Question Paper

MANIPAL ACADEMY OF HIGHER EDUCATION

THIRD SEMESTER B.TECH END SEMESTER EXAMINATIONS, DEC 2022
NETWORK ANALYSIS [BME 2154]

Marks: 50   **Duration: 180 mins.**
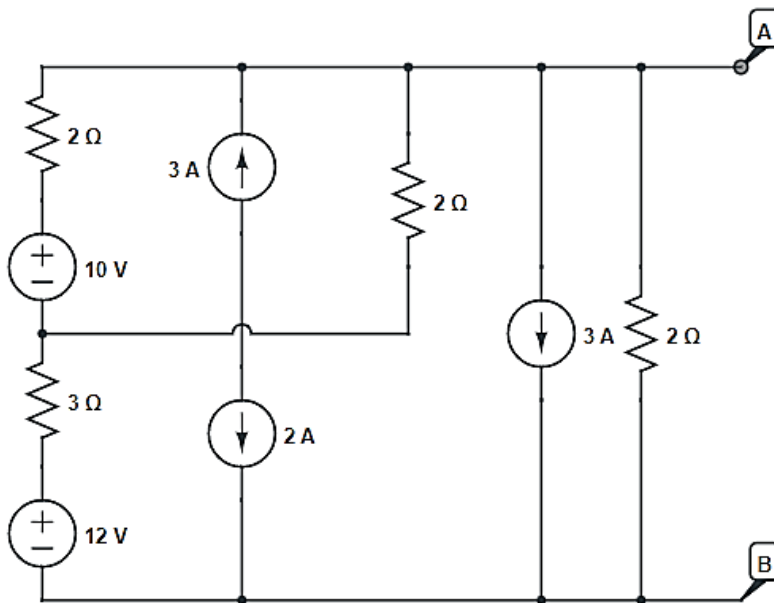
A

Answer all the questions.

