Code: 9A02406

1

II B. Tech II Semester (R09) Regular & Supplementary Examinations, April/May 2012

NETWORK THEORY

(Electrical & Electronics Engineering)

Time: 3 hours Max Marks: 70

Answer any FIVE questions

All questions carry equal marks

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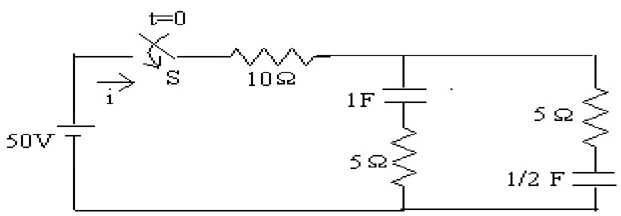
1 (a) Derive the relation between phase and line values of a three phase star connected balanced system.

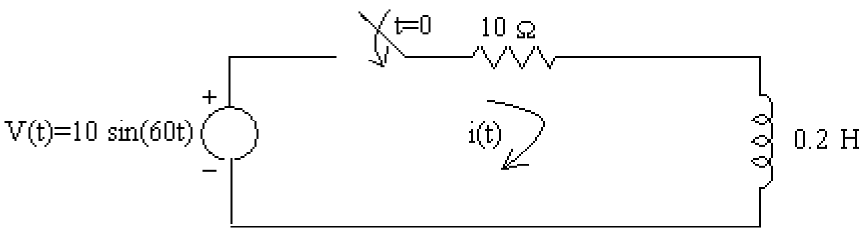
(b) Three inductive coils, each with a resistance of 15 Ω and an inductance of 0.03 H are connected in delta to three phases, 400 V, 50 Hz supply. Calculate: (i) phase current and line current (ii) total power absorbed.

2 A symmetrical 3-phase, 400 V, three wire supply feeds an unbalanced star connected load, with impedances of the load as, $Z_R = 25\angle 0^0$ Ω, $Z_Y = 11\angle -20^0$ Ω and $Z_B = 15\angle 10^0$ Ω. Find: (i) Line currents (ii) Voltage across the impedances (iii) The displacement neutral voltage by Milliman's theorem.

3 In the network shown in figure below, the switch is closed at t=0 and there is no initial charge on either of the capacitors. Find the current 'i' by Laplace transform method.



4 A series RL circuit is shown in figure below. If the switch 'K' in the circuit is closed at t=0, Find an expression for i (t).



5 (a) What are Z-parameters?

(b) A two port network has the following Z-parameters:

$Z_{11} = 10\Omega$; $Z_{22} = 12\Omega$; $Z_{12} = Z_{21} = 5\Omega$ Complete the y parameters of the same network.

6 What is meant by cascading of networks? Obtain the parameters of a resulting network when two networks are cascaded.

7 Find the cosine and sine form of the Fourier series: $f(t) = 2 + \sum_{n-1}^{\infty} \frac{10}{n^3+1} \cos\left(2nt + \frac{n\pi}{4}\right)$

8 Derive the Fourier transform of a single rectangular pulse of width τ and height A.

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NETWORK THEORY

(Electrical & Electronics Engineering)

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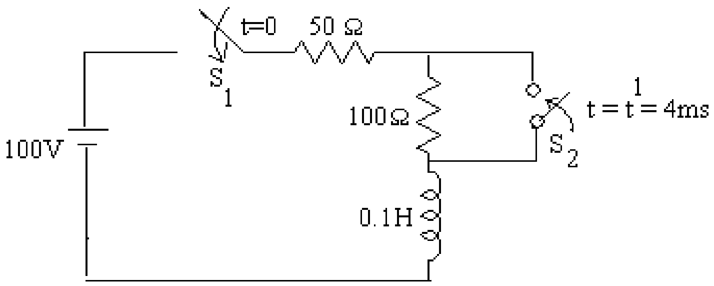
1 (a) Show that line current is $\sqrt{3}$ times the phase current in a 3-phase delta connected balanced system.

(b) Three inductive coils, each with a resistance of 15 Ω and an inductance of 0.03 H are connected in star to three phases, 220 V, 50 Hz supply. Calculate: (i) phase current and line current (ii) total power absorbed.

2 A symmetrical 3-phase, 400 V, three wire supply feeds an unbalanced star connected load, with impedances of the load as, $Z_R = 25\angle 0^0$ Ω, $Z_Y = 11\angle -20^0$ Ω and $Z_B = 15\angle 10^0$ Ω. Find: (i) Line currents (ii) Voltage across the impedances (iii) The displacement neutral voltage by using star-delta conversion method.

3 In the circuit shown in figure below, switch (1) is closed at t=0 and then switch (2) is closed at $t=t^1=4$ms. Find the expression for current i (t) in the intervals $0<t<t^1$ and $t>t^1$.



4 A series RL circuit with R= 50 Ω and L=0.2 H has a sinusoidal voltage source V=150 sin (500 t + Φ) volts applied at a time when Φ=0. Find the expression for total current.

5 (a) What are h-parameters?

(b) For a two-port network, compute h-parameters from the following data:

(i) With the output terminal short circuited: V_1=25V, I_1=1A, I_2=2A.

