

B.Tech Sem - III (2007 Course) (Electronics) : WINTER - 2018

SUBJECT: NETWORK ANALYSIS

Day : Monday
Date : 26/11/2018

W-2018-2714

Time : 10.00 AM TO 01.00 PM
Max Marks : 80

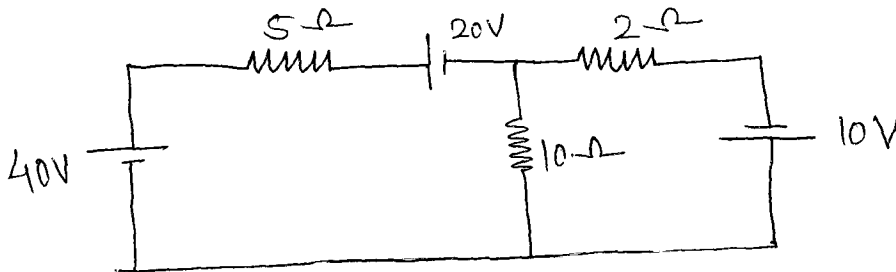
N.B.:

- 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) Answers to both the sections 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 Thevenin's theorem. **(05)**
 - b) What is Q factor? Derive the expression for Q factor of inductor. **(05)**
 - c) Write short note on : Image and Iterative impedance. **(04)**

- Q. 2**
- a) State and explain Reciprocity theorem. **(06)**
 - b) Find the current through the $2\ \Omega$ resistor. **(07)**



- Q. 3**
- a) Derive expression for current and voltage of driven RL circuit. **(07)**
 - b) A coil of $2\ \Omega$ resistance and $0.01\ \text{H}$ inductance is connected in series with a capacitor across $200\ \text{V}$ mains. What must be the capacitance in order that maximum current occurs at a frequency of $50\ \text{Hz}$? Also find the current and the voltage across the capacitor. **(06)**
- Q. 4**
- a) Derive the expression for the characteristic impedance of symmetrical T-network. **(06)**
 - b) A symmetrical T network is composed of pure resistance has following values of open and short circuit impedances, $Z_{oc} = 800\ \Omega$, $Z_{sc} = 600\ \Omega$. Determine the characteristic impedance Z_0 , Z_1 , Z_2 for the T – network. **(07)**

P. T. O.

SECTION - II

- Q. 5** a) What are the disadvantages of prototype filters? Draw the block schematic of composite filter. (05)
- b) A function is given by $Z(s) = \frac{2s}{s^2 + 16}$. Draw its pole zero plot. (05)
- c) State essential properties of driving point function and transfer function. (04)
- Q. 6** a) Design a constant K low pass filter having cut-off frequency 2.5 KHz and design resistance $R_0 = 800 \Omega$. (06)
- b) Derive the expression for cut-off frequency of constant k high pass filter. Also explain its reactance waves. (07)
- Q. 7** a) Derive the expression for h – parameter in terms of (07)
- i) Z parameter
- ii) ABCD parameter
- b) Derive the condition for reciprocity and symmetry in terms of Y parameters. (06)
- Q. 8** a) Test whether the following function is Hurwitz or not: (07)
- i) $s^5 + 3s^4 + 3s^3 + 4s^2 + s + 1$
- ii) $s^4 + 3s^2 + 2$
- b) Test whether $F(s) = \frac{s^3 + 6s^2 + 7s + 3}{s^2 + 2s + 1}$ is positive real function. (06)

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