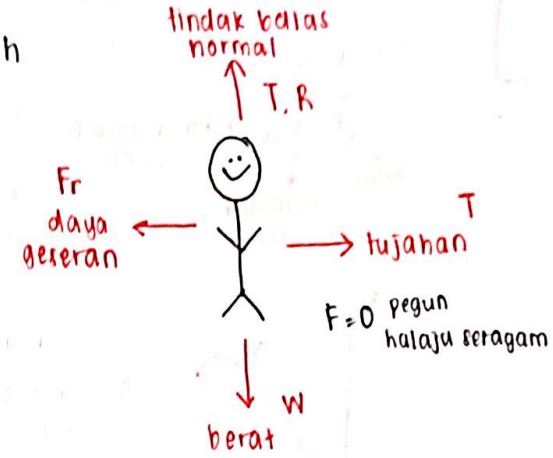
bab 1 : daya & gerakan II

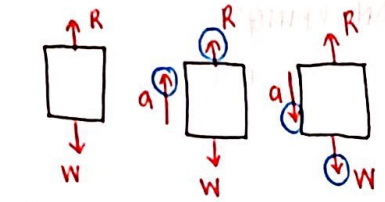
daya paduan

- daya bersih



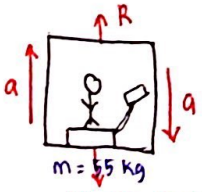
- aplikasi ($F = ma$)

① lif



pegun	ke atas	ke bawah
$R = W$	$R - W = ma$	$W - R = ma$
	$R = ma + W$	$R = W - ma$
	$R = ma + mg$	$R = mg - ma$

contoh soalan :



Berapakah bacaan penimbang ?

a) bergerak ke atas $2\ ms^{-2}$

b) bergerak ke bawah $3ms^{-2}$

a) $R - W = ma$

$R = W + ma$

$= mg + ma$

$= 55(9.81) + (55)(2)$

$= 649.55\ N$ #

b) $W - R = ma$

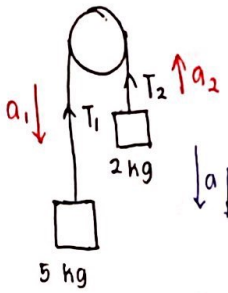
$R = W - ma$

$= mg - ma$

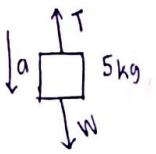
$= (55)(9.81) - (55)(3)$

$= 374.55\ N$ #

② takal



Apabila beban dilepaskan, hitung nilai pecutan.



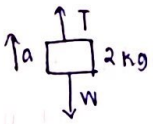
$W - T = ma$

$T_1 = W - ma$

$= mg - ma$

$= (5)(10) - 5a$

$= 50 - 5a$ —①



$T - W = ma$

$T_2 = mg + ma$

$= 20 + 2a$ —②

$T_1 = T_2$

$a_1 = a_2$

$50 - 5a = 20 + 2a$

$50 - 20 = 5a + 2a$

$7a = 30$

$a = 4.29\ ms^{-2}$ #

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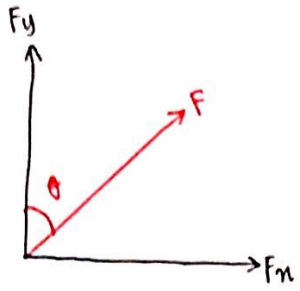
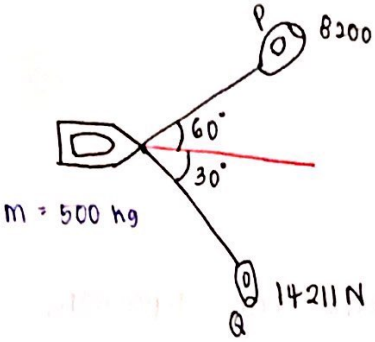
leraian daya



CR's Law
di mana θ berada paksi itu cos

$F_x = F\sin\theta$
$F_y = F\cos\theta$

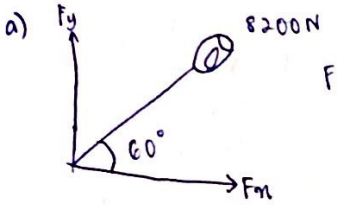
contoh soalan :



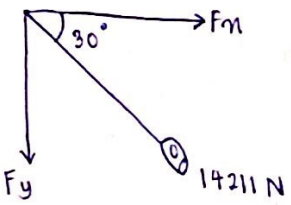
Hitung :
a) daya paduan ~~pakutan~~ bot
b) pecutan bot
[$g = 10 ms^{-2}$]

penyelesaian :

a)



$F_x = F\cos\theta$
$= 8200\cos 60°$
$= 4100\ N$



$F_x = F\cos\theta$
$= 14211\cos(30)$
$= 12307.09\ N$

∴ daya paduan = 4100 + 12307.09
= 16407.09 N #

b) $F = ma$

$16407.09 = 500a$

$a = 32.81 ms^{-2}$ #

* m = kg
* W = mg (N) / ($kgms^{-2}$)

