S.E. Extc Sem III (CBSU). 3/6/16.

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

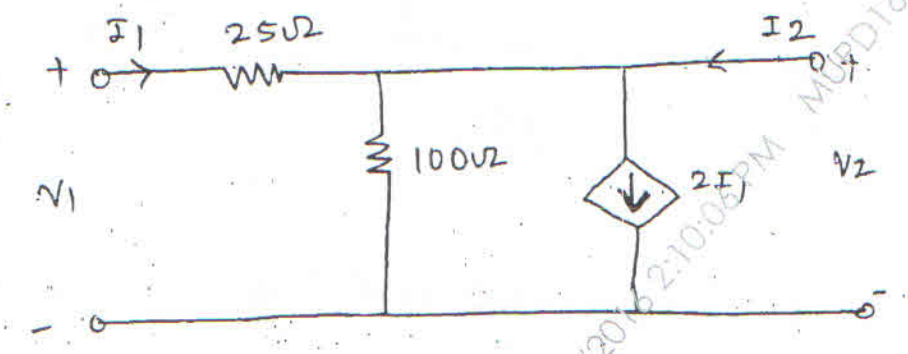

Fig 1 (a)

(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 The total inductance of the circuit is found to 140 mH. Determine the 5
(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.

[TURN OVER]

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

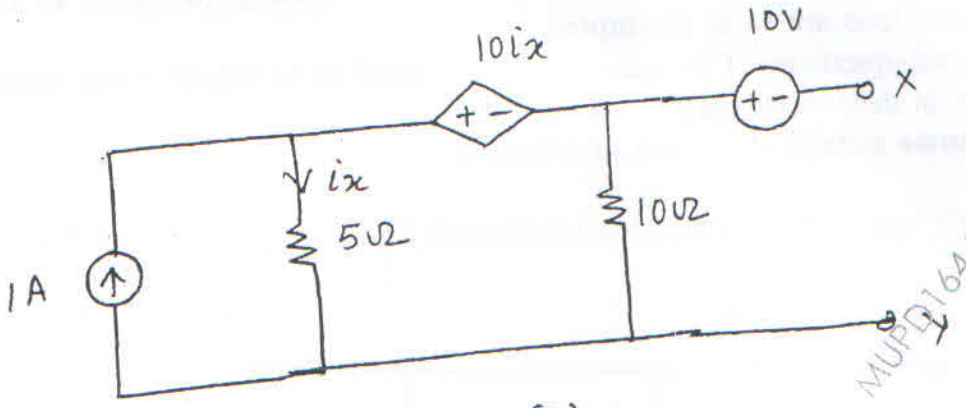

Fig 2(a)

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

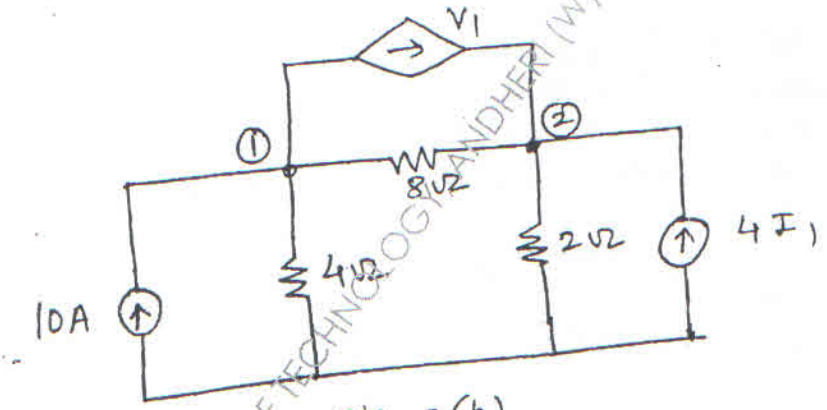

Fig 2(b)

5

(c) Test Whether

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

3. (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

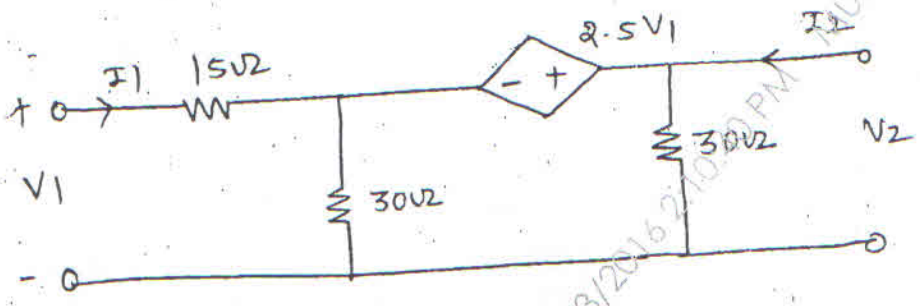

Fig 4 (a)

