ExTc / III / Rev.

03/06/2016

CTL

QP Code : 30754

(3 Hours) **[Total Marks : 80**

N.B. : (1) **Attempt** questions **No. 1** and **any 3** from remaining questions. In all 4 questions are to be attempted.

(2) **All** sub-questions of the **same** question should be answered at **one** place only in their serial orders, and not scattered.

(3) **Assume** suitable **data** with **justification** if missing.

1. (a) Determine Y - parameters for the network shown in fig 1 (a) **5**

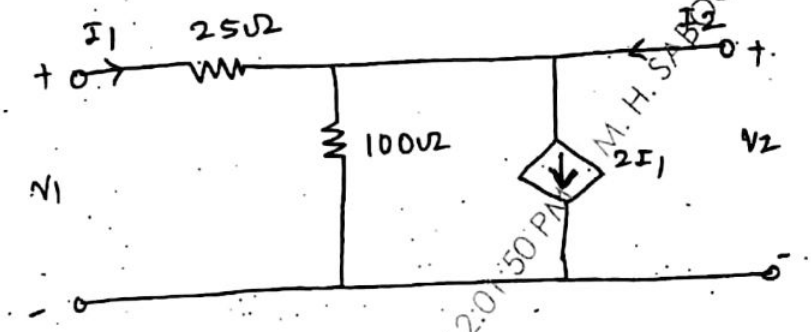

Fig 1 (a)

(b) Test if $F(s) = S^4+S^3+5S^2+3S+4$ is a Hurwitz polynomial. **5**

(c) Two coils connected in series have self inductance 80 mH & 20 mH respectively **5**
The total inductance of the circuit is found to 140 mH. Determine the
(i) mutual inductance between two coils and
(ii) The coefficient of coupling

(d) Synthesize the following function into a network. **5**

$$z(s) = \frac{s^2+2s+2}{s^2+s+1}$$ using cauer -1 form.

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2. (a) Find the Thevenin's equivalent across the terminals XY for the circuit shown in fig 2 (a) 10

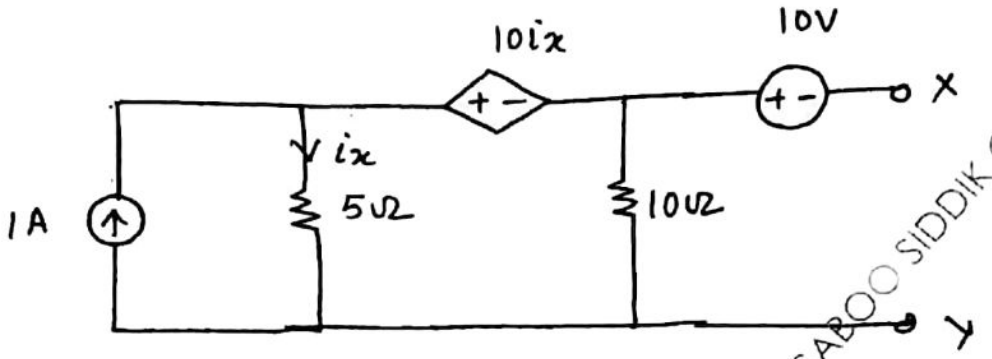

Fig 2(a)

(b) Determine the node voltage at node (1) & (2) of the Network Shown in fig 2(b) by using nodal analysis. 5

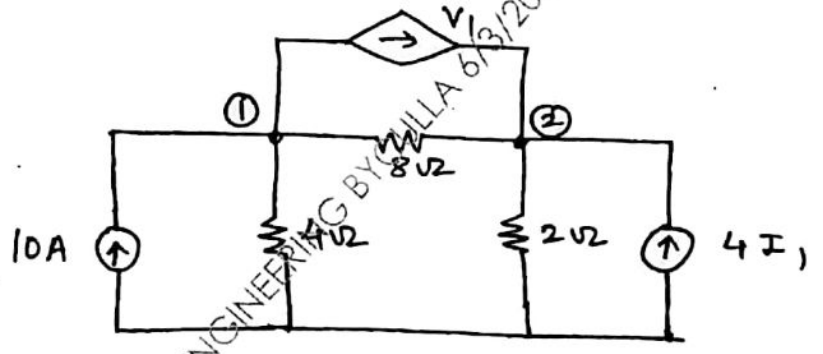

Fig 2(b)

(c) Test Whether 5

$$F(s)=\frac{s(s+3)(s+5)}{(s+1)(s+4)}$$ is a positive real function.

(a) Synthesize the driving point function using Foster -I and Foster -II form. 10

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

(b) State and prove Initial value theorem. 5

(c) A Transmission line has distributed parameters R=6 Ohms / km, L= 2.2 mH/km 5
C=0.005 μF /km & G = 0.005 μmho/km
Determine characteristics impedance and propagation constant at 1KHz frequency.