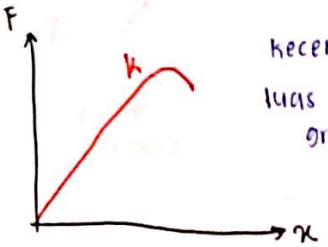
kekenyalan

- sifat sesuatu benda untuk kembali ke bentuk asal selepas dikenakan daya

* HUKUM HOOKE

k (pemalar spring)
- nak tahu kekerasan bahan
- nak tahu jenis bahan

$F = kx$
F → daya
x → pemanjangan spring
k → pemalar spring

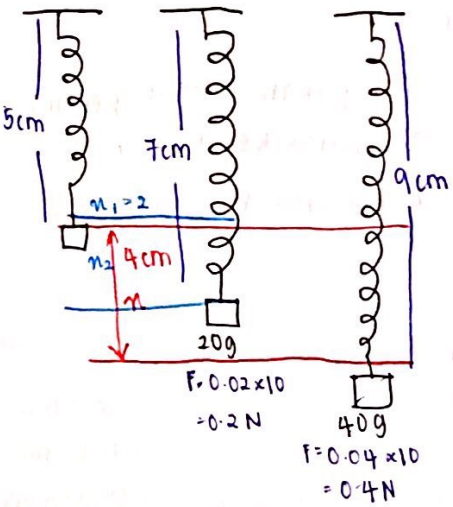


kecerunan = nilai k
luas bawah graf = tenaga keupayaan kenyal

$E_p = \frac{1}{2}kx^2$

FAKTOR KEKENYALAN SPRING
① jenis bahan
② panjang spring
③ diameter gegelung
④ ketebalan dawai
⑤ susunan spring

contoh soalan :
Jika beban ditukarkan ke 40 kg, hitung pemanjangan spring. [$g = 10 ms^{-2}$]



$F = kx$
$k = \frac{F}{x}$
$k_1 = k_2$
$\frac{F_1}{x_1} = \frac{F_2}{x_2}$

$\frac{0.2N}{2cm} = \frac{0.4N}{x}$

$x_2 = 4\ cm$ #

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bab 2 : tekanan

pepejal

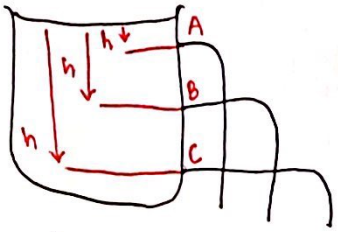
$P = \frac{F}{A}$ ↑ daya, ↓ luas permukaan

- daya per unit luas

tekanan

cecair

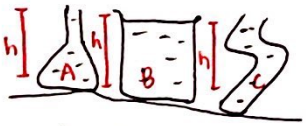
$P = \rho gh$ → graviti, → kedalaman, ↓ ketumpatan



$h_C > h_B > h_A$

$P_C > P_B > P_A$

$\rho = \frac{m}{V}$ kgm^{-3}



$h_A = h_B = h_C$

$P_A = P_B = P_C$

gas

- tekanan ỹ terhasil hasil drpd tekanan atmosfera
- nilai tekanan atmosfera

1 atm = 76 cm Hg (merkuri)
= 10m air
= 1.0×10^5 Pa

prinsip pascal

- tekanan ỹ dikenakan dlm suatu sistem tertutup adalah ~~h~~ sama ke semua arah.

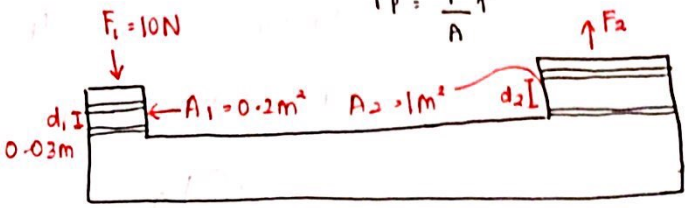
$P_1 = P_2$

$\frac{F_1}{A_1} = \frac{F_2}{A_2}$

$A_1 d_1 = A_2 d_2$

F = daya
P = tekanan
A = luas permukaan
d = sesaran ỹ dilalui ō ombak

↑ $P = \frac{F}{A}$ ↑



a) $F_2 = ?$

$\frac{F_1}{A_1} = \frac{F_2}{A_2}$

$\frac{10}{0.2} = \frac{F_2}{1}$

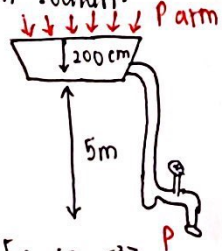
$F_2 = 50$ N #

b) $d_2 = ?$

$(0.2)(0.03) = (1)d_2$

$d_2 = 0.006$m #

① cth soalan:



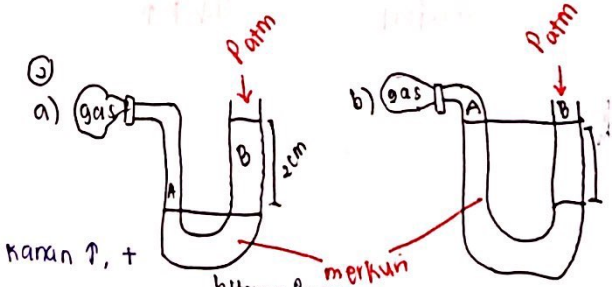
[$g = 10 ms^{-2}$]

$P = \rho gh + P_{atm}$

$= (1000)(10)(5+2) + 1 \times 10^5$

$= 1.7 \times 10^5$ Pa #

②



hitung Pgas.

a) $P_A = P_B$

$P_B = P_{atm} + h$

$= 76 + 2$

$= 78$

$P = \rho gh$

$= 13600(9.81)(0.78)$

$= 1.04 \times 10^5$ Pa.

b) $P_A = P_B$

$P_B = P_{atm} - h$

$= 76 - 3$

$= 73$ cm Hg #

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prinsip archimedes (terapung)

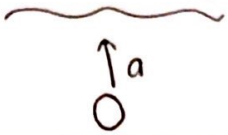
daya apungan

$F_B = \rho g V$ → isipadu air tersesar (m^3)

① terapung

- isipadu air tersesar > isipadu objek
- daya apungan = berat air tersesar

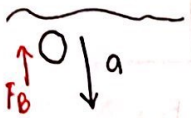
② memecut ke atas



ρ air > ρ objek

F_B > berat objek

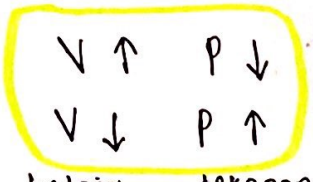
③ memecut ke bawah

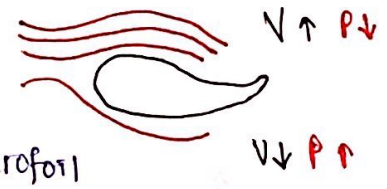


ρ objek > ρ air

F_B < berat objek

prinsip bernoulli





- aerofoil

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bab 3 : elektrik

$Q = It = ne = \frac{W}{V}$

$Q = It$ → masa
- cas
- arus

$I = \frac{Q}{t}$ (arus)

* kadar pengaliran cas
* ammeter (sesiri)

$Q = ne$ → e^- (1.6×10^{-19} C)
- bil. elektron

$Q = \frac{W}{V} = \frac{E}{V}$ → tenaga (J)

$V = \frac{W}{Q}$ → kerja (J)
- beza keupayaan

* kerja yg diperlukan u membawa 1C cas dari satu titik ke titik y lain
* voltmeter (selari)

hukum Ohm

$V = IR$ → rintangan
- beza keupayaan
- arus

$\uparrow R = \frac{V}{I\downarrow}$

FAKTOR² MEMPENGARUHI RINTANGAN

① panjang dawai

panjang ↑ rintangan ↑ arus ↓

② luas keratan rentas

$R \propto \frac{1}{A\uparrow}$ luas ↑ rintangan ↓ arus ↑

③ jenis bahan

tungsten
aluminium
konstantan
kuprum
perak

↑ rintangan semakin tinggi

* tungsten
* suhu tinggi
* panjang
* dawai nipis

④ suhu

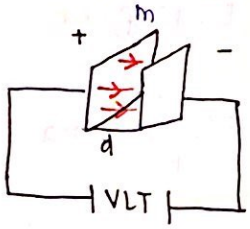
suhu ↑ rintangan ↑

kekuatan medan elektrik

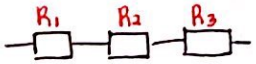
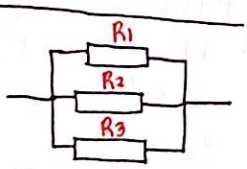
$E = \frac{F}{Q}$ → daya (N)
- NC^{-1}
- cas (C)

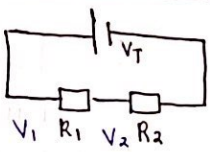
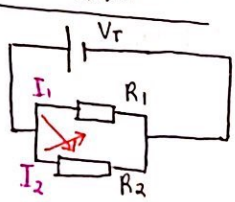
$E = \frac{V}{d}$ → beza keupayaan (V)
- jarak (m)

