B.TECH SEM - III (2007 COURSE) (BIOMEDICAL ENGG.) :
SUMMER - 2018
SUBJECT: NETWORK THEORY

Day: **Friday**
Date: **25/05/2018**

S-2018-2595

Time: **02.30 PM TO 05.30 PM**
Max. Marks: 80

N.B.:

1) **Q. No. 1** and **Q. No. 5** are **COMPULSORY**. Out of remaining attempt **ANY TWO** questions from **Section – I** and **Section – II**.
2) Figures to the right indicate **FULL** marks.
3) Answer to both the section should be written in **SEPARATE** answer books.
4) Use of non-programmable calculator is **ALLOWED**.
5) Draw neat and labeled diagram **WHEREVER** necessary.
6) Assume suitable data, if necessary.

SECTION - I

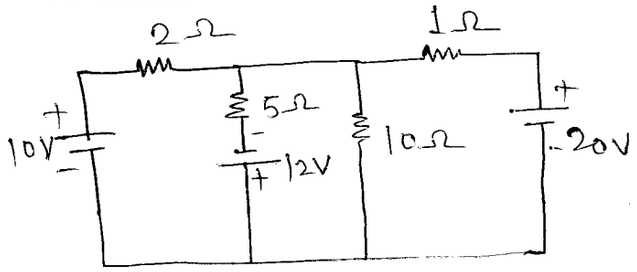
Q. 1 **a)** State and prove Reciprocity theorem. **(05)**

b) Discuss the significance of quality factor Q and its effect on bandwidth for parallel resonance circuit. **(05)**

c) Describe propagation constant. **(04)**

Q. 2 **a)** State and explain Norton's theorem. **(06)**

b) In the network of following figure find the current through 10Ω resistor using Thevenin's theorem. **(07)**



Q. 3 **a)** Derive the expression for cut off frequency for parallel resonant circuit. **(06)**

b) Justify a parallel resonant circuit as current amplifier. **(07)**

Q. 4 **a)** Derive the expression for characteristic impedance of symmetrical T network. **(06)**

b) Design the arm parameters of symmetrical T network having characteristic impedance 500Ω, attenuation constant 1.5 neper. Assume zero value of phase shift constant. **(07)**

P. T. O.

SECTION – II

Q. 5 **a)** Draw circuit diagram of T and $\prod$ section band stop filter and write its design equations. **(05)**

b) A function is given by $Z(s) = \dfrac{2}{s^2 + 2s + 2}$ **(04)**

Draw its pole zero plot.

c) Describe the necessary and sufficient conditions for a function to be positive real function. **(05)**

Q. 6 **a)** Design a T and $\prod$ section constant K low pass filter having cut off frequency of 10KHz and design impedance $R_0 = 600\Omega$. **(07)**

b) Describe the working of high pass filter with impedance curves and also write the design equations. **(06)**

Q. 7 **a)** Find the equation for Y parameter in terms of **(07)**

i) ABCD parameters

ii) Z parameter

b) Derive the condition for reciprocity and symmetry in terms of H parameters. **(06)**

Q. 8 **a)** Write and explain properties of Hurwitz polynomials. Also test the polynomial: **(06)**

$$s^5 + 3s^4 + 3s^3 + 4s^2 + s + 1$$

b) Synthesis the following network function in Causer-II form **(07)**

$$Z(s) = \frac{8s^3 + 10s}{5 + 6s^2 + s^4}$$

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