



Roll No.

**PRESIDENCY UNIVERSITY
BENGALURU**

SCHOOL OF ENGINEERING

TEST – 1

Sem: Odd Sem 2019-20

Course Code: EEE 219

Course Name: NETWORK THEORY

Program & Sem: B.Tech (EEE) & III

Date: 01.09.2019

Time: 11.00AM to 12.00PM

Max Marks: 40

Weightage: 20%

Instructions:

- (i) *Read the question properly and answer accordingly.*
 - (ii) Scientific and Non-programmable calculators are permitted.
-

Part A [Memory Recall Questions]

Answer the Questions. Each Question carries four marks.

(3Qx4M=12M)

1. Differentiate between (C.O.NO.1)[Comprehension]
 - (i) Linear and non linear elements
 - (ii) Active and Passive elements
2. State the followings (C.O.NO.2) [Knowledge]
 - (i) Superposition theorem
 - (ii) Thevenin's theorem
3. Replace the given network shown in the Fig. 3 with a single current source and a resistor using source transformation. (C.O.NO.1)[Comprehension]

Fig. 3

Part B [Thought Provoking Questions]

Answer both the Questions. Each Question carries eight marks. (2Qx8M=16M)

4. How to reduce the complexity of the given network shown in the Fig. 4 so that we can find the supply current when 20V is applied between the terminals A & B.

(C.O.NO.1) [Comprehension]

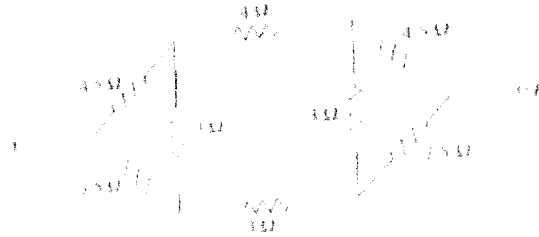


Fig. 4

5. Find the current through the 4 Ω resistor using mesh analysis shown in the Fig. 5.

(C.O.NO.1) [Comprehension]



Fig. 5

Part C [Problem Solving Questions]

Answer the Question. The Question carries twelve marks.

(1Qx12M=12M)

6. a) Find voltage at nodes 1 & 2 shown in the Fig. 6 (a). (C.O.NO.1) [Comprehension]

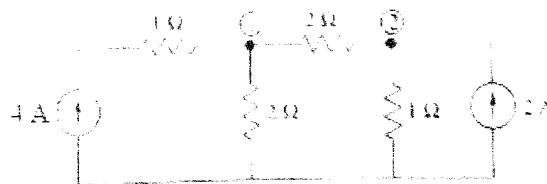


Fig. 6(a)

- b) Find the current through the 10 Ω resistor shown in the Fig.6 (b).

(C.O.NO.1)[Comprehension]



Fig. 6 (b)



SCHOOL OF ENGINEERING

Semester: III

Course Code: EEE 219

Course Name: Network Theory

Date: 01 October, 2019

Time: 1 Hour

Max Marks: 40

Weightage: 20%

Extract of question distribution [outcome wise & level wise]

| Q.NO | C.O.NO | Unit/Module Number/Unit /Module Title | Memory recall type | | | Thought provoking type | | | Problem Solving type | | | Total Marks |
|------|-------------|---|--------------------|----------------|--|------------------------|----------------|---|----------------------|----------------|--|-------------|
| | | | [Marks allotted] | Bloom's Levels | | [Marks allotted] | Bloom's Levels | | [Marks allotted] | Bloom's Levels | | |
| | | | | K | | C | | C | | C | | |
| 1 | 1 | 1 | | | | 4 | | | | | | |
| 2 | 2 | 2 | 4 | | | | | | | | | |
| 3 | 1 | 1 | | | | 4 | | | | | | |
| 4 | 1 | 1 | | | | 8 | | | | | | |
| 5 | 1 | 1 | | | | 8 | | | | | | |
| 6 | 1 | 1 | | | | | | | 12 | | | |
| | Total Marks | 40 | | | | | | | | | | |

A 2A 12

K = Knowledge Level C = Comprehension Level, A = Application Level

Note: While setting all types of questions the general guideline is that about 60%

Of the questions must be such that even a below average students must be able to attempt, About 20% of the questions must be such that only above average students must be able to attempt and finally 20% of the questions must be such that only the bright students must be able to attempt.

