C

Question Paper Code: U3403

B.E./B.Tech. DEGREE EXAMINATION, NOV 2022

Third Semester

Electronics and Communication Engineering

21UEC303 – Circuit Theory

(Regulation 2019)

Duration: Three hours   Maximum: 100 Marks

Answer ALL Questions

PART A - (5 x 1 = 5 Marks)

1. The network has 7 nodes and 5 independent loops , the number of branches in
   the network is   CO1- U

   (a) 13   (b) 12   (c) 11   (d) 10

2. Which of the following theorem is applicable for both linear and nonlinear
   circuits?   CO1- U

   (a) Superposition theorem.   (b) Thevenin's theorem

   (c) Norton's theorem   (d) none of the above

3. If the lower cutoff frequency is 2400 Hz and the upper cutoff frequency is 2800   CO1- U
   Hz. What is the bandwidth?

   (a) 400 Hz   (b) 2800 Hz   (c) 2400 Hz   (d) 5200 Hz

4. The time constant of a series RC circuit is   CO1- U

   (a) 1/RC   (b) R / C   (c) RC   (d) e^{-RC}

5. Which elements act as independent variables in Y-parameters?   CO1- U

   (a) Current   (b) Voltage   (c) Both A & B   (d) Power

PART – B (5 x 3= 15 Marks)

6. Define active elements and passive elements.   CO1- U

7. State norton's theorem and draw its equivalent circuit..   CO1- U

8. In a parallel resonance circuit the value of R=10Ω, C=0.01μF, L=2mH. Find   CO4- App
   the resonant frequency and bandwidth of the circuit

9. What is transient and transient time? CO1- U

10. Give the expression of h-parameters in terms of Z-parameters CO1- U

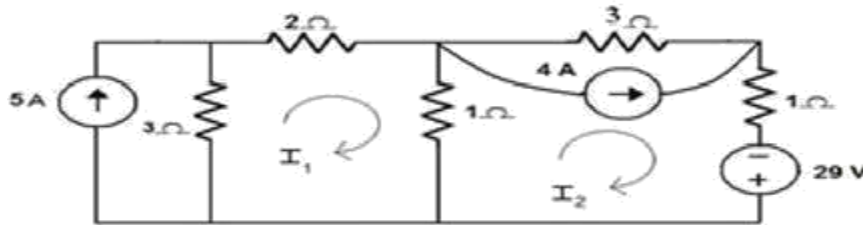PART – C (5 x 16= 80Marks)

11. (a) Calculate (a) the equivalent resistances across the terminals of CO2- App (16)
the supply,(b) total current supplied by the source and (c) power
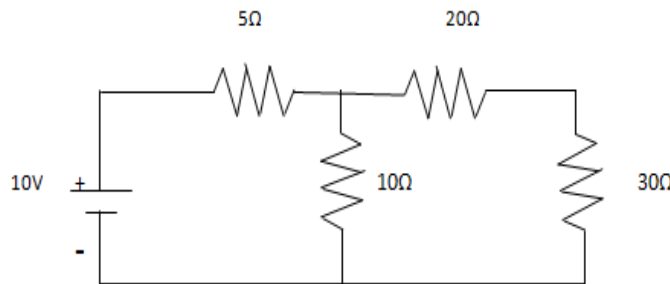delivered to 16 ohm resistor in the circuit shown in figure
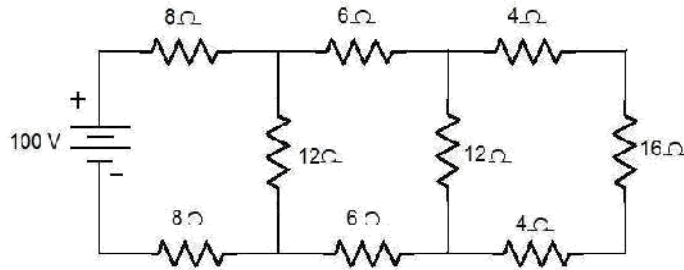
Or

(b) Analyze the mesh currents I1 and I2 for the given circuit shown CO2- App (16)
below

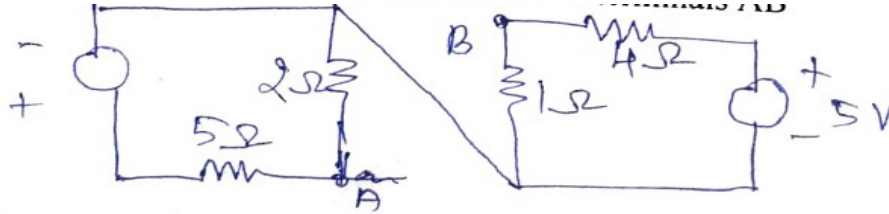12. (a) For the circuit shown in figure, find the current through 30 ohms CO3-App (16)
load resistor using Norton's theorem.

Or

U3403

(b) Determine the Thevenin's equivalent circuit between the terminals   CO3- App   (16)
     AB in the given network.

13. (a) Obtain the resonant frequency, Q- factor, bandwidth and voltage   CO4- App   (16)
         across the capacitor at resonance for the series RLC circuit having
         R= 7.5 Ω , L = 6µH and C = 40pF, with a Supply voltage of 0.5
         volts

                                    Or

    (b) Explain and derive the relationship for bandwidth and half power   CO4- App   (16)
         frequencies of RLC series circuit.

14. (a) A series circuit consists of R-L in series with switch and supply   CO5-App   (16)
         voltage E. Derive the transient current i(t) when the switch is
         closed at t=0.

                                    Or

    (b) Derive the DC response of the series RLC circuit. Assume that   CO5-App   (16)
         inductance and capacitance are initially uncharged

15. (a) Prove that the 'g'-parameter are the inverse of h-parameters.   CO6-E   (16)
                                    Or
    (b) Derive the expression for Z-parameters in terms of Y-parameters.   CO6-E   (16)