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Third Semester B.E. Degree Examination, July/August 2005

Common to EC/TE/EE/IT/ML/BM

Network Analysis

Time: 3 hrs.]

[Max.Marks : 100

Note: Answer any FIVE full questions.

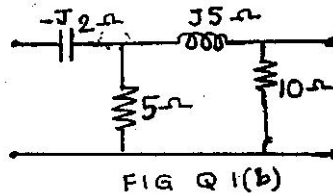
1. (a) Distinguish between the following network elements citing examples :

i) Unilateral and bilateral

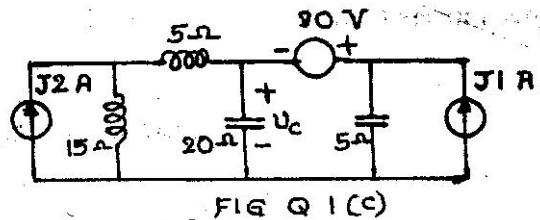
ii) Independent and dependent sources.

(6 Marks)

(b) Obtain the delta connected equivalent of the network shown in fig.Q1(b). (6 Marks)

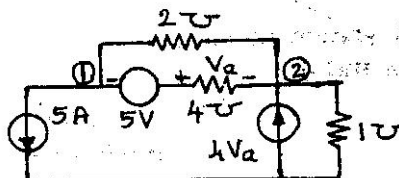


(c) Find the voltage across the capacitor of 20Ω reactance of the network shown in Fig.Q1(c), by reducing the network to contain one source only, by source transformation techniques. (8 Marks)



2. (a) Explain the procedure of writing node equations for a network, that contains ideal voltage sources in addition to current sources, without source transformation techniques. (6 Marks)

(b) Set up node equations for the circuit shown in Fig.Q2(b) to determine the voltage V_a . (6 Marks)



- (c) Use 3 mesh equations for the network shown in Fig.Q2(c) to determine R and C such that the current in $3 + j4\Omega$ is zero. Take $\omega = 50\text{rad/sec}$. (8 Marks)

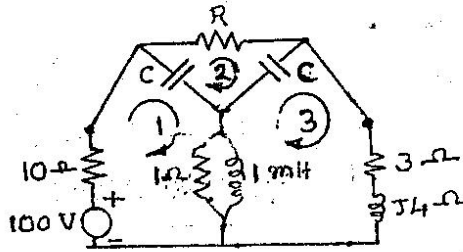


FIG Q 2(c)

3. (a) With usual notations, derive from topological considerations, the matrix relationship for node equations. (6 Marks)

$$[Q] [Y_b] [V_s] - [Q] [I_s] = [Q] [Y_b] [Q]^T [V]$$

- (b) Construct a tree for the network shown in Fig.Q3(b) so that all loop currents pass through 7Ω . Write the corresponding tie set matrix. (8 Marks)

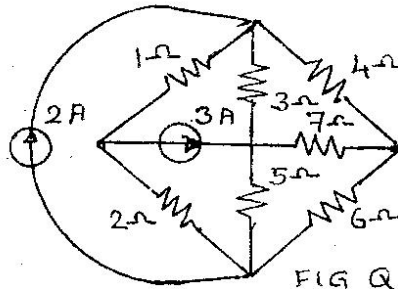


FIG Q 3(b)

- (c) What are dual networks? What is their significance? Draw the dual of the circuit shown in Fig.Q3(c). (6 Marks)

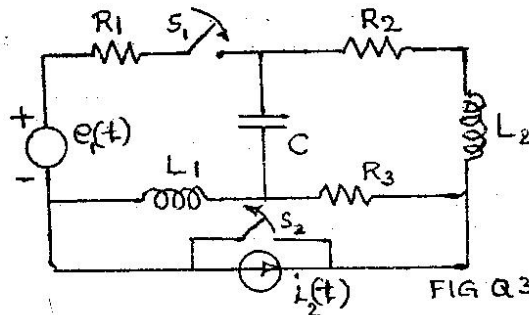


FIG Q3(c)

4. (a) State and explain reciprocity theorem. What is transfer impedance? (6 Marks)
- (b) For the network shown in Fig.Q4(b), obtain the Thevenin's equivalent as seen from terminals p and q. (8 Marks)

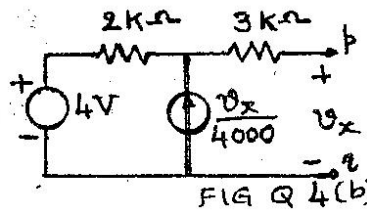
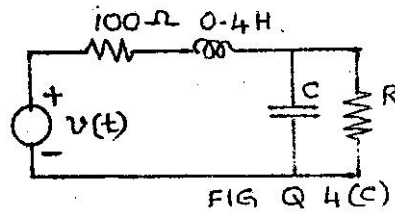