[I hereby certify that All the questions are set as per the above guide lines. Mr. Abrar]

Reviewers' Comments

Annexure- II: Format of Answer Scheme



SCHOOL OF ENGINEERING

SOLUTION

Date: 01 October, 2019

Time: 1 Hour

Semester: III

Course Code: EEE 219

Max Marks: 40

Course Name: Network Theory

Weightage: 20%

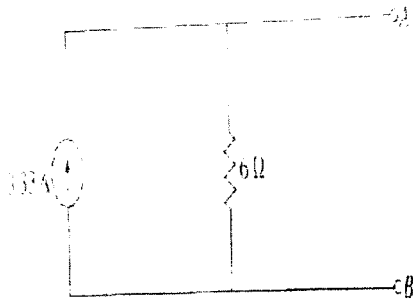
Part A

(3Q x 4M = 12 Marks)

| Q No | Solution | Scheme of Marking | Max. Time required for each Question |
|------|--|-------------------|--------------------------------------|
| 1 | (i) Difference between Linear and non linear elements (ii) Difference between Active and Passive elements | 2 M 2 M | 5 Mins |
| 2 | Statement of (i) Superposition theorem (ii) Thevenin's Theorem | 2 M 2 M | 5 Mins |

Solution Since the resistance of 5Ω is connected in parallel with the voltage source of 20 V , we are to find the equivalent resistance of the circuit. The current source and resistor is converted into equivalent voltage source and resistor.

By source conversion,



2 M

2 M

Part B(2Q x 8M = 16 Marks)

| Q No | Solution | Scheme of Marking | Max. Time required for each Question |
|------|---|-------------------|--------------------------------------|
| 4 | <p>By source conversion, we have</p> <p>Fig. 2.4</p> $R_1 = R_6 = \frac{4.5 \times 7.5}{4.5 + 7.5 + 3} = 2.25 \Omega$ $R_2 = R_5 = \frac{7.5 \times 3}{4.5 + 7.5 + 3} = 1.5 \Omega$ $R_3 = R_4 = \frac{4.5 \times 3}{4.5 + 7.5 + 3} = 0.9 \Omega$ <p>The simplified network is shown in Fig. 2.5.</p> <p>Fig. 2.5</p> | 4 M | 10 Mins |

| | | | |
|---|--|--------------------------|---------|
| | <p>The network can be simplified as follows</p> | 4 M | |
| 5 | <p>By KVL</p> <p>Loop 1: $6i_1 + 1(i_1 - i_2) - 10 = 0$ $7i_1 - i_2 = 10$ -----(1)</p> <p>Loop 2: $4i_1 + 3(i_2 - i_3) + 1(i_2 - i_1) = 0$ $-i_1 + 8i_2 - 3i_3 = 0$ -----(2)</p> <p>Loop 3: $10i_3 + 20 + 3(i_3 - i_2) = 0$ $-3i_2 + 13i_3 = -20$ -----(3)</p> <p>Solving equations (1), (2) and (3), we get $i_1 = 1.365$ A $i_2 = -0.4447$ A $i_3 = -1.641$ A</p> <p>Current in 4 Ω is $i_2 = -0.4447$ A</p> | 2 M 2 M 2 M 2 M | 10 Mins |

Part C

(1Q x 12M = 12 Marks)

| Q No | Solution | Scheme of Marking | Max. Time required for each Question |
|------|---|-------------------|--------------------------------------|
| 6 a) | <p>By KCL</p> <p>At node 1</p> $-4 + \frac{V_1}{2} + \frac{V_1 - V_2}{2} = 0$ $2V_1 - V_2 = 8$ ----- (1) <p>At node 2</p> $-2 + \frac{V_2}{1} + \frac{V_2 - V_1}{2} = 0$ $-V_1 + 3V_2 = 4$ ----- (2) <p>Solving equations (1) and (2), we get $V_1 = 5.6$ Volts</p> | 2 M 2 M | 10 Mins |

$$V_2 = 3.2 \text{ volts}$$

2 M

6
b)

Solution Applying KVL to Mesh 1,

$$2 - I_1 - 10(I_1 - I_2) - I_1 = 0$$

$$11I_1 - 10I_2 = 2$$

Since meshes 2 and 3 contain a current source of 4 A, the supermesh is formed by two adjacent meshes that have a common current source. The current through the 4 A and current $(I_2 - I_3)$ will be same, i.e., in the upward direction.

