3E1614

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3E1614

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)**

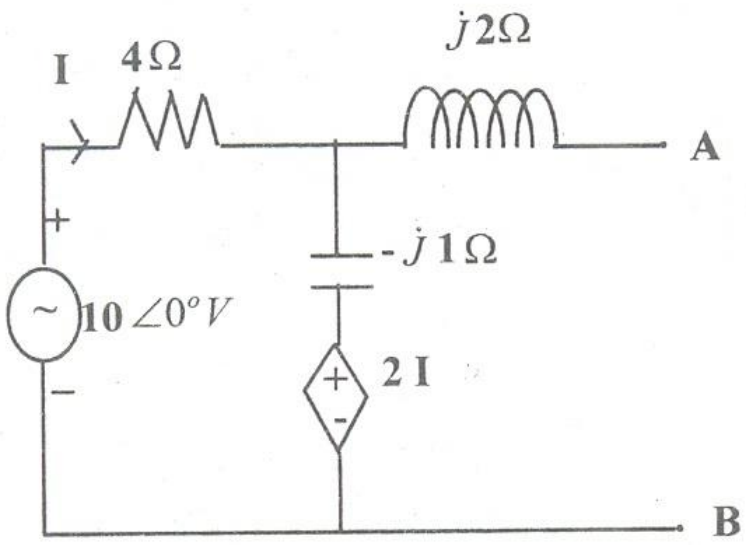

Fig.1

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 Ω resistance in the magnetically circuit as shown in Fig.2 **(8)**

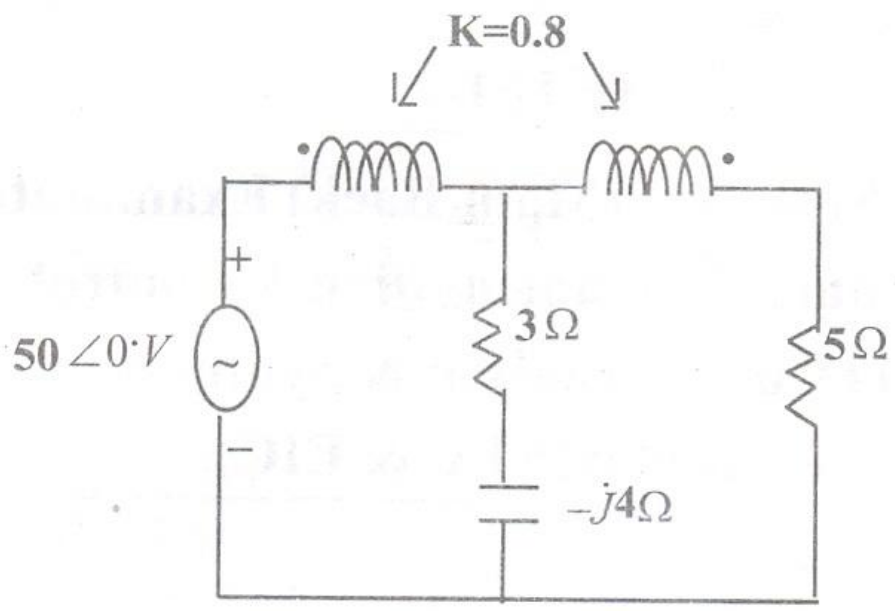

Fig.2

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)**

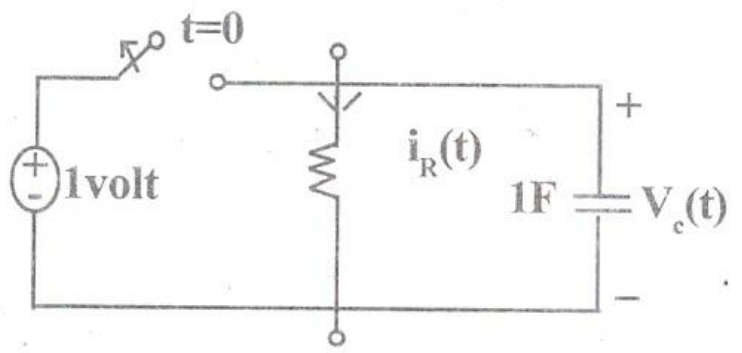

Fig.3

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 $G_{21}(s) = \frac{V_2(s)}{V_1(s)}$ of the network in Fig.4. Find $v_2(t)$ when $v_1(t) = 10e^{-2t}$ **(8)**

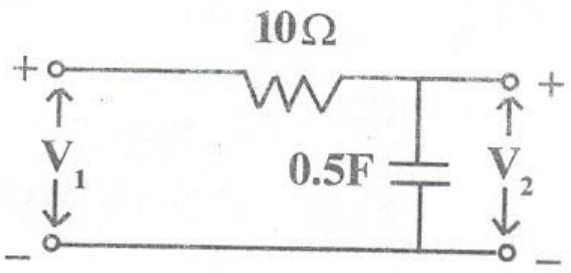

Fig.4

b) Check whether the given polynomial

$p(s) = S^7 + 2S^6 + 2S^5 + S^4 + 4S^3 + 8S^2 + 8S + 4$ is Hurwits or not. **(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)**

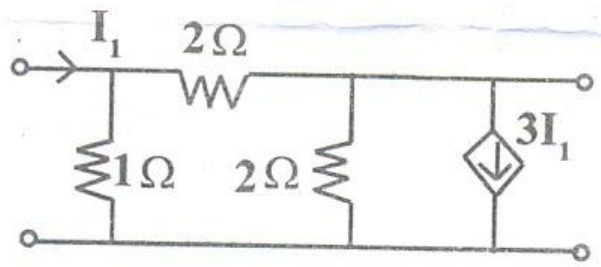

Fig.5

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

Unit - V

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

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

b) Synthesize the given function $F(s) = \frac{3(s+2)(s+4)}{s(s+3)}$ 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 $F(s)=\frac{s(3s+8)}{(s+1)(s+3)}$ 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

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

i) Foster's type-I form

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