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SE-6181

B. E. - II (Sem - III) (Common With EL & ECC) Examination

April / May – 2011

Electrical Network - I

Time : 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. - 2 (SEM - 3) (COMMON WITH EL & ECC)

Name of the Subject :

☛ ELECTRICAL NETWORK - 1

☛ 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 full marks.

(4) Assume suitable data wherever necessary.

(5) Scientific calculator upto *fx*100*D*,100*W*,100*MS* series and equivalent are permitted

1 (a) Answer the following questions :

(i) The maximum value of coefficient of coupling is _____. **1**

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

(iii) The current in the neutral wire of a balanced three-phase, four wire star connected load is _____. **1**

(iv) While calculating the Thevenin's equivalent impedance of an electrical network, **1**

(a) the terminal of interest are short circuited

(b) the terminal of interest are open circuited

(c) voltage source is replaced by its short circuit equivalent.

(d) the terminal of interest are open circuited and voltage source is replaced by its short circuit equivalent.

(v) The principle of superposition does not hold good while calculating. **1**

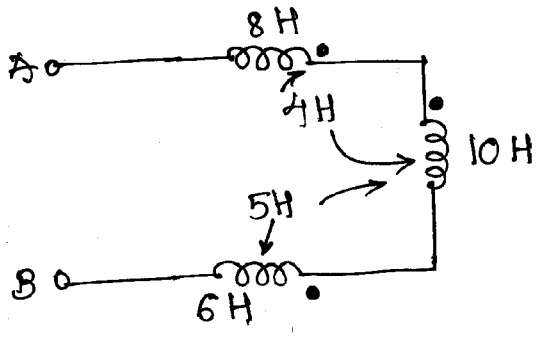
(a) the current through a resistor

(b) the voltage across an impedance

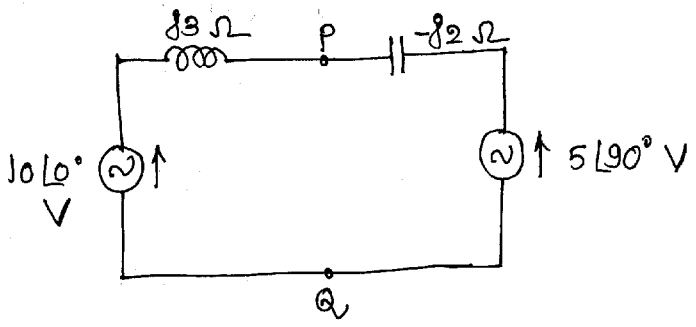
(c) the current and voltage across a resistor

(d) the instantaneous power

(vi) The equivalent inductance across terminals A and B for the given coupled circuit is _____. **2**



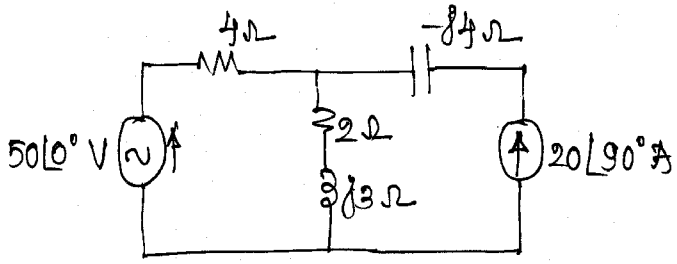
(vii) For the network shown in Fig. below, the Thevenin's equivalent voltage between terminals P and Q is _____. **3**



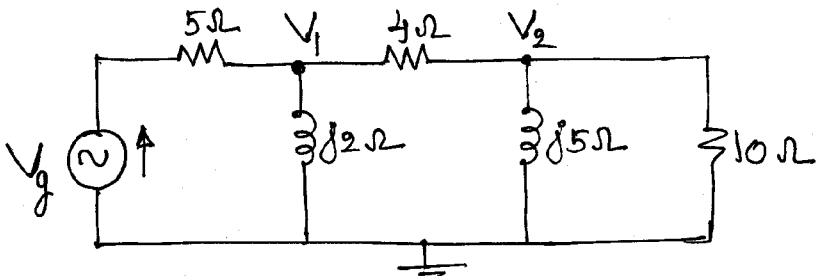
(b) Explain the concept of duality with a suitable example. **5**

(c) State the explain dot rule. **5**

2 (a) For the circuit shown in Fig. below, determine the current in (2+j3) ohm, using superposition theorem. 7

