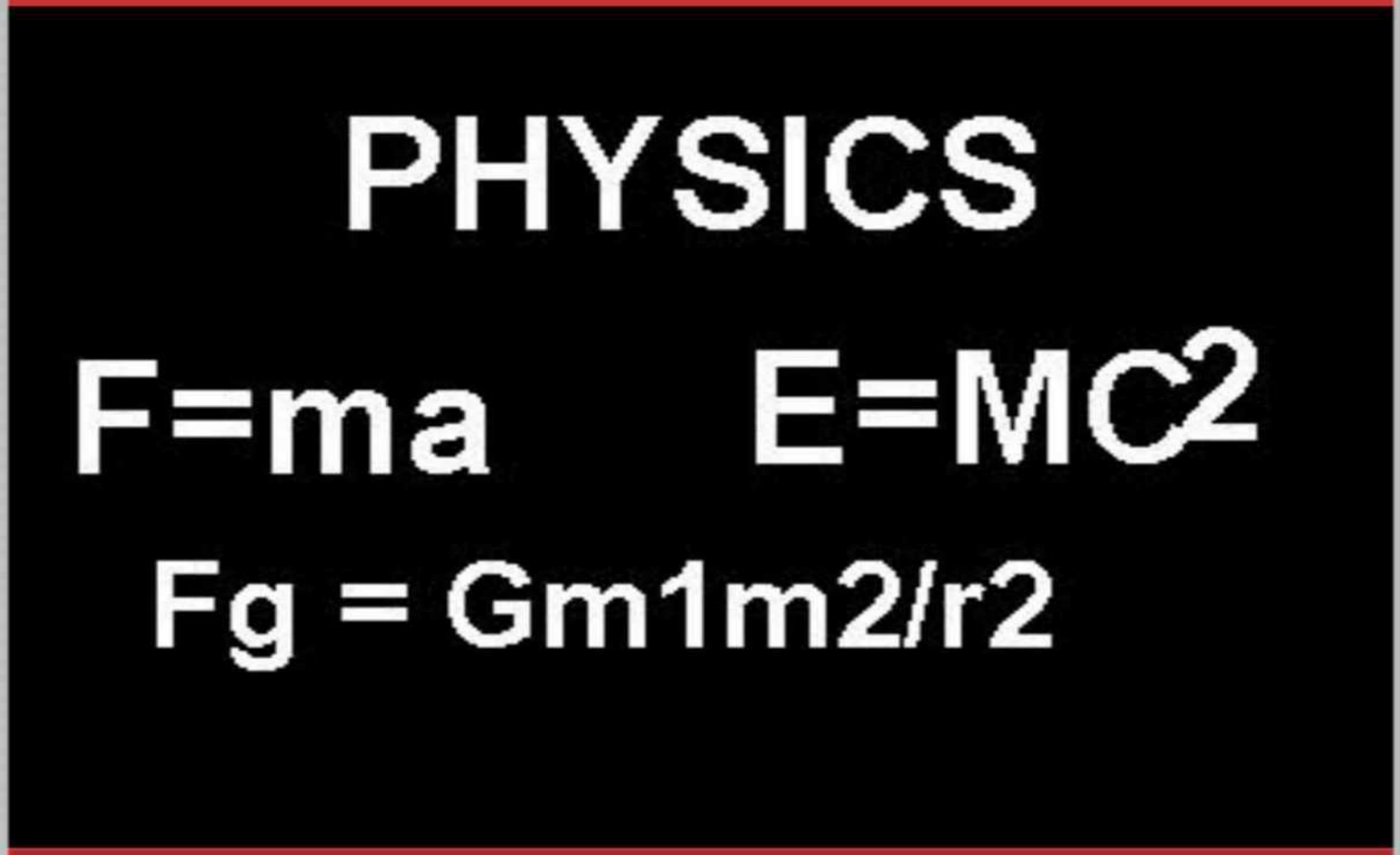
BRIAN Y GLENN



ELECTRICITY, GENERAL, MAGNETISM, MECHANICS, OPTICS, SOUND, THERMAL & MODERN PHYSICS FORMULAS, PRINCIPLES & REFERENCES LAST MINUTE REVISION GUIDE FOR SUCCESS AT ANY PHYSICS JOBS & ENTRANCE EXAMINATION

PHYSICS FORMULAS

ELECTRICITY, GENERAL, MAGNETISM, MECHANICS, OPTICS, SOUND, THERMAL & MODERN PHYSICS FORMULAS, PRINCIPLES & REFERENCES LAST MINUTE REVISION GUIDE FOR SUCCESS AT ANY PHYSICS JOBS & ENTRANCE EXAMINATION

Key Words: Electricity, Magnetism, Heat, Light, Mechanics, Modern Physics, Sound, Physicist
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A Note from the Author:

Why this Book:

“Success always comes when preparation meets opportunity” -Henry Hartman

All students are expected to demonstrate knowledge and competence in the core fields of physics at all competitive exams like MCAT AIEEE, IIT JEE, and Engineering entrance exams. The purpose of this book is to help all students succeed at such entrance examinations. This book tries to bring together the important information for a last minute preparation in as low as 60 minutes. You may find that some of the formulas are presented in different formats to help you memorize and understand them.
It has been well written to make it a very quick read. Why reinvent the wheel. Practicing with this will help with your replies to questions and pass with flying colors. Try to be in parking lot an hour before the exam and use this time to read over this e-book.
Go through all the formulae before exam and refresh your memory. Go through all the section, tips, tricks and formulae before exam or interview and refresh your memory. With planning, preparation and practice everyone can succeed. It also covers non-technical, HR and Personnel questions. You will learn to practice mock interviews for any admission interviews.

It’s for: All levels Elementary & High School, undergraduate, graduate and postgraduate.

It will help you prepare for competitive exams such as GRE, GMAT, SAT, ACT, CLASS XI-XII, AIEEE, IIT-JEE, CAT, MCAT AIPMT, PTU CET

In this book you will get 1000s of A-Z of Physics Formulas & references covering:

Kinematics
Circular Motion and Satellite Motion
Electricity and Magnetism
Energy
Fluid Dynamics
Forces

Heat
Light
Momentum and Its Conservation
Motion
Modern Physics
Newton's Laws
Power
Quantum Physics
Reflection and Ray Model of Light
Rotational Dynamics
Sound Waves
Static Electricity
Thermal Physics
Thermodynamics
Vectors - Motion and Forces
Waves
Work, Energy, and Power

Good Luck,

Brian Y Glenn

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INDEX

HR INTERVIEW: COMPLIMENTARY

BOTTOM LINE JOB INTERVIEW?

