D 42024 (Pages 4) Name.....

Reg. No.....

THIRD SEMESTER B.TECH. (ENGINEERING) DEGREE EXAMINATION, DECEMBER 2007

EC/AI 04 303—ELECTRIC CIRCUIT AND NETWORK THEORY

(2004 admissions)

Time : Three Hours Maximum : 100 Ma

Part A

Answer **all** *the questions.*

I. 1 **In the circuit given there is no initial charge on the capacitor if the switch is closed at t = determine the resulting current.**

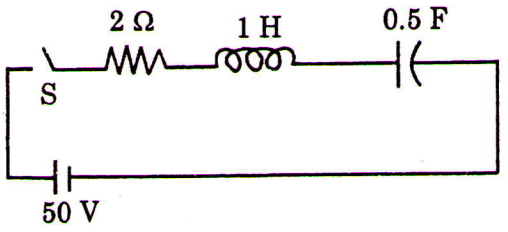

Fig. 1.

2 For the initially inert network, the excitation is $v_g(t) = \frac{1}{2}\cos t\, u(t)$. Determine the free a forced response parts of $v_0(t)$.

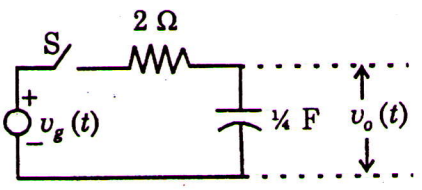

Fig. 2.

3 Determine the driving point impedance function of the given circuit.

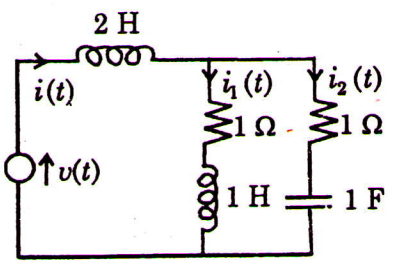

Fig. 3.

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4 Plot the following poles on S-plane and determine the nature of time response of the individual poles. Assume response to be current. $S_1 = 1 \pm j1$, $S_2 = 2 \pm j2$.

5 Find the four 'y' parameters for the given network.

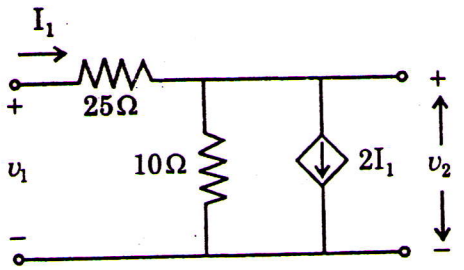

Fig. 4.

6 Apply the T - π transformation to obtain an equivalent T network for the capacitive network given in the figure.

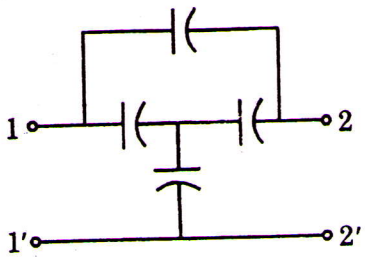

Fig. 5.

7 It is required to find a transfer function for a low-pass filter to satisfy the following specifications :

(a) The end of the pass band is 10 kHz.

(b) The peak to peak ripple in the pass band must not exceed 1dB.

(c) At 60 kHz the response must be down atleast 50 dB from its peak value in the pass band.

8 Design a π type attenuation to give an attenuation of 50 dB and to walk in a line of 600Ω impedance.

(8 × 5 = 40 marks)

Part B

II. (a) State and prove initial and final value theorem. (6 marks)

(b) A periodic function with T = 5 has the values : $f(t) = 0$, $0 < t < 1$, and $3 < t < 5$ and $f(t) = 3 + \delta(t - 3)$, $1 < t < 3^+$ find its Laplace transform. (5 marks)

(c) Determine $f(t)$ if :

(i) $F(s) = \frac{s}{s^2 + 4}$, (ii) $\frac{8s - 2}{s^2 - 6s + 10}$. (4 marks)

Or

III. (a) Find $i(t)$ in the given circuit.

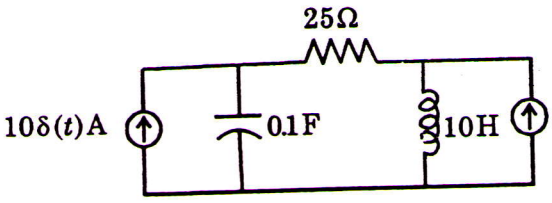

Fig. 6.

(7 marks)

(b) Find both the initial and final values of the time functions :

(i) $\frac{8s-2}{s^2+6s+10}$.

(ii) $\frac{2s^3-s^2-3s-5}{s^3+6s^2+10s}$.

(8 marks)

IV. Determine the transfer impedance, driving point impedance and voltage transfer function of the given network.

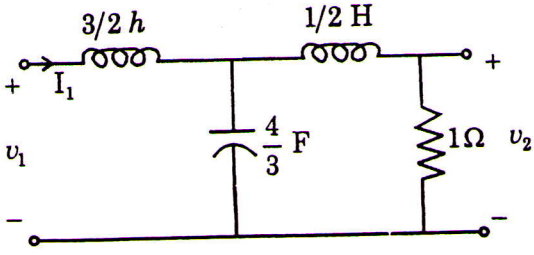

Fig.7.

(15 marks)

Or

V. Find ABCD constants and show that AD – BC = 1, for the given network.

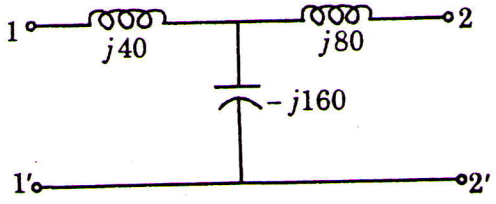

Fig. 8.

(15 marks)

VI. Discuss in detail about the different methods of interconnection of two port networks. (15 marks)

Or

VII. Derive expressions for the elements of a T network interms of known z parameters of a two port network.

(15 marks)

VIII. Synthesize (a) a band-pass filter ; (b) a band stop filter with maximally flat (n = 4) am plitud response with $wc_2 = 8 \times 10^4$ Hz and $wc_1 = 2 \times 10^4$ Hz.

(15 marks

Or

IX. Discuss in detail about the different types of filters.

(15 marks

[4 × 15 = 60 marks