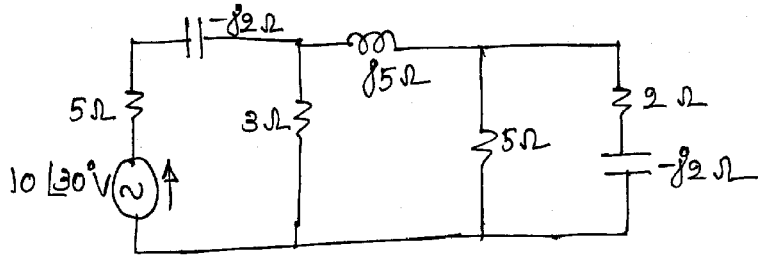


(b) Find the ratio of node voltages V_1/V_2 for the network given below. 8

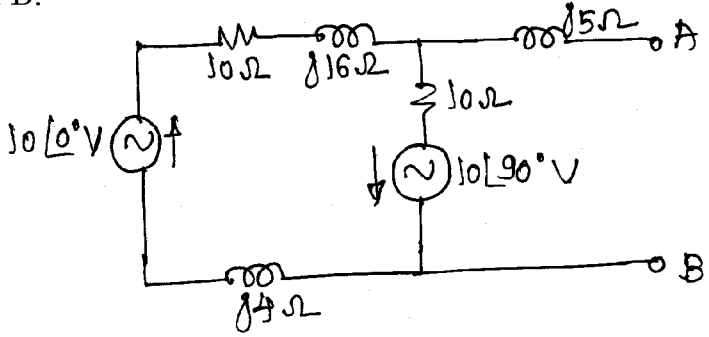


OR

2 (a) Determine the current through impedance (2-j2) Ω using Thevenin's theorem. 7

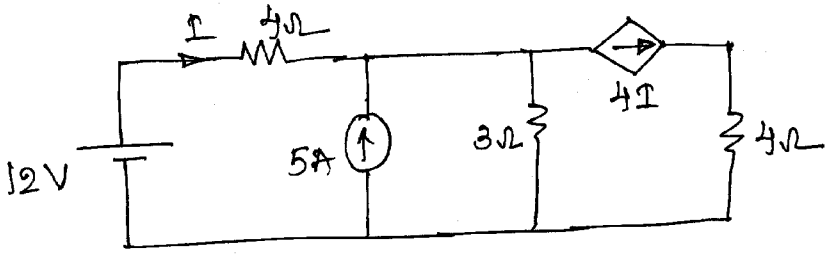


(b) Obtain Norton's equivalent circuit at open terminals A-B. 8

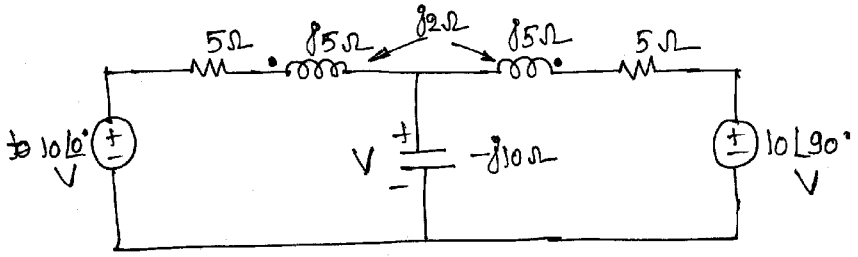


3 Attempt any **three** : **15**

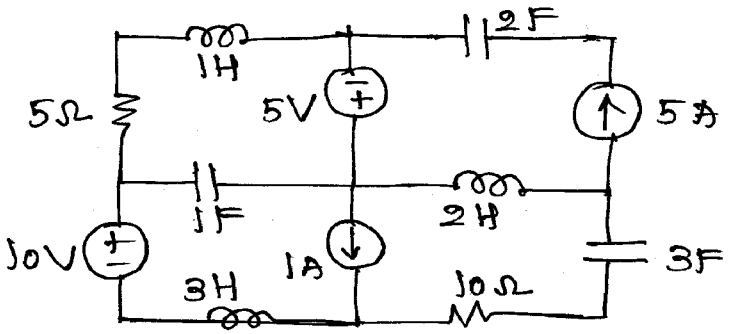
(i) Find current I through 4 Ω resistor using Thevenin's theorem in the given figure.



(ii) For the given dotted equivalent circuit, determine voltage V across 10Ω capacitive reactance.



(iii) Obtain the dual of the following network.



(iv) A three phase, 3-wire, 100 V, ABC system supplies a delta connected three equal impedances of $5\angle 45^{\circ}\,\Omega$. Determine the line currents I_A, I_B, I_C. Also draw phasor diagram.

(v) Explain displaced neutral method for 3-phase, 3-wire unbalanced star connected load. Derive expression for displaced neutral voltage.