Writing current equation to supermesh,

$$I_2 - I_3 = 4$$

Applying KVL to outer path of supermesh,

$$-10(I_2 - I_1) - 5I_2 - 15I_3 = 0$$

$$10I_1 - 15I_2 - 15I_3 = 0$$

$$2I_1 - 3I_2 - 3I_3 = 0$$

Solving equations (i), (ii) and (iii),

$$I_1 = -2.35 \text{ A}$$

$$I_2 = -2.78 \text{ A}$$

$$I_3 = 1.22 \text{ A}$$

$$\text{Current through the } 10\text{-}\Omega \text{ resistor} = I_1 - I_2$$

$$= -(-2.35) - (-2.78) = 0.43 \text{ A}$$

1 M

2 M

2 M

1 M

15 Mins

| | | | | | | | | | | | | | | | | | | | |
|----------|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|
| Roll No. | | | | | | | | | | | | | | | | | | | |
|----------|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|



**PRESIDENCY UNIVERSITY
BENGALURU
SCHOOL OF ENGINEERING**

TEST – 2

Sem & AY: Odd Sem 2019-20

Course Code: EEE 219

Course Name: NETWORK THEORY

Program & Sem: BTech. (EEE) & III Sem

Date: 19.11.2019

Time: 11.00 AM to 12.00 PM

Max Marks: 40

Weightage: 20%

Instructions:

(i) Answer all questions.

Part A [Memory Recall Questions]

Answer both the questions. Each question carries six marks. (2Qx6M=12M)

1. Determine the current in the 10Ω resistor by using Superposition Theorem.

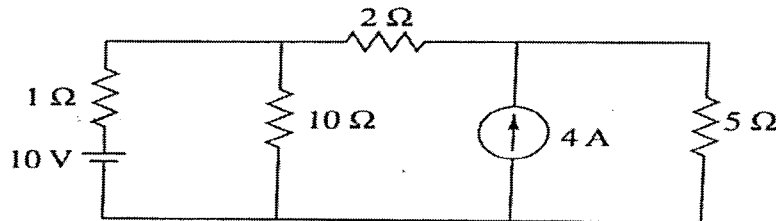


Fig. 1 (C.O.NO.3)[Comprehension]

2. Determine the current through 24Ω using Thevenin's theorem.

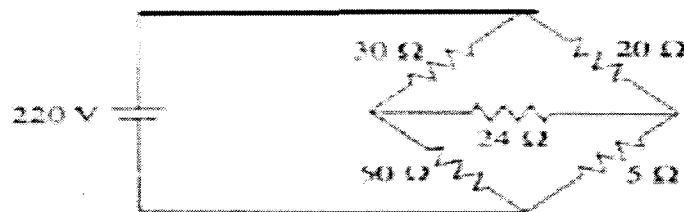


Fig. 2 (C.O.NO.4)[Comprehension]

Part B [Thought Provoking Questions]

Answer both the Questions. Each question carries eight marks.