$\frac{V}{m} = \frac{JC^{-1}}{m} = \frac{Nm\,C^{-1}}{m} = NC^{-1}$ #



petua litar

sesiri	selari
	
$I_T = I_1 = I_2 = I_3$	$V_T = V_1 = V_2 = V_3$
$V_T = V_1 + V_2 + V_3$	$I_T = I_1 + I_2 + I_3$
$R_T = R_1 + R_2 + R_3$	$\frac{1}{R_T} = \frac{1}{R_1} + \frac{1}{R_2} + \frac{1}{R_3}$

sesiri	selari
	
$V_1 = \frac{R_1}{R_1+R_2} \times V_T$	$I_1 = \frac{R_2}{R_1+R_2} \times I_T$
$V_2 = \frac{R_2}{R_1+R_2} \times V_T$	$I_2 = \frac{R_1}{R_1+R_2} \times I_T$

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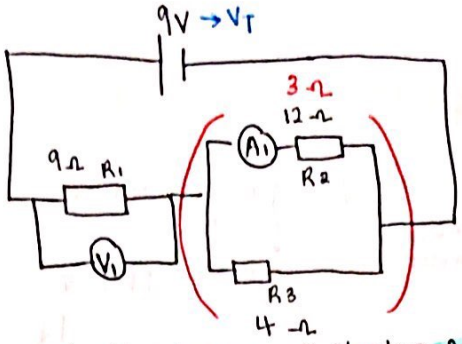
daya gerak elektrik

contoh soalan



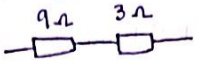
cari nilai bacaan di V_1 dan A_1

$$\frac{1}{R_T} = \frac{1}{12} + \frac{1}{4}$$

$$\frac{1}{R_T} = \frac{1}{3}$$

$$R_T = 3\,\Omega$$

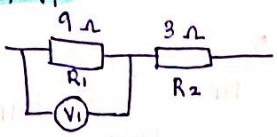
dlm kurungan



$R_T = 9 + 3$

$= 12\,\Omega$

a) V_1



$$V_1 = \frac{9}{9+3} \times 9$$

$= 6.75\,V$ #

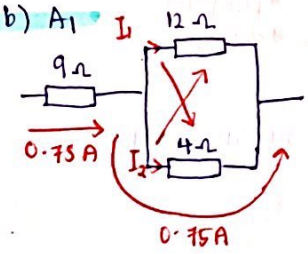
$V = IR$

$I = \frac{V_T}{R_T}$

$= \frac{9}{12}$

$I_T = 0.75A$

b) A_1

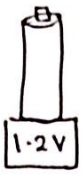


$$I_1 = \frac{4}{4+12} \times 0.75$$

$= 0.1875\,A$ #

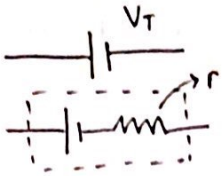
d.g.e = suis terbuka

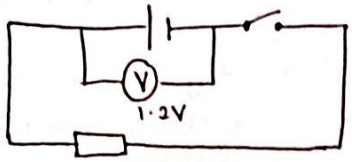
I = tiada arus

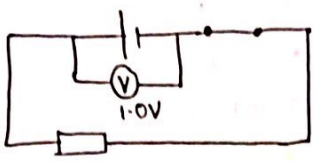


V_T = suis tertutup

= ada arus







* rintangan dalaman

- disebabkan oleh tindak balas kimia dlm bateri

$E = IR + Ir$ → rintangan dalaman

$E = V + Ir$

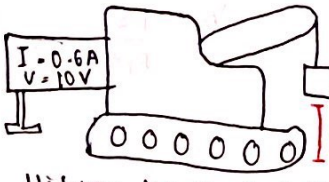
$E = I(R + r)$

kuasa (W)	tenaga (J)
$P = IV$ (power; $V = IR$)	$E = Pt$ → time (energy; power)
$P = I(IR)$	$E = VIt$ time
$P = I^2R$	$E = I^2Rt$ time
$I = \frac{V}{R}$	
$P = \left(\frac{V}{R}\right)V$	$E = \frac{V^2}{R}t$ masa
$P = \frac{V^2}{R}$	

Kecekapan

$$e = \frac{P_{out}}{P_{in}} \times 100\%$$

$$e = \frac{E_{out}}{E_{in}} \times 100\%$$



t = 12 saat.

Hitung kecekapan motor

input

$E = Pt$

$= IVt$

$= (0.6)(10)(12)$

$= 72J$

output

$E = mgh$

$= (0.6)(9.81)(5)$

$= 29.43\,J$

$e = \frac{E_{out}}{E_{in}} \times 100\%$

$= \frac{29.43}{72} \times 100\%$

$= 40.88\%$ #

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bab 4 - elektromagnet

① magnet kekal
- teras besi keras
- tiada arus, tetap ada magnet

② magnet sementara
- teras besi lembut
- ada arus, ada magnet
- tiada arus, tiada magnet