INTERVIEW QUESTION?

WHAT ARE YOUR GREATEST STRENGTHS?

WHAT ARE YOUR GREATEST WEAKNESSES?

HAD YOU FAILED TO DO ANY WORK AND REGRET?

WHERE DO YOU SEE YOURSELF FIVE YEARS FROM NOW?

HOW WILL YOU ACHIEVE YOUR GOALS?

WHY ARE YOU LEAVING YOUR CURRENT POSITION?

WHY ARE YOU LOOKING FOR A NEW JOB?

WHY SHOULD I HIRE YOU?

AREN'T YOU OVERQUALIFIED FOR THIS POSITION?

DESCRIBE A TYPICAL WORK WEEK?

ARE YOU WILLING TO TRAVEL?

DESCRIBE THE PACE AT WHICH YOU WORK?

HOW DID YOU HANDLE CHALLENGES?

HOW DO YOU HANDLE PRESSURE? STRESSFUL SITUATIONS?

HOW MANY HOURS DO YOU WORK?

WHY ARE YOU THE BEST PERSON FOR THE JOB?

WHAT ARE YOU LOOKING FOR IN A POSITION?

WHAT DO YOU KNOW ABOUT OUR ORGANIZATION?

WHAT ARE YOUR SHORT TERM GOALS?

WHAT SALARY ARE YOU LOOKING FOR?

TELL ME MORE ABOUT YOURSELF.

WHY DID YOU LEAVE YOUR PREVIOUS JOB?

WHAT RELEVANT EXPERIENCE DO YOU HAVE?

IF YOUR PREVIOUS CO-WORKERS WERE HERE, WHAT WOULD THEY SAY ABOUT YOU?

WHERE ELSE HAVE YOU APPLIED?

WHAT MOTIVATES YOU TO DO A GOOD JOB?

ARE YOU GOOD AT WORKING IN A TEAM?

HAS ANYTHING EVER IRRITATED YOU ABOUT PEOPLE YOU'VE WORKED WITH?

IS THERE ANYONE YOU JUST COULD NOT WORK WITH?

TELL ME ABOUT ANY ISSUES YOU'VE HAD WITH A PREVIOUS BOSS.

ANY QUESTIONS?

WHY DID YOU CHOOSE THIS CAREER?

WHAT DID YOU LEARN FROM YOUR LAST JOB EXPERIENCE?

HOW DO YOU KEEP CURRENT AND INFORMED ABOUT YOUR JOB AND THE

Fundamental Constants

Physical constants

A. **Avogadro's Constant=6.022169 x 10^{23} mol^{-1}**

B. **Base of Natural Logarithm= e = 2.71828**

C. **Bohr magneton= 9.274 096 × 10^{--24} joule per tesla**

D. **Bohr Radius=5.2917715 x 10^{-11} m**

E. **Boltzmann's Constant=1.380622 x 10^{-23} J K^{-1}**

F. **1Curie=1Ci=3.7x1010 Bq**

G. **Faraday's Constant=96486 C mol^{-1}**

H. Gas Constant=8.31434 J K^{-1} mol^{-1}

I. Mass of Electron=9.109558 x 10^{-31} kg

J. Planck's constant = 6.626068 × 10-34 m2 kg / s

K. Permeability of Vacuum=4π x 10^{-7} ms^{-2} A^{-2}

L. Rydberg Constant, 1.09677578 x 10^{7} m^{-1}

***M.* Permittivity of Vacuum, 8.8541853 x 10^{-12}**

kg^{-1} m^{-3} s^{4} A^{2}

N. Volume of Ideal Gas=22413.6 cm^{3} mol^{-1} at

1atm, 0°C

O. Speed of light (m/s) C =

2.997924562E8

P. Charge of electron (coulombs) eC =

1.6021917e-19

Q. Planck's constant (J sec) h = 6.626196e-

34

R. Atomic mass unit (g) Amu = 1.660531e-

24

S. Electron rest mass (kg) Emass = 9.109558e-

31

T. Proton rest mass (kg) Pmass = 1.672614e-

27

U. Neutron rest mass (kg) Nmass = 1.674920e-

27

V. Charge-to-mass ratio for electron e /

m_e= 1.75880e11 C/kg

W. Atomic mass unit= 1.66057e-27 kg

X. Bohr radius a_0= 5.29177e-11 m

Y. Electron radius r_e= 2.81792e-15 m

Z. Gas constant R =R = N_A

k_B 8.3143 m2 kg/s2 K mol

AA. Molar volume V_mol = 22.41383 m3/kmol

BB. Faraday constant F F N_A e = 9.64846e4 C/mol

CC. Proton g factor(Lande factor)

g_H= 5.585

DD. Gravitational constant

G= 6.6732e-11 m3/kg s2

EE. Acceleration due to gravity g

= 9.80665 m/s2

FF. 1 Hartree = 2.625501e+06 J/mol (approx. 627.5 kcal/mol)

