1059
B.E. (Electronics and Communication Engineering)
Second Semester
EC-204: Electrical Science

Allowed: 3 Hours   Max. Marks: 50

Attempt _five_ questions in all, including Question No. I which is compulsory and selecting
two questions from each Part.

x-x-x

I. **a)** State with appropriate example current division and voltage division in network analysis?
b) What do you understand by duality Principle?
c) Define the concept of stability?
d) State maximum power transfer theorem?
e) Define tree and twig?
f) What is ladder network?
g) Can band pass and band stop filters be realized using low pass and high pass filters?
h) What is the significance of 'm' in m-derived filter?
i) Distinguish between cut-off frequency and attenuation frequency?
j) What do you understand by term slip in an induction motor?   (1*10=10)

PART –A

II. **a)** Find the equivalent resistance between terminal 'xy' in the network shown.
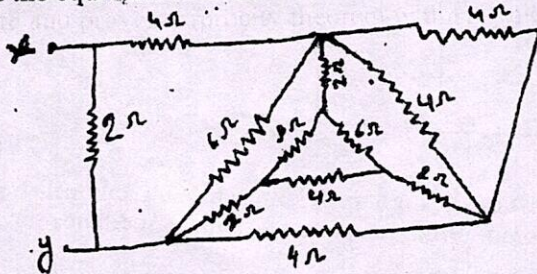
b) State ohm's law?
c) State and prove superposition theorem with suitable example?   (3,2,5)

III. **a)** Determine the Thevenin's equivalent circuit across terminal 'ab' for the given circuit. Also calculate the value of load voltage and load current across the load resistance.
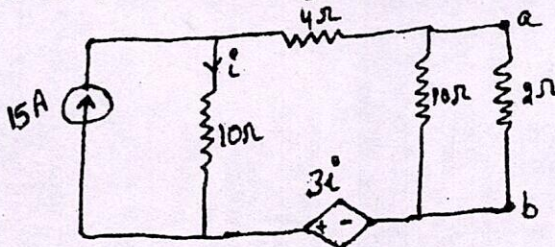
**b)** State and prove reciprocity theorem with suitable example?   (5,5)

P.T.O.

IV. **a)** Explain the concept of complex frequency. Also discuss its physical significance?

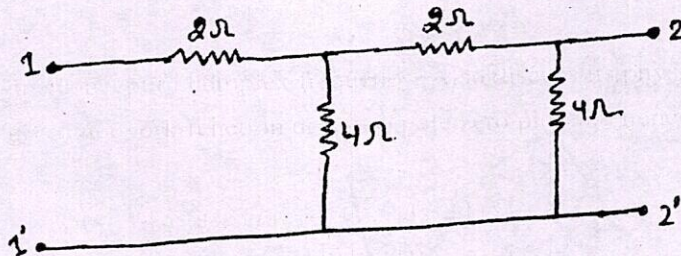**b)** For the given network function draw the pole zero plot and hence obtain time domain response.

$$G(s) = 15s(s+3) / (s+4) (s^2 + 3s+11)$$
(5,5)

PART-B

V. **a)** Draw the oriented graph of the network shown below. Also write down the incidence matrix and reduced incidence matrix by inspection?
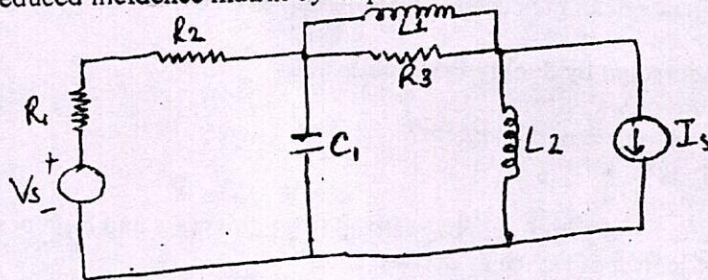
b) Determine the transmission parameters for the network shown below.

VI. **a)** Design T and Pie section of constant-K high pass filter having cut off frequency 15kHz and design impedance 600 ohm. Find its characteristic impedance and phase constant at 25 kHz.

b) Design an m-derived low pass filter in both T and Pie configuration having a design impedance of 600 ohm, cut off frequency of 5 kHz and m=0.35? (5,5)

VII. **a)** Draw and explain the basic construction of DC motor? Also derive the torque and emf equations for the same?

b) Write short note on:
   (i) Torque-Slip characteristics
   (ii) Composite Filters
(6,4)

x-x-x