* U H - 6 1 8 1 *

UH-6181

B. E - II (Sem. - III) (Common with EC & C) Examination

May/June – 2012

Electrical Network - I

Time : **3** Hours] [Total Marks : **100**

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 - II (Sem. - III) (COMMON WITH EC & C)**

Name of the Subject :

☛ **Electrical Network - I**

☛Subject Code No. : **6 1 8 1** ☛Section No. (1, 2,.....) : **Nil**

Seat No. :

Student's Signature

(2) Attempt all questions.
(3) Figures to right indicate marks.
(4) Scientific calculator upto casio-super fx 100D, 100W, 100MS series and equivalent are permitted.
(5) Assume suitable data wherever necessary.

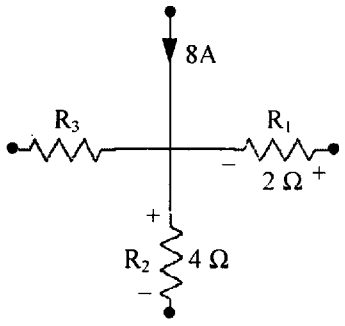
1 (a) Fill in the following blanks :

(i) The mutual inductance in a coupled circuit is given by _____. **1**

(ii) While calculating R_{TH}, constant current source in the circuit is replaced by _____. **1**

(iii) In an electrical circuit, dual of capacitor is _____. **1**

(iv) The voltage drops across R_1 and R_2 are 10V and 16V with polarities as indicated, The current in R_3 is _____. **1**

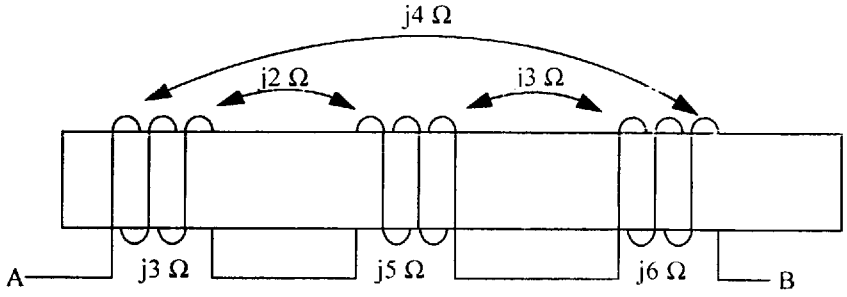


(v) The mesh analysis is primarily based on the application of _____. 1

(b) State and explain maximum power transfer theorem. 5

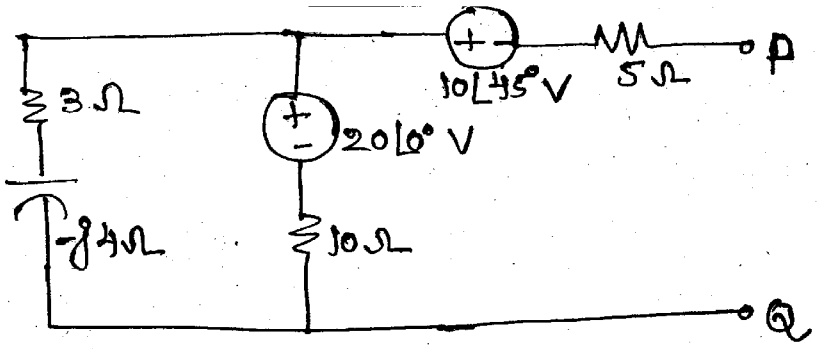
(c) Explain independent and dependent sources. 5

