* K C - 6 1 8 1 *

KC-6181

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

November / December – 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. - 2 (SEM. 3) (COMMON WITH EC & C)

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) Scientific calculator upto casio-super fx 100D, 100W, 100 MS series and equivalent are permitted.

(5) Assume suitable data wherever necessary.

1 (a) Fill in the following blanks :

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

(2) A source has an emf of 100 V and an impedance of $(500 + j100)\Omega$. The amount of the maximum power transferred to the load will be _____ W. **1**

(3) The time constant of series RC circuit is _____. **1**

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

(5) The nodal analysis is primarily based on the application of _____. **1**

(b) State and explain superposition theorem. **5**

(c) Explain different controlled sources. **5**

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

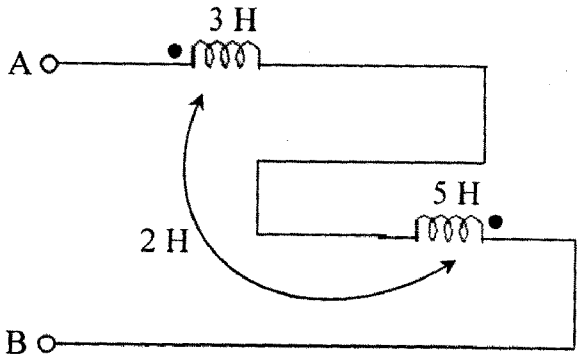

Fig.

2 Attempt any **three** : **15**

(1) Obtain V_{TH} across terminals A and B.

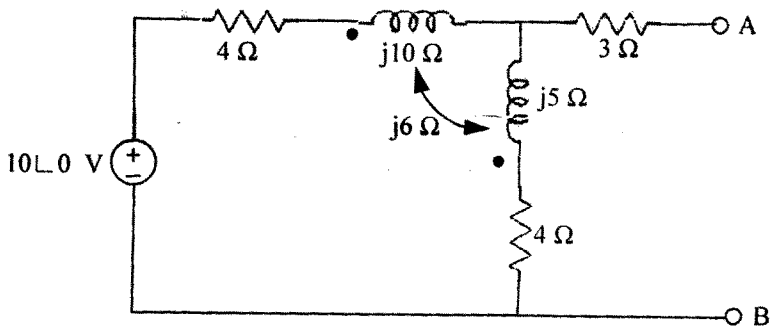

Fig.

(2) Find the current through 100 Ω resistor using Norton's theorem.

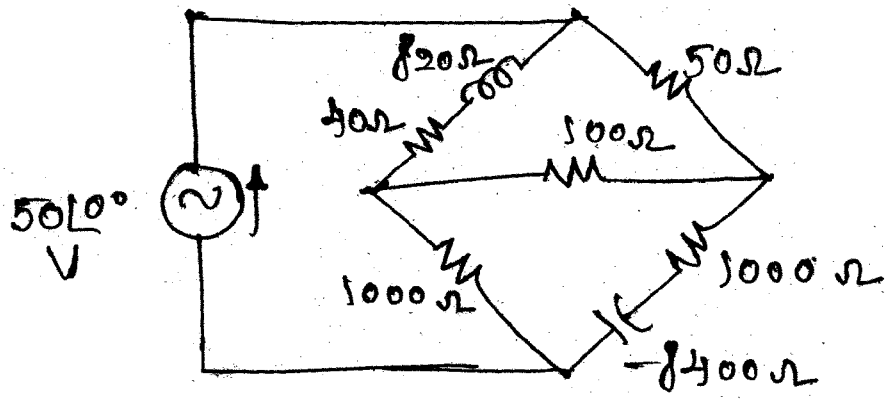

Fig.

(3) Calculate current through $24\,\Omega$ resistor.

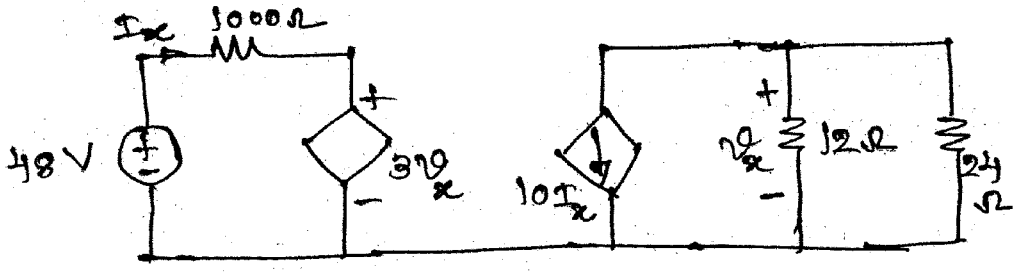

Fig.