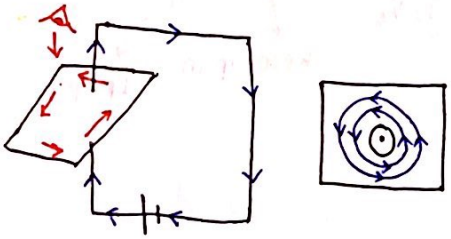
medan magnet

* hukum genggaman tangan kanan

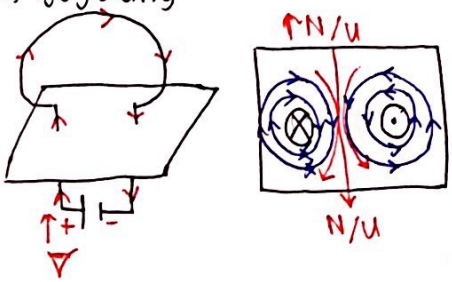
ibu jari - arah arus
4 jari - arah medan magnet

masuk ⊗ keluar ⊙

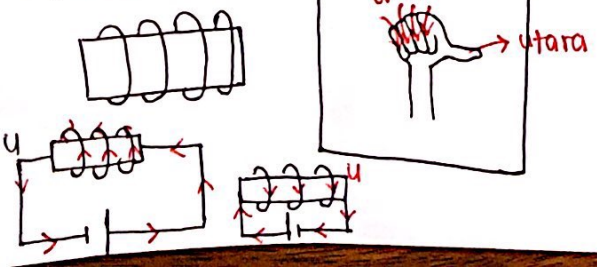
i) dawai lurus



ii) gegelung

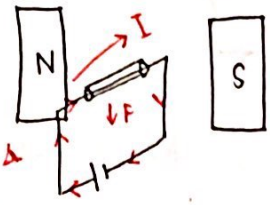


iii) solenoid

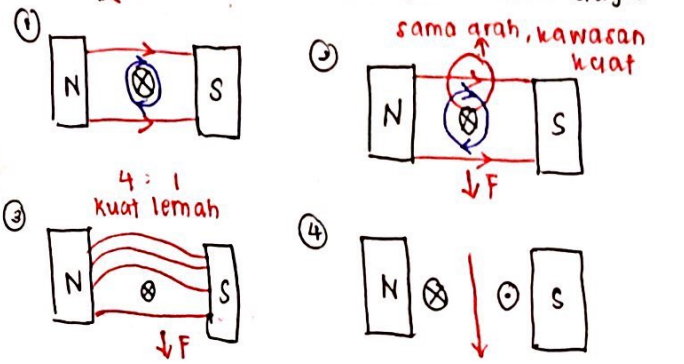


daya konduktor pembawa arus

- daya ini terhasil dipd interaksi antara medan magnet bagi magnet kekal & magnet sementara
- hukum tangan kiri flemming (arah daya)

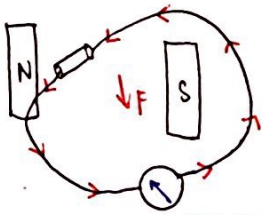


jari telunjuk = kutub U → S
jari hantu = arah arus
ibu jari = arah daya

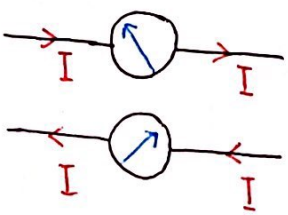


arus aruhan

- terhasil dipd pemotongan flaks magnet



* hukum tangan kanan flemming
jari telunjuk = arah kutub
jari hantu = arah arus aruhan
galvanometer ibu jari = arah daya (arah elektron)



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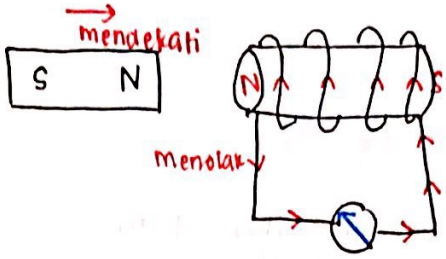
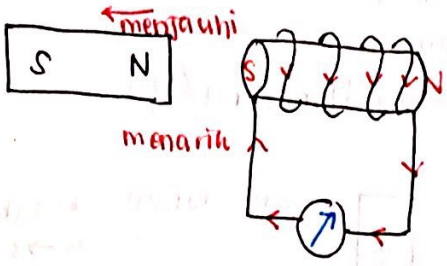
hukum lenz

