Please check that this question paper contains 09 questions and 02 printed pages within first ten minutes.

MORNING

11 MAY 2023

[Total No. of Questions: 09] [Total No. of Pages: 02]

Uni. Roll No. .....

Program: B.Tech. (Scheme 2018)
Semester: 3rd
Name of Subject: Network Analysis and Synthesis
Subject Code: PCEC-102
Paper ID: 16032
Scientific calculator is allowed

Time Allowed: 03 Hours Max. Marks: 60

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]

Q1.

a) Define "poles and zeros" of a transfer function.
b) Write two differences between 'network analysis' and 'network synthesis'.
c) State Thevenin's theorem.
d) M-derived filters are better than Constant-K type filters. Justify
e) Distinguish between transient and steady state response of a circuit having reactive elements.
f) Compute whether the polynomial $P(s)=s^4+s^3+3s^2+2s+12$ is Hurwitz or not?

Part – B [Marks: 04 each]

Q2. State and prove Maximum Power transfer theorem.
Q3. Explain the terms 'twigs and links'. Also, explain the procedure to obtain fundamental Cut-set matrix.
Q4. Write the necessary conditions for driving point functions.
Q5. For the network shown in Fig 1, compute the transform impedance Z(s).

MORNING
11 1 MAY 2023

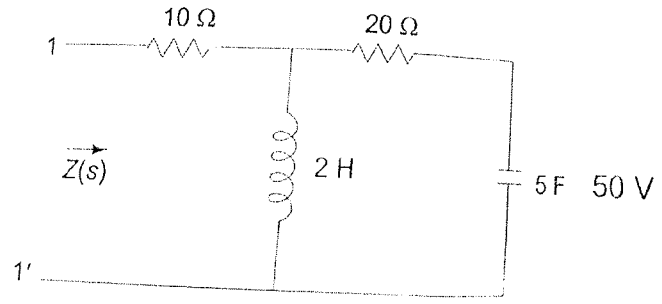

Fig 1.

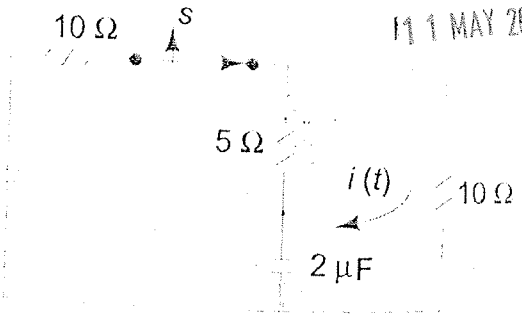

Fig 2.

Q6. For the circuit shown in Fig 2, find the current equation when the switch S is opened at t=0.

Q7. Design a Constant-K high pass filter(π-section) ,having f_c=4KHz and design impedance R_o=600Ω

Part – C

[Marks: 12 each]

Q8. With the help of an example, prove the duality between Thevenin's and Norton's theorem.

OR

Differentiate between dependent and independent energy sources. Using Supernodal analysis, determine the current in the 5Ω resistor in the circuit shown in Fig 3.

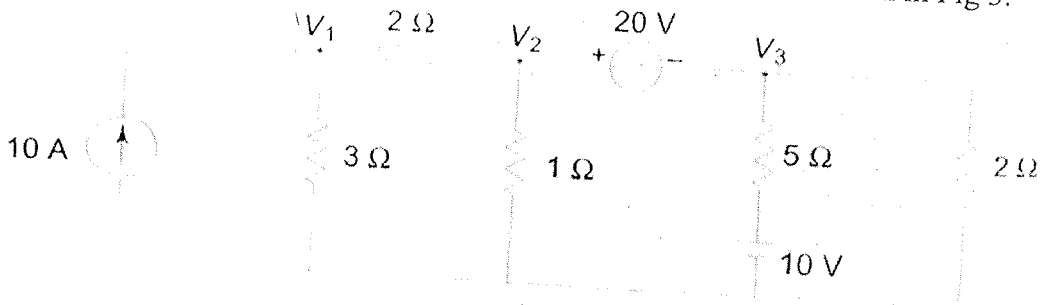

Fig 3.

Q9. Find the first and second Foster forms of the driving point impedance function:

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

OR

Design an m-derived low pass filter to match a line having characteristic impedance of 500 Ω and to pass signals upto 1 KHz with infinite attenuation occurring at 1.2 KHz.

****