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RN-8079

B. E. - II (Sem. III) (EL/ECC) Examination

May / June – 2010

Circuit & Network

Time : Hours] [Total Marks :

Instructions :

(1)

નીચે દર્શાવેલ ☛ નિશાનીવાળી વિગતો ઉત્તરવહી પર અવશ્ય લખવી.
Fillup strictly the details of ☛ signs on your answer book.

Name of the Examination :

☛ B. E. 2 (Sem. 3) (EL/ECC)

Name of the Subject :

☛ Circuit & Network

☛ Subject Code No. : 8 0 7 9 ☛ Section No. (1, 2,.....) : 1&2

Seat No. :

Student's Signature

(2) Attempt all questions.
(3) Answer to the two sections must be written in separate answer books.
(4) Figures to the right indicate full marks.
(5) Assume suitable data wherever required.
(6) Scientific calculator upto casio-super fx 100D, 100W, 100MS series and equivalent are permitted.

SECTION - I

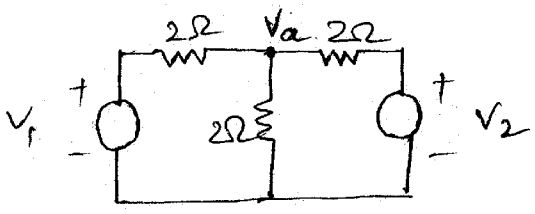
1 (a) Do as directed :

(i) Dual of independent loop is _____. 1

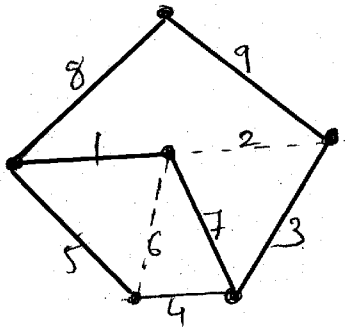
(ii) Reciprocity theorem is applicable to network containing both dependent and independent sources (true/false). 1

(iii) Define active network and passive network. 2

(iv) According to linearity theorem for given circuit $V_a = V_1 + V_2$ 1



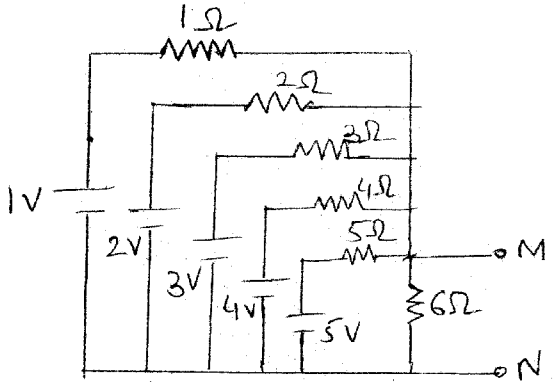
(v) Match the following for given graph. 3



(a)	1,7,4,5	(i)	Twigs
(b)	2,5,6,9	(ii)	Links
(c)	1,3,4,7,8	(iii)	Fundamental loop

(vi) Write down the statement of Norton's theorem. 2

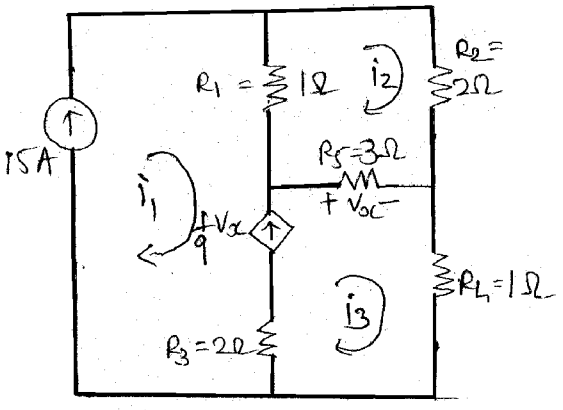
(b) (i) Using Norton's theorem find V_{in} across terminal M-N. 4



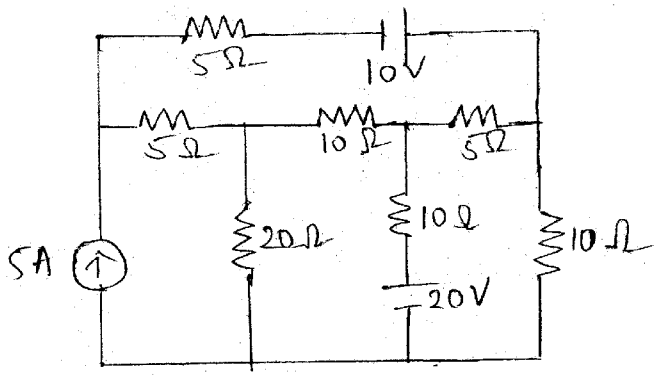
(ii) Derive Z-parameters in terms of Y parameters. 6