GG. Inches to centimeters = 2.54

HH. Mile to feet = 5280

II. Fahrenheit to Celsius = 5*(x-32)/9

JJ. Kelvin to Celsius = x + 273.15

KK. Pounds to newtons = 4.44822161526

LL. Pounds to ounces = 16

MM. Joules to ergs = 1e7

NN. Calories to joules= 4.1854

OO. BTU's to joules= 1055

PP. Electron volt to joules= 1.6021917e-19

QQ. Electron volt to ergs= 1.6021917e-12

RR. Kilograms to MeV = 5.609538e29

SS. Amu to MeV= 931.4812

TT. Proton mass= 1.67 x 10^-27 kg

UU. Neutron mass= 1.67 x 10^-27 kg

VV. Electron mass= 9.11 x 10^-31 kg

WW. Avogadro's number= 6.02 x 10^23 mol^-1

XX. Universal gas constant= 8.31 J/mol*K

YY. Boltzmann's constant= 1.38 x 10^-23 J/K

ZZ. Electron charge magnitude= 1.60 x 10^-19 C

AAA. 1 electron volt= 1.60 x 10^-19 J

BBB. Speed of light= 3.00 x 10^8 m/s

CCC. Universal gravitational constant= 6.67 x 10^-11 m^3/kg*s^2

DDD. Acceleration due to gravity at Earth's surface= 9.8 m/s^2

EEE. 1 unified atomic mass unit= 1.66 x 10^-27 kg; 9.31 MeV/c^2

FFF. Planck's constant= 6.63 x 10^-34 Js; 4.14 x 10^-15 eVs

GGG. 1.99 x 10^-25 Jm; 1.24 x 10^3 eVnm

HHH. Vacuum permittivity= 8.85 x 10^-12 C^2/N*m^2

III. Coulomb's law constant= 9.0 x 10^9

N*m^2/C^2

JJJ. Vacuum permeability= 4π x 10^-7

T*m/A

KKK. Magnetic constant= 1 x 10^-7

T*m/A

LLL. 1 atmospheric pressure= 1.0 x 10^5

N/m^2; 1.0 x 10^5 Pa

MMM. ln x = 2.3026 log x

NNN. π = 3.14159265

OOO. √ 2 1.4

PPP. √ 3 1.7

QQQ. cos(0°) 1

RRR. sin(0°) 0

SSS. cos(30 °) √ 3/2 = 0.85

TTT. sin(30°) 0.5

UUU. cos(45 °) √ 2/2 = 0.7

VVV. sin(45 °) √ 2/2 = 0.7

WWW. cos(60°) 0.5

XXX. sin(60 °) √ 3/2 = 0.85

YYY. cos(90°) 0

ZZZ. sin(90°) 1

*****

Physics Symbols

A.	a	acceleration
B.	alpha	angular acceleration
C.	ampere	A
D.	coulomb	C
E.	degree Celsius	°C

F. electron volt eV

G. English

H. F force

I. f frequency

J. farad F

K. h height

L. henry H

M. hertz Hz

N. I rotational inertia

O. J impulse

P. joule J

Q. K kinetic energy

R. k spring constant

S. kelvin K

T. kilogram kg

U. L angular momentum

V. l length

W. m (italics) mass, units:

kg, scalar

X. m mass

Y. m meter, units: m, scalar

Z. meter m

AA. mole mol

BB. mu coefficient of friction

CC. N Newton, units: N or kg*m/s^2, vector

DD. N normal force

EE. newton N

FF. ohm O

GG. p momentum

HH. P power

II. pascal Pa

JJ. r (bold) position vector

KK. r radius or distance

LL. second s

MM. t time

NN. t time ,units: seconds

,scalar

OO. T time period

PP. tau torque

QQ. tesla T

RR. theta angle

SS. U potential energy

TT. upsilon velocity or speed

UU. volt V

VV. w angular speed

WW. W work done on a system

XX. watt W

YY. x position

ZZ. Δ change

AAA. a avg average

acceleration, units: m/s^2, vector

BBB. v avg average velocity, units: m/s, vector

CCC. g gravity, units: m/s^2, vector

DDD. F of g weight (force of gravity), units: N, vector

EEE. p momentum, units:

(kg m)/s or N s, vector

FFF. Pa Pascals/pressure,

Pa or F/A, vector

GGG. A area, units: m^2,

scalar

HHH. θ the measure of the

launch angle of a projectile

III. units: degrees, scalar

JJJ. sin the sine function, used to find the vertical velocity

KKK. cos the cosine function, used to find the horizontal velocity

LLL. Δp impulse, units: N,

vector

MMM. d distance, units:

meters, scalar

NNN. W work (F*d), units:

Joules, vector

OOO. Power work done

over time, units: W/Δt, vector

PPP. μ friction coefficient, units: N/A, scalar

QQQ. F friction force of friction (μ * F normal), units: N, vector

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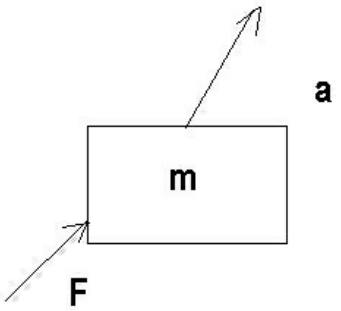
General Physics and Mechanics