① 

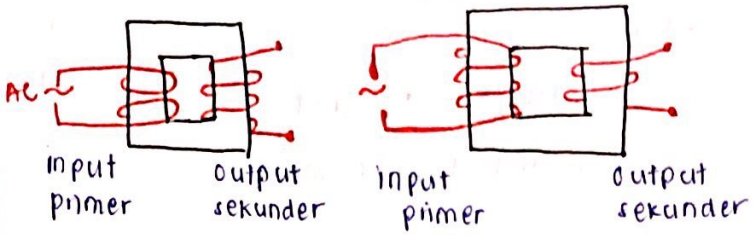
② 

transformer

- meningkatkan & mengurangkan nilai voltan

Injak - naik
tingkatkan voltan

Injak - turun
turunkan voltan



voltan di primer ← $\frac{V_p}{N_p} = \frac{V_s}{N_s}$ → voltan di sekunder

N_p → bilangan gegelung primer

N_s → bilangan gegelung sekunder

transformer unggul

100% kecekapan

$P_{input} = P_{output}$

$I_p V_p = I_s V_s$

$e = \frac{P_{out}}{P_{in}} \times 100\%$

$I_s V_s$ → output

P_{in} → $I_p V_p$

e → kecekapan

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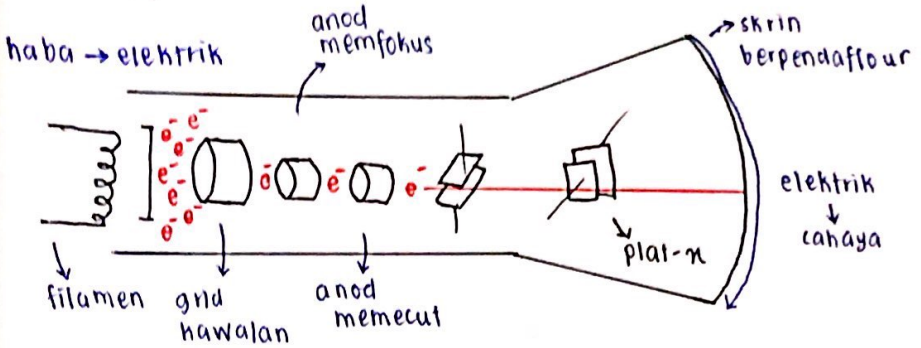
bab 5 : ELEKTRONIK

pancaran termion (proses)

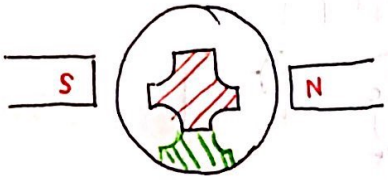
- OSK



katod - bebaskan e^-

anod - terima e^-

palang maltase



tenaga keupayaan kinetik = tenaga kinetik elektron

$eV = \frac{1}{2}mv^2$

- cas e^- : 1.6×10^{-19} C
- beza keupayaan (V)
- jisim e^- : 9.1×10^{-31} kg
- halaju e^-

contoh :

voltan lampau tinggi = 5 kV

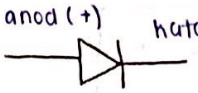
halaju e^- = ?

$(1.6 \times 10^{-19})(5000) = \frac{1}{2}(9.1 \times 10^{-31})(v^2)$

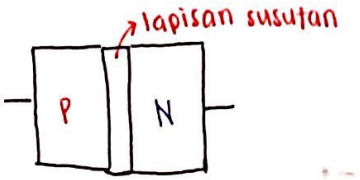
$v = 4.19 \times 10^7 \text{ ms}^{-1}$ #

semikonduktor diod

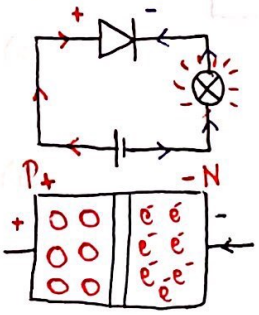
- membenarkan arus mengalir satu arah sahaja
- simbol : anod (+) katod (-)



- rajah :

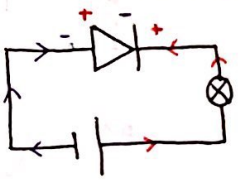


pincang depan :



- arus boleh lalu

pincang songsang :



- arus tak boleh lalu

semikonduktor

- proses memasukkan bendasing ke dalam kekisi hablur semikonduktor u meningkatkan kekonduktiviti-annya.

TRIBIGAP PAFAN

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Semikonduktor

* PENDOPAN
  - proses memasukkan bendasing kedlm kekisi hablur semikonduktor u meningkatkan kekonduktivitiannya

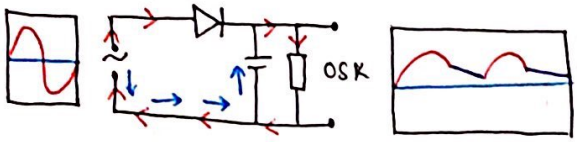
TriBIGAP PAFAN

rektifikasi

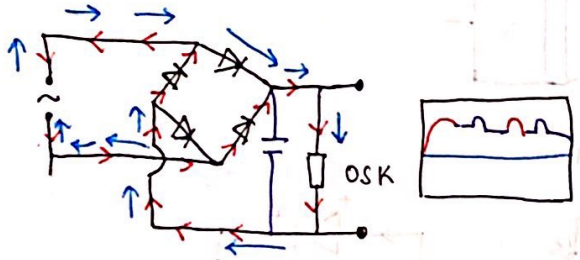
$\downarrow R = \frac{V}{I \uparrow}$

- tukarkan arus ulang alik kepada arus terus

* gelombang separuh



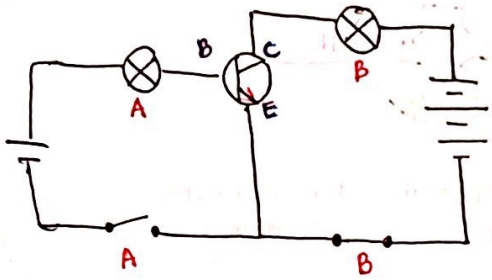
* gelombang penuh



AC

DC

HOW IT WORKS ?



