



\* R N - 6 1 8 1 / 8 0 0 \*

**RN-6181**

**B. E. - II (Sem. - III) (Elect.)  
(Common with ECC) Examination  
May / June - 2010  
Electrical Network - I  
(Old Course)**

Time : 3 Hours]

[Total Marks :

**Instructions :**

(1)

नीचे दशावेक निशानीवाणी विगतो उत्तरवही पर अवश्य कभवी. Fillup strictly the details of signs on your answer book.	Seat No. :
Name of the Examination :	<input type="text"/>
<input type="text" value="B. E. - 2 (SEM. - 3) (ELECT.) (COMMON WITH ECC)"/>	<input type="text"/>
Name of the Subject :	<input type="text"/>
<input type="text" value="ELECTRICAL NETWORK - 1 (OLD)"/>	<input type="text"/>
Subject Code No. : <input type="text" value="6"/> <input type="text" value="1"/> <input type="text" value="8"/> <input type="text" value="1"/>	<input type="text" value="Student's Signature"/>
Section No. (1, 2,.....) : <input type="text" value="1&amp;2"/>	

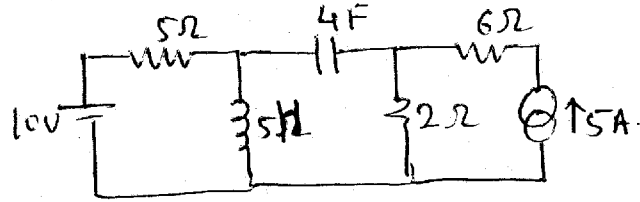
- (2) Attempt all questions.
- (3) Answers to the two sections must be written in separate answer books.
- (4) Assume suitable data whenever required.
- (5) Figures to the right indicate full marks.
- (6) Scientific calculator upto casio - super fx-100 $\pi$ , 100w, 100 ms series and equivalent is permitted.

**SECTION - I**

- 1 (a) Fill in the following blanks : 5
  - (1) A source has an emf of 100 V and an impedance 2  
of  $(500 + j100)$ . The amount of maximum power  
transferred to the load will be \_\_\_\_\_ w.
  - (2) In electrical circuit, dual of capacitor is \_\_\_\_\_ 1
  - (3) Millman's theorem is applicable, when the sources 1  
are connected in \_\_\_\_\_.
  - (4) For a particular network,  $V_{oc} = 60V$  and 1  
 $I_{sc} = 12A$ ,  $Z_{eq} =$  \_\_\_\_\_.

(b) State and explain superposition theorem. 4

(c) Obtain dual of the following network. 5

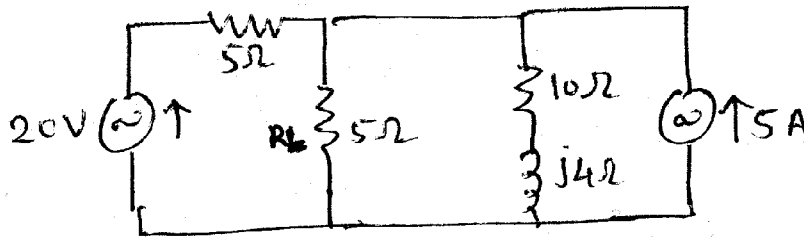


(d) Define z-parameters. 2

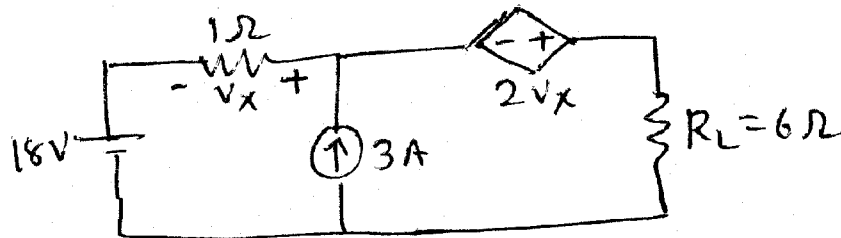
(e) Explain controlled source. 4

2 Attempt any three : 15

(1) Determine current flowing through  $R_L = 5\Omega$  resistor for the network shown in figure below using loop current method or nodal voltage method.



