$$R = \frac{E_i - E_o}{I_Z + I_{L\,max}}$$

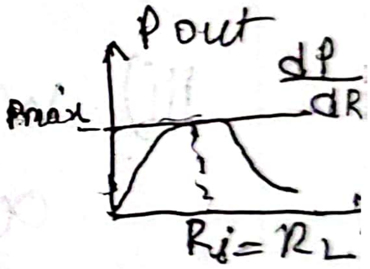
chapter-1

~~Ex-1.1~~

Maximum power transfer theorem

Maximum power is transferred from a source to a load when the load resistance is made equal to the internal resistance of source

$$I = \frac{V_{th}}{R_{th} + R_L}$$



$$P = I^2 R_L$$

$$P = \left(\frac{V_{th}}{R_{th} + R_L}\right)^2 R_L$$

$$\frac{dP}{dR_L} = 0$$

$$\Rightarrow \frac{d}{dR_L}\left(\frac{V_{th}^2}{(R_{th}+R_L)^2} \times R_L\right) = 0 \Rightarrow V_{th}^2 \frac{d}{dR_L}\left(\frac{R_L}{(R_{th}+R}\right.$$

$$\Rightarrow V_{th}^2 \left[\frac{(R_{th}+R_L)^2 - 2R_L(R_{th}+R_L)}{(R_{th}+R_L)^4}\right] = 0$$

$$(R_{th} + R_L)^2 - 2R_L(R_{th} + R_L) = 0$$

$$\Rightarrow (R_{th} + R_L)^2 = 2R_L(R_{th} + R_L)$$

$$\Rightarrow R_{th} + R_L = 2R_L$$

$$\Rightarrow R_{th} = R_L$$

Load resistance = internal resistance

<u>Ex-1.5</u>

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Questionsolve 20-21

1 a) The electrons in the outermost orbit of an atom are known as valance electrons. on the basis of electron conductivity material are genarally classified conductor insulator semiconductors

Conductor

When the number of valence electron less than 4 the matirial is usally a Metal and a conductor

Ex: sodiam, magnesium.

Insulator

when the number of valence electron of an atom is more than 4, the material is usally a non-metal and an insulator.

Ex. nitrozen, Salphar

Semiconductor

When the number of valence electron of an atom is 4, the material has both metal

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and non-metal properties and is usually a semiconductor. Examples are carbon, silicon, germanium.

~~b) A direct voltage source is a device that pro~~

b) There are two type of voltage source

i) Direct voltage source

ii). Alternative voltage source

i) <u>Direct Voltage source</u>

A direct voltage source is provide a constant voltage output with a fixed polarity meaning the positive and negative terminals remain fixes. ~~Ex~~

Example: battery cells, dc genarators.

When a load resistance connected a direct current flow from the positive terminal to the negetive terminal throug the load

GOOD LUCK

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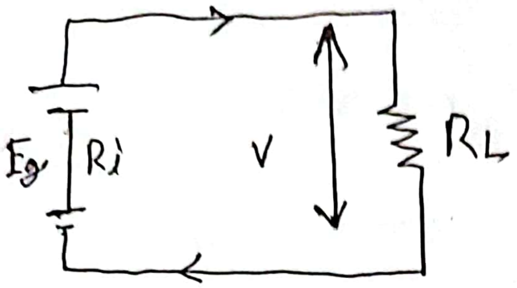
Figure



equation

Load current, $I = \frac{E_g}{R_L + R_i}$

Terminal voltage $V = E_g - IR_i$ or IR_L

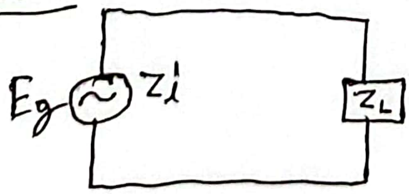
ii) Alterchating ~~current~~ voltage source

A device which prodces alternating voltage output continuously is know as alternating voltage sorce. ~~An~~

Ex. ac generator.

An the important charactoristics of altornating voltage source is that is priodicly reverse polarity of the output voltage.

Figure:



equation:

Load current $I(r.m.s) = \frac{E_g}{Z_i + Z_L}$

Terminal voltage, $V = (E_g - IZ)$ or IZ_L

c) book ex- 1.1

$E_g = 24V$

$r_i = 0.01\Omega$

Power = 100 watts

$P = E_g \times I$

$I = \frac{~~24~~ 100}{~~100~~ 24} = 4.17 A$

(i) voltage drop internal resistance $= 4.17 \times 0.01$

~~= 0.017V~~

$= 0.0417V$

(ii) Terminal voltage drop $= 24 - 0.0417V$

$= 23.96V$