18136

BRAINWARE UNIVERSITY

Term End Examination 2025-2026
Programme – B.Tech.(EE)-2024
Course Name – Electric Circuit Theory
Course Code - BTE30102
(Semester III)

Full Marks : 60 **Time : 2:30 Hours**

[The figure in the margin indicates full marks. Candidates are required to give their answers in their own words as far as practicable.]

Group-A

(Multiple Choice Type Question) 1 x 15=15

1. *Choose the correct alternative from the following :*

(i) A 2-port resistive network satisfy the condition A = D = 3/2B = 4/3C. Identify the value of Z11 of the network

a) 4/3 b) 3/4
c) 2/3 d) 3/2

(ii) Identify the correct option which satisfy the condition of reciprocity for transmission parameters.

a) AB - CD = 1 b) AD - BC = 1
c) AC /BD = 1 d) None of the this

(iii) Given the lower and higher cut-off frequency of a band-pass filter are 2.5kHz and 10kHz. Calculate its bandwidth.

a) 750 Hz b) 7500 Hz
c) 75000 Hz d) None of the mentioned

(iv) The graph of an electrical network has N nodes and B branches. Calculate the number of links, L , with respect to the choice of a tree

a) B-N+1 b) B+N
c) B-N-1 d) B+N+2

(v) Select on which principle of conservation Kirchhoffs Voltage Law is based on

a) energy b) momentum
c) mass d) charge

(vi) State that the ideal current sources have

a) zero internal resistance b) low value of voltage
c) large value of current d) infinite internal resistance

(vii) Select the loop current direction of the basic loop formed from the tree of the graph is

a) same as the direction of the branch current b) opposite to the direction of the link current

c) same as the direction of the link current

d) opposite to the direction of the branch current

(viii) Identify the Laplace transform of a unit step function is:

a) 1/s

b) s

c) 1/s^2

d) s^2

(ix) Identify the integral of a unit step function is

a) A constant function

b) A ramp function

c) An impulse function

d) A sinusoidal function

(x) Choose the correct option. A square wave signal is characterized by,

a) Continuous variation of amplitude

b) A sudden change in amplitude between two levels

c) A sinusoidal shape

d) A constant amplitude

(xi) Select the dual of a Thevenin equivalent circuit is a

a) Norton equivalent circuit

b) Thevenin equivalent circuit

c) Series-parallel circuit

d) None of the mentioned

(xii) Choose the correct answer. The rank of an incidence matrix for a connected graph with 'n' nodes is

a) n

b) n-1

c) n+1

d) b

(xiii) The coefficient of coupling between two coils indicates

a) The ratio of their self-inductances

b) The ratio of their mutual inductance to the square root of the product of their self-inductances

c) The ratio of their mutual inductance to their self-inductances

d) The product of their self-inductances and mutual inductance

(xiv) The polarity of an induced voltage in a coil is determined by

a) Lenz's law

b) Faraday's law

c) Ampere's law

d) Ohm's law

(xv) Choose the High-pass filters are used in

a) Audio systems to remove low-frequency noise

b) Power supplies to filter out AC components

c) Communication systems to separate high-frequency signals

d) All of the mentioned

Group-B

(Short Answer Type Questions) 3 x 5=15

2. Illustrate two similarities and two differences between a circuit with 2 bulbs in series and a circuit with 2 bulbs in parallel. (3)

3. Explain the condition of maximum power transfer to a load. (3)

4. Define the four parameters which are commonly used to describe a two-port network. (3)

5. Explain initial value theorem. (3)

6. Compare Thevenin's Theorem with Norton's Theorem. (3)

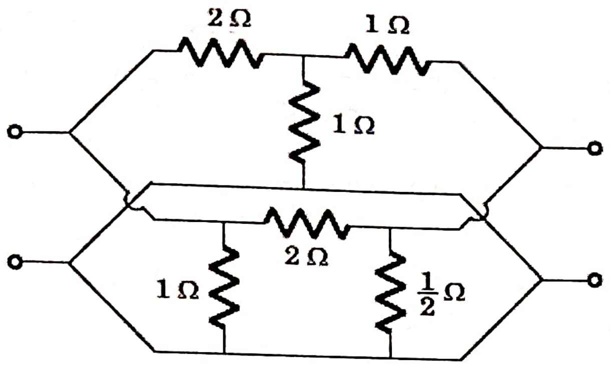
OR

Estimate the equivalent resistance of the circuit where R1 = 15 Ohm, R2 = 20 Ohm and R3 = 30 Ohm are in a parallel. (3)

Group-C
(Long Answer Type Questions)

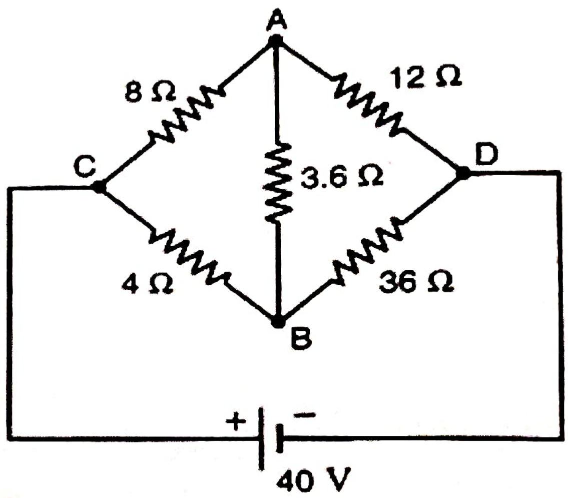
5 x 6=30

7. (5)

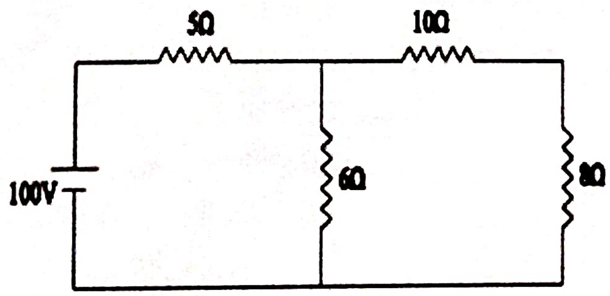


Estimate the Y parameter.

8. Examine current in branch AB in the unbalanced bridge. (5)



9. (5)



Estimate the current through 8-ohm resistance using Thevenin's theorem.

10. Explain how 50% efficiency is achieved in Maximum power transfer theorem. (5)

11. A coupled inductor has a coefficient of coupling of 0.8 and the self-inductance of each coil is 10 mH. Estimate the total inductance of the coupled inductor if the coils are connected in parallel with additive polarity. (5)

12. Establish the relation of the Y parameter in terms of the H parameter. (5)

OR

Establish the relation of the ABCD parameter in terms of the Z parameter. (5)

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