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Reg. No. : .....

Name : .....

Third Semester B.Tech. Degree Examination, January 2015
(2008 Scheme)
BRANCH : Electrical and Electronics
08.304 : NETWORK ANALYSIS AND SYNTHESIS (E)

Time : 3 Hours Max. Marks : 100

***Instructions** : Answer **all** questions from Part – **A** and **one full** question from **each** Module of Part – **B**.*

PART – A

1. State and explain superposition theorem.

2. For the circuit shown in fig. (1), find the current through 5 Ω using Nodal method.

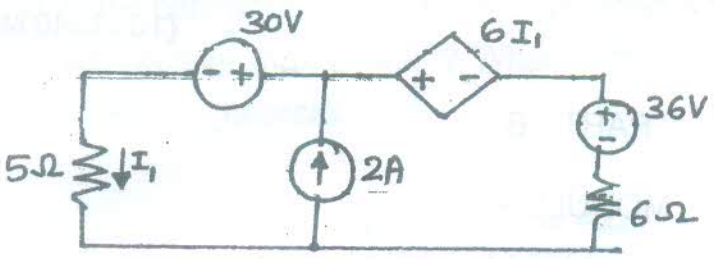

Fig. (1)

3. Find the equivalent inductance of two coupled coils connected in parallel.

4. A 3-phase, 4-wire, 440 V, RYB system supplies a star connected load in which $Z_R = 10\angle 0°\Omega$, $Z_Y = 15\angle 45°\Omega$, $Z_B = 10\angle -30°\Omega$. Find the line currents and neutral current.

5. Define step function, ramp function and impulse function. Also give their signal representation.

P.T.O.

6. Derive an expression for the step response of an RC circuit. Define time constant also.

7. Determine the value of C which will make the circuit in fig.(2) resonate at 6000 Hz.

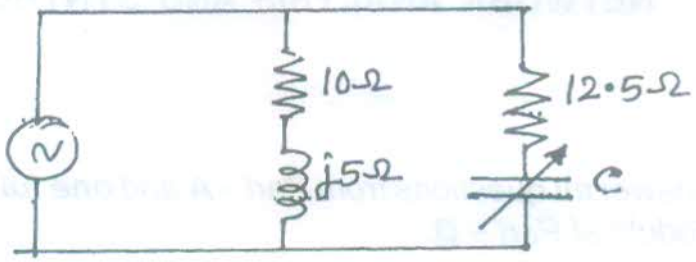

Fig. (2)

8. What are hybrid parameters ? Where are they useful ?

9. What are the properties of a reactance function ?

10. Define transfer function. Briefly explain the four forms of transfer function of a 2-port network. **(10×4=40 Marks)**

PART – B

MODULE – I

11. a) Verify reciprocity theorem for the network shown in fig. (3).

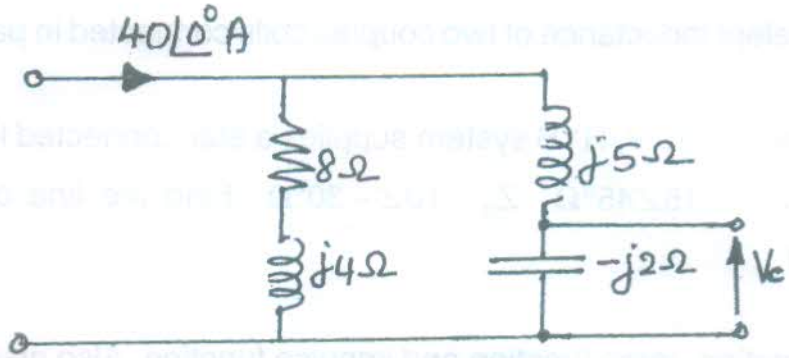

Fig. (3)

b) Obtain the dotted equivalent for the coupled circuit shown in Fig.(4). Also find the current through – j10 Ω reactance using the equivalent circuit.