Instructions to Candidates: Answer ALL questions Missing data may be suitably assumed
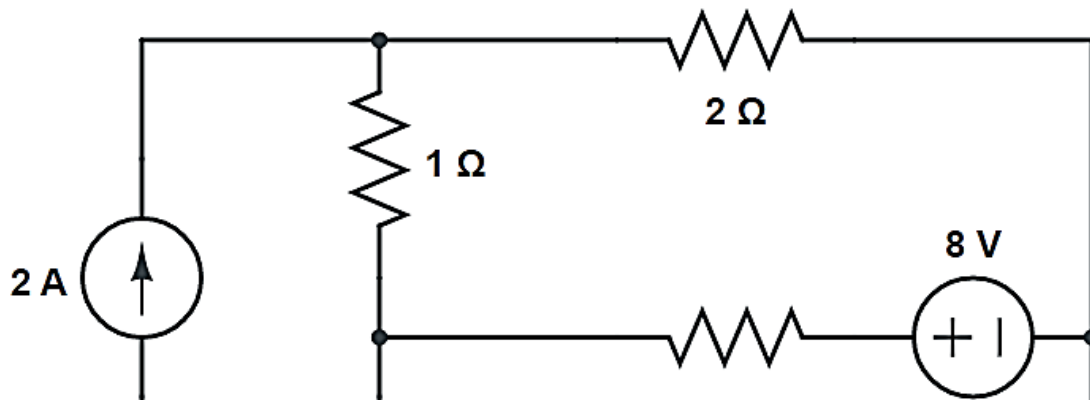
1)   For the network shown apply source transformation and reduce the network with a single voltage source in series with a single resistance   (3)
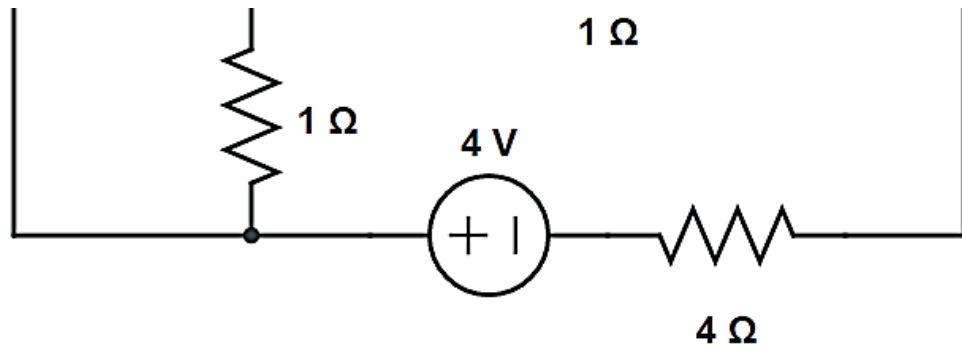   between the terminals AB. Clearly indicate each step in the process of transformation.
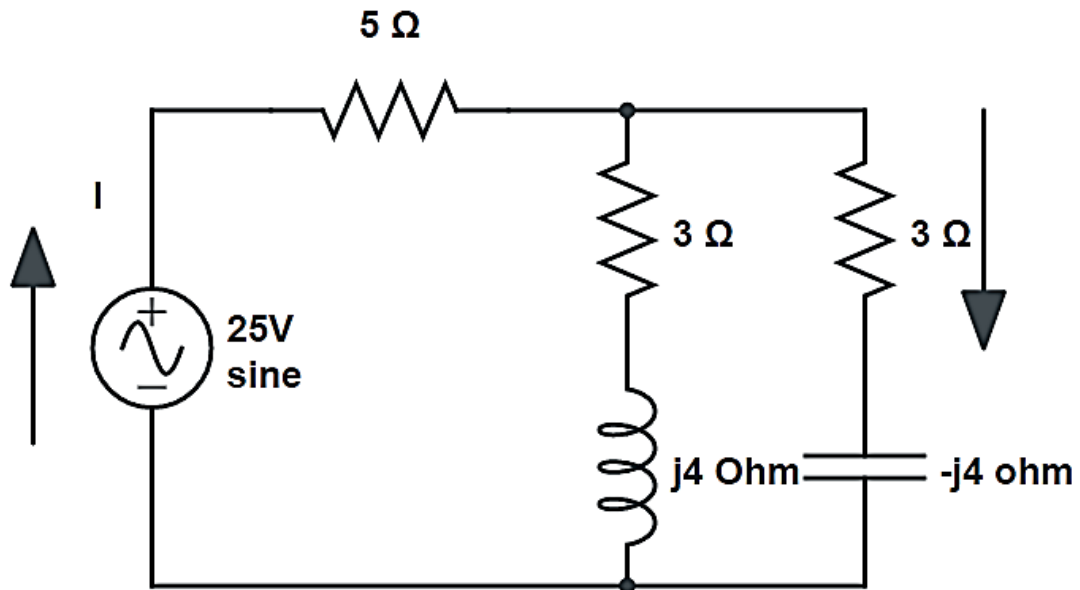
   A)

   B)   In the circuit shown calculate the power dissipated in each resistor, apply loop analysis to solve the network.   (3)
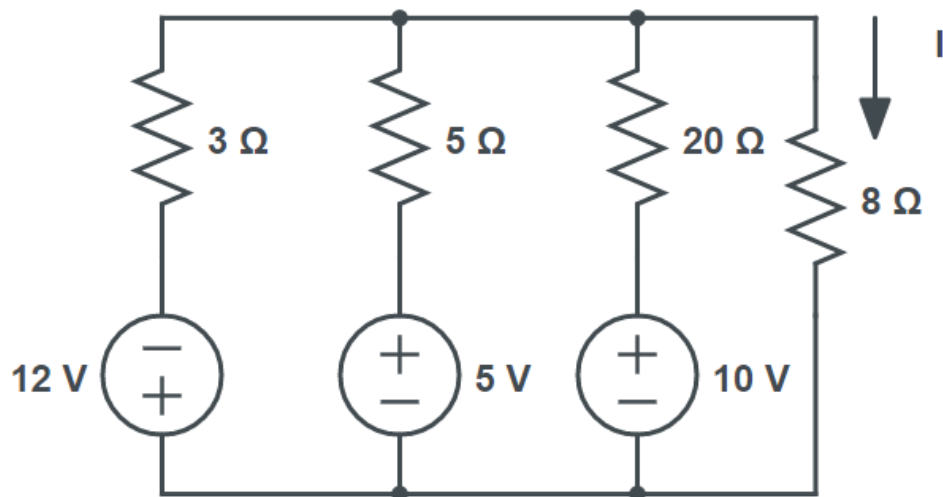
1 Ω

