

Reg No.: _____

Name: _____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY
THIRD SEMESTER B.TECH DEGREE EXAMINATION, APRIL 2018

Course Code: EE201

Course Name: CIRCUITS AND NETWORKS (EE)

Max. Marks: 100

Duration: 3 Hours

PART A

Answer all questions, each carries 5 marks

Marks

- | | | |
|---|---|-----|
| 1 | Stat and explain reciprocity theorem. | (5) |
| 2 | Write down the properties of incidence matrix. | (5) |
| 3 | If an RLC series circuit is energised by a 10V DC source at $t=0$ sec. Draw the expected graph of the following circuit variables under different damping conditions: | (5) |
| | i) The current through the circuit ii) Voltage across the capacitor. | |
| 4 | Find the current through circuit shown in Fig. 1. | (5) |

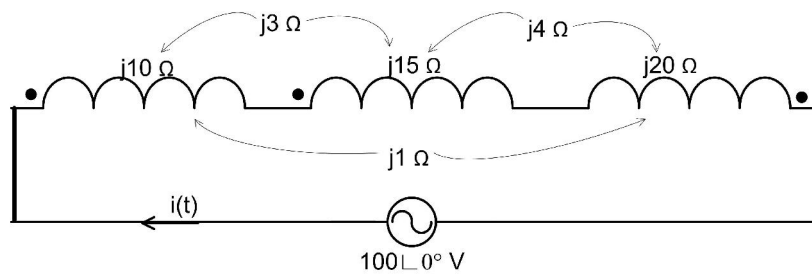


Figure 1

- | | | |
|---|--|-----|
| 5 | Derive the condition for symmetry and reciprocity of Y-parameters. | (5) |
| 6 | What is h-parameters? Why they are called hybrid parameters? | (5) |
| 7 | What is the differentiate between network analysis and synthesis. | (5) |
| 8 | State the properties of LC driving point immittance function. | (5) |

PART B

Answer any two full questions, each carries 10 marks

- | | | |
|----|--|------|
| 9 | For the circuit shown in Fig. 2 find the value of R_L that absorbs maximum power from the circuit and the corresponding power under this condition. | (10) |
| 10 | For the network shown in Fig. 3, draw the oriented graph, write the tie-set schedule and hence obtain the equilibrium equations on loop basis. Calculate the values of branch current and branch voltages. | (10) |

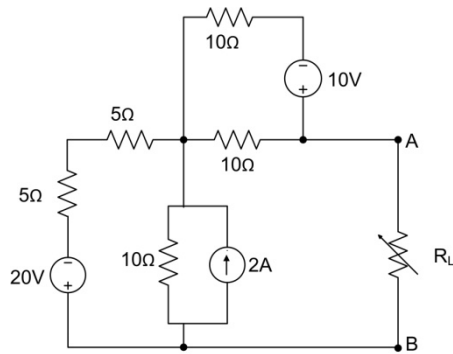


Figure 2

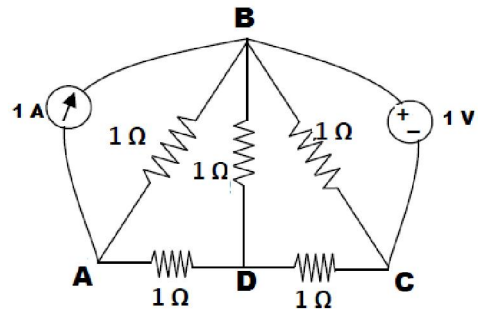


Figure 3

- 11 (a) Draw the Norton's equivalent circuit and Thevenin's equivalent circuit of (5)
 Fig. 4.
- (b) Obtain basic cutset matrix for the oriented graph shown in Fig. 5. Take 1,2,3 as (5)
 twigs.