I. ∑F = Fnet = ma

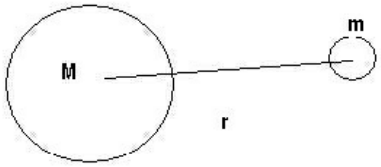


II. **Gravitational Force** **G =m1 m2 / r^2**

III. **(G) Gravitational constant** **6.67 * 10^-11**

IV. **Force of Gravity** **$F_g = (GmM)/r^2 = mg$**

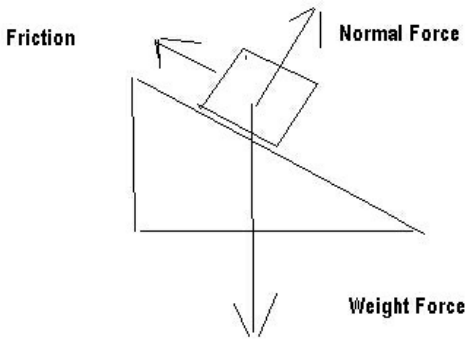
V. **$g = mM/r^2$**



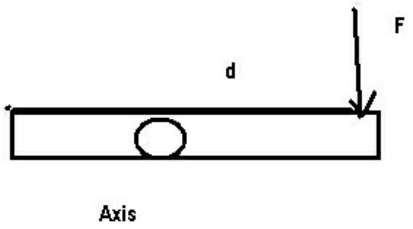
VI. **Ffric ≤** **μN**

VII. **Friction=** **μ * Force**

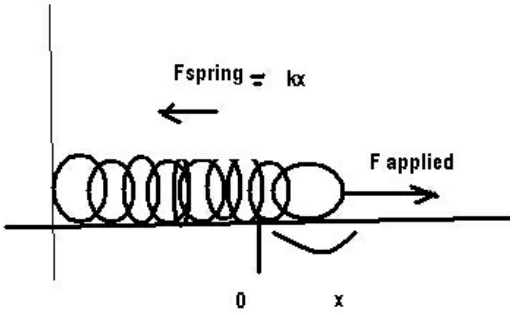
VIII. **Weight =** **mass * gravity**


Friction
Normal Force
Weight Force

IX. Torque= Torque $\tau = rF\sin\theta = r \times F$



X. Restoring force of a spring $F = -kx$



XI. Centripetal Acceleration a (centripetal) = v^2/r

XII. Fg= mg

XIII. Force Of Gravity (Universal) $-Gm_1 m_2 /r^2$

XIV. Potential Energy due to Universal Gravity $-Gm_1 m_2 /r$

XV. Arc length (displacement) is $s = r\theta$, therefore= $\theta = s/r$

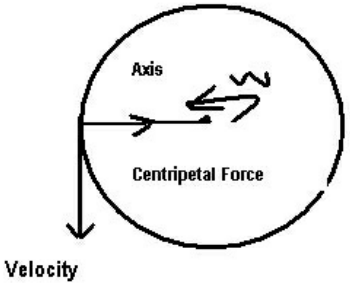
XVI. Angular velocity is the rate of change over angle. $\theta/T = \omega$

XVII. Because angular velocity is the rate of the change over angle and 2π is the angle of a complete circle,

therefore= $\omega = 2\pi/T$

XVIII. Frequency is one over time period,

therefore= $\omega = 2\pi f$



XIX. Stress F/A

XX. Strain $\Delta L/L$

XXI. Hooke's Law $\Delta L = FL/EA$

XXII. $E = 2G(r+1)$

Where E is Young's modulus (psi),

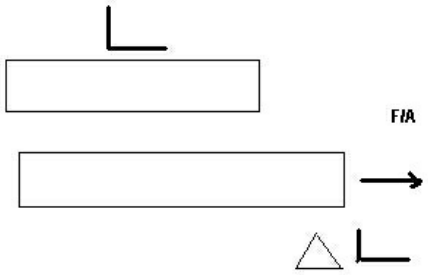
G is modulus of rigidity (psi)

r is Poisson's ratio.

Stress = modulus x strain

XXIII. Young's modulus E = stress / strain = P / ($\Delta L/L$)

XXIV. Units = N/m^2



XXV. $W = \int F \cdot dr$

XXVI. $K = \frac{1}{2}mv^2 = \frac{1}{2}I(\omega)^2$

XXVII. $P = dW/dt = F \cdot v$

XXVIII. $U_g = mgh = -(Gm_1 m_2)/r$

XXIX. $a_c = v^2/r = (\omega)^2 r$

XXX. $\tau = r \times F$

XXXI. $\sum(\tau) = \tau_{net} = I\alpha$

XXXII. $I = \int r^2 dm = \sum mr^2$

XXXIII. $r_{cm} = \sum mr / \sum m$

XXXIV. $L = r \times p = I(\omega)$

XXXV. $F_s = -kx$

XXXVI. $U_s = \frac{1}{2}kx^2$

XXXVII. $T = = (2\pi)/(\omega) = 1/f$

XXXVIII. $T_s = 2\pi\sqrt{(m/k)}$

XXXIX. $T_p = 2\pi\sqrt{(l/g)}$

XL. $F_g = (-(Gm_1 m_2)/r^2)r$

XLI. Newton's Laws=

Every object in a state of uniform motion tends to remain in that state of motion unless an external force is applied to it (Inertia)

F=ma

For every action there is an equal and opposite reaction

XLII. Orbital force= mass * velocity^2 / radius

XLIII. Centripetal velocity= velocity * tan^2

XLIV. Frequency= revolution / time

XLV. Angular velocity (ω)= 2 π frequency=velocity / radius

XLVI. 1 revolution =circumference of a circle= 2 π r

XLVII. Newton's 2nd Law ΣF=ma

XLVIII. Centripetal Acceleration $a=v^2/r$

XLIX. Friction on a plane $F \leq \mu N$

L. Torque $\tau = rF\sin\theta$

LI. Momentum p=mv

LII. Impulse $J=F\Delta t$ or Δp

LIII. Kinetic Energy $K=\frac{1}{2}mv^2$

LIV. Change in Gravitational Potential Energy $\Delta U=mg\Delta h$

LV. Work done by a force at an angle $W=F\Delta r\cos\theta$

LVI. Average Power $P=W/\Delta t$

LVII. Power of an object in motion $P=Fv\cos\theta$

LVIII. Elastic Potential Energy $U=\frac{1}{2}kx^2$

LIX. Period of an object oscillating on a spring $T=2\pi\sqrt{(m/k)}$

LX. Period of a pendulum for small angles $T=2\pi\sqrt{(l/g)}$

LXI. Period and frequency relationship $T=1/f$

LXII. $v = v_0 + at$ Kinematic with Velocity, Acceleration, and Time

LXIII. If the acceleration is constant:

The formula for velocity = $v = v_0 + at$

for distance: $d = d_0 + v_0 t + \frac{1}{2}at^2$

for velocity without time: $v^2 = v_0^2 + 2ad$

Kinematic with Displacement, Velocity, Acceleration, and Time: $x=x_0+v_0 t+\frac{1}{2}at^2$.

LXIV. Find final displacement by using initial displacement, final velocity, time, and acceleration

LXV. Maximum Kinetic energy (Kmax) with respect to Plank's constant (h), frequency (f), and the work function (ø) $Kmax = hf - ø$