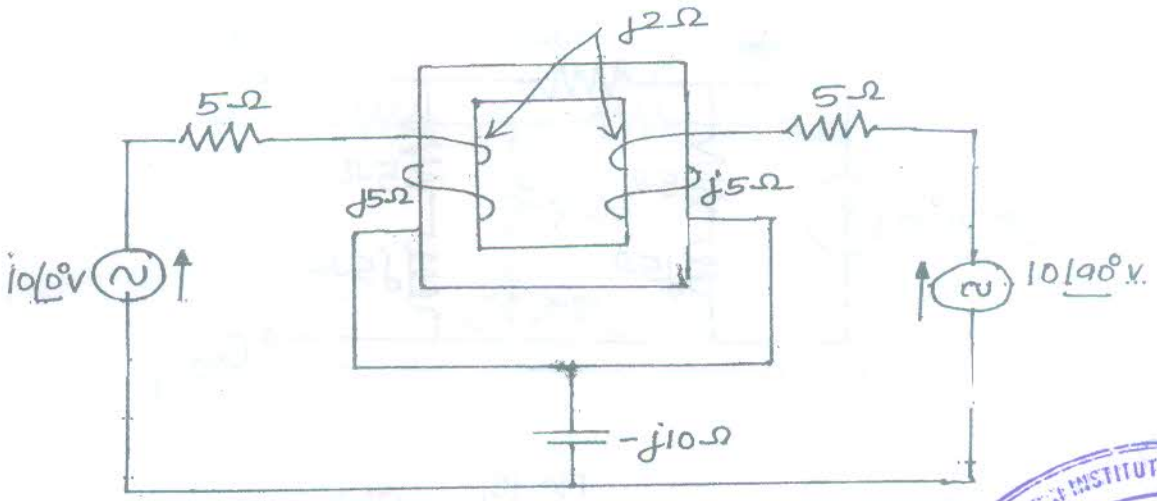

Fig (4)

OR

12. a) In the network shown in fig.(5), if the load is a complex impedance, what load will receive max power ? What is the value of maximum power ? Apply Millman's theorem.

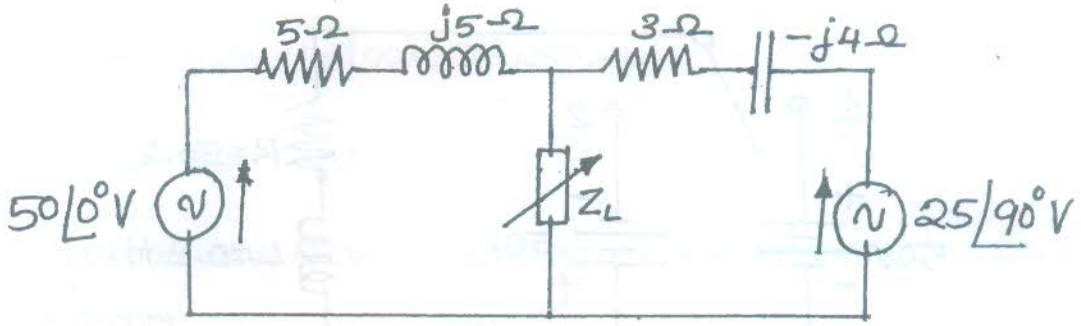

Fig. (5)

b) Obtain the Thevenin and Norton equivalent circuit of the network shown in Fig. (6).

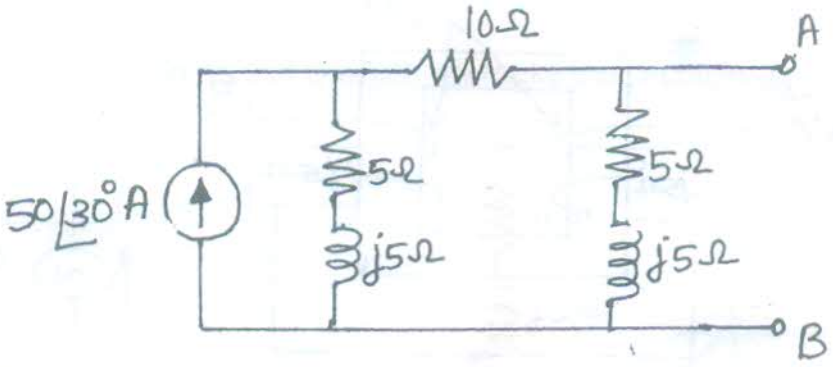

Fig. (6)

MODULE – II

13. a) In the RL circuit shown in fig.(7) the switch is closed at t = 0 on position 1 and changed over to position 2 after one time constant. Find the complete transient and sketch it.

