B.TECH SEM - III (2007 COURSE) (ELECTRONICS) : WINTER - 2017

SUBJECT : NETWORK ANALYSIS

Day : **Monday**
Date : **15/01/2018**

W-2017-2371

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

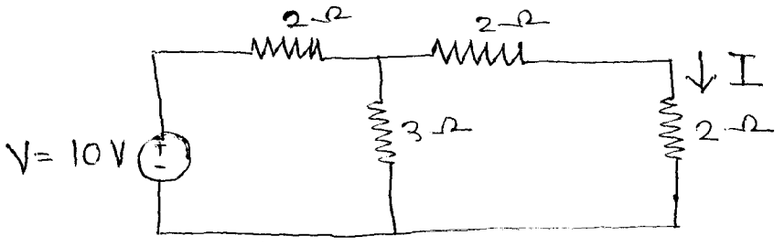
Q.1 **a)** Explain how source transformation is useful in the network analysis. **(05)**

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

c) Explain electrical characteristics of asymmetrical network. **(04)**

Q.2 **a)** State and explain : **(06)**
i) Superposition Theorem **ii)** Thevenin's Theorem

b) Verify the Reciprocity theorem for the voltage V and current I, in the network shown in the following figure: **(07)**



Q.3 **a)** Derive expressions for voltages and currents for driven RL circuit. **(06)**

b) For the parallel resonant circuit, derive expression for : **(07)**
i) Resonant frequency **ii)** Q factor **iii)** Parallel resonant circuit as current amplifier.

Q.4 **a)** Prove that in symmetrical T-network characteristic impedance is the geometric mean of the short circuit impedance and open circuit impedance. **(07)**

i.e. $Z_{oT} = \sqrt{Zoc.Zsc}$.

b) A symmetrical T section composed of pure resistance has the values for open circuit and short circuit impedance Zo/c $=800\angle 0^0\Omega$, Zs/c = 600 Ω respectively. Determine Z_0, Z_1 and Z_2 for T- network. **(06)**

P.T.O.

SECTION – II

Q.5 **a)** Explain with reactance curves, constant K-type low pass filter. Also derive the expression for its cut-off frequency. **(05)**

b) Explain in detail: **(04)**
i) Driving point impedance and admittance
ii) Transfer impedance and admittance.

c) State the properties of RC driving point impedance functions. **(05)**

Q.6 **a)** Design a T and π section high pass filter to work into impedance 500 Ω and have cut off frequency of 1KHz. For this filter calculate phase angle 'β' at frequency 1.5 KHz and attenuation 'α' in neper at frequency of 0.9 KHz. **(07)**

b) Compare prototype filter and m-derived filter. **(06)**

Q.7 **a)** Derive the expressions for Y-parameters in terms of : **(07)**
i) Z-parameters **ii)** h-parameters

b) Derive the conditions of symmetry for **(06)**
i) Y-parameters **ii)** ABCD parameters

Q.8 **a)** Test whether $F(s)=\frac{S^2+1}{S^3+4S}$ is positive real function. **(06)**

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

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