3E1614

Roll No. :_

Total Printed Pages : 8

3E1614

B. Tech. (Sem. III) (Main/Back) Examination, December 2017
Electronics & Communication Engg.
3EC4A Circuit Analysis & Synthesis

Time : 3 Hours

Maximum Marks : 80
Min. Passing Marks : 26

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.

Use of following supporting material is permitted during examination. (Mentioned in form No. 205)

1. NIL 2. NIL

UNIT - I

1 (a) Find the norton equivalent current in amperes with respect to the terminal P and Q is in fig. 1.

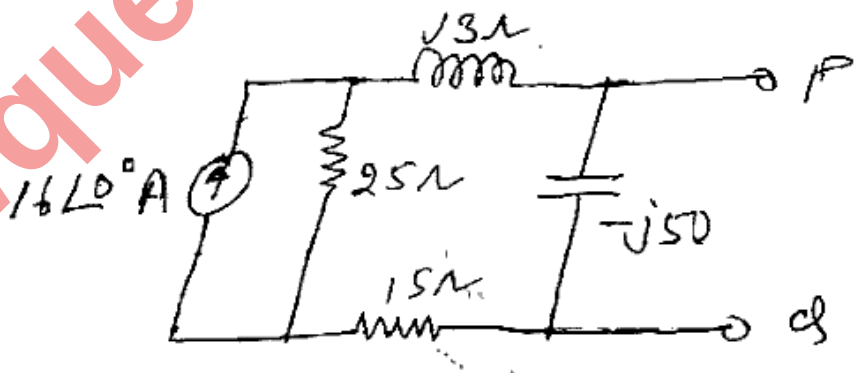

Fig. 1

5

(b) Find the total current in 10 Ω resistor in fig. 2 using superposition theorem.

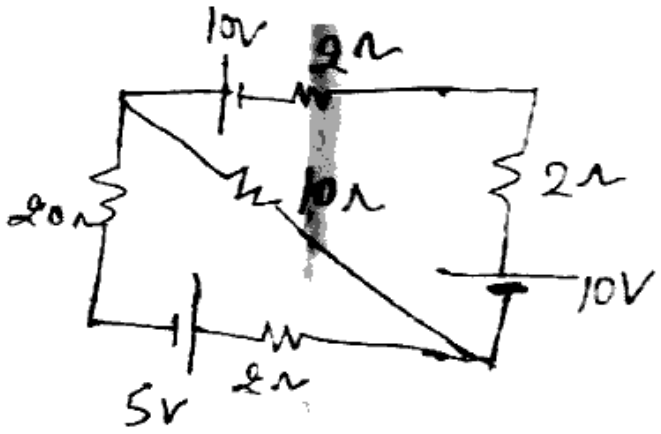

Fig. 2

5

(c) Define following and explain :

(i) Reciprocity condition in network

(ii) Coupling coefficient between two mutually coupled coils.

3+3=6

OR

1 (a) Find the current I in fig. 3 flowing through the 2 Ω resistor using superposition theorem.

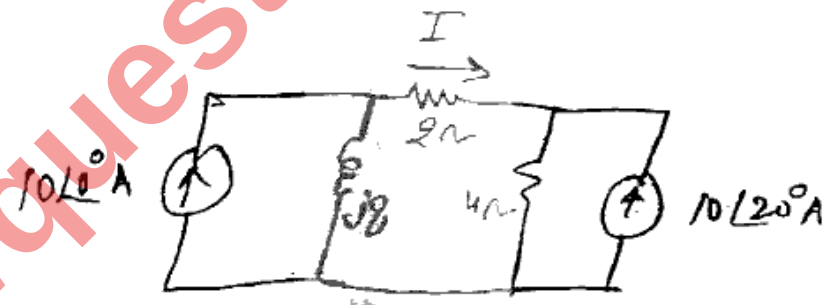

Fig. 3

8

(b) State maximum power transfer theorem and find the maximum power that can flow in load Z_L in fig. 4