2 Attempt any **two** : 15

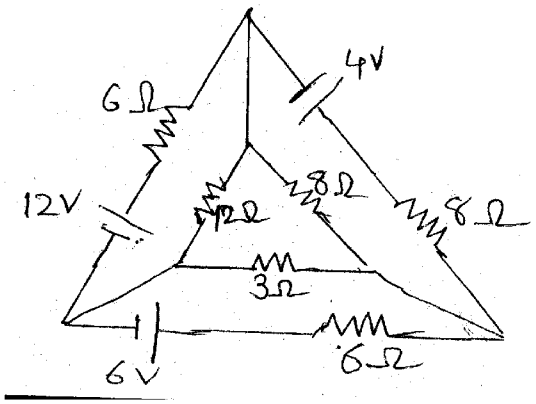
(i) Determine the voltage drop across $R_3 = 2\,\Omega$ resistor using mesh analysis.



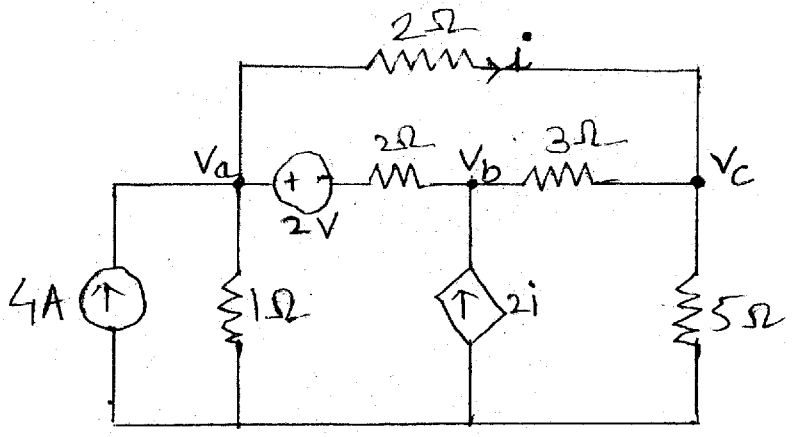
(ii) Find out current passing through 20 Ω resistance for given circuit using Norton's theorem.



(iii) Determine the current in the 3 Ω resistor in the given circuit using Thvenin's theorem.

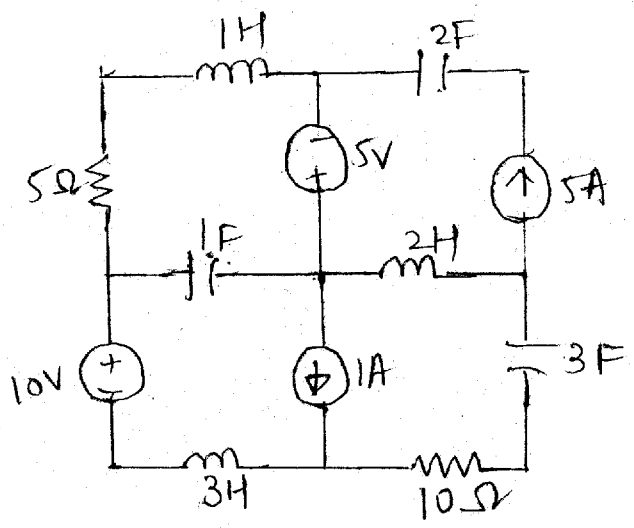


(iv) Find V_a, V_b, V_c using nodal analysis.

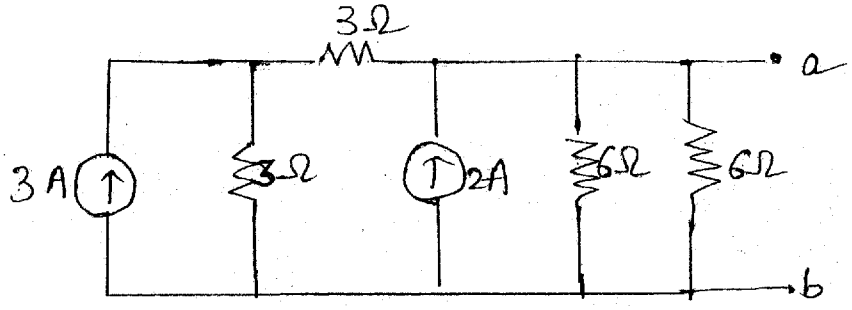


3 Attempt any **three** : **15**

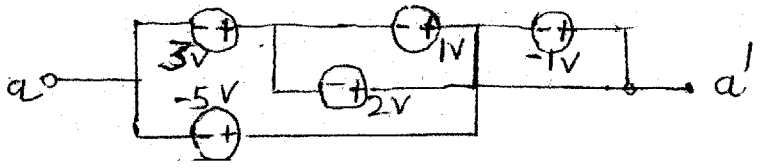
(i) What do you mean by 'Duality'?
Derive the dual of given circuit.



