B. TECH. SEM -III (E & TC ENGG.) (2014 COURSE) (CBCS) : WINTER - 2017

SUBJECT : NETWORK THEORY

Day : **Monday** Time : **10.00 AM TO 01.00 PM**

Date : **22/01/2018** Max. Marks : 60

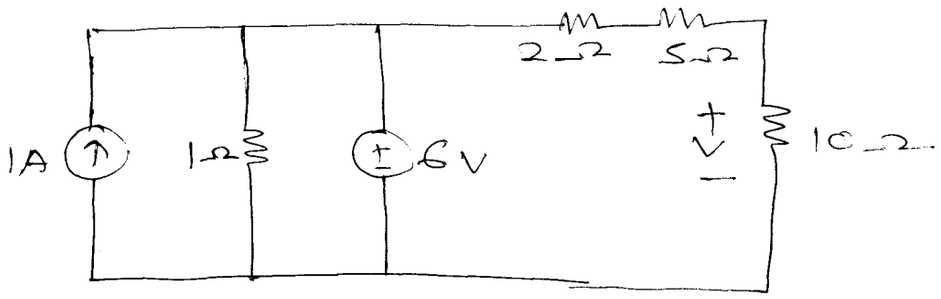
W-2017-2061

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.

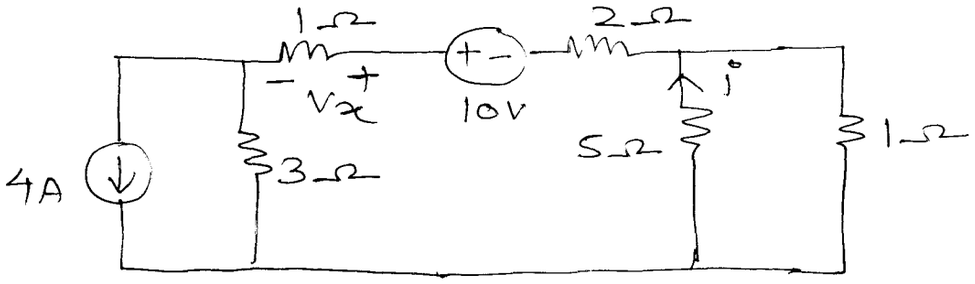
Q.1 **a)** Two storage batteries A and B are connected in parallel for charging from a d.c. source having an open circuit voltage of 14V and internal resistance of 0.15Ω. The open circuit voltage of A is 11V and that of B is 11.5V. Their internal resistances are 0.06Ω and 0.05Ω respectively. Calculate the initial charging currents and the source current. **[06]**

b) Using source transformation find the voltage V for the shown circuit. **[04]**

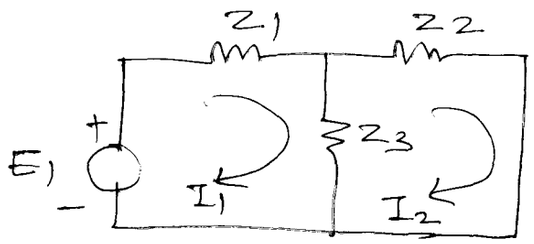


OR

a) Find current (i) and voltage (V_x) in the figure given below. **[06]**

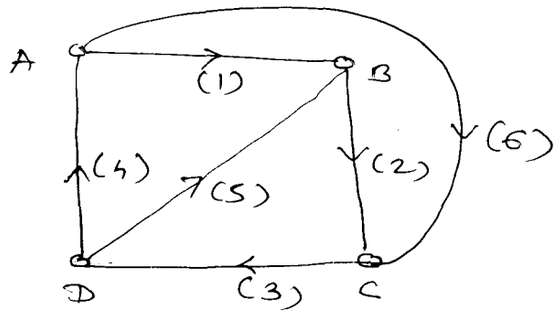


b) What will be the condition of reciprocating for following circuit? **[04]**

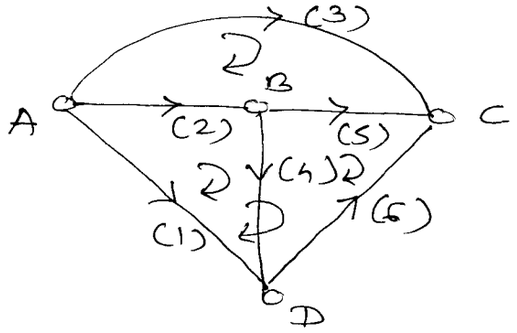


P.T.O.

