B.E. Instrumentation Engineering Third Semester

IN303 - Network Theory

P. Pages : 4 **GUG/W/18/1510**

Time : Three Hours Max. Marks : 80

Notes :
1. All questions carry marks as indicated.
2. Due credit will be given to neatness and adequate dimensions.
3. Assume suitable data wherever necessary.
4. Illustrate your answers wherever necessary with the help of neat sketches.

1. a) Determine the voltages at each node for the circuit shown in fig. 1(a) **8**

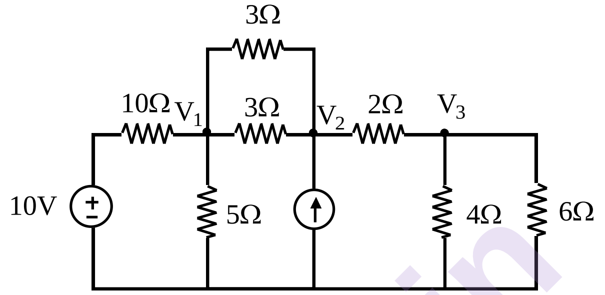

Fig. 1 (a)

b) For the circuit shown in fig. 1(b), Find the current passing through 5Ω resistor. **8**

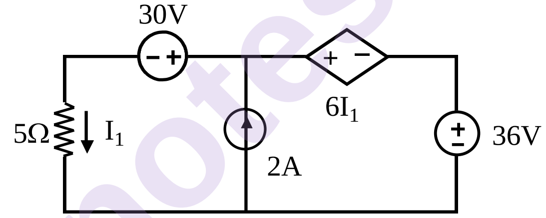

Fig. 1 (b)

OR

2. a) Determine the current in the 5Ω resistor for the circuit shown in Fig. 2(a). **8**

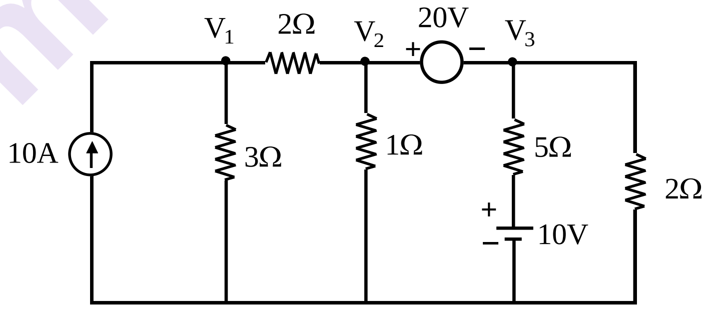

Fig. 2 (a)

b) Use mesh analysis to find V_x in the circuit as shown in fig. 2(b) **8**

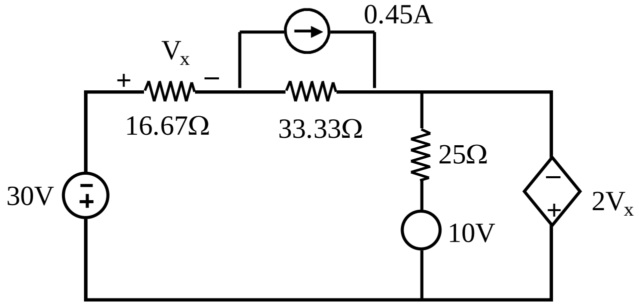

Fig. 2 (b)

3. a) Determine the current flowing through the 5Ω resistor in the circuit shown in Fig. 3(a) by using Norton's theorem. **8**

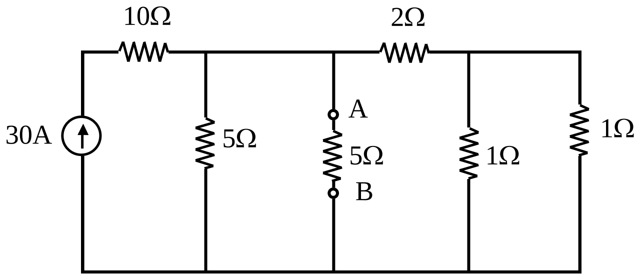

Fig. 3 (a)

b) State the Tellegen's theorem. verify Tellegen's theorem for the fig. 3(b) **8**