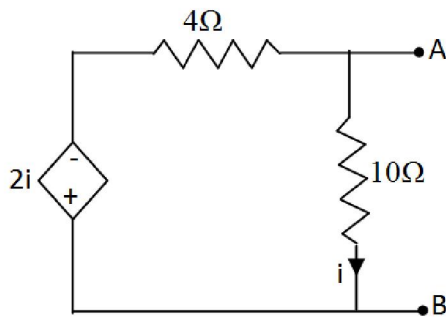


Figure 4

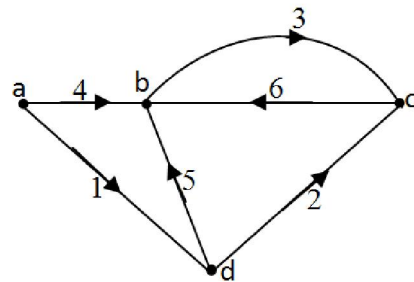


Figure 5

PART C

Answer any two full questions, each carries 10 marks

- 12 For the circuit shown in Fig.6 , the DPDT switch at position 2 for a long time. (10)
 At $t=0$ sec. contact is moved from position 2 to 1 and at $t= 10$ sec. the contact is
 moved from 1 to 2. Derive an expression for the $i_C(t)$ and $v_C(t)$ in both cases.
 Plot variation of $i_C(t)$ and $v_C(t)$.

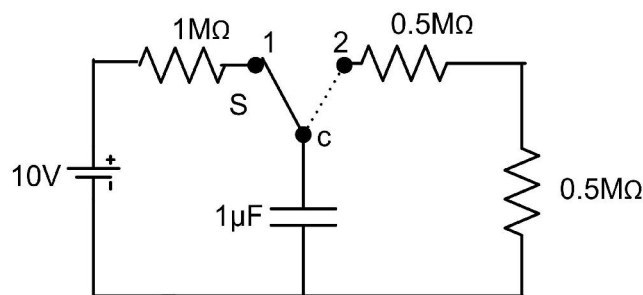


Figure 6

- 13 Find the expression for the current through the inductor $i_L(t)$ in a parallel RLC (three branch) circuit when a step input of I amperes is applied across it at time $t = 0$. Assume all initial conditions are zero. Apply Laplace transform technique. (10)
- 14 The switch S in the circuit of Fig. 7 is in the closed position for long time. At $t=0$, the switch opens. Find the expression for the current using Laplace transform. (10)

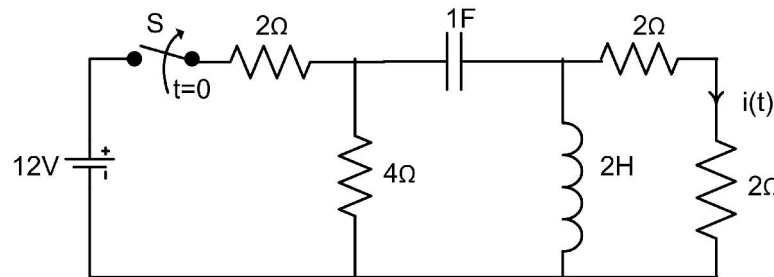


Figure 7

PART D

Answer any twofull questions, each carries 10 marks

- 15 Obtain the z parameters for the network in Fig. 8 as functions of s. (10)

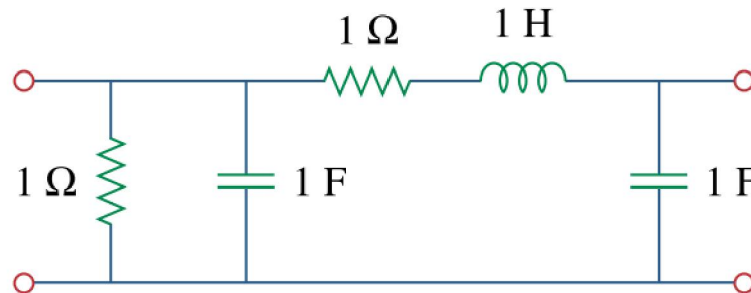


Figure 8

- 16 a) The Z- parameters of a two port network are $Z_{11}= 10\Omega$, $Z_{22}=15\Omega$, $Z_{12}=Z_{21}=5\Omega$. (6)
Find the equivalent T-network and ABCD parameters
- b) Test whether the polynomial $P(s)=s^4+s^3+3s^2+2s+12$ is Hurwitz (4)
- 17 a) Point out the difference in the philosophy between Foster and Cauer form of synthesis of a given driving point impedance (4)
- b) The driving point impedance of a circuit is (6)

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

Realize the given impedance function $Z(s)$ as a Cauer's first form.