Q.2 **a)** Find out cut sets for the given graph. **[05]**



b) Define f – circuits. What will be the rank of f – circuits? **[05]**



OR

a) Compare incidence matrix and cut-set matrix. **[05]**

b) Draw the oriented graph from reduced incidecnce matrix and find number of trees for the graph. **[05]**

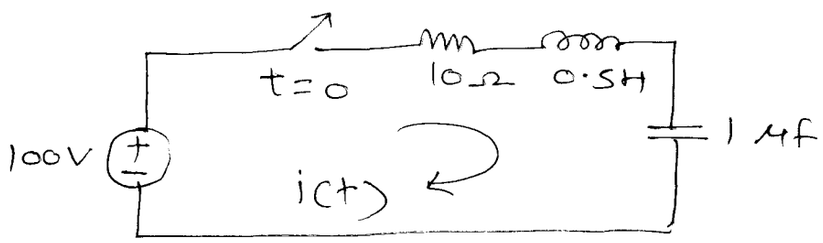
$$A=\begin{bmatrix} -1 & 0 & 1 & 0 \\ 1 & -1 & 0 & 0 \\ 0 & 1 & 0 & -1 \end{bmatrix}$$

Q.3 **a)** For the shown network switch K will be closed at t = 0 with capacitor uncharged. Find the value of $i, \frac{di}{dt}, \frac{d^2i}{dt^2}$ at $t = o^+$. Given that V = 120V, R = 2kΩ and C = 0.1μF. **[07]**

b) What is the procedure for evaluating initial conditions? **[03]**

OR

a) Obtain current i(t) for t ≥ 0 using time approach. **[07]**



b) What is the need of initial condition? **[03]**

Q.4 **a)** Derive quality factor of series RLC circuit. **[05]**

b) An RLC series circuit has R = 1KΩ, L = 100mH, C = 10μF. If a voltage of 100 is applied across the series combination, determine: **[05]**

i) Resonant – frequency
ii) Q factor
iii) Half power frequencies

OR

a) Derive anti-resonance frequency. **[07]**

b) A series RLC circuit has R = 30Ω, L = 0.06H and C = 0.02μF. Calculate series resonance frequency. **[05]**

Q.5 **a)** A prototype LPF is to be designed which must have R0 = 600Ω and fc = 1KHz. Find the filter elements. **[05]**

b) What is composite filter? **[05]**

OR

a) What are the disadvantages of prototype filters? **[04]**

b) Find m – derived T and π sections having a cut-off frequency of fc = 1KHz and a design impedance (R0) = 600Ω. The filter must have infinite attenuation f∞ = 1050 Hz. **[06]**

Q.6 **a)** Determine the h parameters with the following data: **[05]**

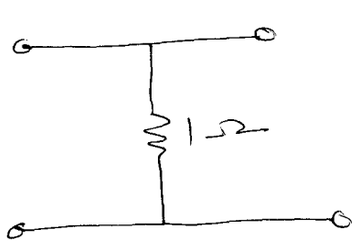
i) with output shorted
$V_1 = 30V$, $I_1 = 1.5A$, $I_2 = 1.5A$.

ii) with input terminals open circuited
$V_1 = 15V$, $V_2 = 75V$, $I_2 = 2A$

b) Derive transmission parameters in terms of z parameters. **[05]**

OR

a) Determine z, h and y parameter of the shown network. **[05]**



b) Show that the h parameters will not exist for a two port network when $z_{22} = 0$. **[05]**

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