4 (a) (i) Match the following : **04**

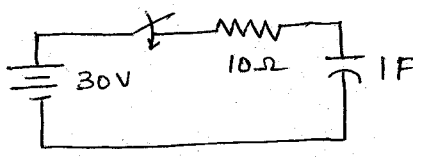
(a)	$sinwt$	(i)	$\frac{1}{s+a}$
(b)	$sinhwt$	(ii)	$\frac{s\cos\theta - w\sin\theta}{s^2+w^2}$
(c)	$\cos(wt+\theta)$	(iii)	$\frac{w}{s^2-w^2}$
(d)	e^{-at}	(iv)	$\frac{w}{s^2+w^2}$

(ii) Fill in the blanks : **6**

(i) Given $f(S)=\frac{S+2}{S(S+1)}$ the initial value of the function will be _____.

(ii) Time constant for a series R-C circuit is_____.

(iii) for the circuit shown current through the circuit at $t=\infty$ is _____



(iv) Laplace transform of impulse function is_____.

(v) When $f(t)=-f(-t)$ then function is said to have _____ symmetry.

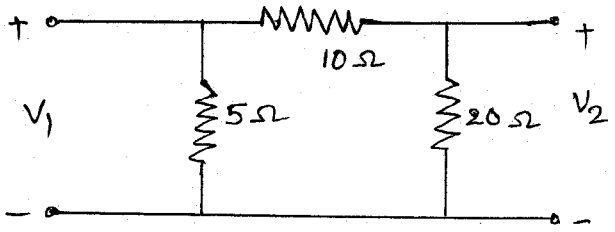
(vi) The z-parameter equation of a 'T'-network is

$V_1=24I_1+8I_2$

$V_2=8I_1+32I_2$

z_{22} for the network is _____.

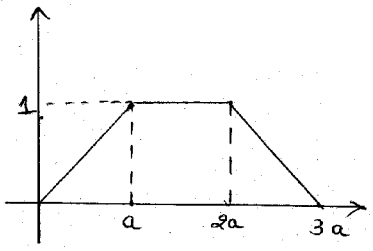
(b) Obtain y parameter for the network shown. **05**

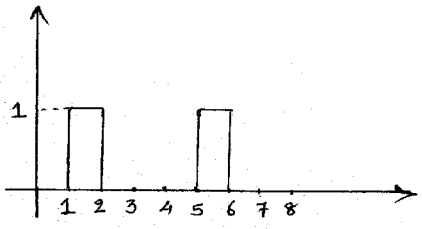


(c) State and prove final value theorem. **03**

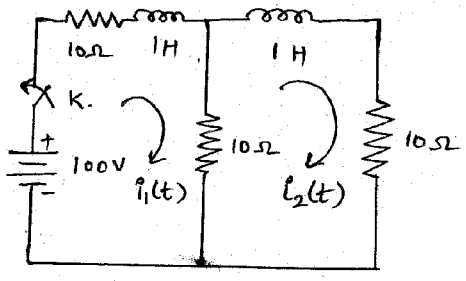
(d) If $f_1(t)=f_2(t)=e^{at}$ determine convolution between $f_1(t)$ and $f_2(t)$. **02**

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





(b) Find current $i_2(t)$ using Laplace transformation for the circuit shown. Assume initial condition to be zero. **10**

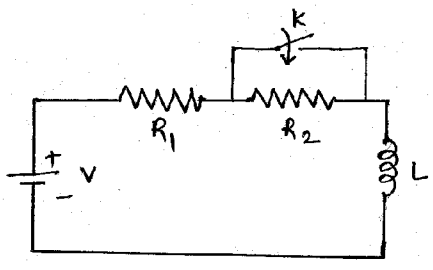


OR

5 (a) Find inverse Laplace for the following function. **05**

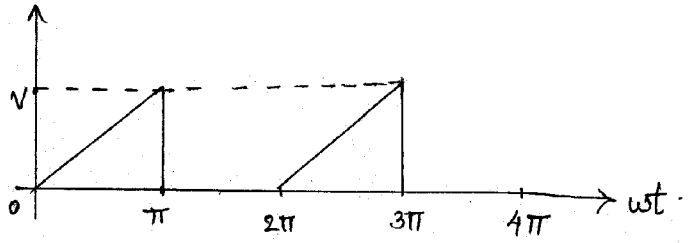
$$F(s)=\frac{3s^2+4}{s(s^2+4)}$$

(b) In the figure the battery voltage is applied for a steady state condition. Obtain complete expression for current after closing the switch 'K'. Assume $R_1=1\Omega$, $R_2=2\Omega$, $L=1H$ and $V=10v$. **10**



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

(b) Find trigonometric fourier series for the waveform shown. **10**



OR

6 (a) Find Laplace transform for the following functions. **05**

(i) $f(t) = \cos wt$

(ii) $f(t) - e^{at}$

(b) Find trigonometric fourier series for the waveform shown and plot line spectrum. **10**