LXVI. Wavelength (lambda) with respect to Plank's constant (h) and momentum (p) lambda = h/p

LXVII. Energy (E) with respect to mass and the speed of light (c)

LXVIII. F = dp/dt

LXIX. J = ∫Fdt = Δp

LXX. p = mv

LXXI. Kinematic with Velocity, Acceleration, and Displacement$v^2 = v_0^2 + 2a(x-x_0)$

LXXII. ∑F = ma Newton's Second Law

LXXIII. F (friction) ≤ μN Force of Friction

LXXIV. W = FΔrcosθ Work

LXXV. P (avg) = W/Δt Power from Energy

LXXVI. F (spring) = -kx Force of Spring

LXXVII. Force Of Gravity (Universal), $-Gm_1 m_2 / r^2$.

LXXVIII. p = mv Momentum

LXXIX. J = FΔt = Δp Impulse

LXXX. K = ½mv^2 Kinetic Energy

LXXXI. ΔU (gravitational) = mgh Gravitational Potential Energy on Earth

LXXXII. $U(spring) = \frac{1}{2}kx^2$ Spring Potential Energy

LXXXIII. $P = Fv\cos\theta$ Power from Force

LXXXIV. $\sum F = F_{net}$ ma

LXXXV. Force of Friction μN

LXXXVI. Acceleration of a Circle v^2/r

LXXXVII. Torque $rF\sin\theta$

LXXXVIII. p mv

LXXXIX. J $F\Delta t = \Delta p$

XC. K $\frac{1}{2}mv^2$

XCI. ΔU_g mgh

XCII. W $F\Delta r\cos\theta$

XCIII. P W/Δt

XCIV. W $F\Delta r\cos\theta$

XCV. Force of a Spring -kx

XCVI. Potential Energy of a Spring $\frac{1}{2}kx^2$

XCVII. Period of a Spring $2\pi\sqrt{(m/k)}$

XCVIII. Period of a Pendulum $2\pi\sqrt{(l/g)}$

XCIX. T 1/f

C. Fg mg

CI. Mechanics:

CII. Spring Period Ts = 2pvm/k

CIII. Spring restoring force $F_s = -kx$

CIV. Static Friction $F_{fric} = \mu_s N$

CV. The restoring force is given by: Hooke's Law F=-kx x is the displacement from equilibrium and k is the force constant (spring constant).

CVI. For springs in series: 1/keff = 1/k1 + 1/k2

CVII. Springs in parallel: keff = k1 + k2

Period of A Spring Mass Oscillator T=2pvm/k m mass k spring constant

CVIII. T does not depend on g the period is smaller for a stiffer spring (large values of k).

CIX. Harmonic Motion of a Pendulum Period T=2pvL/g

CX. L=length of string T depends on g

CXI. The restoring force is given by: Hooke's Law F=-kx x is the displacement from equilibrium and k is the force constant (spring constant).

CXII. For springs in series: 1/keff = 1/k1 + 1/k2

CXIII. Springs in parallel: keff = k1 + k2

CXIV. Period of A Spring Mass Oscillator T=2pvm/k m mass k spring constant

CXV. T does not depend on g the period is smaller for a stiffer spring (large values of k).

CXVI. Harmonic Motion of a Pendulum Period T=2pvL/g

CXVII. L=length of string T depends on g

CXVIII. Velocity after time t (classical mechanics) $v=v_0+at$

CXIX. Position after time t (classical mechanics) $x=x_0+v_0t+(1/2)at^2$

CXX. Velocity squared (classical mechanics) $v^2=v_0^2+2a(x-x_0)$

CXXI. Force due to friction $F \leq \mu N$

CXXII. centripetal acceleration $a_c=v^2/r=\omega^2 r$ (ω=angular speed)

CXXIII.

