

ELEMENTS OF ELECTRICAL ENGINEERING

Course Code : UE25EE141A/B



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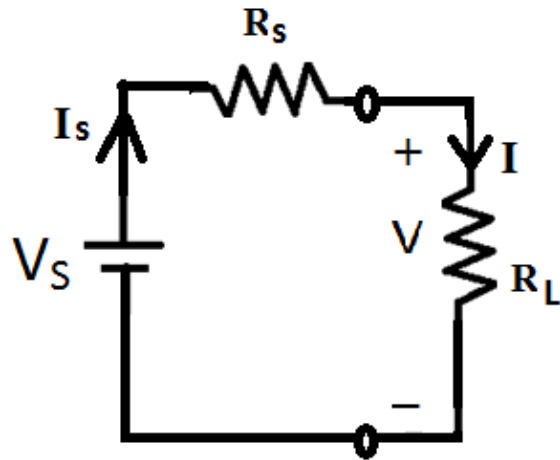
Numerical Examples – Practical source and Source Transformation

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A battery of EMF 12V and internal resistance of 0.05Ω supplies power to a load resistance R_L . Determine the % change in load voltage as load resistance varies from 10Ω to 100Ω .

Solution:



Case 1: $R_L = 10\Omega$

$$V = \frac{V_S \cdot R_L}{(R_S + R_L)} = 11.94V$$

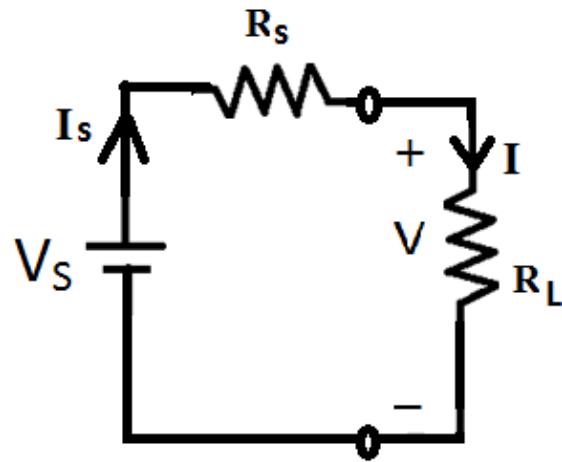
(By Voltage Division)

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Numerical Example on Practical Sources



Solution (Continued..):

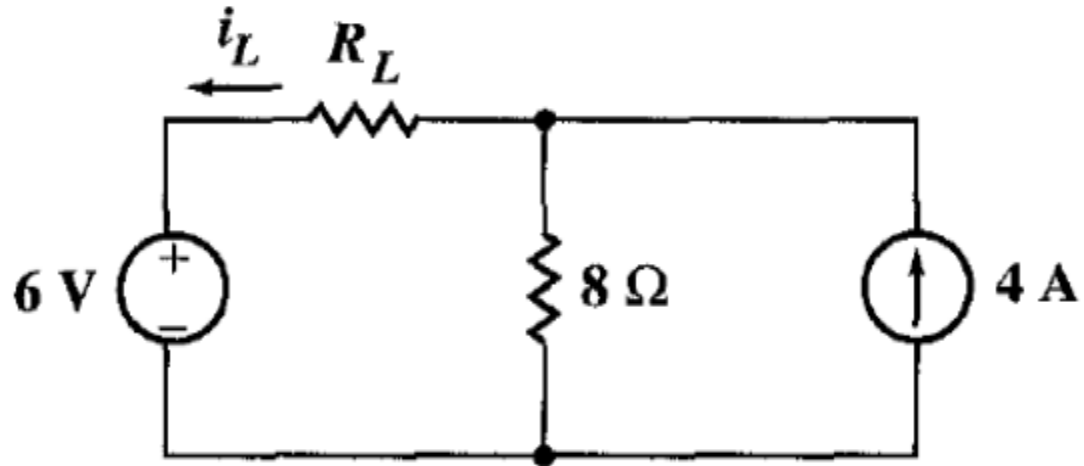


Case 2: $R_L = 100\Omega$

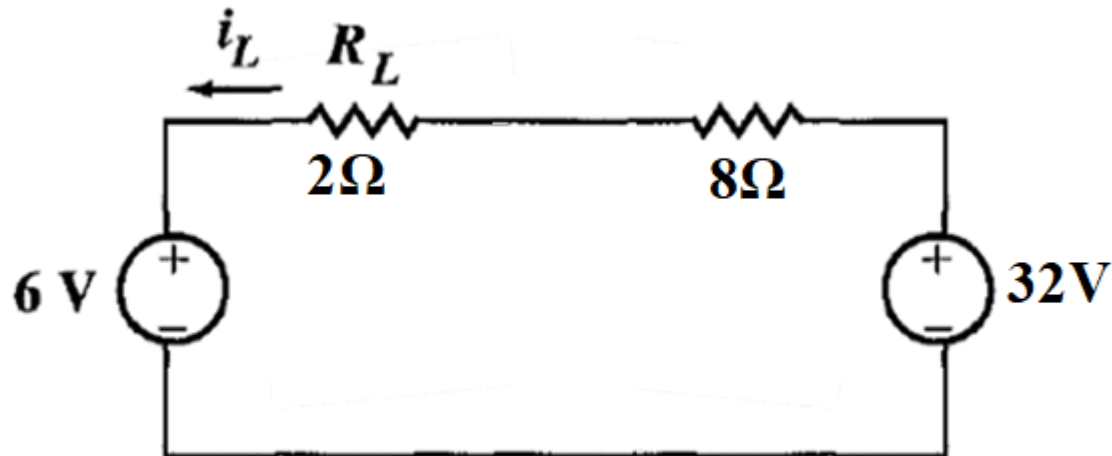
$$V = \frac{V_S * R_L}{(R_S + R_L)} = 11.99V$$

$$\% \text{ Change in the load voltage} = \frac{(11.99 - 11.94)}{11.94} * 100 = 0.42\%$$

Using source transformation find the current I_L when $R_L = 2\Omega$.



Solution:



By applying KVL

$$32 - 10I_L - 6 = 0$$

$$I = 2.6\text{A}$$

Q. Two batteries A and B are connected in parallel and a load of 10Ω is connected across them. Battery A has an emf of 9V and internal resistance of 0.5Ω and B has an emf of 12V and internal resistance of 1Ω . Determine i) the magnitude and the direction of current flowing through load resistance, ii) current supplied by each battery and iii) potential difference across the load resistance.

Text Book:

1. “Basic Electrical Engineering” S.K Bhattacharya, 1stEdition Pearson India Education Services Pvt. Ltd., 2017
2. “Basic Electrical Engineering”, D. C. Kulshreshta, 2ndEdition, McGraw-Hill. 2019
3. “Special Electrical Machines” E G Janardanan, PHI Learning Pvt. Ltd., 2014

Reference Books:

1. “Engineering Circuit Analysis” William Hayt, Jack Kemmerly, Jamie Phillips and Steven Durbin, 10th Edition McGraw Hill, 2023
2. “Electrical and Electronic Technology” E. Hughes (Revised by J. Hiley, K. Brown & I.M Smith), 12th Edition, Pearson Education, 2016.



THANK YOU

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