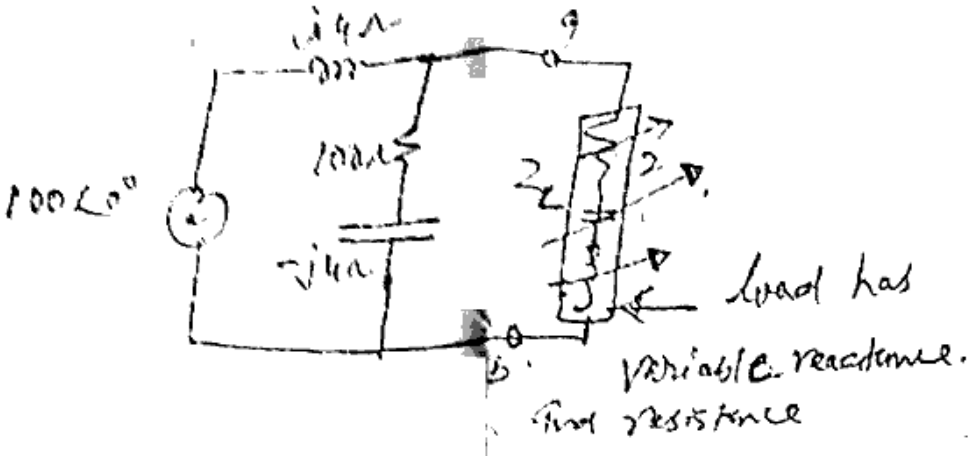

Fig. 4

5

(c) Find the equivalent inductance in fig. 5. Assume the frequency is f = 50 Hz.

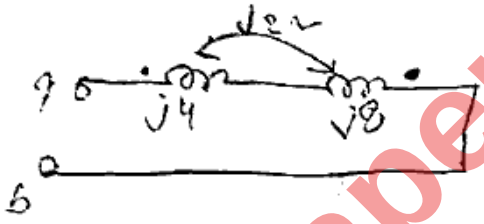

Fig. 5

3

UNIT - II

2 (a) In fig. 6 the switch was closed for a long time before opening at t = 0. Find the voltage V_x at (i) $t = 0^+$ and $t = \infty$.

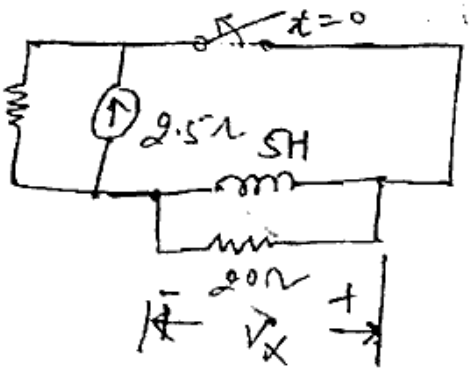

Fig. 6

4+4=8

(b) Transform the following network shown in **fig. 7** and find. $I(s), V_c(s)$ and $V_L(S)$.

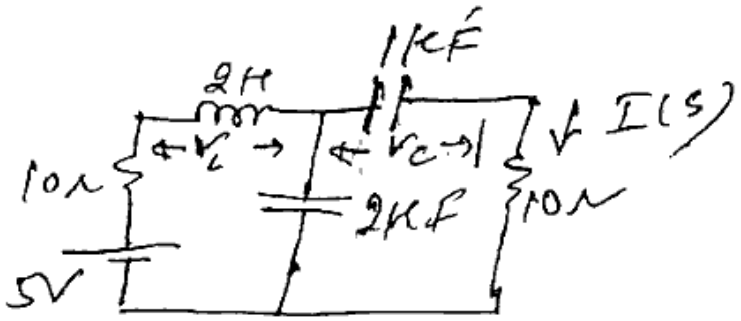

Fig. 7

4+2+2=8

OR

2 (a) Find $V(s)$ for the voltage waveform shown in **fig. 8**.