CXXIV. Momentum $p=mv$

CXXV. Impulse $J=F\Delta t=\int F dt=\Delta p$

CXXVI. Kinetic Energy $K=1/2mv^2$

CXXVII. Potential Energy $U=mgh$

CXXVIII. Work $W=F \cdot \Delta r= \int Fdr=F\Delta d=Fdcos\theta$

CXXIX. Average Power $Pavg=W/\Delta t$

CXXX. Power $P=F \cdot v=Fvcos\theta$

CXXXI. Force (Spring) $Fs=-kx$

CXXXII. Potential Energy (Spring) $Us=1/2kx^2$

CXXXIII. Period (Spring) $Ts=2 \pi\sqrt{} (m/k)$

CXXXIV. Period (Pendulum) $Tp=2 \pi\sqrt{} (l/g)$

CXXXV. Period $T=1/f$

CXXXVI. Force (Gravity) $-Gm_1 m_2 /r^2$

CXXXVII. Potential Energy (Gravity) $-Gm_1 m_2 /r$

CXXXVIII. Newton's First Law $\sum Fnet = 0$

CXXXIX. Newton's Second Law $Fnet = ma$

CXL. $Fnet = \nabla p/ \nabla t$

CXLI. Components of Force and Acceleration $m(ax + ay) = max + may$

CXLII. Newton's Third Law $Fab = -Fba$

CXLIII. Static Friction $Fs \leq \mu sN$

CXLIV. $Fsmax = \mu sN$

CXLV. Kinetic Friction $Fk = \mu kN$

CXLVI. Work $W = Fdcos \varnothing$

CXLVII. Kinetic Energy $K = mv^2/2$

CXLVIII. Work-Energy Theorem $W = \nabla K$

CXLIX. Potential Energy $W = - \nabla U$

CL. $U = mgh$

CLI. Energy $\nabla E = E-E_0 = 0$

CLII. Mechanical Energy $E = U+K$

CLIII. Change in Energy $\nabla E = Wnc$

CLIV. Power $P = W/t$

CLV. Momentum $p = mv$

CLVI. Impluse $\nabla p_0 = mv-mv_0$

CLVII. $p= p_0$

CLVIII. Kinetic energy (KE) refers to the energy associated with the motion

of an object: KE = (½)mv2

Where

i. **m = mass in [kg], and**

ii. **v = velocity of object in [m/sec]**

CLIX. average angular speed w = delta theta/ delta time

CLX. average angular acceleration a = delta omega/

CLXI. v $v_0 + at$

CLXII. x $x_0 + v_0 t + \frac{1}{2}at^2$

CLXIII. v^2 $v_0^2 + 2a(x - x_0)$

CLXIV. ∑F=Fnet ma

CLXV. Force of Friction μN

CLXVI. Acceleration of a Circle v^2/r

CLXVII. Torque rFsinθ

CLXVIII. p mv

CLXIX. J FΔt=Δp

CLXX. K $\frac{1}{2}mv^2$

CLXXI. ΔUg mgh

CLXXII. W FΔrcosθ

CLXXIII. P W/Δt

CLXXIV. W FΔrcosθ

CLXXV. Force of a Spring -kx

CLXXVI. Potential Energy of a Spring $\frac{1}{2}kx^2$

CLXXVII. Period of a Spring $2\pi\sqrt{(m/k)}$

CLXXVIII. Period of a Pendulum $2\pi\sqrt{(l/g)}$

CLXXIX. $T \quad 1/f$

CLXXX. $\Delta x = Vit + \frac{1}{2}at^2$

CLXXXI. a must be constant.

CLXXXII. Force of spring $F = -kx$

CLXXXIII. k is spring constant

CLXXXIV. Elastic Potential Energy PEelastic = $\frac{1}{2}kx^2$

CLXXXV. Frequency and period $f = 1/T$; $T = 1/f$

CLXXXVI. Frequency of simple harmonic motion $f=(1/2\pi)\sqrt{(k/m)}$

CLXXXVII. Period of SHM $T=(2\pi)\sqrt{(m/k)}$

CLXXXVIII. Frequency of simple pendulum $f = (1/2\pi)\sqrt{(g/L)}$

CLXXXIX. Velocity of waves $v = \lambda f$

CXC. Newton's Laws

1. **Fnet = 0**
2. **Fnet = ma**
3. **$F_{21} = -F_{12}$**

CXCI. Force due to gravity parallel to ramp $= mg \sin\theta$

CXCII. Force due to gravity normal to ramp $= mg \cos\theta$

CXCIII. Center of Mass $X_{cm} = (m_1 x_1 + m_2 x_2 + m_3 x_3)/(m_1 + m_2 + m_3)$

CXCIV. Center of Gravity $X_{cg} = (w_1 x_1 + w_2 x_2 + w_3 x_3)/(w_1 + w_2 + w_3)$

CXCV. Force of Kinetic Friction $f = N\mu f$

CXCVI. Force of static friction $f_{smax} = N\mu s$

CXCVII. Centripetal Acceleration $a = v^2/r$

CXCVIII. Centripetal Force $F = ma = mv^2/r$

CXCIX. Torque $= rF \cdot \sin\theta$

r = distance from the pivot point

F = force applied

units= N·m

torque =ιF

l = lever arm coming from pivot to line of action of F.