(4) Obtain equivalent impedance at terminals at A-B.

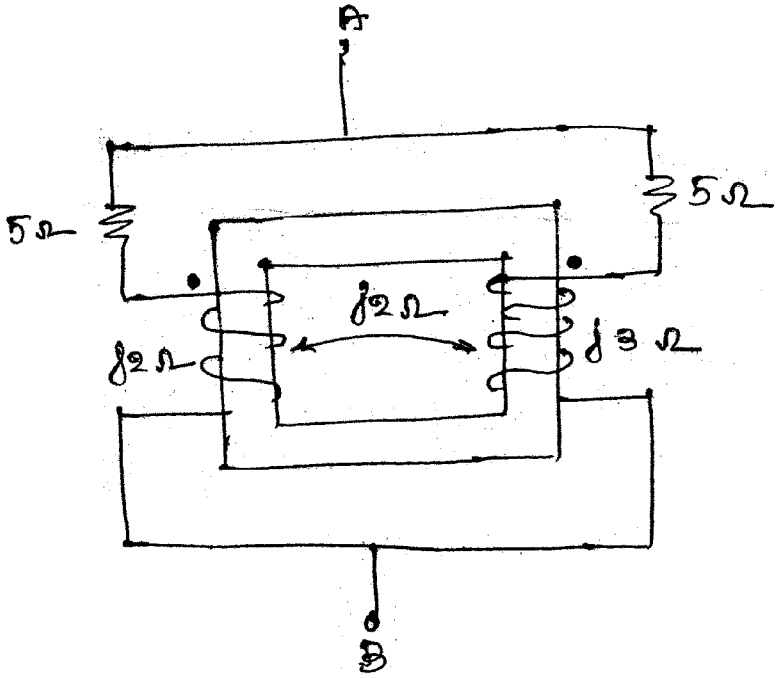

Fig.

(5) Find mesh current I_3 for given choice of mesh currents.

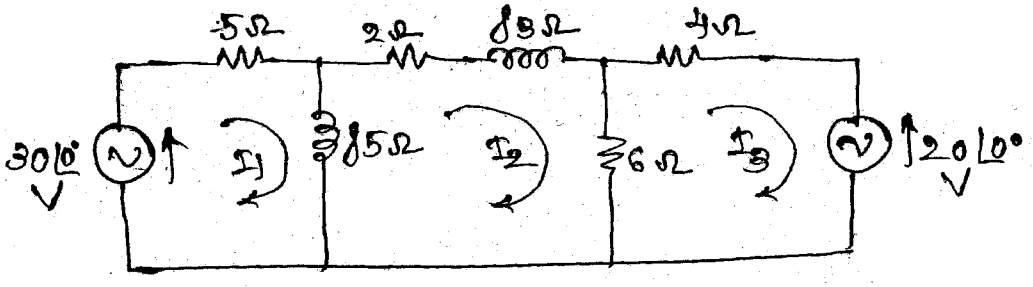

Fig.

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

(1) Draw the dual of following networks.

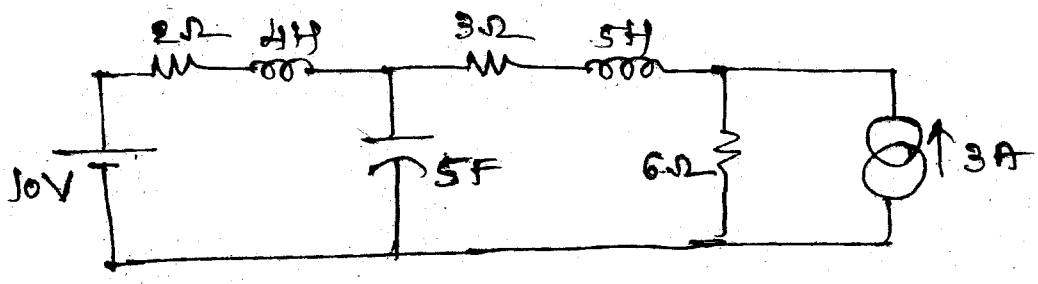

Fig.

