SE - Sem-III - CBGS - EXTC

CTL

186

16/12/15

QP Code : 5262

(3 Hours) [Total Marks : 80

N. B. : (1) Attempt question 1 and any **three** from remaining question.
(2) All sub questions of the same question should be answered at one place only in their serial orders and not scattered.
(3) Write every thing in inkonly. Pencil is not allowed.
(4) Assume suitable data with justification if missing.

1. (a) Determine the ABCD parameter of the network shown in fig. No. 1(a) **5**

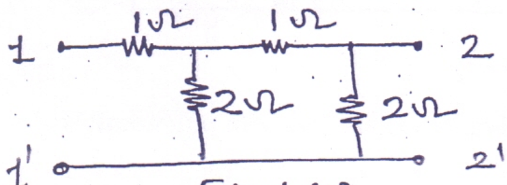

Fig 1 (a)

(b) Test whether $P(s) = S^5 + 12S^4 + 45S^3 + 60S^2 + 44S + 48$ is Hurwitz polynomial. **5**

(c) The combined inductance of two coils connected in series is 0.6 H or 0.1 H depending on relative directions of currents in the two coils. If one of the coils has a self inductance of 0.2 H. Find (a) Mutual inductance (b) Coefficient of coupling. **5**

(d) Find Foster I and II and Cauer I and II Circuits for the driving point admittance **5**

$$y(s)=\frac{S^2+1}{S}$$

2. (a) Find the current in the 10Ω resistor using Thevenin's theorem for the network shown in fig. 2(a) **10**

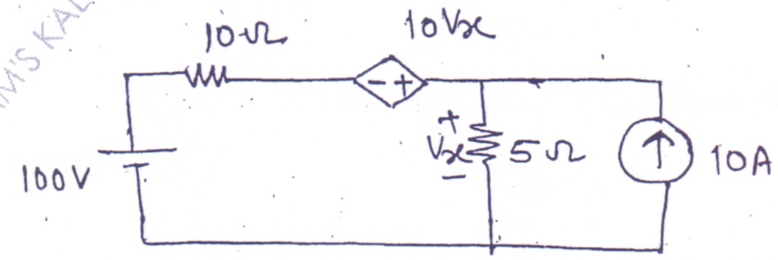

Fig. 2(a)

(b) Find the value of Vx in the network shown in fig 2(b) using nodal analysis. 5

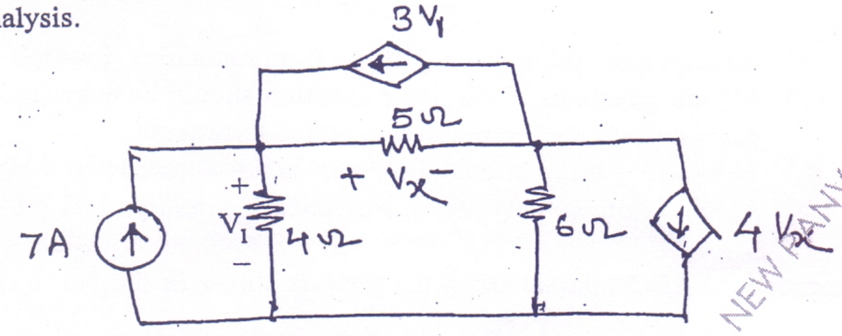

Fig 2(b)

(c) Check if the following polynomials are Hurwitz polynomials 5

(i) $S^5 + S^3 + S$

(ii) $S^4 + S^3 + 2S^2 + 3S + 2$

3. (a) Synthesize the driving point function 10

$$F(s) = \frac{(S^2+1)\ (S^2+3)}{S(S^2+2)}$$ when F(s) is a driving point (i) Impedence (ii) Admittance

Test if the circuit obtained are canonic.

(b) State and prove initial value theorem. 5

(c) The parameters of a transmissionlines are R = 6Ω/km, L = 2.2 mH/km G = 0.25×10^{-6} ℧/km, C = 0.005×10^{-6} F/km. Determine the characteristics impedence and propagation constant at a frequency of 1 GHz. 5

4. (a) Determine z and y parameters of the network shown in fig 4(a). 10

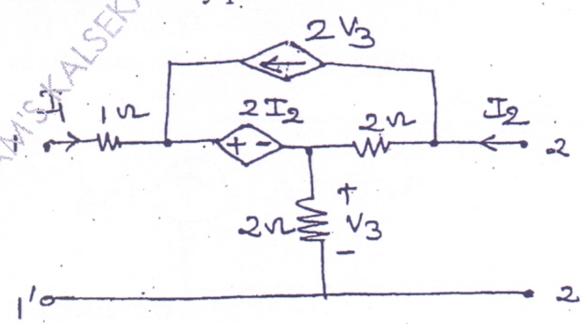

fig 4 (a)

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(b) Determine the voltage transfer function $\frac{V_2}{V_1}$ for the network shown in fig. 4(b). 5

