Department of ECE, Bennett University

EECE105L: Fundamentals of Electrical and Electronics Engineering

Tutorial Sheet-7

Topics Covered: Superposition Theorem (Principle of Superposition)

1. Using superposition theorem, find the current flowing through 12 Ω resistance in fig. 1.

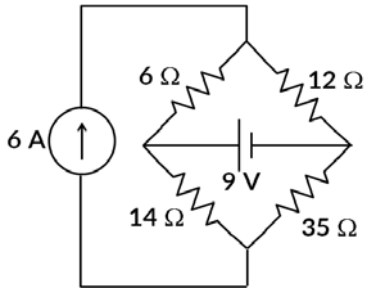

Fig. 1

2. Using superposition principle (superposition theorem), in the circuit shown in fig. 2, find the current flowing through 2 Ω resistance.

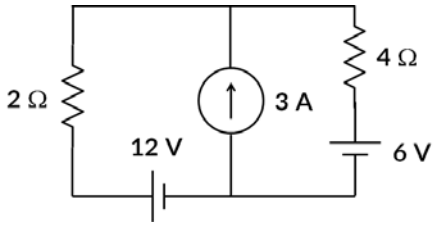

Fig. 2

3. Using superposition theorem, for the circuit shown in fig. 3, determine the voltage across the 4.7 Ω resistor and power delivered to the resistor. Find the power delivered to 4.7 Ω resistor solely by voltage source and solely by current source. What are your observations and reasons for discrepancies if any.

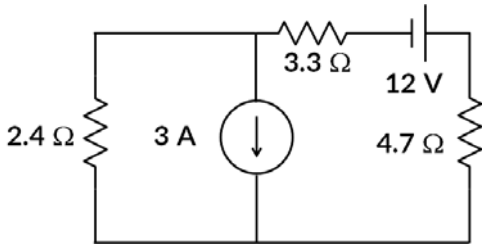

Fig. 3

4. Using superposition theorem, find the current through 56 Ω resistor for the circuit in fig. 4.

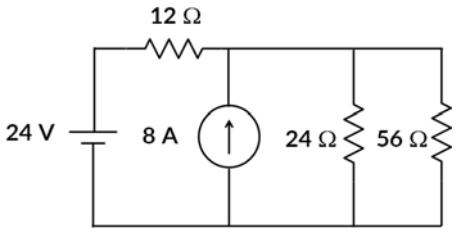

Fig. 4

5. Using superposition theorem, for the 24 V source shown in fig. 5, find the current through and power consumed or delivered by the 24 V source.

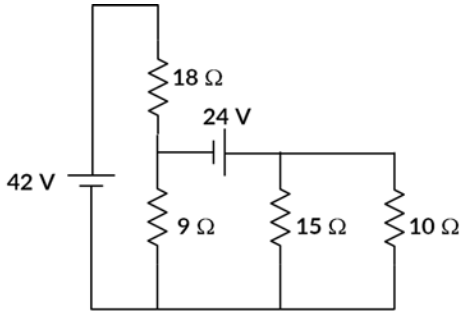

Fig. 5

6. Find the voltage across 6 A source shown in fig. 6.

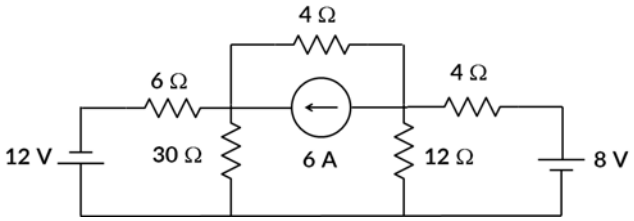

Fig. 6

7. For the circuit shown in fig. 7, using superposition theorem, find the power consumed by 6 Ω resistor.

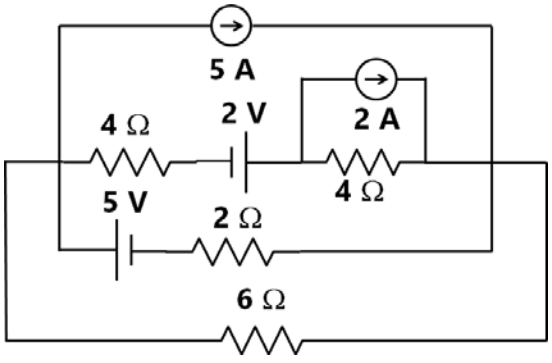

Fig. 7

8. For the circuit shown in fig. 8, using superposition theorem, find the power consumed by 3 Ω resistor and 1 Ω resistor.