units= N·m

CC. Work $W = F \cdot d \cos\theta = Pt$ **,units= J**

CCI. Kinetic energy $KE = \frac{1}{2}mv^2$**, units= J**

CCII. Work-Energy Theorem $W_{total} = \Delta KE$**, units= J**

CCIII. Power $P = work/time = W/t = \Delta KE/t$**, units= W**

CCIV. Power $P = Fv$**, units= W**

CCV. Potential Energy $PE = mgh$**, Units= J**

CCVI. Mechanical Energy $E = PE + KE$

CCVII. Conservation of Mechanical Energy $PE_1 + KE_1 + Wf \text{ (usually negative)} = PE_2 + KE_2$

CCVIII. Momentum $p = mv$

CCIX. Units= kg·m/s

CCX. Impulse $J = Ft$

CCXI. Impulse-momentum $J = \Delta p$

CCXII. Conservation of Momentum $p_i = p_f$

CCXIII. Mechanical power $P = \Delta E/t$

CCXIV. Units = Watts = J / s

CCXV. Inelastic collision $p_i = p_f$

CCXVI. Impulse $J = \Delta p = F_{avg} * \Delta t$

CCXVII. Velocity without time $v^2 = v_0^2 + 2ax$

CCXVIII. Spring Energy $U = \frac{1}{2} k (x^2)$

CCXIX. General Form of Work $W = \int F(x)\, dx$

CCXX. General Form of Potential Energy $\Delta U = -\int F(x)\, dx$

CCXXI. Conservation of Energy $K_1 + U_1 = K_2 + U_2$

CCXXII. Thermal Energy $\Delta E_{th} = F_k (d)$

CCXXIII. Isolated System $\Delta E(mech) + \Delta E(th) + \Delta E(int) = 0$

CCXXIV. Average Power $P(avg) = \Delta E / \Delta t$

CCXXV. Instantaneous Power $P = dE / dt$

CCXXVI. Hooke's Law (Spring Force) $F = -k(x)$

CCXXVII. Work by Gravity $W = mgd \cos (\phi)$

CCXXVIII. Uniform Circular Motion $a = v^2 / R$

CCXXIX. Centripetal Force $F = m(v^2) / R$

CCXXX. Drag Force $D = \frac{1}{2} C\rho Av^2$

CCXXXI. Newton's Law for a System of Particles $F(net) = M(sys) \times a(com)$

CCXXXII. Net Force of a System of Particles $F(net) = dP / dt$

CCXXXIII. Impulse $J = \Delta P = \int F(t)\, dt$

CCXXXIV. Period $T = 2\pi R / v$

CCXXXV. Angular Velocity $V = r\omega$

CCXXXVI. Angular Acceleration $\alpha = d\omega/dt = d^2\theta/dt^2$

CCXXXVII. $a(t) = \alpha r$

CCXXXVIII. $a(r) = v^2/R$

CCXXXIX. Torque $\tau = I\alpha$

CCXL. Linear Speed of Rolling Motion $v(com) = ds/dt = Rd\theta/dt = R\omega$

CCXLI. Kinetic Energy of Rolling Motion $K = \frac{1}{2}I_{(com)}\omega^2 + \frac{1}{2}Mv^2$

CCXLII. Rolling Down a Ramp (acceleration) $a_{(com)} = g\sin\theta / (1 + I_{(com)}/MR^2)$

CCXLIII. Net External Torque $\tau_{(net)} = dL/dt$

CCXLIV. Angular Momentum $L = I\omega$

CCXLV. Young's Modulus $E = \text{Stress/Strain} = (F/A) / (\Delta L/L)$

CCXLVI. Shear's Modulus $G = \text{Shear stress/Shear Strain} = (F/A) / (\Delta x/L)$

CCXLVII. Bulk Modulus $B = \text{Hydraulic pressure/Hydraulic Strain} = p / (\Delta V/V)$

CCXLVIII. Gravitational Potential Energy $U = -GMm / r$

CCXLIX. Escape Speed $v = \sqrt{(2GM / R)}$

CCL. Kepler's Law of Periods $T^2 = (4\pi^2 / GM) r^3$

CCLI. Kepler's Ratio T^2 / a^3

CCLII. Inertia for Solid Cylinder or Disk $I = \frac{1}{2} mr^2$

CCLIII. Inertia of a Hoop or Wheel $I = mr^2$

CCLIV. Inertiaof a Solid Sphere: $I = \frac{2}{5} mr^2$

CCLV. Inertia of a Rod (center) $I = 1/12\ mL^2$

CCLVI. Inertia of a Solid Cylinder (diameter) $I = \frac{1}{4}\ mr^2 + 1/12\ mL^2$

CCLVII. Inertia of a Hoop (diameter) $I = \frac{1}{2}\ mr^2$

CCLVIII. Inertia of a Spherical Shell $I = \frac{2}{3}\ mr^2$

CCLIX. Inertia of a Rod $I = \frac{1}{3}\ mr^2$

CCLX. Newton's 2nd Law $\Sigma F=ma$

CCLXI. Centripetal Acceleration $a=v^2/r$

CCLXII. Friction on a plane $F \leq \mu N$

CCLXIII. Torque $\tau=rF\sin\theta$

CCLXIV. Momentum $p=mv$

CCLXV. Impulse $J=F\Delta t$ or Δp

CCLXVI. Kinetic Energy $K=\frac{1}{2}mv^2$

CCLXVII. Change in Gravitational Potential Energy $\Delta U=mg\Delta h$

CCLXVIII. Work done by a force at an angle $W=F\Delta r\cos\theta$

CCLXIX. Average Power $P=W/\Delta t$

CCLXX. Power of an object in motion $P=Fv\cos\theta$

CCLXXI. Restoring force of a spring $F=-kx$

CCLXXII. Elastic Potential Energy $U=\frac{1}{2}kx^2$

CCLXXIII. Period of an object oscillating on a spring $T=2\pi\sqrt{(m/k)}$

CCLXXIV. Period of a pendulum for small angles $T=2\pi\sqrt{(l/g)}$

CCLXXV. Period and frequency relationship $T=1/f$

CCLXXVI. Force due to gravity acting parallel to inclined plane= $mg*\sin\theta$

CCLXXVII. Force due to gravity acting perpendicular to inclined plane= $mg*\cos\theta$, where theta is measured between incline and horizontal

Symbols and Units used in General Physics and Mechanics

Physical Quantity	Symbol	Unit
A. Mass	*m, M*	kg
B. Linear position	*x, r*	m
C. Length, Distance	*l, d*	meter
D. Radius	*R*	
E. Time	*t*	s
F. Linear angle		rad
G. Angular position	∎	
H. Spherical angle	∎	sr
I. Area	*A*	m^2
J. Volume	*V*	m^3
K. Moment of inertia	*I*	$kg*m^2$
L. Density		kg/m^3
M. Linear velocity	*v, u, c*	m/s
N. Angular velocity	,	rad/s
O. Linear momentum	*p*	kg*m/s
P. Angular momentum	*L*	$kg*m^2/s$
Q. Linear acceleration	*a*	m/s^2
R. Angular acceleration		rad/s^2
S. Force	*F*	$N=kg*m/s^2$
T. Torque		N*m
U. Impulse	*I*	N*s
V. Work	*W*	J=N*m
W. Energy	*E*	
X. Power	*P*	W=J/s
Y. Dynamic viscosity		Pa*s

Waves and Optics

I. Sign convention of focal lengths:

Positive - converging

Negative – diverging

II. Sign convention for radius of curvature:

Positive - if on the R side

Negative - if on the V side

III. Optical power of lenses P = 1/f.

Where:
P = optical power (δ) unit is dioptres δ
f = Focal length (m)

IV. Focal length for lenses in

contact 1/f=1/f1+1/f2+1/f3...

V. Power for lenses in contact P=P1+P2+P3...

VI. Magnification for lenses not in contact m = m1 X m2 X

m3...

VII. Focal length (f), object distance (u) and image distance (v) =

$$\frac{1}{f} = \frac{1}{u} + \frac{1}{v}$$

VIII. Convention:
For a convex lens f is positive
For a concave lens f is negative

IX. 'Real is Positive' convention (RiP):
For a real image v is positive
For a virtual image v is negative

X. Magnification

$$M = \frac{v}{u}$$

XI. $P = \frac{1}{f}$ **Power of a Lens = 1/focal length**

XII. The unit of power is m-1

XIII. Convention

The power of a converging (convex) lens is taken as positive (+): f is positive.
The power of a diverging (concave) lens is taken as negative (-): f is negative.

XIV. Two Lenses in Contact: If two lenses of power P1 and P2 are placed in contact, the power P of the combination is given

by:

$$P_{Total} = P_1 + P_2$$

And the focal length f of the combination is given by :

$$\frac{1}{f_{Total}} = \frac{1}{f_1} + \frac{1}{f_2}$$

XV. Critical Anglesinθc (θc is the critical angle) = n_2 / n_1

XVI. Energy gained from photoelectric effect: E=h*f*=pc

XVII. Energy released from the conversion of mass: E= (Δm) c^2

XVIII. Focal point of a mirror: *f*=R/2

XIX. Index of refraction: n=c/v

XX. Location of bands in thin slit interference: x[m] =mλL/d

XXI. Magnification of an image: M= m = hi/ho = – di/do

XXII. Separation between bands of thin slit interference: dsinθ=mλ

XXIII. Velocity of a wave: v=*f*λ

XXIV. Wavelength of light to release a electron: λ=h/p

XXV. Mirror equation: 1/si + 1/so = 1/f

Where :

Si= Image Distance

So= Object Distance

F=Focal Length

XXVI. **Mirror equation: $M = -s_i/s_o = h_i/h_o$**

Where:

s_i: Image Distance

s_o: Object Distance

h_i: Image Height

h_o: Object Height

M: Magnification

XXVII. Relationship between the focal length, f, the object distance, do, and the image distance, di

(1 / di) + (1 / do) 1 / f (f is focal distance for mirrors and lenses)

XXVIII. Magnification Equation:

(hi / ho) = (- di / do) M (magnification for mirrors and lenses)