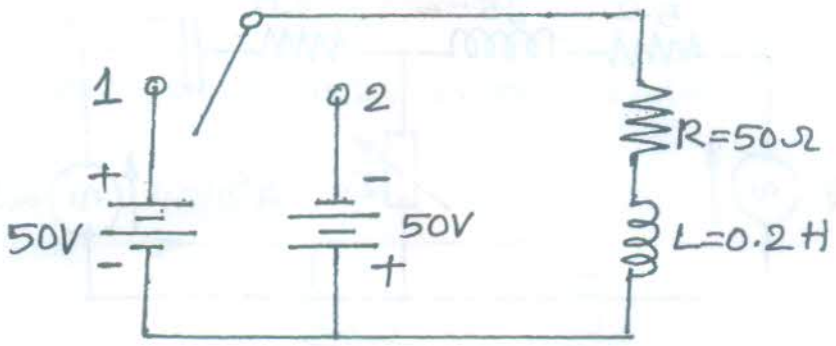

Fig. (7)

b) Express Z-parameters in terms of Y-parameters.
For the network shown in fig. (8) find Y-parameters and Z-parameters.

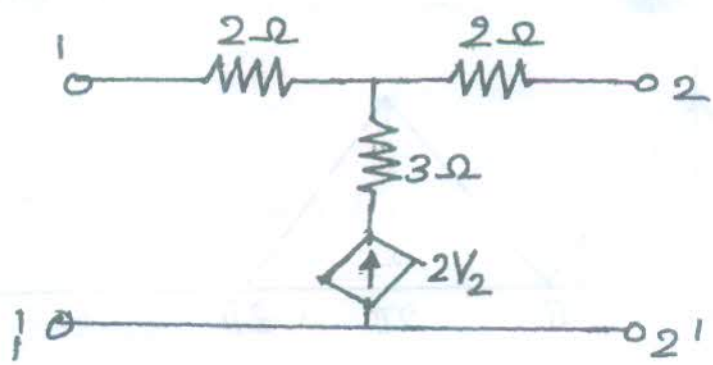

Fig. (8)

OR

14. a) A series RLC circuit has R = 10Ω, L = 0.5 H and C = 40 x10^{-6}F. The applied voltage is 100 V. Find

i) Resonant frequency and current at resonance.

ii) Upper and lower half power frequencies.

iii) Voltage magnification.

iv) Maximum value of the voltage across the capacitor and the frequency at which it occurs.

b) Find the Fourier series representation for the triangular wave shown in fig. (9)

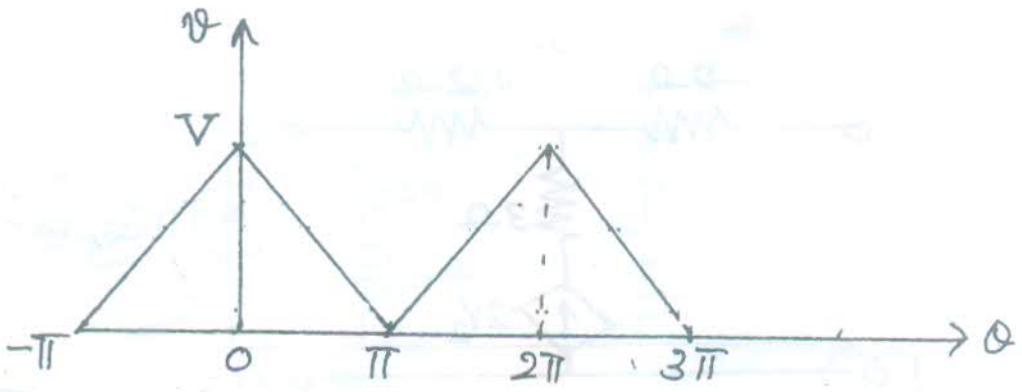

Fig. (9)

MODULE – III

15. a) Design a constant K high pass filter (T and π)having a characteristic impedance of 300Ω and a cutoff frequency of 2000Hz. Also find its characteristic impedance and phase constant at 5000Hz.

b) Obtain the Camer realization of the driving point impedance

$$Z(s) = \frac{s(s^2+4)}{(s^2+1)(s^2+9)}$$

OR

16. a) Design a low pass m derived T and π section filter having a cutoff frequency of 2.5 kHz, a frequency of infinite attenuation at 2.6kHz and a design impedance of $600\,\Omega$.

b) Check the positive realness of

$$F(s) = \frac{s^2 + 2s + 20}{s + 10}$$

c) A function Z(s) has the following zeros and poles. Zeros at 0, – 4; Poles at – 1, – 9. Taking scale factor as unity, synthesize Z(s) in First Foster form.

(3×20=60 Marks)