BRAINWARE UNIVERSITY

Term End Examination 2022
Programme – B.Tech.(EE)]-2021
Course Name – Electric Circuit Theory
Course Code - PCC-EE301
(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) Select the unit of inductance

a) Weber b) Henry
c) Farad d) Tesla

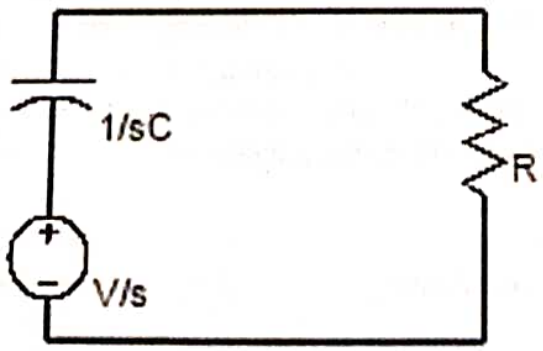
(ii) Recognize on which Kirchhoffs Current Law is applied At

a) loops b) nodes
c) both loop and node d) none of the mentioned

(iii) Name the circuit in which current has a complete path to flow is called _____ circuit.

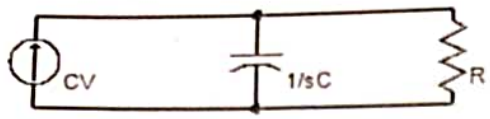
a) short b) open
c) closed d) open loop

(iv) From the circuit shown below, evaluate the value of current in the loop.



a) (V/R)/(s+1/RC) b) (V/C)/(s+1/R)
c) (V/C)/(s+1/RC) d) (V/R)/(s+1/R)

(v) Evaluate the voltage across the resistor in the parallel circuit shown below?



a) V/(s-1/R)
b) V/(s-1/RC)
c) V/(s+1/RC)
d) V/(s+1/C)

(vi) In a series RLC circuit, predict the phase difference between the current in the capacitor and the current in the resistor is

a) 0
b) 90
c) 180
d) 360

(vii) Select an electric current of 10 A is the same as

a) 10 J/C
b) 10 V/C
c) 10C/sec
d) 10 W/sec

(viii) The number of branches incident at the node of a graph is identified as

a) degree of the node
b) order of the node
c) status of the node
d) number of the node

(ix) In Superposition theorem, while considering a source, all other ideal current sources act as

a) open circuited
b) short circuited
c) change its position
d) removed from the circuit

(x) The circuit which satisfies Reciprocity Theorem is employ as

a) open circuited
b) short circuited
c) Linear circuit
d) Non-linear circuit

(xi) Transfer the value of capacitor into the s-domain equivalent of the capacitor

a) sC
b) C
c) 1/C
d) 1/sC

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

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

(xiii) Choose the correct relation.

a) y11=h11/h12
b) y11=h11
c) y11=1/h11
d) y11=h12

(xiv) Infer which filter performs exactly the opposite to the band-pass filter?

a) Band-reject filter
b) Band-stop filter
c) Band-elimination filter
d) All of the mentioned

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

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

Group-B

(Short Answer Type Questions) 3 x 5=15

2. Write down the operation of low pass filter (first order) using operation amplifier. (3)
3. Illustrate Thevenin's Theorem with example. (3)
4. How to transfer the a) Current Source into a Voltage Source, b) Voltage Source into a Current source? (3)
5. Two resistors 40 Ohm and 60 Ohm are connected in parallel. Calculate the current flowing (3)

through each resistor if the total current is 30 A. (3)

6. $$F(s)=\frac{s+17}{(s+2)(s+6)}$$

Evaluate f(t) at t=2

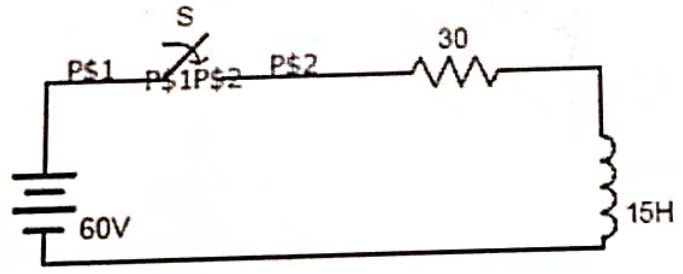
OR (3)

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

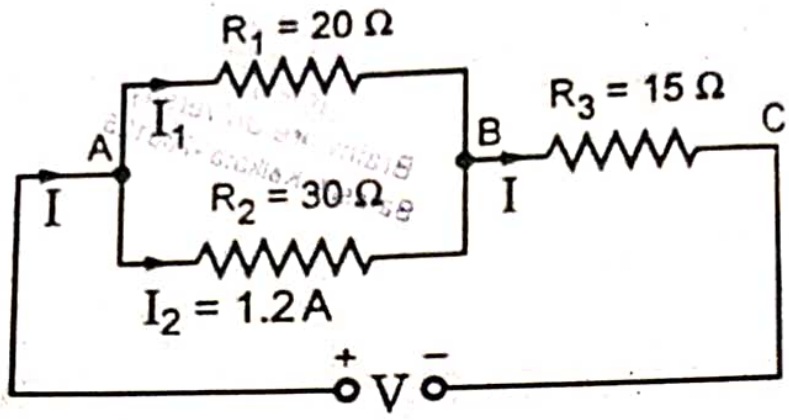
Evaluate the expression of f(t)

