

B. Tech Second Year : 3rd Semester

Circuit Analysis & Synthesis, Jan., 2012

(FOR 3EC3 BRANCH OF ENGINEERING)

Times : 3 Hours

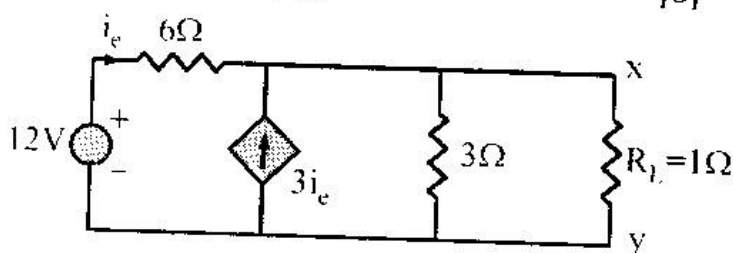
Min. Passing Marks : 24

Total Marks : 80

Attempt overall five questions in all. Schematic diagrams must be shown wherever necessary. Any data you feel missing may suitably be assumed and stated clearly.

Unit-I

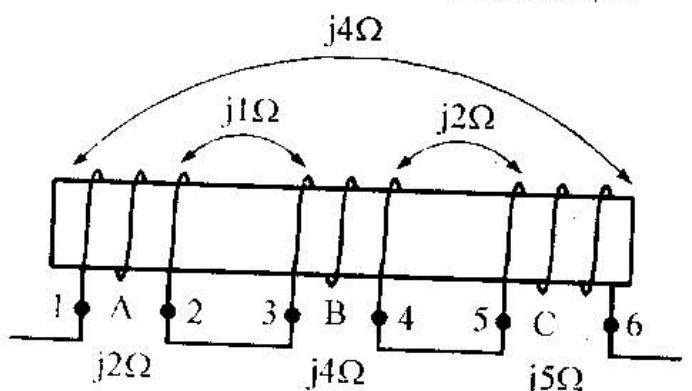
1. (a) Calculate the current through R_1 in the following circuit using Norton's Theorem. [8]



- (b) Explain Reciprocity theorem in detail with suitable example. [8]

OR

1. (a) What is Coupling Coefficient? Derive the relation for coupling coefficient in terms of self inductance and mutual inductance. [6]
 (b) Write short note on inductively and conductively coupled circuits. [4]
 (c) Draw the dotted equivalent of the circuit shown below and find the equivalent inductive reactance. [8]



[4+6+6]

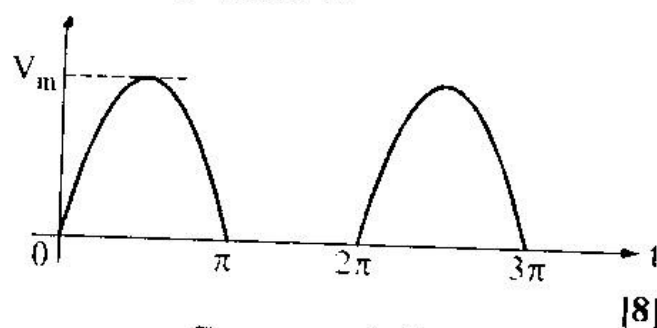
Unit-II

2. (a) Explain different types of functions used in transient analysis. [4]
 (b) Explain initial value and final value theorem. [6]
 (c) A series circuit of resistance 10Ω and inductance 0.1 H is connected across a 50 Hz sinusoidal voltage of maximum value 200 V .
 (i) Find an expression for the value of current at any instant after the voltage is applied, assuming that the voltage is zero at the instant of application. [6]
 (ii) Calculate the value of current 0.02 sec. after switching on. [6]

OR

2. (a) Explain different kinds of Symmetry in non-sinusoidal waves. [8]

- (b) Determine the Fourier series for the half-wave rectified voltage waveform shown below. [8]