(d) Equivalent reactance between A-B is _____. 5

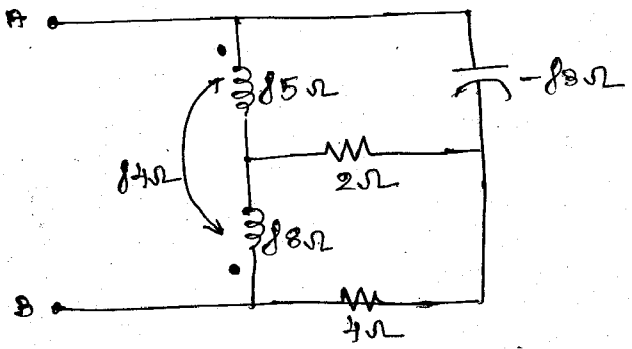


2 Attempt any **three** : 15

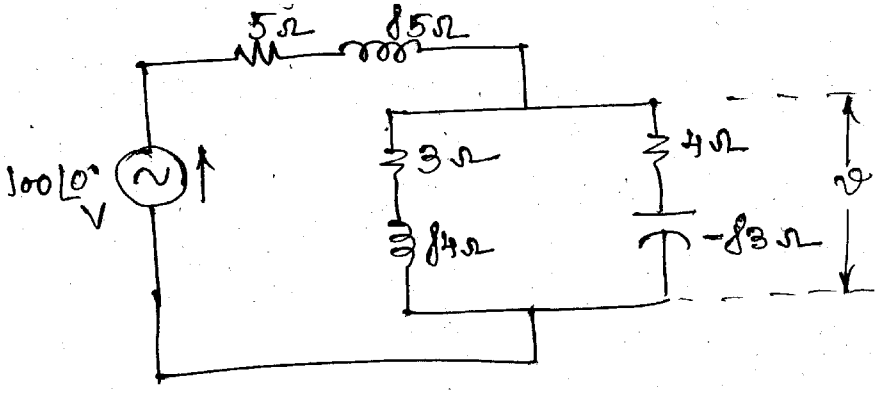
(i) Obtain Thevenin's equivalent circuit for the network shown in the figure below at terminals P-Q.



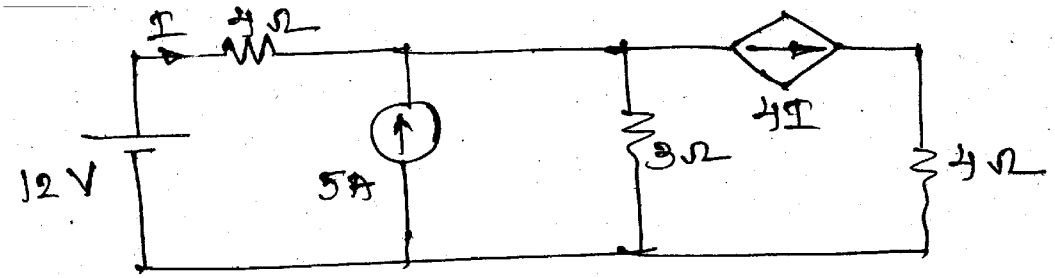
(ii) Determine equivalent impedance between terminals A-B for the coupled circuit given below. (Assume k=1.)



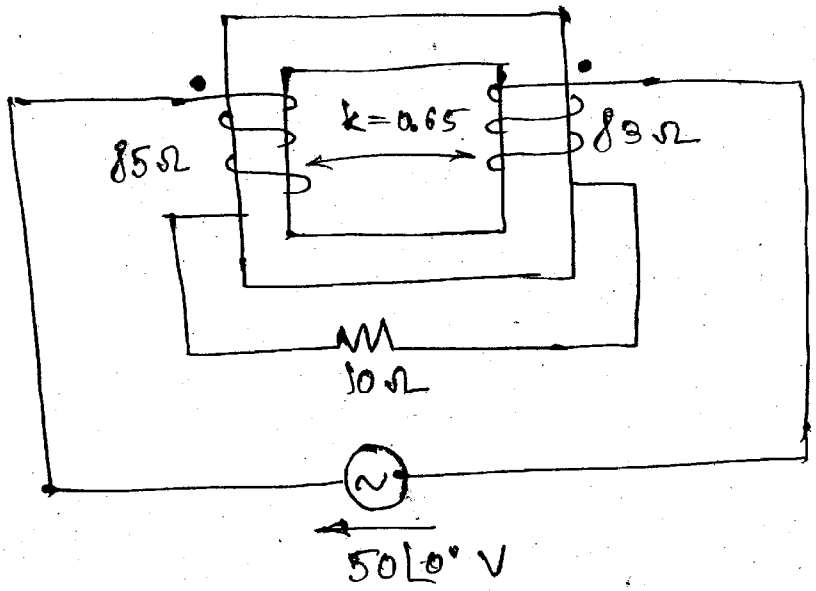
(iii) Find the voltage across the parallel impedance by the modal method.



(iv) Find current I by Thevemin's theorem for the network given below.

