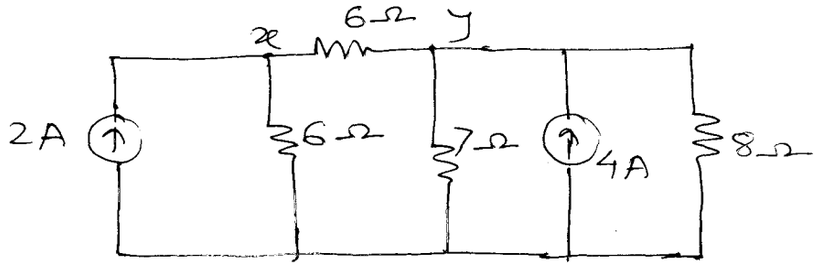
B. TECH. SEM -III (E & TC ENGG.) (2014 COURSE) (CBCS) :
SUMMER - 2018
SUBJECT : NETWORK THEORY

Day : **Friday** | **S-2018-2269** | Time : **02.30 PM TO 05.30 PM**
Date : **25/05/2018** | Max. Marks : 60

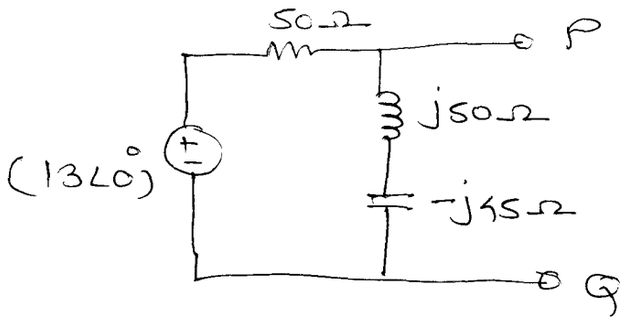
N.B.:

1) All questions are **COMPULSORY**.
2) Figures to the right indicate **FULL** marks.
3) Use of non-programmable **CALCULATOR** is allowed.
4) Draw neat and labeled diagram **WHEREVER** necessary.
5) Assume suitable data if necessary.

Q.1 a) Using nodal method find voltage V_{xy} for the shown network. **[05]**

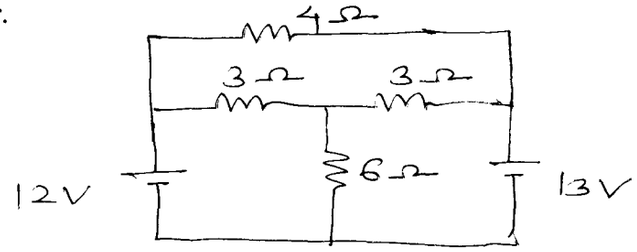


b) Find load impedance required to be connected across the terminals P – Q for the maximum power transfer in the shown network. Also find maximum power delivered to the load. **[05]**

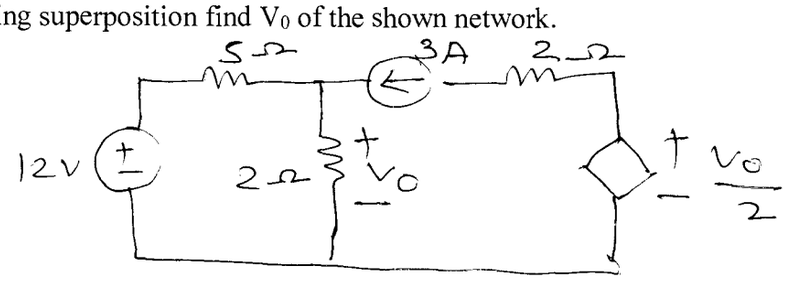


OR

a) Write loop current equations for the shown network and determine current through 6Ω resistor. **[05]**

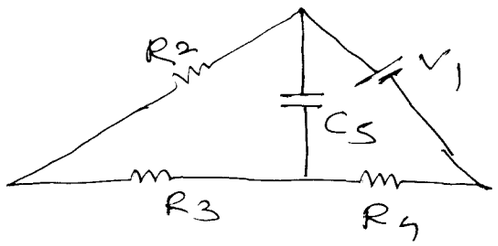


b) Using superposition find V_0 of the shown network. **[05]**



P.T.O.