(ii) With the input terminals open circuited: V_1=10V; V_2=50V; I_2=2A.

6 Derive the expression for ABCD parameters of the resulting network when two networks are cascaded.

7 Express the Fourier series $f(t) = 10 + \sum_{n=1}^{\infty} \frac{4}{n^2+1}\cos 10nt + \frac{1}{n^3}\sin 10nt$ in a cosine and angle form.

8 Find the Fourier transform of the following functions.

(a) $4\delta(t+2)$ (b) sin $w_0 t$

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Code: 9A02406 **3**

II B. Tech II Semester (R09) Regular & Supplementary Examinations, April/May 2012

NETWORK THEORY

(Electrical & Electronics Engineering)

Time: 3 hours Max Marks: 70

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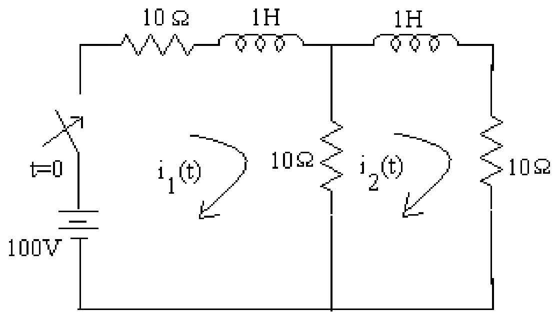
1 (a) Derive the expressions for phase and line voltages, phase and line currents in a three phase star connected balanced system.

(b) Three inductive coils, each with a resistance of 15 Ω and an inductance of 0.03 H are connected in delta to three phases, 220 V, 50 Hz supply. Calculate (i) phase current and line current (ii) total power absorbed.

2 A 400 V, 3-phase supply feeds an unbalanced three wire, star connected load, consisting of impedances $Z_R=7\angle 10^0$ Ω, $Z_Y=8\angle 30^0$ Ω and $Z_B=8\angle 50^0$ Ω. The phase sequence is RYB. Determine the line currents and total power taken by the load.

3 An ac voltage of V=V sin (500 πt) is applied to a series R-L circuit. If the R-L circuit has R =10 Ω and L=0.1H, calculate the ratio of maximum value to which the current rise to the steady state maximum value when the voltage is applied at an instant t=0.002 sec.

4 In the network shown in the fig below, the switch is closed at t= 0. Find the values of i_1 (t) and i_2 (t) assuming zero initial currents through inductors.



5 Derive the relations between: (i) y parameters and z-parameters (ii) h-parameters and Z-parameters.

6 Explain the concept of calculation of two port network parameters using transformed variables.

7 The voltage across a device is given by:

$v(t) = -2 + 10\cos 4t + 8\cos t + 6\cos 8t - 5\sin 4t - 3\sin 6t - \sin 8t$.

Find (i) the period of $v(t)$ (ii) the average value of $v(t)$ (iii) the effect value of $v(t)$.

8 Find the Fourier transform of the following functions:

(a) $\cos w_0 t$ (b) gate function, g (t) =u (t-1) – u (t-2).

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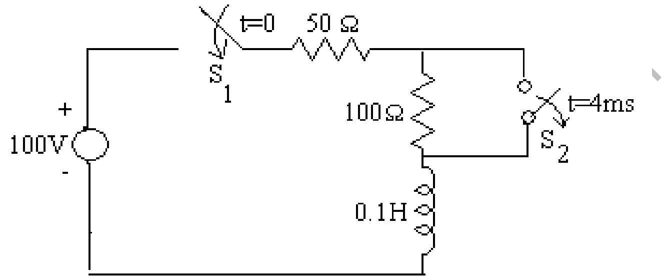
1 (a) Explain how the reactive power can be measured by using single watt meter with a neat diagram.

(b) Three coils each having a resistance of 19 Ω and an inductive reactance of 14 Ω are connected in star and fed by a 3-phase, 220 V, 50 Hz system. Find:
(i) Line current (ii) Power and (iii) Power factor.

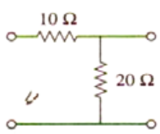
2 Two watt meters are connected to measure power in a 3-phase circuit. The reading of the one of the meter is 5 kW when the load power factor is unity. If the power factor of the load is changed to 0.707 lagging, without changing the total input power. Calculate the readings of the two watt meters. Derive the formula for power factor.

3 The circuit shown in fig below, the switch S_1 is closed at t=0 and switch S_2 is opened at t = 4 ms. Obtain 'i' for t>0 and sketch it.



4 A series R-C circuit has R = 20 Ω and C =100 μF. A voltage V=200 sin (314 t) is applied at t = 2.14 m sec. Obtain an expression for 'i'. Also, find the value of current after time 1 m sec from the switching instant.

5 Find h-parameters for the network shown below:



6 Discuss in detail the concepts of transformed networks and network parameters using transformed variables.

7 Derive the Fourier series of a square wave drawing a neat wave form.

8 Find the Fourier Transform of the following functions: (a) $\delta(t-t_0)$ (b) $\cos w_0 t$.

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