4. (a) Find ABCD parameters for the two port Network shown in fig 4 (a). 10

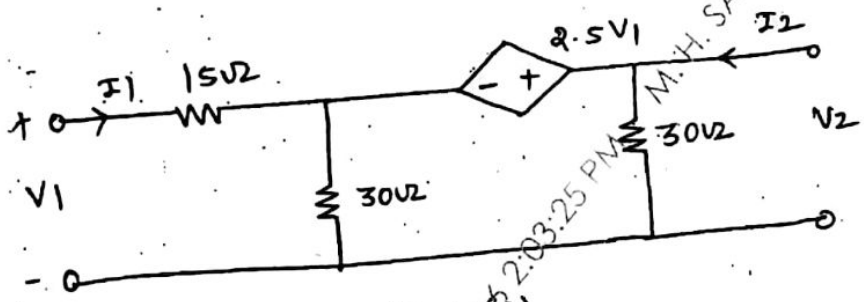

Fig 4(a)

(b) Find the Network functions $\frac{V_2}{I_1}, \frac{V_2}{I_1}, \frac{V_2}{V_1}$ for the network shown in fig 4 (b) 5

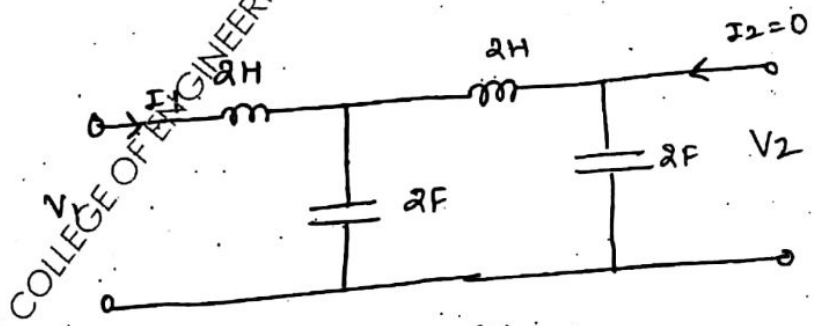

Fig 4(b)

4

(c) A Transmission line has a characteristics impedance of 50+j 100 Ω and is terminated in a load impedance of 73 - j 42. 5 Ω Calculate 5

(a) The reflection coefficient.

(b) The standing wave ratio

5. (a) The Network shown in fig 5 (a), switch K is closed at t = 0, Assume all initial conditions as zero. Find $i, \frac{di}{dt} \& \frac{d^2i}{dt^2}$ at $t = 0^+$ 10

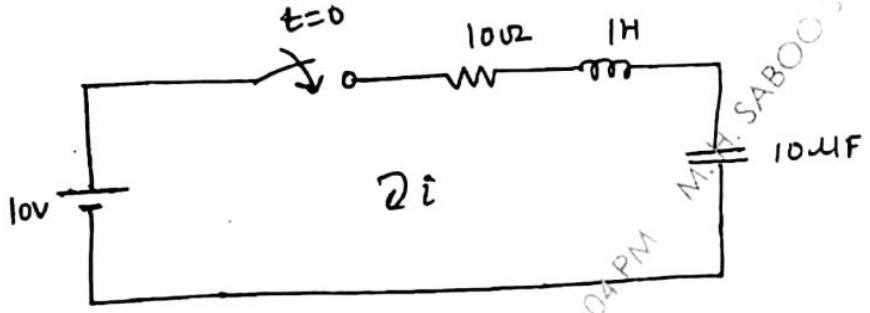

Fig 5(a)

(b) Write the KVL equations in standard form for the N/W shown in fig 5(b) 5

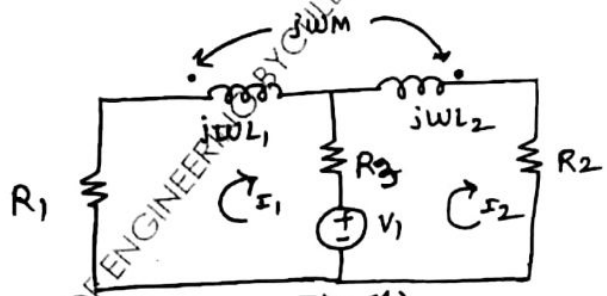

Fig 5(b)

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5

(c) Find poles and zero of the Impedance Z(s) for the Network Shown in fig 5 (c) 5

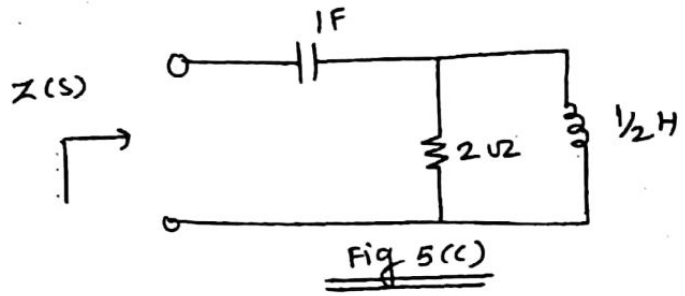

Fig 5(c)

6. (a) Why is the Impedance matching required? Draw the following normalized quantities on the smith chart. 10

(i) (3+i3) Ω (ii) (1.0) Ω

(iii) (2-j1) Ω (i) j 1.0 Ω

(b) Write short note on : 5
Time domain analysis using Laplace Transform.

(c) Define the following terms 5

(i) Phase Velocity
(ii) Characteristic impedance
(iii) Reflection coefficients

Course: SE (all Branches)

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Correction

Q.No.2 (b)

In Q.2 (b),
Replace (by) ↑ $4I_1$ by ◇ $4I_1$

AlmP
03/6/16.

Q. No. 6 (a) (i)

Replace (3+i3) by (3+j3)

Date and Time 03/06/2016 04:18 PM