(2Qx8M=16M)

3. Find the current through the 10Ω resistor by Thevenin's theorem.

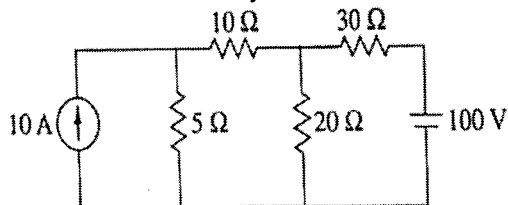


Fig. 3

(C.O.NO.3)[Comprehension]

4. For the circuit shown, find the value of resistance R_L for maximum power transfer and determine maximum power.

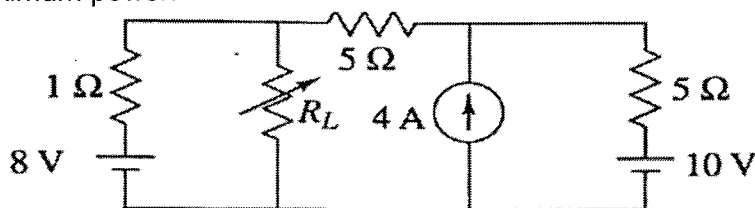


Fig. 4

(C.O.NO.3)[Comprehension]

Part C [Problem Solving Questions]

Answer both the Questions. Each question carries six marks.

(2Qx6M=12M)

5. In the network shown, the switch is closed at $t=0$. Assuming initial current in inductor to be zero, find i , di/dt , d^2i/dt^2 at $t=0^+$.

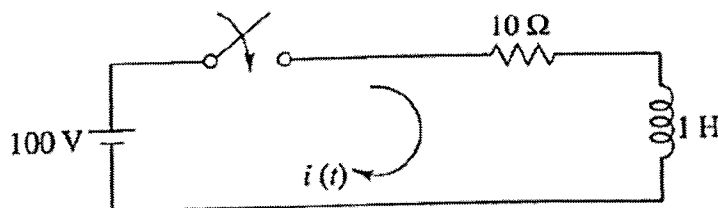


Fig. 5

(C.O.NO.4)[Comprehension]

6. With the help of a table explain the behavior of R,L,C elements at the time of switching at $t=0$, at $t=0^+$ and $t=\infty$.

(C.O.NO.4)[Knowledge]



SCHOOL OF ENGINEERING

Semester: 3

Course Code: **EEE219**

Course Name: Network Theory

Date: 19-11-19

Time: Max Marks: 40

Weightage: 20

Extract of question distribution [outcome wise & level wise]

| Q. NO | C.O.NO | Unit/Module Number/Unit /Module Title | Memory recall type [Marks allotted] Bloom's Levels | | | Thought provoking type [Marks allotted] Bloom's Levels | | Problem Solving type [Marks allotted] | | Total Marks |
|-------|--------|--|--|------------|--|--|-------------|--|-------------|-------------|
| | | | K | | | C | | A | | |
| 1 | 3 | 2/ Network Theorems: | | | | | | 6 | Comprehsion | 6 |
| 2 | 3 | 2/ Network Theorems: | | | | | | 6 | Comprehsion | 6 |
| 3 | 3 | 2/ Network Theorems: | | | | 8 | Comprehsion | | | 8 |
| 4 | 3 | 2/ Network Theorems: | | | | 8 | Comprehsion | | | 8 |
| 5 | 4 | 3/ Transient Analysis,Laplace Transforms and Frequency response | | | | | | 6 | Comprehsion | 6 |
| 6 | 4 | 3/ Transient Analysis,Laplace Transforms and Frequency response | 6 | Knowle dge | | | | 6 | | 6 |

Annexure- II: Format of Answer Scheme



SCHOOL OF ENGINEERING

SOLUTION

Semester:

Course Code:

Course Name:

Date: 19-11-19

Time: 12-12

Max Marks: 40

Weightage: 20

Part A

(2Q x 6M = 12Marks)

| Q No | Solution | Scheme of Marking | Max. Time required for each Question |
|------|---|-------------------|--------------------------------------|
| 1 | With 10V source alone current through 10Ω is 0.8A, with 4A current source alone is 0.23A Total current=1.03A | 2 2 2 | 9 |
| 2 | $V_{TH} = 93.5V$ $R_{TH} = 22.75\Omega$ Current through $24\Omega = 2A$ | 2 2 2 | 7 |

Part B

(2Q x 8M = 16Marks)

| Q No | Solution | Scheme of Marking | Max. Time required for each Question |
|------|---|-------------------|--------------------------------------|
| 3 | $V_{TH} = 10V$ $R_{TH} = 17\Omega$ Current through $10\Omega = 0.37A$ | 3 3 2 | 15 |
| 4 | $V_{TH} = 10V$ $R_{TH} = 0.91\Omega$ R_L Maximum Power=669.6W | 3 3 2 | 15 |

