Formula Sheet: Level 2 Electrical Installation

Pythagoras $C = \sqrt{a^2 + b^2}$ $a = \sqrt{c^2 - b^2}$ $b = \sqrt{c^2 - a^2}$

Trigonometry (SOH CAH TOA)
Sine = sine (button on calculator)
Cos = cosine (button on calculator)
Tan = tangent (button on calculator)
θ = given angle $\text{Sine } \theta = \frac{O}{H}$ $\text{Cos } \theta = \frac{A}{H}$ $\text{Tan } \theta = \frac{O}{A}$
O = Opposite (triangle side opposite angle given)
A = Adjacent (longest side of triangle)
T = Tangent (side of triangle left over)

s = speed **(m/s)**
d = distance **(m)** $s = \frac{d}{t}$ $t = \frac{d}{s}$ $d = s \times t$
t = time **(s)**

a = acceleration **(m/s^2)**
v = final velocity **(m/s)** $a = \frac{v - u}{t}$ $t = \frac{v - u}{a}$ $v = at + u$ $u = at - v$
u = initial velocity **(m/s)**
t = time **(s)**

PE = potential energy **(J)**
m = mass **(kg)** $PE = mgh$ $m = \frac{PE}{g \times h}$ $g = \frac{PE}{m \times h}$ $h = \frac{PE}{m \times g}$
g = gravity **(9.81)**
h = height **(m)**

KE = kinetic energy **(J)**
m = mass **(kg)** $KE = \frac{m \times V^2}{2}$ $m = \frac{2KE}{V^2}$ $V = \sqrt{\frac{2KE}{m}}$
v = velocity **(m/s)**

V = volts **(V)** $V = IR$ $I = \frac{V}{R}$ $R = \frac{V}{I}$
I = current **(A)** $P = IV$ $I = \frac{P}{V}$ $V = \frac{P}{I}$
R = resistance **(Ω)**
P = power **(W)** $P = I^2R$ and $P = \frac{V^2}{R}$

Q = Coulombs **(C)**
I = Current **(A)** $Q = It$ $t = \frac{Q}{I}$ $I = \frac{Q}{t}$
t = time **(s)**

R = Resistance **(Ω)**
p = Resistivity **(Ω/m)** $R = \frac{\rho l}{a}$ $a = \frac{\rho l}{R}$ $p = \frac{l}{R a}$ $l = \frac{\rho}{R a}$
l = length **(m)**
a = CSA **(m^2)**

β = magnetic flux density **(T)**
Φ = magnetic flux **(wb)** $\beta = \frac{\Phi}{A}$ $A = \frac{\Phi}{\beta}$ $\Phi = B \times A$
A = area **(m^2)**

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F = Force on conductor **(N)**
B = magnetic flux density **(T)** $F = BIL$ $B = \frac{F}{IL}$ $I = \frac{F}{BL}$ $L = \frac{F}{BI}$
I = current **(A)**
L = length of conductor **(m)**

e = induced EMF **(V)**
B = magnetic flux density **(T)** $e = BLv$ $B = \frac{e}{Lv}$ $L = \frac{e}{Bv}$ $V = \frac{e}{BL}$
L = length of conductor **(m)**
v = velocity **(m/s^2)**

E = EMF $E = \frac{N \times (\Phi_2 - \Phi_1)}{t}$
ϕ_1 & ϕ_2 = flux values
N = number of turns $L = \frac{E \times t}{(I_2 - I_1)}$
L = inductance of the coil **(H)**
t = time **(s)**
m = mutual inductance **(H)** $M = \frac{N \times (\Phi_2 - \Phi_1)}{(I_2 - I_1)}$
I_1 & I_2 = change of current **(A)**

F = Force **(N)**
m = mass **(kg)** $F = m \times a$ $m = \frac{F}{g}$ $g = \frac{F}{m}$
g = gravity **(9.81)**

Wd = work done **(J)**
F = Force **(N)** $Wd = F \times d$ $F = \frac{Wd}{d}$ $d = \frac{Wd}{F}$
d = distance **(m)**

P = Power **(W)**
Wd = work done **(J)** $P = \frac{Wd}{t}$ $t = \frac{Wd}{P}$ $Wd = P \times t$
t = time **(s)**

In.p = power in **(W)**
out.p = power out **(W)** $eff = \frac{out.p}{In.p} \times 100$ $In.p = \frac{out.p}{eff} \times 100$
eff = efficiency **(%)**

f = frequency **(Hz)**
N = revolutions per second $f = NP$ $N = \frac{f}{P}$ $p = \frac{f}{N}$
P = pairs of poles

f = frequency **(Hz)** $f = \frac{1}{t}$
t = time **(s)**

Average 0.636 **RMS 0.707**

For angles θ between 90° and 180°; $e = E \times \sin(180 - \theta)$
For angles θ between 180° and 270°; $e = E \times -\sin(\theta - 180)$
For angles θ between 270° and 360°; $e = E \times -\sin(360 - \theta)$