3E1614

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B.Tech. III Semester (Main/Back) Examination - 2014
Electronics Instrumentation & Control
3EI4 Circuit Analysis & Synthesis
(Common to EC & EIC)

Time : 3 Hours

Maximum Marks : 80
Min. Passing Marks : 24

Instructions to Candidates:

Attempt any five questions, selecting one question from each unit. All questions carry equal marks. (Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly. Units of quantities used/calculated must be stated clearly.)

Unit - I

1. a) State and verify Thevenin's theorem and also write its limitations. **(8)**

   b) Obtain Thevenin's equivalent circuit across AB terminals for the circuit shown in Fig.1 **(8)**
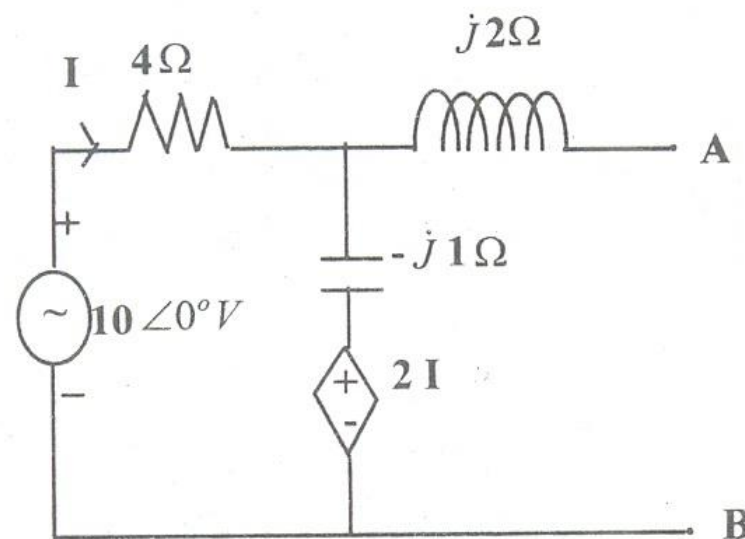

Fig.1

OR

1. a) Draw the magnetic coupled circuits and their equivalent circuits for different dot conversations. Also write the corresponding equations. **(8)**

   b) Find the voltage across $5\,\Omega$ resistance in the magnetically circuit as shown in Fig.2 **(8)**
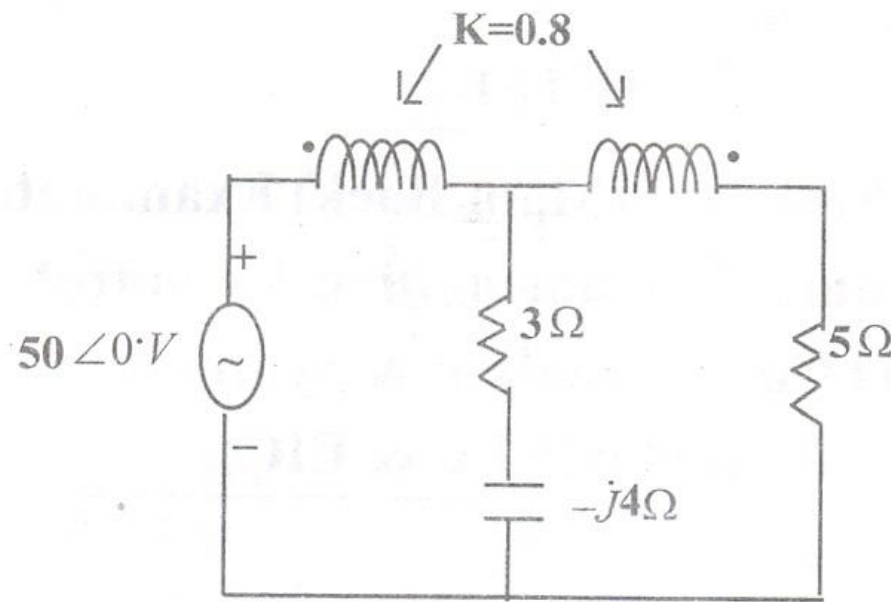
Fig.2

Unit - II

2. a) What are the initial conditions? Explain the procedure to evaluate the initial conditions in the transient analysis. (8)

   b) Find the transient responses of series R-C circuits having sinusoidal excitation. (8)