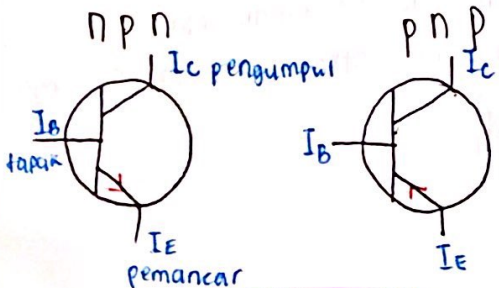
a) suis A & B dihidupkan
mentol A & B menyala

b) suis A sahaja dihidupkan
mentol A sahaja menyala

c) suis B sahaja dihidupkan
dua² tidak menyala

transistor

fungsi: - menyambungkan 2@ lebih litar elektrik
- menjadi suis automatik



* I_B sangat penting
* I_B tiada arus, transistor takkan hidup

$I_E = I_B + I_C$

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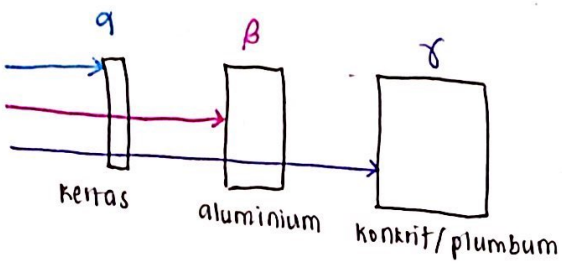
bab 6 : fizik nuklear

reputan radioaktif

- proses pereputan ỹ spontan apabila nukleus ỹ tidak stabil dengan memancarkan sinaran radioaktif untuk menjadi lebih stabil

zarah bertenaga: α, β — $^{4}_{2}He$, $^{0}_{-1}e$

sinaran elektromagnet: γ — neutral



separuh hayat

- masa ỹ diambil oleh sesuatu nuklid radioaktif mereput menjadi separuh

* contoh

1) Natrium-24 mempunyai setengah hayat 15 jam, jisim asal 64g

a) berapakah jisim ỹ tinggal selepas 45 jam?

$T_{\frac{1}{2}}$ = 15 jam

$\frac{45 \text{ jam}}{15 \text{ jam}} = 3\,T_{\frac{1}{2}}$

15j 15j 15j

64g → 32g → 16g → 8g

45 jam

= 8g #

2) setengah hayat talah 15 hari. Berapakah masa yg diambil u 75% dpd atom mereput?

ỹdh reput

100% − 75% = 25%

15 hari 15 hari

100% → 50% → 25%

2 × 15 hari = 30 hari #

tenaga nuklear

* pembelahan nukleus

- pemecahan satu nukleus ỹ berat menjadi dua nukleus ỹ lebih ringan
- apabila satu nukleus dihentam oleh satu neutron.

$E = mc^2$

E: tenaga nuklear (J)

m: cacat jisim (kg)

c: laju cahaya $3 \times 10^8\ ms^{-1}$

contoh soalan:

$$^{1}_{0}n + {}^{235}_{92}U = {}^{141}_{56}Ba + {}^{92}_{36}Kr + 3\,{}^{1}_{0}n$$

$^{235}_{92}U$ = 235.043930 u.j.a

$^{1}_{0}n$ = 1.008665 u.j.a

$^{141}_{56}Ba$ = 140.91441 u.j.a

$^{92}_{36}Kr$ = 91.926156 u.j.a

1 u.j.a = 1.66×10^{-27} kg

Tips (berat → ringan)

① cari cacat jisim

② convert kpd kg

③ masuk dlm formula

penyelesaian:

sebelum	selepas
1.008655 + 235.043930	140.91441 + 91.926156 + (3 × 1.008665)
= 236.052585 u.j.a	= 235.866561 u.j.a

① cari cacat jisim

236.052595 − 235.866561 = 0.186034 u.j.a

② convert → kg

$0.186034 \times 1.66 \times 10^{-27} = 8.0881644 \times 10^{-28}$

③ $E = (3.09 \times 10^{28})(3 \times 10^{8})^2$

$= 2.781 \times 10^{-11}$ J #

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bab 7 : fizik kuantum

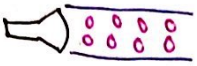
klasik

1) Isaac Newton (mengandaikan)
   ↳ cahaya adalah zarah

2) Thomas Young (buktikan)
   ↳ interferens

kuantum

1) Max Planck (tak cerita apa² pasal sifat cahaya)
   ↳ tenaga gelombang elektromagnet dlm bentuk diskrit ($E \propto f$)



