Uni. Roll No. ....

Program: B.Tech. (Batch 2018 onward)

Semester: 3

Name of Subject: Network Analysis and Synthesis

Subject Code: PCEC-102

Paper ID: 16032

Scientific calculator is Allowed

Max. Marks: 60

Time Allowed: 03 Hours

NOTE:

1) Parts A and B are compulsory
2) Part-C has Two Questions Q8 and Q9 Both are compulsory, but with internal choice
3) Any missing data may be assumed appropriately

| Part – A | [Marks: 02 each] |

1

a) Define Isomorphism. Also mention the relation between twigs and links in a graph.

b) List the various applications of filters.

c) Mention the necessary conditions for transfer functions.

d) What is meant by network synthesis?

e) A voltage of 100 V d.c. is applied across two capacitors in series having capacitances 100 µF and 25 µF. Find the voltage drop across each capacitor.

f) Check whether the following polynomial: $s^5 + s^3 + s$, is Hurwitz or not?

| Part – B | [Marks: 04 each] |

2 State and explain Maximum Power Transfer Theorem

3 How are active filters more advantageous compared to passive filters? Also mention the important considerations in the design of a prototype LPF section.

4 State and explain Convolution theorem.

5 With reference to fig. 1, draw the graph and write down the tie-set matrix.

Fig. 1.
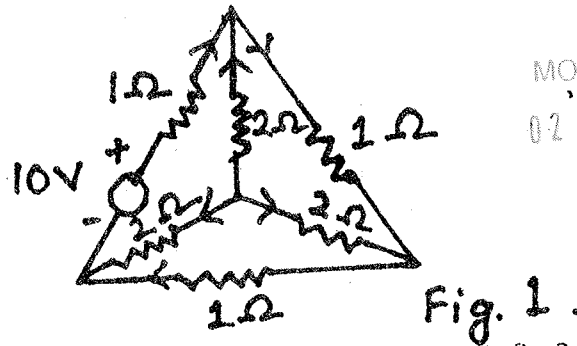
6 Find the current in 1 Ω resistor using Norton's theorem in fig. 2

Fig. 2.
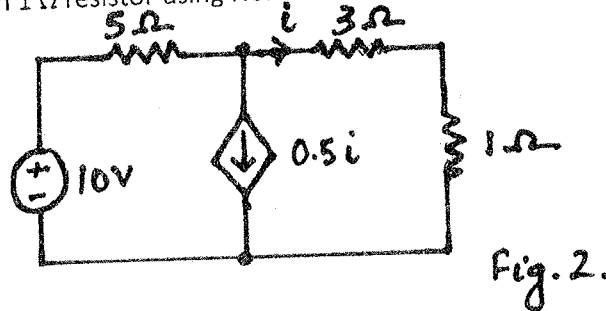
7 Find the driving point impedance for the network shown in fig. 3

Fig. 3.
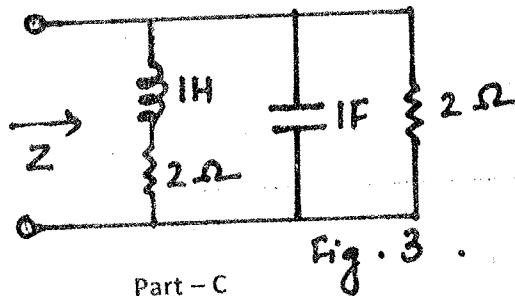
Part – C

[Marks: 12 each]

8 Describe transient response of series RL and RC circuit with d.c. excitation.

OR

Describe Mesh analysis with the help of a suitable example

9 Design a T and π section constant-K high pass filter having cut-off frequency of 12 kHz and nominal impedance $R_0 = 500\ \Omega$. Also find: (i) its characteristic impedance and phase constant at 24 kHz and (ii) attenuation at 4 kHz.

OR

An impedance function at the input of a network is represented by

$$Z(s) = \frac{s^2 + 5s + 4}{s^2 + 2s}$$

Express it in both the foster forms.

****