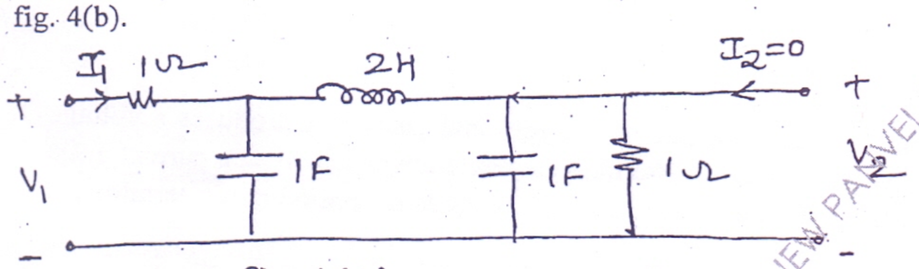

Fig 4(b)

(c) Test whether $F(s)=\frac{2S^3+2S^2+3S+2}{S^2+1}$ is a positive Real Function. 5

5. (a) The network shown in fig 5(a), a steady state is reached with the switch open. At t=0 the switch is closed. Determine $V_C(0^-)$, $i_1(0^+)$ $i_2(0^+)$, $\frac{di_1}{dt}(0^+)$ and $\frac{di_2}{dt}(0^+)$ 10

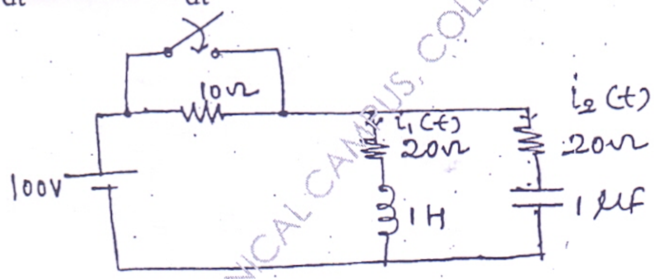

Fig 5 (a)

(b) Find the voltage across the 5Ω resistor in network shown in fig. 5(b). 5

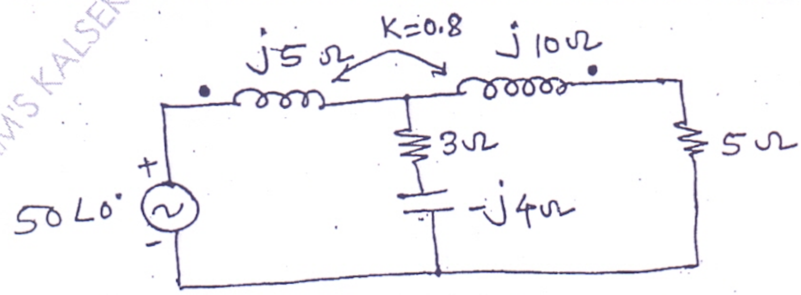

Fig 5(b)

(c) Find the function v(t) using the pole-zero plot of the following function. 5

$$V(s) = \frac{(S+2)\ (S+6)}{(S+1)\ (S+5)}$$

6\. (a) A unit impulse applied to two terminal black box produces a voltage $V_O(t) = 2e^{-t} - e^{-3t}$. Determine the terminal voltage when a current pulse of 1A height and a duration of 2 seconds is applied at the terminal. 10

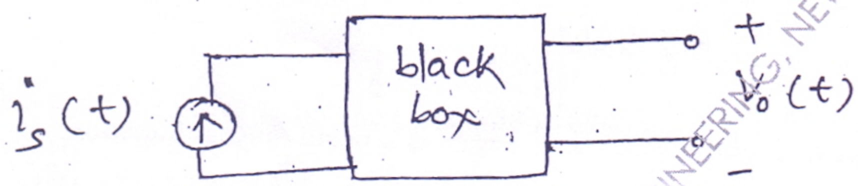

Fig 6.(a)

(b) Determine the driving point impedence of the network shown in fig. 6(b) 5

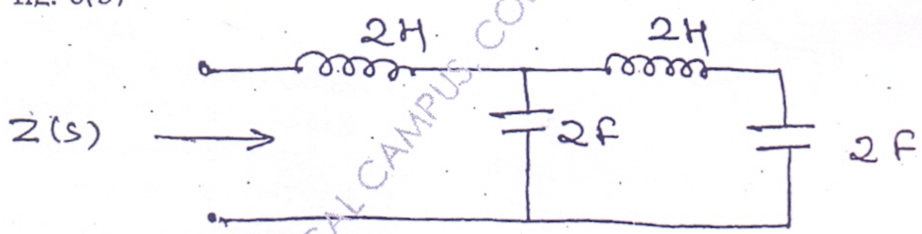

Fig 6 (b)

(c) Draw the following normalized quantities on the smith chart. 5

(i) (2 + j2) Ω (ii) (4 – j2) Ω
(iii) (1.0) Ω (iv) (j1.0) Ω