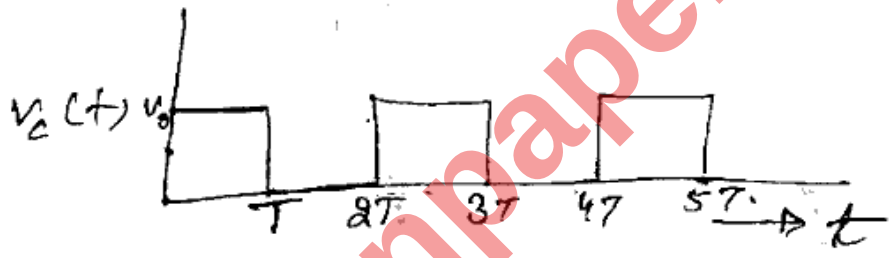

Fig. 8

6

(b) Find the step response in **fig. 9**.

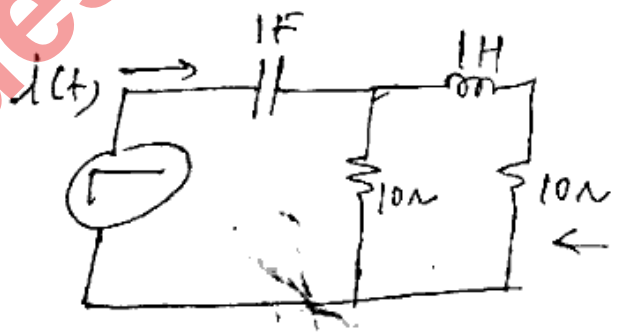

Fig. 9

6

(c) Define the initial and final value condition across an inductor and capacitor.

2+2=4

UNIT - III

3 (a) Write the restrictions on pole zero location for immittance functions. Check whether following polynomical are Hurwitz or not :

(i) $2(s) = 20s^3 + 4s^2 + 9s + 4$

(ii) $Y(s) = 1 + s + s^2 + s^3$.

2+2+2=6

(b) Find $Z_{11}(s)$ and $Z_{12}(s)$ in network shown in fig. 10.

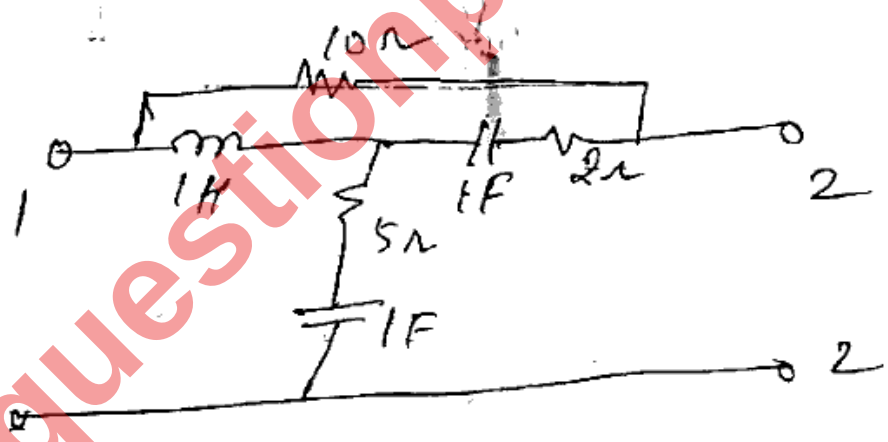

Fig. 10

4+4=8

(c) Write any two property of positive real functions.

2

OR

3 (a) Check whether following functions are positive real or not

(i) $Y(s) = \dfrac{1+s^2}{s^3+4s^2+2s-1}$

(ii) $Z(s) = 4s^4 + 2s^2 + 2.$

3+3=6

(b) Determine $Y_{21}(s)$ and $Z_{12}(s)$ for the network shown in fig. 11.

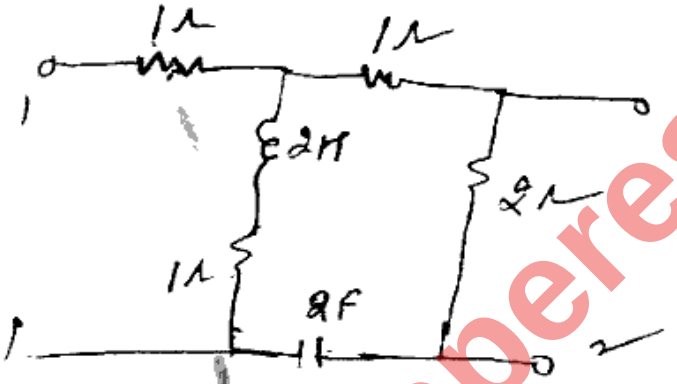

Fig. 11

4+4=8

(c) Draw the pole-zero diagram of $H(s) = \dfrac{s^2+s+1}{s^3+2s^2+2s+1}$.