Part C

(2Q x 6M = 12Marks)

| Q No | Solution | Scheme of Marking | Max. Time required for each Question |
|----------|--|-------------------|--------------------------------------|
| 5 | $i(0^+) = 0$ | 2 | 8 |
| | $di/dt = 100A/s$ at $t=0^+$ | 2 | |
| | $d^2i/dt^2 = -1000A/s^2$ at $t=0^+$ | 2 | |
| 6 | For initial conditions For final conditions | 3 each | 6 |



SCHOOL OF ENGINEERING

END TERM FINAL EXAMINATION

Extract of question distribution [outcome wise & level wise]

| Q.NO. | C.O.NO (% age of CO) | Unit/Module Number/Unit /Module Title | Memory recall type | Thought provoking type | Problem Solving type [Marks allotted] | Total Marks |
|---------------------------------------|---|---|------------------------------------|------------------------------------|---|----------------|
| | | | [Marks allotted] Bloom's Levels | [Marks allotted] Bloom's Levels | | |
| | | | K | C | C | |
| PART A Q. NO1 Q.NO.2 | CO 01 CO 02 CO 03 CO 04 CO 05 | All the 4 modules | 20 [3+3+2+6+6] | | | 20 |
| PART B Q.NO.3 | CO 05 | MODULE 04 Three phase circuits | - | 10 | - | 10 |
| PART B Q.NO.4 | CO 03 | MODULE 02 Superposition theorem | - | 10 | - | 10 |
| PART B Q.NO.5 b | CO 01 | MODULE 01 Nodal Analysis | - | 05 | - | 05 |
| PART B Q.NO.5 a | CO 04 | MODULE 03 Frequency response | - | 05 | - | 05 |
| PART C | CO 03 | MODULE 03 Thevenin | - | - | 07 | 07 |



SCHOOL OF ENGINEERING

SOLUTION

Semester: III

Course Code: EEE 219

Course Name:

Date: ~~27~~ December /2019

Time: 1:00 PM to 4:00 PM

Max Marks: 80

Weightage: 40%

Part A

(Q x M =20 Marks)

| Q No | Solution | Scheme of Marking | Max. Time required for each Question |
|------|--|-------------------------------------|--------------------------------------|
| 1 | a. Root 3 times e. L/R b. b. inner loop c. KVAR f. Time , frequency d. Opem circuited | Each Part:1 M Circuit:1M | 12 min |
| 2 | a. $R1 = R_{th}$ b. $Y12 = Y21$ and $Y11 = Y22$ c. Voltage & current magnitudes are equal in each phase and identical load is to be connected. d. $R1 = R_b R_c / R_a$ e. Time taken to reach its final steady state from zero state. f. Single Current source in parallel with R g. Exponential function. | Each Part: 2 M | 28 min |

Part B

(3Q x 10M = 30 Marks)

| Q No | Solution | Scheme of Marking | Max. Time required for each Question |
|------|---|-----------------------|--------------------------------------|
| 3 | $V_l = 230 \text{ V}$, $V_{ph} = 132.79 \text{ V}$ $Z_{ph} = 10.71$, phase angle = 38.13 $I_{ph} = 13.05 \text{ A} = I_l$ $P = 1.73 * V_l * I_l \cos \phi = 4.088 \text{ kW}$ $Q = 3.21 \text{ KVAR}$ | Each Part: 2 M | 20 min |
| 4 | Find $Z_t = 5 + 1/3 + j9(3+j4)(j5) = 6.35$ at 23.2 degree Find $I_t = V / Z_t = 7.87$ at 66.8 degree A Apply current Division rule $I' = 4.15$ at 85.3 A Repeat the same procedure with source 2 $I'' = 4.15$ at 85.3 A $I = I' + I''$ | Each Part 5M | 20 min |
| 5 | a. Substitute $s = j\omega$ | Each part 2.5M | 20 min |



| | | | | | | | | | | | | | | | | | | | | |
|---------|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|
| Roll No | | | | | | | | | | | | | | | | | | | | |
|---------|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|