(2) Determine current flowing through  $R_L = 6\Omega$  using nodal voltage analysis in network shown in figure below.

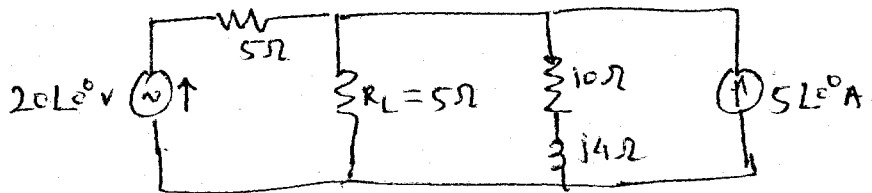


- (3) State and explain maximum power transfer theorem for a.c. network. Derive the condition for maximum power transfer.
- (4) Explain the concept of duality and write steps to obtain dual of a network.

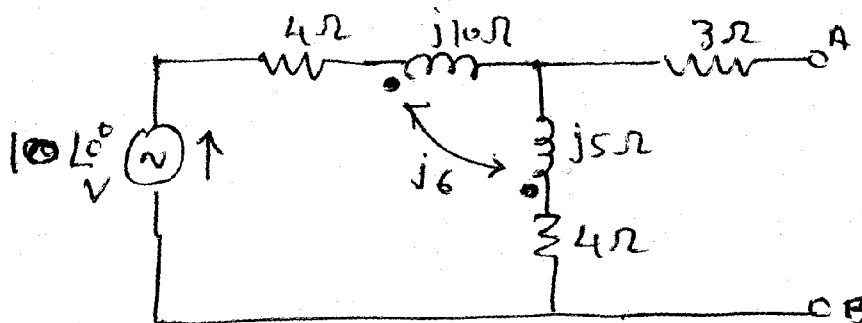
3 Attempt any two :

15

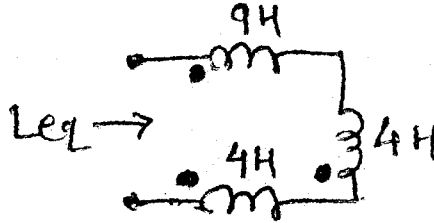
- (1) For the network shown in figure below, determine current flowing through  $R_L = 5\Omega$  resistor using Norton's theorem.



- (2) A delta connected load bank with  $Z_{AB} = (13 + j75)\Omega$ ,  $Z_{BC} = j25\Omega$  and  $Z_{CA} = 20\Omega$  is connected to a three phase, 3-wire 450 volt CBA system. Taking  $V_{BC}$  as reference determine line currents and power consumed by the load.
- (3) Obtain thevenin's equivalent circuit at terminals A-B for the coupled circuit shown in figure below.



- (4) State and explain dot rule.  
Determine equivalent inductance between terminals A-B assuming  $K = 1$  between two coils.



## SECTION - II

- 4 (a) Do as directed :

(1) Match the following :

5

$f(t)$	$F(s)$
(a) $\sin wt$	(1) $1/s$
(b) $\cos wt$	(2) $1/s^2$
(c) $u(t)$	(3) $\frac{w}{s^2 - w^2}$
(d) $t$	(4) $\frac{w}{s^2 + w^2}$
(e) $\sinh wt$	(5) $\frac{s}{s^2 + w^2}$

(2) The Laplace transform of  $e^{at}$  function is \_\_\_\_\_. 1

(3) For the following Laplace transform find the value of  $i(t) = \infty$  making use of final value theorem 2

$$I(s) = \frac{s+6}{s(s+3)}$$

(4) Obtain the Laplace transform of 2

$$f(t) = \frac{1}{2a}(\sin at)$$

(b) Obtain the inverse Laplace transform for the following 5  
function.