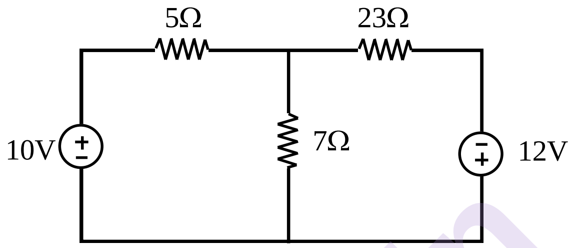

Fig. 3 (b)

OR

4. a) State superposition theorem. Determine the current I in the circuit shown in Fig. 4(a) using superposition theorem. **8**

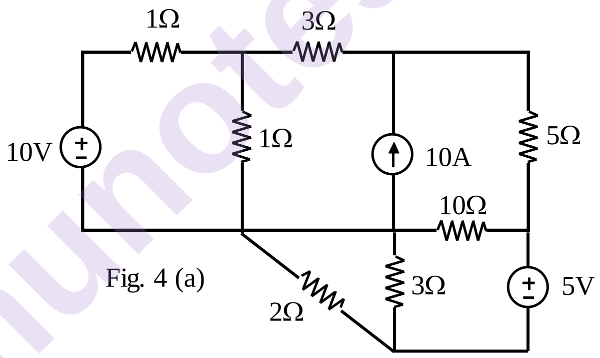

Fig. 4 (a)

b) Verify the reciprocity theorem in the circuit shown in fig. 4 (b) **8**

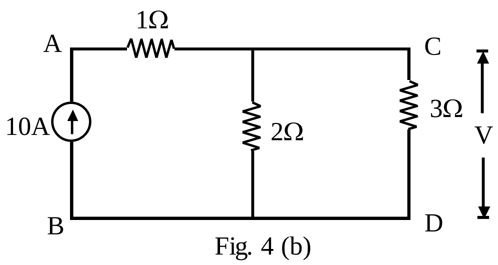

Fig. 4 (b)

5. a) Derive the expression for impedance z, for the circuit shown in Fig. 5(a) Also draw the impedance diagram. **8**

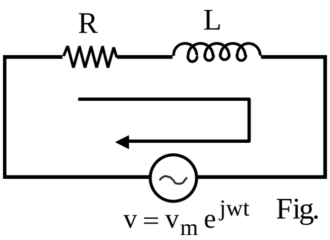

Fig. 5 (a)

b) For the circuit shown in Fig. 5(b), determine Thevenin's equivalent between the output terminals. **8**

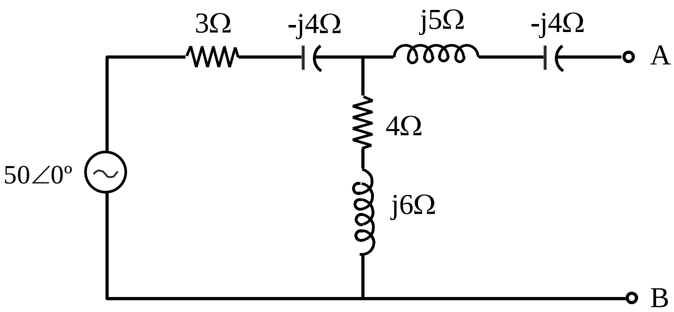

Fig. 5 (b)

OR

6. a) Determine the value of the voltage source and power factor in the following network if it delivers a power of 100W to the circuit shown in fig. 6(a). Find also the reactive power drawn from the source. **8**

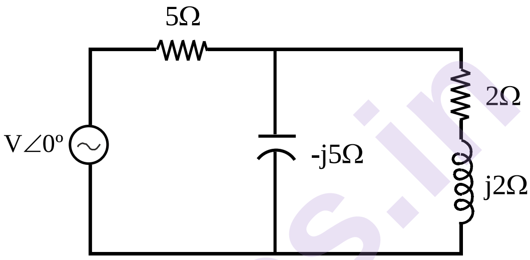

Fig. 6 (a)

b) Derive the condition for maximum power transfer for the circuit excited by a. c. supply using maximum power transfer theorem. **8**

