a)** Determine h- parameters for the network shown in Fig. Determine whether the network is reciprocal. (06)



- b)** Write Condition for Reciprocity and symmetry for the following parameters. (04)

- Z-Parameter
- Y-Parameter
- H-Parameter
- ABCD parameter