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

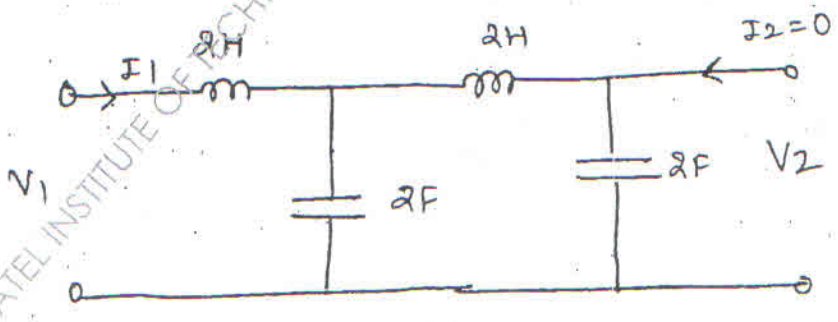

Fig 4(b)

(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

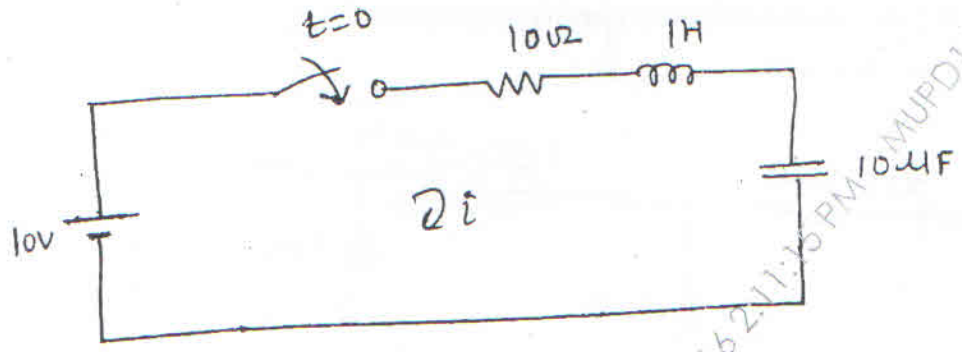

Fig 5(a)

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

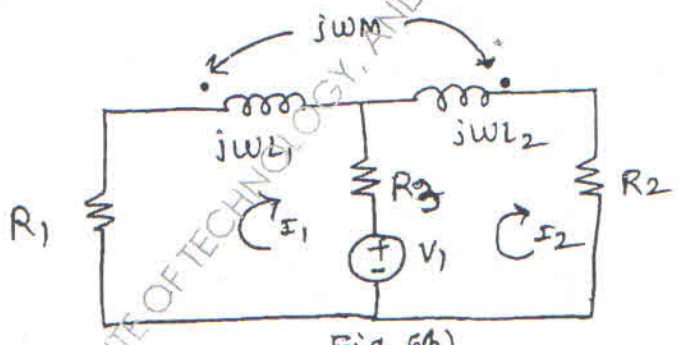

Fig 5(b)

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

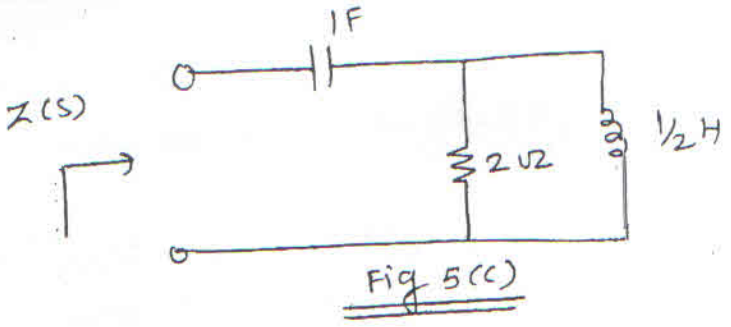

Fig 5(c)

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