7. a) Obtain the d. c. response of an R – C circuit shown in fig. 7(a) **8**

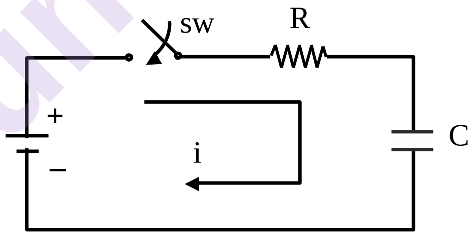

Fig. 7 (a)

b) The circuit shown in fig. 7(b) consists of resistance, inductance and capacitance in series with a 100V constant source when the switch is closed at t = 0. Find the current transient. **8**

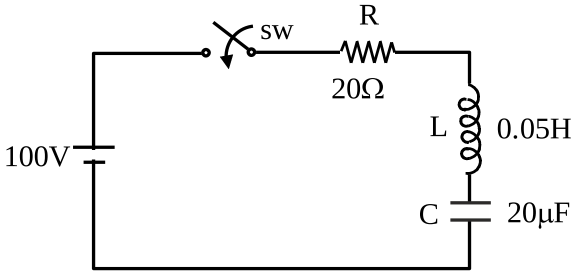

Fig. 7 (b)

OR

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8. a) In the circuit shown in fig. 8(a) determine the complete solution for the current when switch 's' is closed at t = 0. Applied voltage is $v(t) = 50\cos(10^2 t + \pi/4)$ resistance R = 10Ω & Capacitance C = 1μF **8**

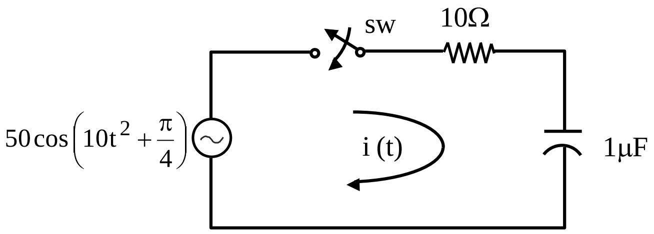

Fig. 8 (a)

b) Obtain the d. c. response of current in the an RLC circuit shown in fig. 8 (b) **8**

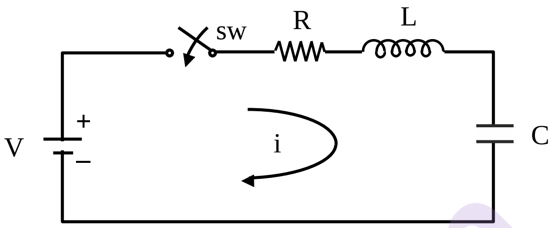

Fig. 8 (b)

9. a) Define the Fourier transform. Determine the Fourier transform of the signal shown in fig. 9(a) **8**

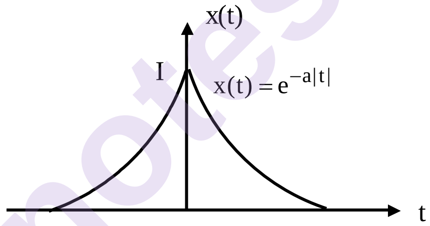

Fig. 9 (a)

b) Find the complex Fourier series for the square wave shown in fig. 9(b) **8**

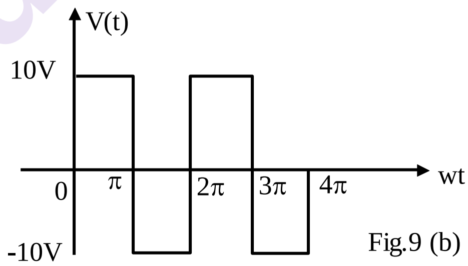

Fig.9 (b)

OR

10. a) For the circuit shown in fig. 10(a), Find the output voltage $V_0(t)$ by using the Fourier transform method. **8**

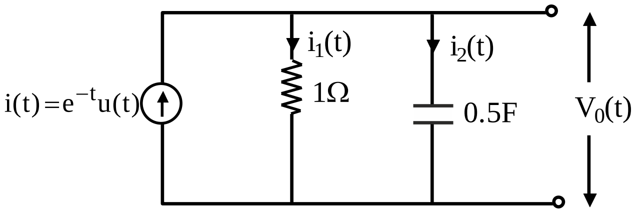

Fig. 10 (a)

b) Find the Fourier series expansion for even and odd functions. **8**

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