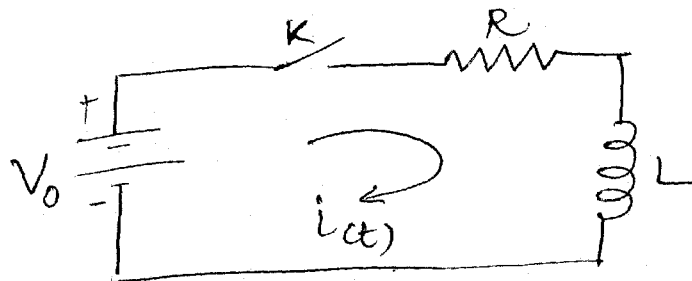
(1)  $F(s) = \frac{2s^2 + 6s + 2}{s^3 + 3s^2 + 2s}$

(2)  $F(s) = \frac{2s + 5}{s^2 + 5s + 6}$

(c) Define y parameters and derive their value in terms 5  
of z parameters.

5 (a) State and prove shifting theorem. 5

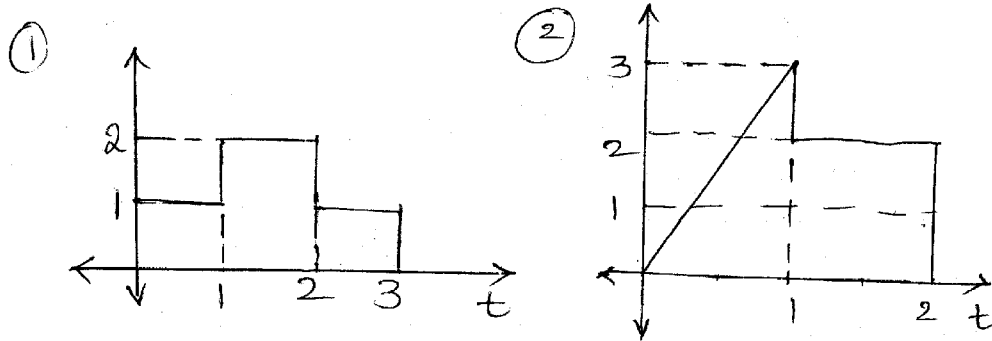
(b) For a series R-L circuit the expression of current 10  
 $i(t)$  when the switch is closed at  $t = 0$ .



OR

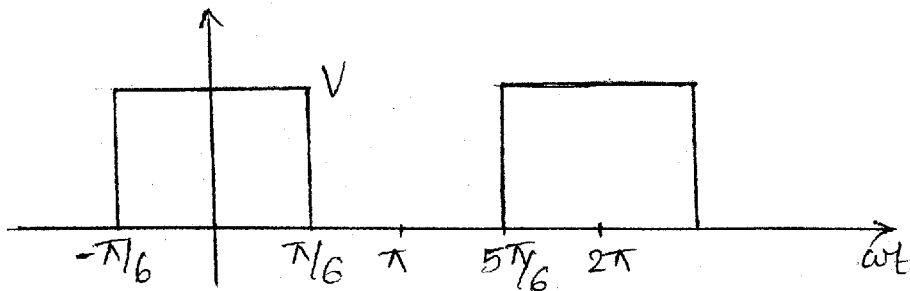
(c) Obtain the Laplace equation for given waveforms

5

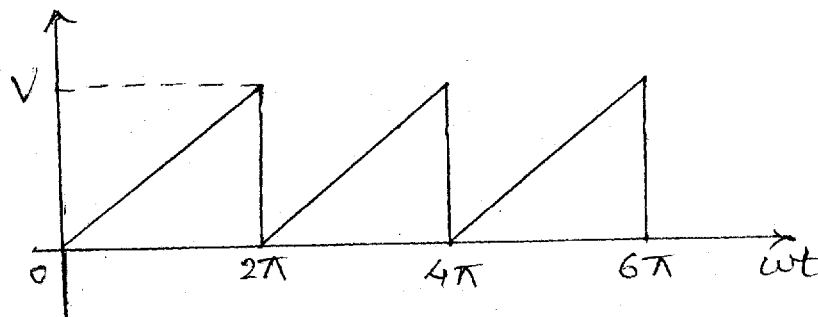


(b) Find trigonometric Fourier series for the waveform shown in fig.

10



- 6 (a) Evaluate the Fourier coefficient for the Fourier series. 5  
 (b) Find the trigonometric Fourier series for the waveform shown in figure. 10



OR

- (b) In the given circuit with switch 'K' moved from position 1 to position 2 at time  $t = 0$ . The steady state current having previously established in the R-L circuit. Find the particular solution for the current  $i(t)$  after switching. 10