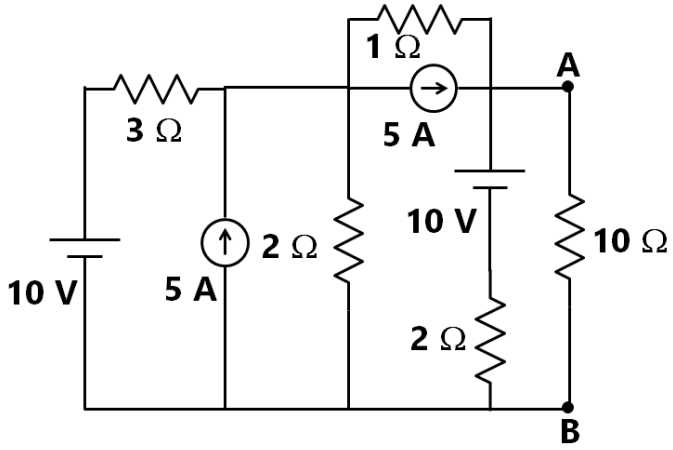

Fig. 8

9. For the circuit shown in fig. 9, using superposition theorem, find the power consumed by 1 Ω resistor and 20 Ω resistor.

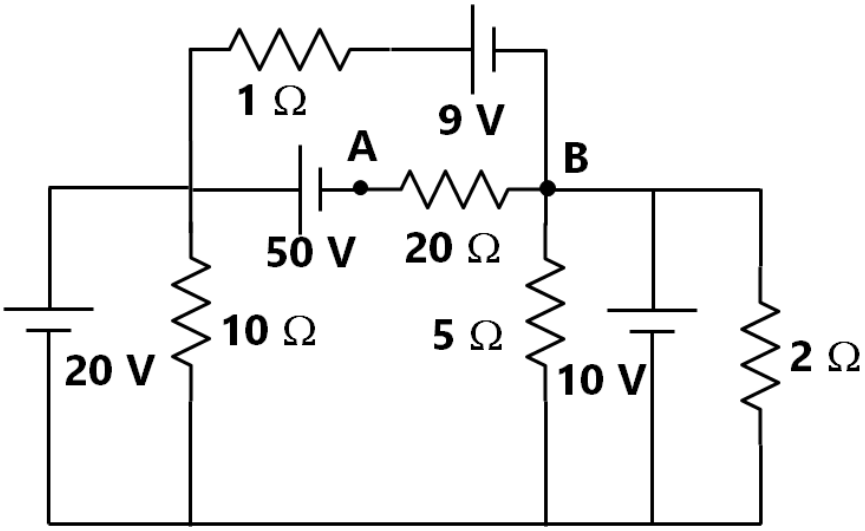

Fig. 9

---------- END OF QUESTIONS ----------

Answers:

Superposition Theorem

1) I(6 mA) = 2 A, I(9 V) = 0.5 A, I = 2.5 mA
2) I(3 A) = 1 A, I(12 V) = 2 A, I(6 V) = -2 A, I = 1A

3) V(3 A) = -3.25 V, P(3 A) 2.24 W; V (12 V) = 5.53 V, P(12 V) = 8.78 W, P = 1.106 W
4) I(24 V) = 0.25 A, I(8 A) = 1 A, I = 1.25 A
5) I(42 V) = 1.17 A, I(24 V) = 2 A, I = 3.17 A, P = 76.08 W
6) V_{S1}(12 V) = -3.34 V, V_{S2}(8 V) = -2 V, V_{S3}(3 A) = -16 V, V = 10.66 V
7) I(5 A) = 1.05 A, I(2 A) = 0.21 A, I(2 V) = 0.042 A, I(5 V) = -0.526 A, I = 0.776 A, P = 3.61 W
8) For 3 Ω: I(10 V) = 2.41 A, I(10 V) = -0.864 A, I(5 A) = -1.38 A, I(5 A) = 0.516 A, $I_{3\Omega}$ = 0.682 A, $P_{3\Omega}$ = 1.4 W
   For 1 Ω: I(10 V) = 1.03 A, I(10 V) = -2.16 A, I(5 A) = 1.55 A, I(5 A) = -3.71 A, $I_{1\Omega}$ = -3.29 A, $P_{1\Omega}$ = 10.82 W
9) For 20 Ω: I(20 V) = 1 A, I(10 V) = -0.5 A, I(9 V) = 0 A, I(50 V) = -2.5 A; I = 2 A, $I_{20\Omega}$= -2 A, $P_{20\Omega}$ = 80 W
   For 1 Ω: I(20 V) = 20 A, I(10 V) = -10 A, I(9 V) = -9 A, I(50 V) = 0 A; I = 1 A, $I_{20\Omega}$= -2 A, $P_{1\Omega}$ = 1 W