**PRESIDENCY UNIVERSITY
BENGALURU**

SCHOOL OF ENGINEERING

END TERM FINAL EXAMINATION

Semester: Odd Semester: 2019 - 20

Course Code: EEE 219

Course Name: NETWORK THEORY

Program & Sem: B.Tech (EEE/ECE) & III

Date: 27 December 2019

Time: 1:00 PM to 4:00 PM

Max Marks: 80

Weightage: 40%

Instructions:

- (i) Read the all questions carefully and answer accordingly.
- (ii) Question paper consists of 3 parts.
- (iii) Scientific and Non-programmable calculators are permitted

Part A [Memory Recall Questions]

Answer all the Questions.

1.

(6Qx1M=6M)

- a. In a 3- ϕ star connected load the line voltage is equal to ----- times of phase voltage. (C.O.No.5) [Knowledge]
- b. Mesh is a loop which doesn't contain any ----- (C.O.No.1) [Knowledge]
- c. ----- are the units of reactive power. (C.O.No.5) [Knowledge]
- d. In Superposition theorem, while considering a source, all other current sources are ----- (C.O.No.2) [Knowledge]
- e. The equation of time constant in R-L circuit is ----- (C.O.No.4) [Knowledge]
- f. Laplace transform changes the _____ domain function to the _____ domain function. (C.O.No.4) [Knowledge]

2.

(7Qx2M= 14M)

- a. State the maximum power transfer theorem. (C.O.No.2) [Knowledge]
- b. Write the reciprocity and symmetry condition for Y- parameters. (C.O.No.5) [Knowledge]
- c. Define a balanced system. (C.O.No.5) [Knowledge]

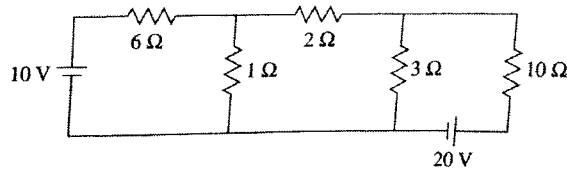


Fig.2

Part C [Problem Solving Questions]

Answer both the Questions. Each Question carries 15 marks.

(2Qx15M=30M)

6. a. For the following circuit shown in Fig.3, find the value of V_{TH} and R_{TH} . [7M]
(C.O.No.3) [Comprehension]

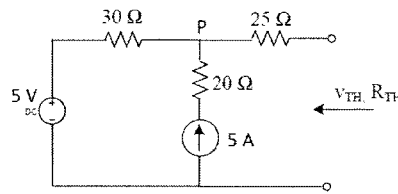


Fig.3

- b. In the network shown in Fig.4 the switch is moved from the position 1 to 2 at $t = 0$, the steady state condition having been established in the position 1. Determine $i(t)$ for $t > 0$ using Laplace transforms. [8M] (C.O.No.4) [Comprehension]

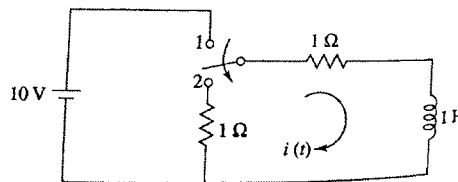


Fig.4

7. a. Compute the h – parameters of a two port network using the following data.

With output port short circuited : $V_1 = 25 V$, $I_1 = 1 A$, $I_2 = 2 A$

With input port open circuited : $V_1 = 10 V$, $V_2 = 50 V$, $I_2 = 2 A$

[6M] (C.O.No.5) [Comprehension]

- b. Determine the open circuit impedance parameters for the following two port network shown in Fig.5. [9M] (C.O.No.5) [Comprehension]

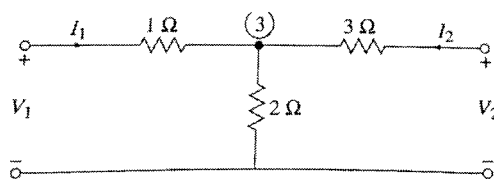


Fig.5