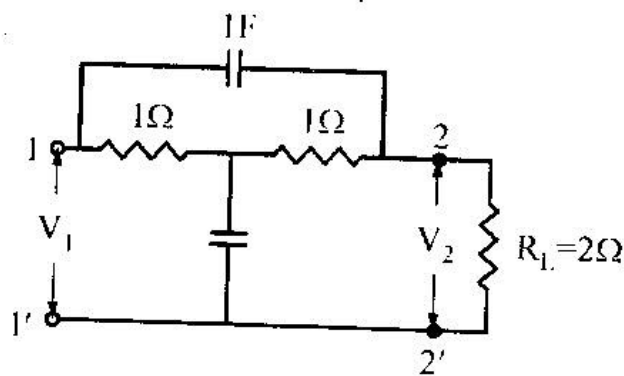


Unit-III

3. (a) Check whether the following polynomial is Hurwitz or not. $P(S) = s^4 + s^3 + 2s^2 + 4s + 1$ [6]
 (b) Apply the Routh-Hurwitz criterion to the following polynomial $P(S) = s^4 + 2s^3 + 8s^2 + 10s + 15$ and determine:
 (i) the number of roots with positive real parts. [4]
 (ii) the number of roots with zero real parts and [4]
 (iii) the number of roots with negative real parts. [10]

OR

3. (a) Determine the driving point admittance and transfer admittance for the bridged T-network shown below with a 2Ω load resistor connected across port 2. [8]



- (b) Write down the properties of Positive Real Function. Also find the positive realness of the following function. [8]

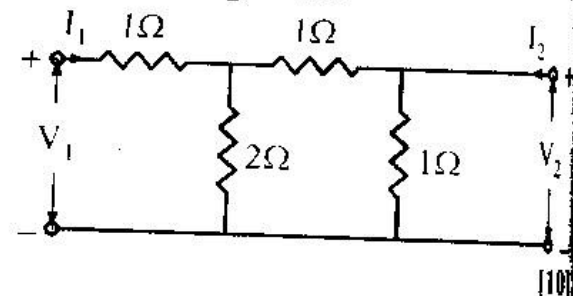
$$Z(s) = \frac{(2s^2 + 5)}{s(s^2 + 1)}$$

Unit-IV

4. (a) Derive the condition of symmetry in two port parameter for h-parameter. [6]

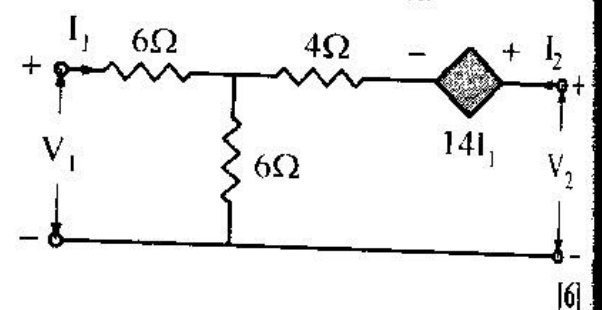


- (b) Explain image impedance. Calculate the values of image impedance of the following circuit. [10]



OR

4. (a) Explain the cascade connection of two two-port networks. The ABCD parameters of a two-port network 'A' are $A = 2, B = 3, C = 1, D = 4$ and h-parameters of a two-port network 'B' are $h_{11} = 2, h_{12} = 3, h_{21} = 1, h_{22} = 4$. If both of these two-port networks are connected in cascade, calculate the ABCD parameters of the overall cascaded two-port network. [10]
 (b) Find the z-parameters of the following two port network. Also prove that the y-parameter of this network does not exist. [6]



Unit-V

5. (a) An impedance function is given by $Z(s) = \frac{(s+1)(s+4)}{s(s+2)(s+5)}$. Find:
 (i) Foster First Form [4]
 (ii) Foster Second Form [8+8]

OR

5. (a) Synthesize $Z(s)$ in Cauer Second Form

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

- (b) Find Cauer First Form for an admittance function

$$Y(s) = \frac{(s+4)(s+6)}{(s+3)(s+5)}$$