FIG Q 4(b)

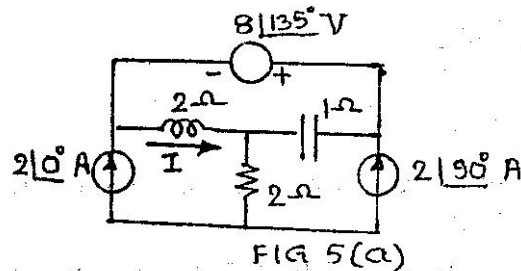
R and C
(8 Marks)

- (c) Select values of R and C in the network shown in Fig Q4(c) so that a maximum power is delivered to R and calculate the value of that power $v(t) = 250 \sin 500t$ volts. (6 Marks)



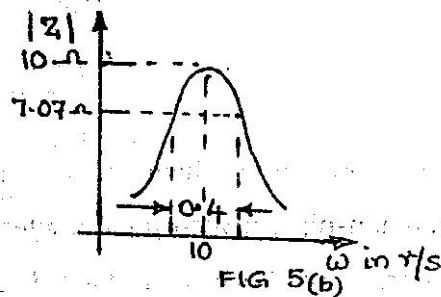
relation-
(6 Marks)

5. (a) Using superposition theorem, obtain the response I for the network shown in Fig.Q5(a). (8 Marks)



ents pass
(8 Marks)

- (b) Determine the R-L-C parallel circuit parameters whose response curve is as shown in Fig.Q5(b). What are the new values of ω_r and band width if c is increased 4 times? (6 Marks)



e circuit
(6 Marks)

- (c) A coil of $R = 10\Omega$ and $L = 0.5H$ is connected in series with a capacitor. The current is maximum when $f = 50Hz$. A second capacitor is connected in parallel with this circuit. What capacitance must it have so that the combination acts like a non inductive resistor at 100 Hz. Calculate the total current supplied in each case if the applied voltage is 220V. (6 Marks)

(6 Marks)
as seen
(6 Marks)

6. (a) Show that :
 i) the voltage of a capacitor cannot change instantaneously.
 ii) the current in an inductor cannot change instantaneously. (6 Marks)
- (b) A coil of $R = 1000\Omega$ and $L = 1H$ is connected to a d.c. voltage of 100V through a changeover switch. At $t = 0$, the switch connects a capacitor of $C = 01.\mu F$ in series with the coil, excluding the voltage. Solve for i , $\frac{di}{dt}$ and $\frac{d^2i}{dt^2}$ in the coil all at $t = 0t$. (7 Marks)

(c) If $f(t) = 2t$, sketch the following :

- i) $f(t-2)u(t)$
- ii) $f(t)u(t-2)$
- iii) $f(t-2)u(t-2)$
- iv) $f(t+2)u(t+2) + f(t)u(t)$
- v) $f(t)\delta(t)$
- vi) $f(t)\delta(t-2)$

(7 Marks)

7. (a) use initial and final value theorems, where they apply, to find $f(0)$ and $f(\infty)$ for the following :

i) $F(s) = \frac{s^3 + 7s^2 + 5}{s(s^3 + 3s^2 + 4s + 2)}$

ii) $F(s) = \frac{e^{2s}(s+2)}{s^2+5}$

iii) $F(s) = \frac{s(s+4)(s+8)}{(s+1)(s+6)}$

(6 Marks)

(b) Obtain the Laplace transform of a full wave rectified sine wave of amplitude 1 and period π secs.

(6 Marks)

(c) The switch in the network of Fig.Q7(c) opens at $t = 0$. use Laplace transformation analysis to determine the voltage across the capacitor for $t \geq 0$.

(8 Marks)

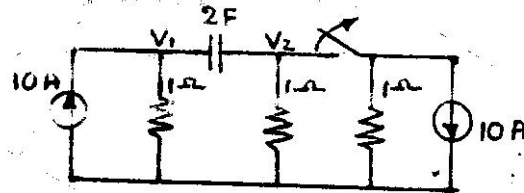


FIG Q 7(c)

8. (a) State and prove convolution theorem.

(6 Marks)

(b) Obtain the relationship between y parameters and h parameters.

(6 Marks)

(c) For the two port network shown in Fig.Q8(c), find the z parameters.

(8 Marks)

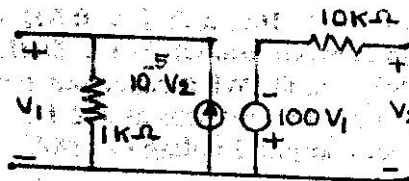


FIG Q 8(c)