1 Ω

4 V

4 Ω

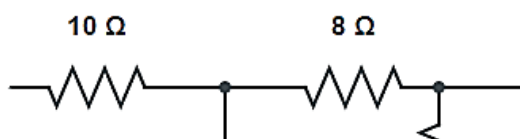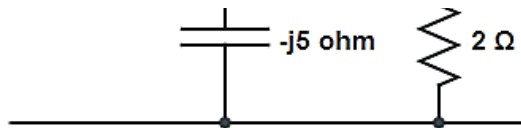C)   Apply and verify the reciprocity theorem to calculate the current I in (3-4j) ohm impedance.   (4)

5 Ω

I

25V
sine

3 Ω   3 Ω

j4 Ohm   -j4 ohm

2)   Apply and verify Millmans theorem, calculate the current I and power dissipated in 8 ohm resistor.   (3)

A)

3 Ω   5 Ω   20 Ω
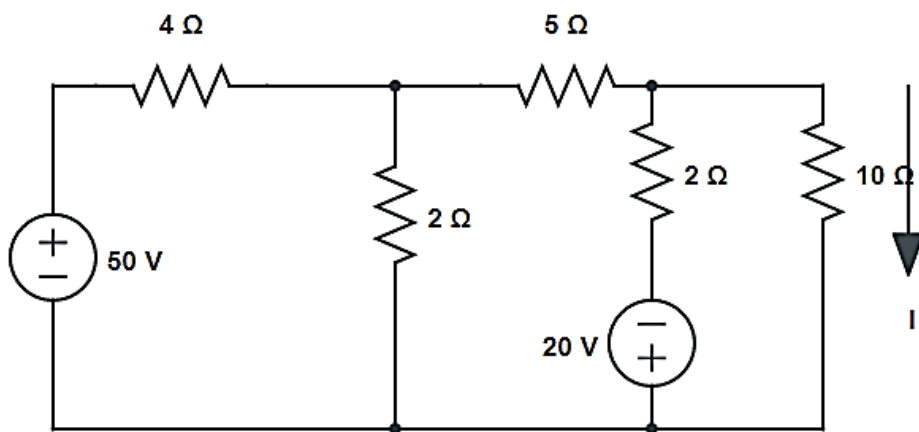
I

8 Ω

12 V   5 V   10 V

B)   Obtain the delta equivalent circuit by doing the transformation.   (3)
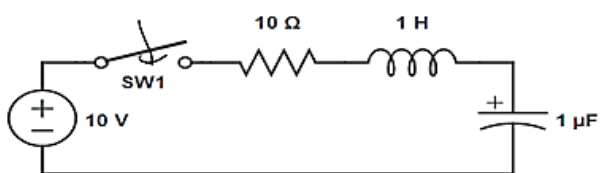

10 Ω   8 Ω

-j5 ohm   2 Ω

C)   Apply Thevenins Theorem to calculate current I in 10 ohm resistor.   (4)

3)   For the network shown the switch is closed assuming all initial conditions as zero, calculate I, di/dt and d²i/dt² at t=0+.   (3)

A)