Group-C
(Long Answer Type Questions) 5 x 6=30

7. Evaluate the expression of current from the circuit shown below is? (5)



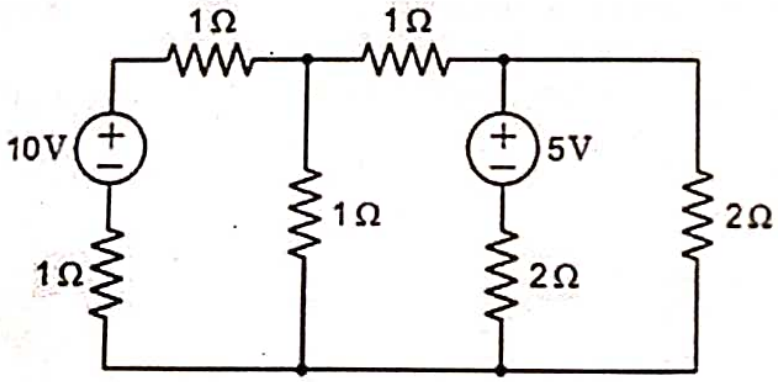
8. A circuit consists of two parallel resistors having resistances of 20 Ohm and 30 Ohm respectively connected in series with a 15 Ohm resistor. If the current through 30 Ohm resistor is 1.2 A, Quote (i) currents in 20 Ohm and 15 Ohm resistors (ii) the voltage across the whole circuit (iii) voltage across 15 Ohm resistor and 20 Ohm resistor (iv) total power consumed in the circuit. (5)



9. A coil has resistance of 18 Ohm when its mean temperature is 20°c and of 20 Ohm when its mean temperature is 50°c. Predict its mean temperature when its mean resistance is 21 Ohm and surrounding temperature is 15°c (5)

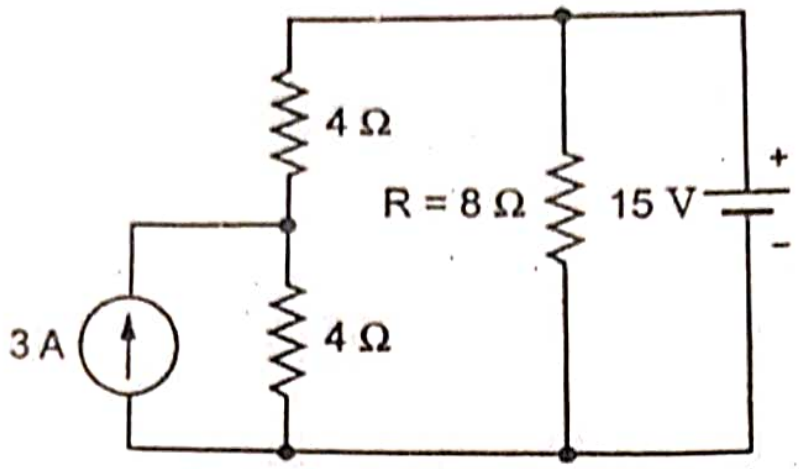
10. A periodic waveform f(t) is described as follows : f(t) = -4 (when $0 < t < 0.3$) ; f(t) = 6 (when $0.3 < t < 0.4$) ; f(t) = 0 (when $0.4 < t < 0.5$), time period of f(t) is 0.5. Apply fourier analysis and evaluate b1. (5)

11. Applying Thevenin's theorem find the current flowing through outer 2 ohm resistor shown in figure (5)



OR

Using superposition theorem calculate the current flowing through resistor R (5)



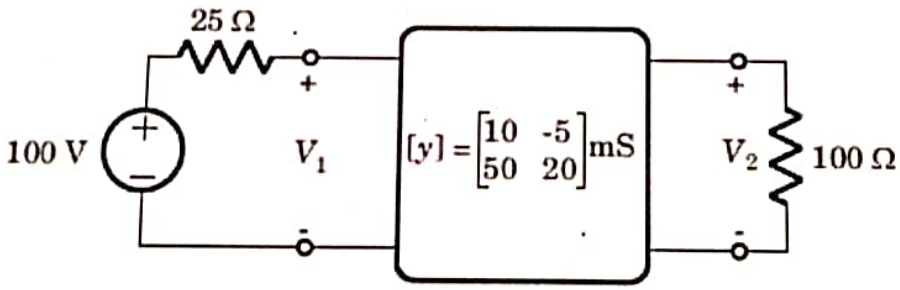
12. A 2-port network is driven by a source Vs = 100 V in series with 5 ohm, and terminated in a 25 ohm resistor. The impedance parameters are (5)

$$[z]=\begin{bmatrix} 20 & 2 \\ 40 & 10 \end{bmatrix}\Omega$$

Evaluate the Thevenin equivalent circuit presented to the 25 ohm resistor

OR

(5)



Estimate V1 and V2.

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