B.TECH SEM - III (2007 COURSE) (BIOMEDICAL ENGG.) :
WINTER - 2017
SUBJECT : NETWORK THEORY

Day : **Monday**
Date : **22/01/2018**

W-2017-2390

Time : **10.00 AM TO 01.00 PM**
Max. Marks : 80

N.B.

1) Q.1 and Q.5 are **COMPULSORY.** Out of the remaining attempt any **TWO** questions from each section.
2) Figures to the right indicate **FULL** marks.
3) Answers to both the sections should be written in **SEPARATE** answer book.
4) Assume suitable data if necessary.
5) Use of non-programmable calculator is allowed.

SECTION – I

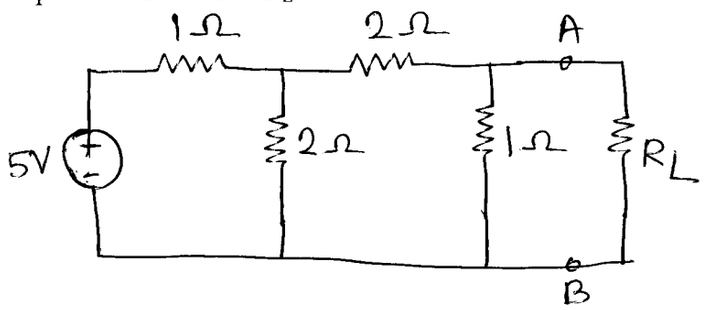
Q.1 **a)** Explain how source transformation is useful in circuit analysis. **(04)**

b) What is the Q factor? Derive the expression for Q factor of capacitor. **(05)**

c) For an asymmetrical four terminal network, explain the terms: **(05)**
i) Image impedance **ii)** Iterative impedance.

Q.2 **a)** State and prove superposition theorem. **(06)**

b) For the circuit shown in following figure, find value of resistance R_L, that will determine the maximum power transfer. Also find value of maximum power delivered to R_L **(07)**



Q.3 **a)** Explain initial conditions in various elements. **(06)**

b) Find the values of R, L and C in a series RLC circuit that resonates at 1.5KHz and consume 50W from a 50V ac source operating at the resonant frequency. The bandwidth is 0.75 KHZ. **(07)**

Q.4 **a)** Explain the electrical properties of symmetrical two port network. **(05)**

b) Derive the expressions for the characteristic impedance of symmetrical T and π network and hence show that $Z_{OT}Z_{O\pi} = Z_1Z_2$. **(08)**

P.T.O.

SECTION – II

Q.5 **a)** Draw a circuit of a band stop filter. Sketch the reactance curves for the same showing pass and stop bands. **(04)**

b) What is the significance of poles and zeros in s-plane? **(05)**

c) State the properties of Hurwitz polynomials. **(05)**

Q.6 **a)** What are the disadvantages of prototype filter? How are they corrected in the m-derived filter? Draw the block schematic of composite filter. **(06)**

b) Design a prototype low pass filter having cut-off frequency of 1KHz and design impedance of 400Ω. **(07)**

Q.7 **a)** Derive the expressions for Y-parameters in terms of Z-parameters and H-parameters. **(07)**

b) Derive the conditions of symmetry and reciprocity for: **(06)**
i) ABCD parameters **ii)** H-parameters.

Q.8 **a)** Find the Forster – I form of the RL impedance function **(06)**

$$Z(S)=\frac{(S+1)(S+4)}{(S+5)(S+3)}$$

b) Test whether the following polynomials are Hurwitz. **(07)**
i) $P(S)=2S^6+S^5+13S^4+6S^3+56S^2+25S+25$
ii) $P(S) = S^5+8S^4+24S^3+28S^2+23S+6$

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