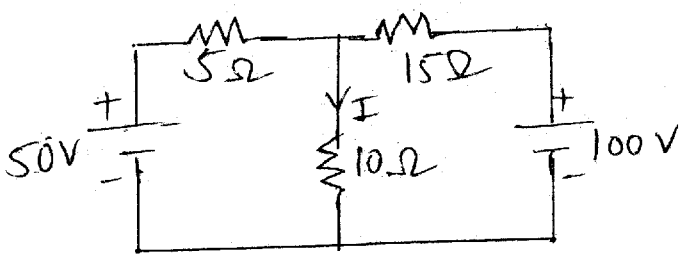
(ii) (a) Using source conversion, reduce the given circuit into single voltage source in series with single resistance.



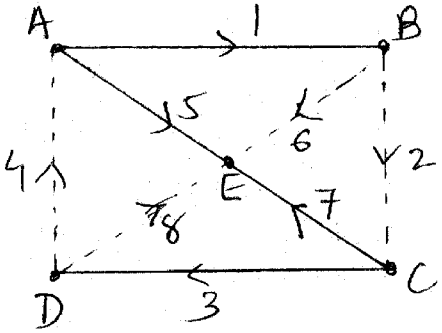
(b) Replace the network of sources shown in figure with $V_{aa'}$.



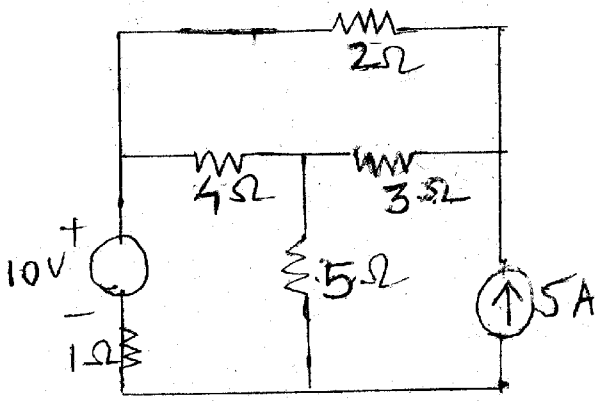
(iii) Calculate current I using Milliman's theorem for the given network.



(iv) For the given graph obtain
(a) Incidence matrix
(b) Fundamental cutset matrix
(c) Fundamental tieset matrix.



(v) For the given network find out current passing through 2 Ω resistance using super position theorem.



SECTION - II

4 (a) Do as directed **10**

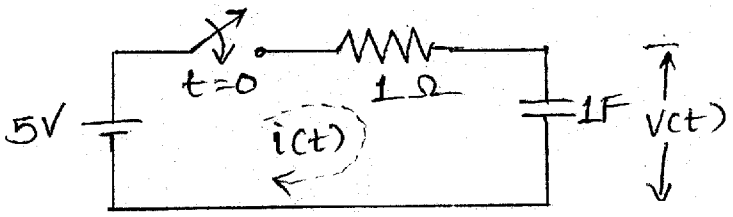
(i) Match the following : **4**

	f(t)		f(s)
(i)	t	(a)	1/S + a
(ii)	e^{-at}	(b)	$S/S^2+\omega^2$
(iii)	coswt	(c)	$\omega /[(s + a)^2 + \omega^2]$
(iv)	e^{-at} sin ω t	(d)	$1/S^2$

(ii) Define Delay time (td) **2**

(iii) State final value theorem. **2**

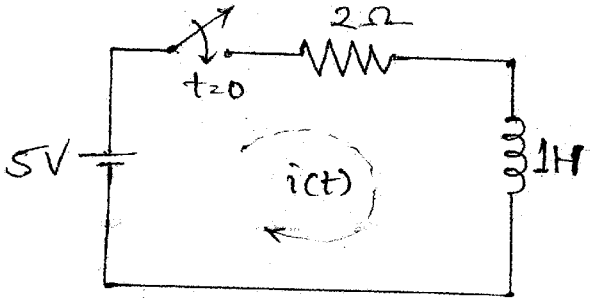
(iv) Find the circuit equivalent for following fig at t = 0^+ after switch is closed at t = 0. **2**