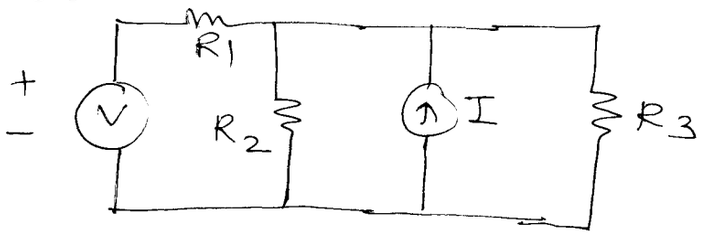
Q.2 **a)** Consider the network shown in figure. Determine the branch current in terms of loop current for the tree of your choice. **[06]**



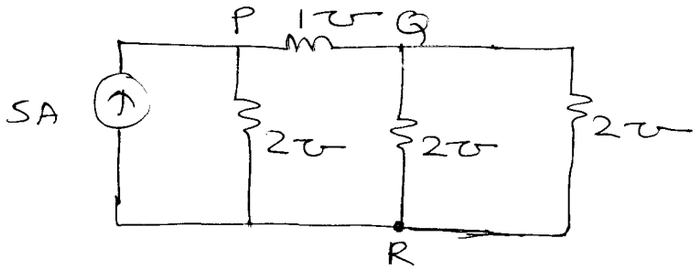
b) Define rank of all matrices. **[04]**

OR

a) For the shown network find graph and indicate the number of all possible trees for that graph. **[05]**

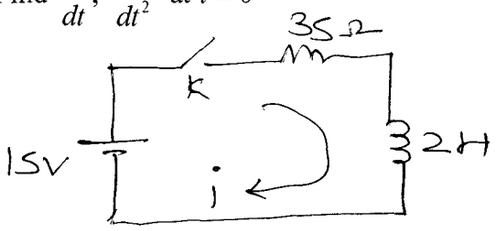


b) For the shown network find out f-cutsets and for f-cutset matrix. **[05]**



Q.3 **a)** Find out unit step response of series RL circuit using laplace transform. **[05]**

b) For the shown network switch is closed at t = 0 with the zero current in the inductor. Find $\frac{di}{dt}, \frac{d^2i}{dt^2}$ at $t = 0^+$ **[05]**



OR

a) Find out unit step response of series RC circuit using classical or laplace transform. **[05]**

b) For the series R – C circuit R = 45Ω and C = 0.3F. Initially switch is open for long time. At t = 0 it is closed. Find expression for $V_c(t)$ and $V_R(t)$ against time. **[05]**

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Q.4 **a)** Derive quality factor when single inductor is connected in circuit. **[05]**

b) What is the effect of f = fr, f > fr and f < fr on resonant circuit? **[05]**

OR

a) Derive quality factor when single capacitor is connected in circuit. **[05]**

b) Draw and explain various impedance curves for series RLC circuit. **[05]**

Q.5 **a)** Enlist the electrical characteristics of passive filter? Explain any one in detail. **[05]**

b) Design constant K – LPF T and π section filters to be terminated in 600Ω resistance. The cut-off frequency is 3KHz. **[05]**

OR

a) Derive design formulas of K-prototype low pass filter. **[05]**

b) Design m derived LPF T section filter to be terminated in 620Ω resistance. Cut off frequency is 1.8KHz and infinite attenuation occurs at 2KHz. **[05]**

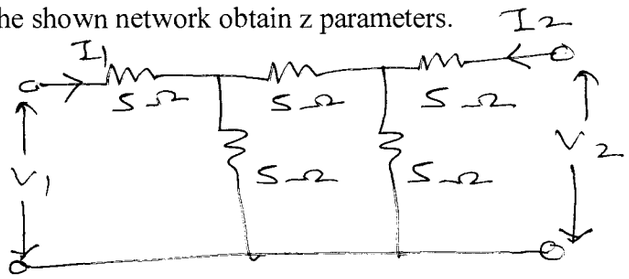
Q.6 **a)** Find out condition for reciprocity and symmetry for two port network in terms of short circuit admittance parameters. **[05]**

b) Prove that for cascade connection of two networks. **[05]**

$$\begin{bmatrix} A & B \\ C & D \end{bmatrix} = \begin{bmatrix} Aa & Ba \\ Ca & Da \end{bmatrix} \begin{bmatrix} Ab & Bb \\ Cb & Db \end{bmatrix}$$

OR

a) For the shown network obtain z parameters. **[05]**



b) Find hybrid parameters in terms of Y parameters. **[05]**

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