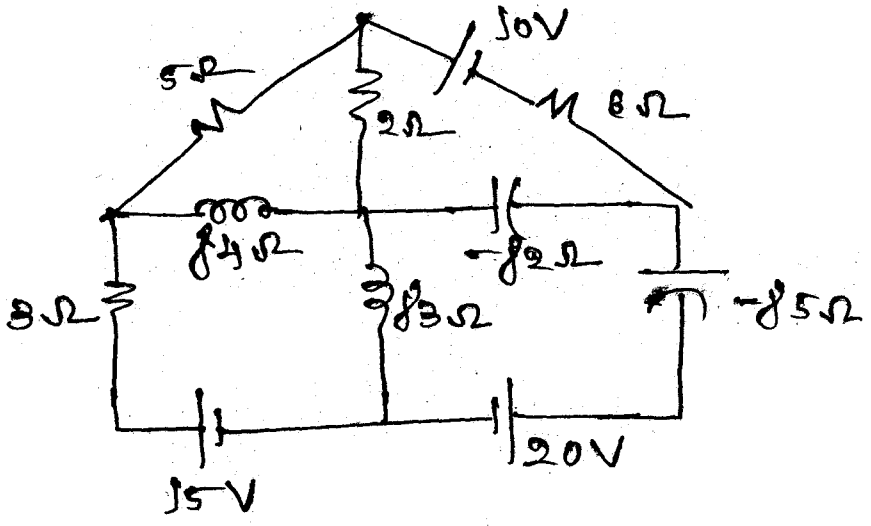

Fig.

(2) A three-phase 3wire, 240 V, ABC system delta connected load with supplies $z_{AB} = 10 \angle 0° \Omega$, $z_{BC} = 10 \angle 30° \Omega$, $z_{CA} = 15 \angle -30° \Omega$. Calculate line currents. Also draw the phasor diagram.

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

4 (a) Do as directed :

(1) Define Laplace transform. **1**

(2) Write basic equations for z-parameters and its values. **3**

(3) Time constant for a series RL circuit is _____. **2**

(4) Find Laplace transformation for the following function. **2**

$F(t) = \sin \omega t$

(5) $F(s) = S + 2/S(S+1)$, the initial value of the function is _____. **2**

(b) Prove the convolution theorem to determine inverse Laplace for the function. **5**

(c) Obtain interrelationship between unit-step, unit ramp and unit impulse function. **5**

5 Attempt any **three** : **15**

(1) Find Laplace transform :

(a) $f(t) = t$

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

(2) Define Y-parameters and derive their in terms on *z*-parameters.

(3) Obtain Laplace transform of the following wave forms :

(a)

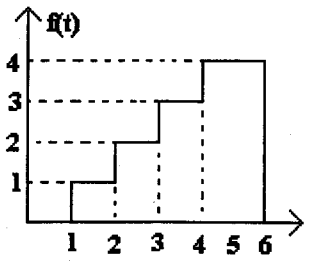

Fig.

(b)

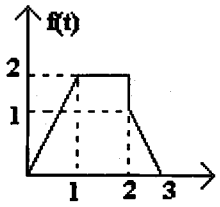

Fig.

(4) In fig. shown below the battery voltage is applied for a steady state period. Obtain the complete expression for the current after closing the switch K. Assume $R_1 = 2\Omega,\ R_2 = 1\Omega,\ \ L = 1\,H, V = 20V$.

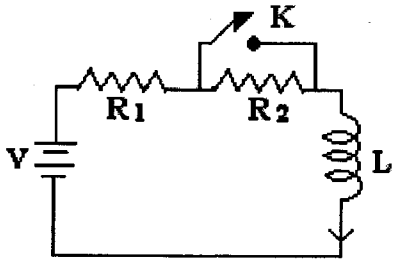

Fig.

6 (a) State and prove the final value theorem. **5**

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

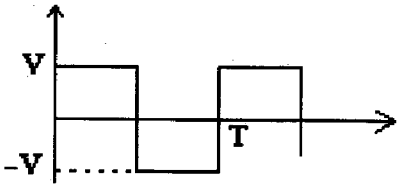

Fig.

OR

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**

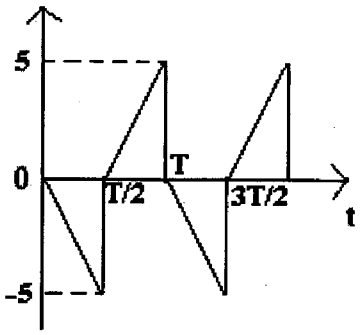

Fig.