OR

2. a) Define all the types of responses in transients analysis (8)

   b) Calculate the voltage, $V_c(t)$ and current $I_R(t)$ for $t \geq 0$ for the circuit shown in Fig.3. Assume that switch S was closed for a long time before being opened at t = 0 (8)
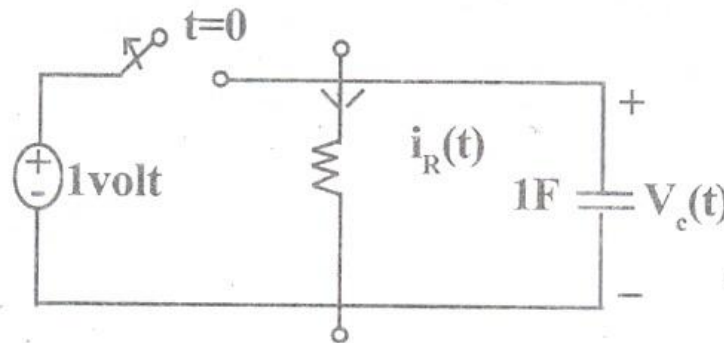

Fig.3

Unit - III

3. a) Define all the transfer functions of the two port network. (8)

   b) Write the necessary conditions for driving point immittance functions. (8)

OR

3. a) Obtain the voltage transfer function $G_{21}(s) = \dfrac{V_2(s)}{V_1(s)}$ of the network in Fig.4. Find $v_2(t)$ when $\overset{\centerdot}{v}_1(t) = 10e^{-2t}$ (8)

3E1614   (2)

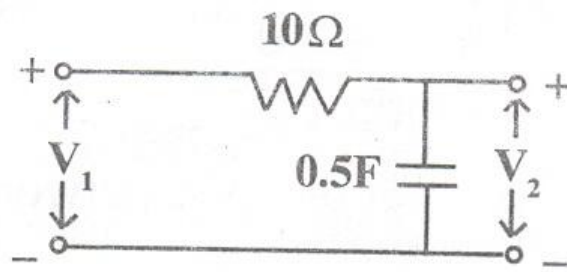**Fig.4**

b) Check whether the given polynomial

$$p(s) = S^7 + 2S^6 + 2S^5 + S^4 + 4S^3 + 8S^2 + 8S + 4 \text{ is Hurwits or not.} \quad \textbf{(8)}$$

Unit - IV

4. a) Determine T- parameters in terms of open circuit and short circuit impedances. **(8)**

   b) Derive the expressions for image transfer constant, image attenuation constant and phase constant **(8)**

OR
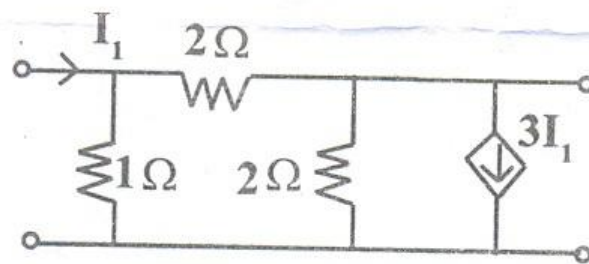
4. a) Find the Y- parameters of the network of Fig.5 **(8)**

Fig.5

b) Obtain the *h*- parameters of the network in terms of all other parameters. **(8)**

Unit - V

5. a) Synthesize the network, if **(8)**

$$Z(s) = \frac{S^5 + 5S^3 + 4S}{S^4 + 3S^2 + 1} \text{ as Causer - I form}$$

b) Synthesize the given function $F(s) = \dfrac{3(s+2)(s+4)}{s(s+3)}$ in a Foster and a Causer forms

   if   i) If F(s) is an impedance function

        ii) If F(s) is an admittance function **(8)**

OR

5. a) Show that function $F(s) = \dfrac{s(3s+8)}{(s+1)(s+3)}$ represents an R-L impedance. Realize

the impedance in Foster - I form **(8)**

b) An L-C impedance function for one port network is given by

$Z(s) = \dfrac{2(s^2+1)(s^2+9)}{s(s^2+4)}$ Synthesize the network in

i) Foster's type-I form

ii) Causer's type-II form **(8)**

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