B)   For the circuit shown the capacitor is initially charged to a voltage V0= 1V for t< 0. At t=0 switch is closed. Obtain the current i(t) using Laplace transform and sketch the waveform.   (4)
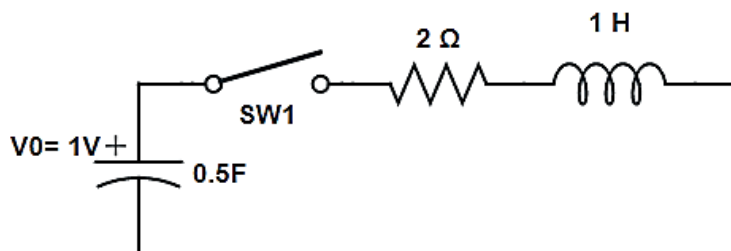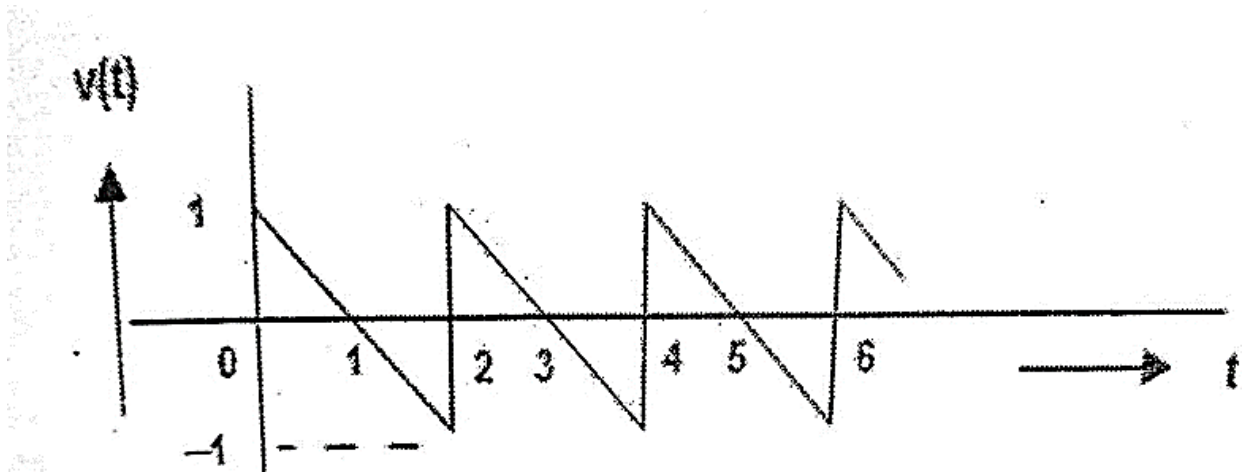

C)   State and prove Initial value and Final value theorem.   (3)

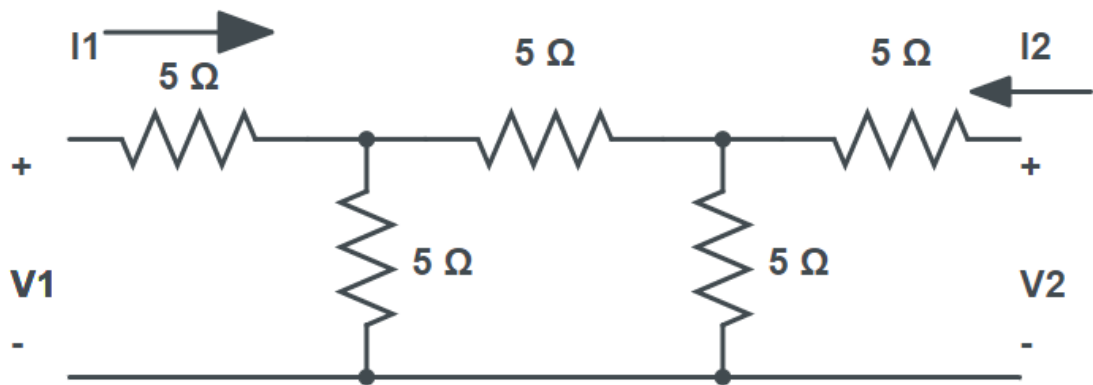4)   Derive the inverse Laplace transform of: 5 s   (3)

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

B) Determine the Laplace transform for the periodic waveform. (4)

C) Determine Laplace transform of $f(t) = \sin wt$. (3)

5) For the circuit shown obtain the Z parameters. (3)

A)

B) Derive and represent the equivalent circuit of Y parameters. (4)

C) Derive the expression of $G_{12}(s) = V_2(s)/V_1(s)$. (3)

V1

I2

V2

-----End-----