2

UNIT - IV

4 (a) Find the Y-parameter in network shown in fig. 12.

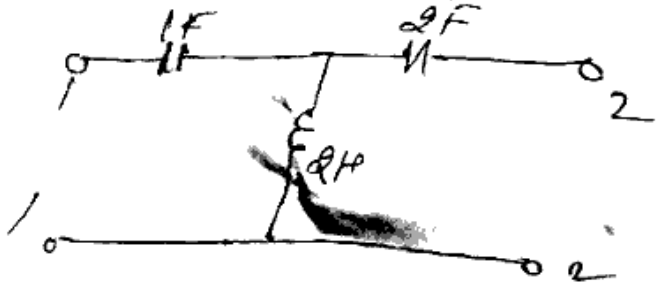

Fig. 12

6

(b) Convert following Z-parameter in Hybrid parameter.

$$Z = \begin{bmatrix} 10 & 1+2j \\ -4j & 5+4j \end{bmatrix}$$

6

(c) Write the condition of symmetry and reciprocal network for Z-parameter and Y-parameter.

2+2=4

OR

4 (a) Find the h-parameter for the network shown in fig. 13.

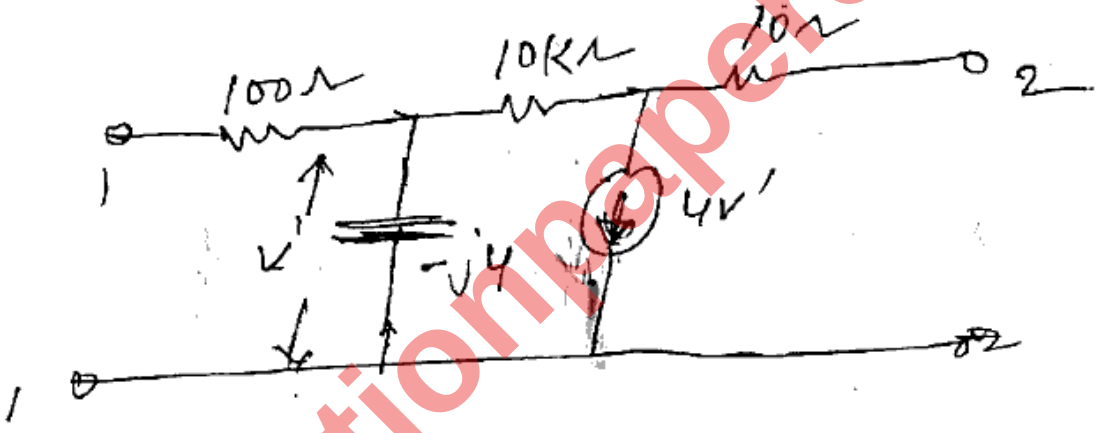

Fig. 13

8

(b) Convert the given h-parameter in equivalent y-parameter

$$h = \begin{bmatrix} 100\Omega & 40 \\ 10^{-3} & 0.0\mho \end{bmatrix}$$

6

(c) Define image impedance of a two port network.

2

UNIT - V

5 (a) Realize the Foster and Cauer form network for

(i) $Z(s) = \dfrac{s^4 + 4s^3 + 3}{s^3 + 25}$ and

(ii) $Z(s) = \dfrac{4 + 5s + s^2}{6 + 5s + s^2}$.

4+4=8

(b) Draw the general pole zero diagram of a LC network.

4

(c) Write all steps of realize a RC network for driving point impedance.

4

OR

5 (a) Realize the first and II Cauer form for

$$Z(s) = \frac{6s^3 + 8s^2 + 4s + 4}{6s^2 + 8s + 1}$$

8

(b) Write all realizability condition of

(i) LC network and

(ii) RC network.

4+4=8
