EVENING

1 0 MAR 2021

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

Uni. Roll No. ....

Program/ Course: **B.Tech. (Sem. 3rd)**
Name of Subject: **Network Analysis and Synthesis**
Subject Code: **PCEC-102**
Paper ID: 16032

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

<div align="center">Part – A</div>   [Marks: 02 each]

Q1.

a) State Superposition theorem.

b) Differentiate dependent and independent sources.

c) Find inverse Laplace transform of $F(s) = \dfrac{3s}{(s+2)\,(s+4)}$

d) What is the significance of a 'pole' and a 'zero' in S- domain?

e) Discuss the limitations of Const-K type filters

f) Write the expression for Final Value theorem. Apply the same for the given function $\dfrac{(5s+3)(s+8)}{s(s+1)(s+2)}$

<div align="center">Part – B</div>   [Marks: 04 each]

Q2. A coil having resistance of 10 Ω and inductance of 1H is switched on to a direct voltage of 100V. Calculate the rate of change of the current (a) at the instant of closing the switch and (b) when $t = L/R$.

Q3. State maximum power transfer theorem. Also, prove the condition; $R_L = R_{TH}$.

Q4. Define "Impedance function". List the properties of R-C driving point impedance function.

Q5. Design a Const-K type BPF to be terminated in 600Ω resistance having cut-off frequencies of 2 KHz and 5 KHz.

Q6. Explain in detail the concept of cut set and tie set.

P.T.O

EVENING

1 0 MAR 2021

Q7. State and prove Convolution theorem in pretext to network theory.

<div align="center">

Part – C   **[Marks: 12 each]**

</div>

Q8. Define Thevenin's theorem. Write atleast its two limitations. Find the power loss in the 10 Ω resistor in Figure 1.
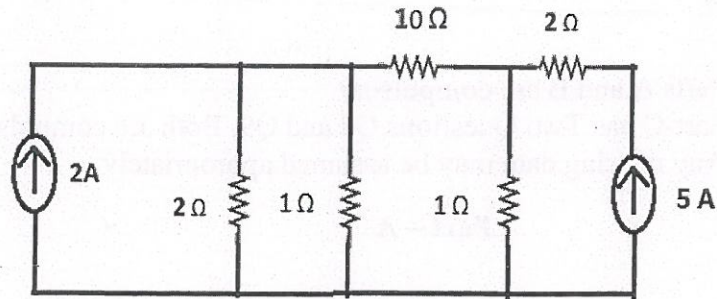
<div align="center">

Figure 1

OR

</div>

Design the following networks for the impedance function

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

(i) Foster-I

(ii) Cauer-I

Q9. Prove that Norton's equivalent circuit is dual of Thevenin's equivalent circuit.

<div align="center">

OR

</div>

State an advantage of m-derived filter over Cont-K type filter. Also, 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.

<div align="center">

****

</div>

<div align="center">

PAGE 2 OF 2

</div>