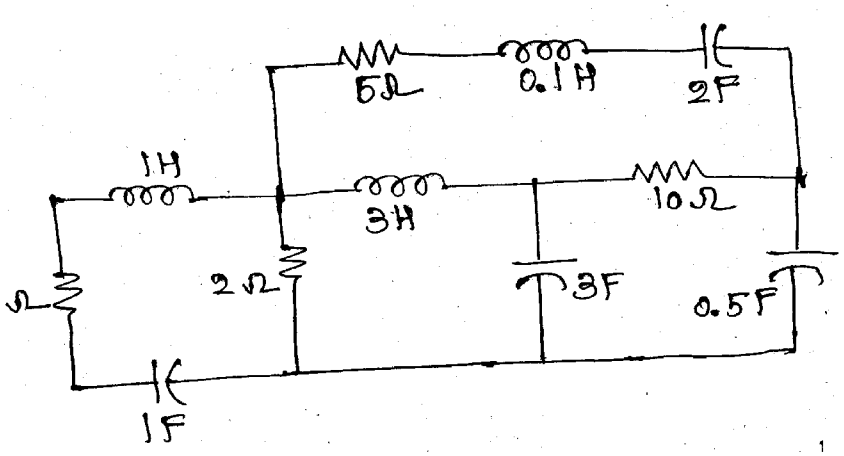


(v) Calculate current I for the coupled circuit given.



3 Attempt any **two** : **15**

(i) Explain the concept of duality and obtain the dual of following network.



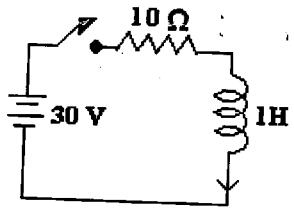
(ii) A three phase, 3 wire, 100V, ABC system supplies a delta connected three equal impedances of $5\angle 45°\Omega$. Determine the line currents I_A, I_B, I_C. Draw phasor diagram.

(iii) Derive the expression of displacement neutral voltage for unbalanced, three-wire, star connected lead.

4 (a) Do as directed :

(i) Write equation for voltage across capacitor in a series RC circuit. **1**

(ii) For the circuit shown below current through the circuit at $t = \infty$ is _____. **4**



(iii) Write basic equations for Y-parameters and its values. **3**

(iv) Define unit step function and obtain its laplace transform. **2**

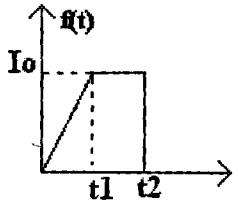
(b) Match the following functions with their Laplace transformations. **5**

	Function	**Laplace Transform**
(1)	u(t)	$1/s^2$
(2)	impulse	1
(3)	e^{at}	$s/(s^2+\omega^2)$
(4)	$\cos \omega t$	1/(s–a)
(5)	ramp	1/s

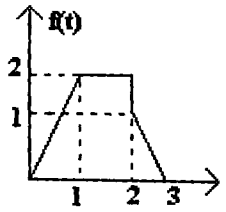
(c) State and prove final value theorem. **5**

5 (a) Obtain Laplace transform of the following waveforms : **5**

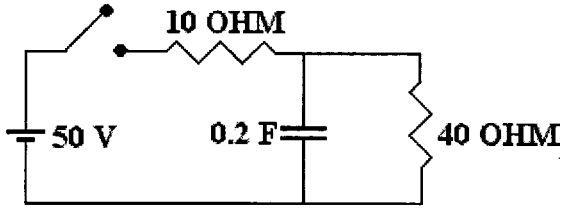
(1)



(2)



(b) In two mesh N/W shown; there is no initial charge on the capacitor. Find the loop currents i_1 and i_2 which result when the switch is closed at t=0. **10**



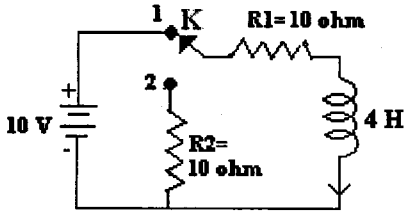
OR

5 (a) Obtain Inverse Laplace transformation for the following function : **5**

(i) $F(s) = (2s^2+6s+5)/(s+1)^2(s+2)$

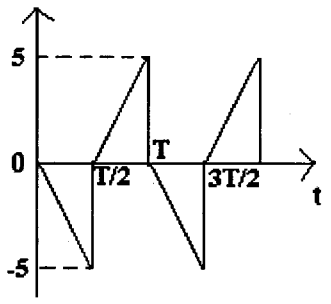
(ii) $F(s) = 2s + 5/(s^2+5s+6)$

(b) In the RL circuit shown, the s/w K moved from position 1 to position 2 at t=0. The steady state current having previously established in the RL circuit. Find the particular solution for current i(t) after switching. **10**



6 (a) Evaluate the Fourier coefficient for the Fourier series. **5**

(b) Find trigonometric Fourier series for the periodic wave shown in fig. below. **10**



OR

(b) Find exponetial Fourier series for the periodic wave shown in fig. below. **10**