(b) (i) Find out the solution for DC or step response of 1st order R-C circuit. **4**

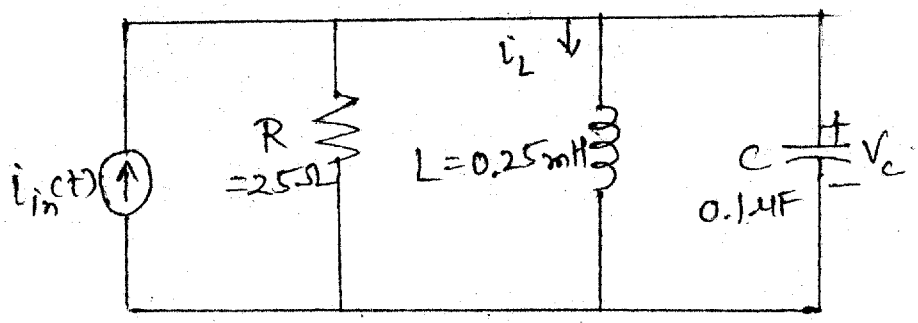
(ii) Find i (0^+), $\frac{di}{dt}(0^+), \frac{d^2i}{dt^2}(0^+)$ for following fig. **6**

switch is closed at t=o.



5 (a) Find out the general solution to second order differential equation if the roots are real and equal. Which type of response does the system has? **7**

(b) Following figure shows a parallel RLC circuit with initial conditions zero. The value of input source current is 1A, at t=0 and maintains constant current excitation for all time. Find the inductor current $i_L(t)$ for $t \geq 0$ for R = 25 Ω. **8**



OR

5 (a) Draw time response of a system corresponding to following poles and discuss stability at these poles. **6**

(i) $F(s) = 1/s^2$

(ii) $F(s) = 1/(s^2 + \omega^2)$

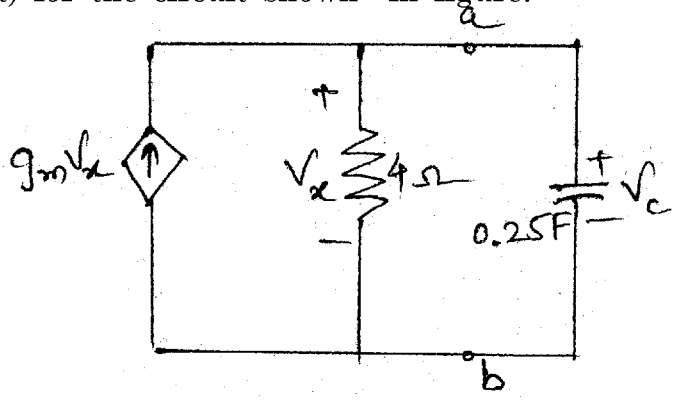
(b) Determine frequency response in terms of resonant, peak and corresponding frequency of system having closed loop transfer function (Cs) = $1/s^2+s+1$, also find out phase angle θ_r. **9**

6 Attempt any **three** : **15**

(i) Obtain inverse laplace transform of

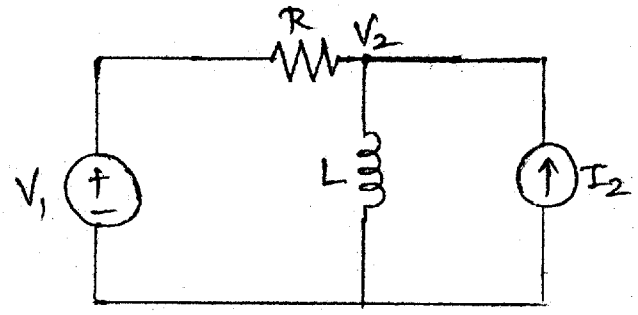
function $F(s) = \dfrac{1}{s(s+1)(s^2+1)}$ using convolution theorem.

(ii) Assuming 9 m = 0.75 S and V_C (0) = 10V, find V_c (t) for the circuit shown in figure.



(iii) Derive the general expression for second order source free parallel RLC circuit.

(iv) Find $V_2(s)$ in the circuit shown in figure use superposition theorem and laplace transform method.



(v) For the circuit shown in figure find V_c (+). The switch 's' is closed at t=0 with zero initial conditions. Use laplace transformation.