2) Albert Einstein (buktikan)
   ↳ cahaya adalah zarah (foton)
   ↳ kesan fotoelektrik

jasad hitam → ani²
1. serap semua cahaya
2. tidak akan memantulkan cahaya
3. cahaya yg dikeluarkan dipengaruhi o suhu

kuantum tenaga
↳ foton (zarah cahaya)
↳ paket² tenaga sinaran elektromagnet

tenaga foton
↳ tenaga yg dimiliki o setiap foton

$E = hf$ → frekuensi gelombang sinaran
tenaga foton (J)
pemalar planck

kuasa sinaran

$P = nhf$
kuasa (W)
bilangan foton persaat

$v = f\lambda$
$c = f\lambda$
$f = \frac{c}{\lambda}$

$E = \frac{hc}{\lambda}$ $P = \frac{nhc}{\lambda}$
panjang gelombang

contoh soalan :

1) Hitung tenaga & panjang gelombang 1 foton cahaya yg mempunyai frekuensi 6.2×10^{14} Hz.

$E = hf$
$= 4.1 \times 10^{-19}$

$c = f\lambda$

$f = \frac{c}{\lambda}$

↳ $E = \frac{hc}{\lambda}$

$\lambda = \frac{hc}{E}$

$\lambda = 4.8 \times 10^{-7}$ m #

2) sebuah laser 10 mW menghasilkan cahaya merah yg panjang gelombang 6.48×10^{-7} m. Hitung bilangan foton per saat yg dihasilkan o laser.

$P = 10$ mW
$= 10 \times 10^{-3}$ W

$\lambda = 6.48 \times 10^{-7}$ m

$n = ?$

$P = nhf$

$P = \frac{nhc}{\lambda}$

$P = \frac{nhc}{\lambda}$ — laju cahaya

$n = \frac{P\lambda}{hc}$

$n = \frac{10 \times 10^{-3}(6.48 \times 10^{-7})}{h(3.0 \times 10^{8})}$

$= 3.26 \times 10^{16}$ foton per saat #

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Sifat kedualan gelombang

EINSTEIN
→ cahaya boleh bersifat gelombang & zarah

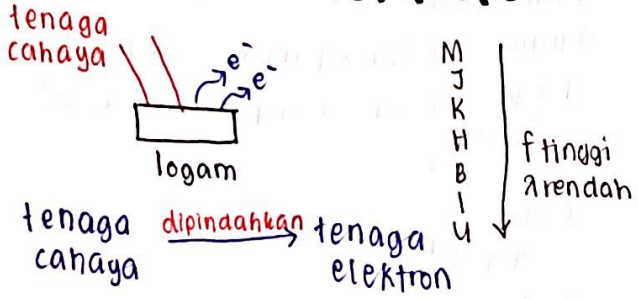
LOUIS DE BROGLIE
→ jirim boleh bersifat gelombang & zarah

momentum
foton / zarah

momentum → $p = \frac{h}{\lambda}$ ← foton / cahaya

$mv = \frac{h}{\lambda}$ ← elektron (e⁻ ada jisim)

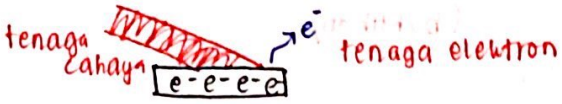
kesan fotoelektrik



Klasik	Kuantum
ramalan: keamatan cahaya ↑ tenaga ↑ ✗ diterima	ramalan: frekuensi ↑ tenaga ↑ (E ∝ F)
merah, f↓ – tiada e⁻ ỹ terbebas	biru – e⁻
biru, f↑ – ada e⁻ terbebas	biru – e⁻ e⁻ e⁻ e⁻

konklusi:
① frekuensi akan bebaskan e⁻
② keamatan cahaya mempengaruhi bil. e⁻ ỹ terbebas.

teori fotoelektrik einstein



(E) tenaga cahaya = tenaga elektron

tenaga elektron = tenaga minimum ỹ bebaskan e⁻ + tenaga kinetik

(W) fungsi kerja
$W = hf_o$
frekuensi ambang
↳ f minimum ỹ membebaskan e⁻

(E_K) $E_K = \frac{1}{2}mv^2$

$E = W + E_K$

$hf = hf_o + \frac{1}{2}mv^2$

$\frac{hc}{\lambda} = hf_o + \frac{1}{2}mv^2$

momentum foton / zarah

$p = \frac{h}{\lambda}$ ← foton / cahaya

$mv = \frac{h}{\lambda}$ ← elektron (e⁻ ada jisim)

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