XXIX. n (index of refraction)= c / v

c speed of light in vacuum

v speed of light in medium

XXX. Snell's Law: n1sin q 1 = n2sin q 2

XXXI. f (focal distance for mirrors and lenses)= R / 2 (R is radius of curvature)

XXXII. Wave equation $c = \lambda f$

XXXIII. Speed of a wave $c=\lambda f$

XXXIV. Distance of a wave $D=ct$

XXXV. Wave equation $c = \lambda f$

XXXVI. Speed of a wave $v=f\lambda$

XXXVII. Index of refraction $n=c/v$

XXXVIII. Snell's law $n1\sin\theta1=n2\sin\theta2$

XXXIX. Thin Lens formula $(1/si)+(1/so)=(1/f)=Power$

XL. Magnification $M=hi/ho=-si/so$

XLI. Focal length $f=R/2$ (R=radius of curvature)

XLII. Focal length (f) with respect to image length (si) and object length (s0)

$1/f = 1/si + 1/s0$

XLIII. Magnification $M = hi/h0 = -si/s0$

XLIV. Critical Angle of Reflection $\sin(x) = n2/n1$

XLV. Focal length (f) with respect to Radius of curvature (R) $f = R/2$

XLVI. Refraction equation $x = (m \text{ lambda } L)/d$

XLVII. Snell's Law: Formula

Sin i Sin r = n2n1 = v1v2

where i is angle of incidence
r is the angle of refraction
n1 is refractive index of medium 1

n2 is refractive index of medium 2
v1, v2 are the velocities of light in medium 1 and medium 2 respectively

Gauss Lens Formula: 1/u + 1/v = 1/f
where

u - object distance
v - image distance
f - Focal length of the lens

XLVIII. Lens Maker's Equation can help you calculate the focal length of a lens, from its physical parameters.

1 / f = [n-1][(1 / R1) - (1 / R2) + (n-1) d / nR1R2)]

Where,

n is refractive index of the lens material
R1 is the radius of curvature of the lens surface, facing the light source
R2 is the radius of curvature of the lens surface, facing away from the light source
d is the lens thickness

For Thin Lens:

1 / f ≈ (n-1) [1 / R1 - 1 / R2]

Compound Lenses

The combined focal length (f) of two thin lenses, with focal length f1 and f2, in contact with each other:

1 / f = 1 / f1 + 1 / f2

If the two thin lenses are separated by distance d, their combined focal length is provided by the formula:

1 / f = 1 / f1 + 1 / f2 - (d / f1 - f2))

Newton's Rings Formulas

Here are the important formulas for Newton's rings experiment which illustrates diffraction.

nth Dark ring formula: r2n = nRλ

nth Bright ring formula: r2n = (n + ½) Rλ

Where

nth ring radius
Radius of curvature of the lens

XLIX. Law of Reflection: Θ_1 (incidence) = Θ_2 (reflected)

Critical Angle

Angel at which all the light is reflected and none is passed out=

sin Θ c = n_2 /n_1

L. Lens Power P = 1/f

LI. Farsighted (hyperopia) = -P (diverging) lens

LII. Nearsighted (myopia) = +P (converging) lens

LIII. Lenses in Contact Behave as a single lens= 1/f = 1/f_1 + 1/f_2 + . . .

LIV. P = P_1 + P_2 + . . .

LV. Lenses not in Contact: the image of one lens is used to make the object of another lens. The image from the last lens is the image of the system.

LVI. $M = m_1 m_2 \ldots$

LVII. **Related to n = c/v, where v is altered for each wave (color).**

LVIII. **Velocity** $v=f\lambda$

Also from basic physics

v=d/t

LIX. **Period** **Period (T) =1/f**

LX. **Similar triangles** **(Base1/Height1) = (Base2/Height2)**

Also

l/l'=h/h' (Pinhole)

LXI. **Vergence** $V=1/r$

LXII. **Vergence formula between incident, wavefront, and emergent rays.** $L+F=L'$

LXIII. **Index of a medium** $n=c/v$

LXIV. **Fresnel's law of reflection**

LXV. **Fresnel's Law describes the reflection rs of light from a surface**

$$rs = \frac{(n-1)2 + K2}{(n+1)2 + K2}$$

Where:

n = refractive index

K = extinction coefficient

for the solid

rs = fraction of light reflected

from the 1st surface

LXVI. $\sin\Theta c = n'/n$

LXVII. Optical path length $t = dn/c$

LXVIII. Optical path length = dn

LXIX. Lateral displacement $d = [t\sin(\Theta 1 - \Theta 1')]/\cos\Theta 1'$

LXX. t=thickness in meters

LXXI. Apparent position $l/n = l'/n'$

LXXII. Object rays are in the n medium, image rays are in the n' medium

Apical angle $\Theta 1' + \Theta 2$

Deviation $\Theta 1 + \Theta 2' - \gamma$

Max apical angle $2 * \Theta c$

Minimum deviation $\Theta 1 = \Theta 2' = (\delta min + \gamma)/2$

$\Theta 1' = \Theta 2 = \gamma/2$

LXXIII. Deviation of ophthalmic prism $\delta = [(np/ns) - 1](\gamma)$

LXXIV. Velocity of a Wave C=hf

LXXV. Tension of a Spring V=square root of Tension/(m/L)

LXXVI. Sound intensity level, B, is equal to 10log(I/Io), where I=intensity of a particular sound and Io=intensity of original sound.

LXXVII. Intensity Level B=10log(I/Io)

LXXVIII. Intensity over a Given Area I=F/A

LXXIX. Intensities formula I = Power / Area

LXXX. Intensity $I \alpha KA^2$

A = amplitude

K = constant of proportionality

LXXXI. Speed of Sound in Air at a Given Tempeture v = 331m/s + 0.6m/s/C * T

LXXXII. V is the speed of sound and T is the temperature of the air.

LXXXIII. Frequency In Terms of a Period f=1/T

LXXXIV. Period in terms of Frequency T=1/f

LXXXV. Frequency of a Wave on a String f=nv/2L n=1

LXXXVI. Beat frequency $f$beat=|f1-f2|

LXXXVII. If the whistle frequency is f, f1 (>f) and f2(<f) in terms of f,

LXXXVIII. Intensity level in decibles β =

$10\log_{10}(I/I_0)$

I_0 = threshold

LXXXIX. Intensity I = power/area I is inversely proportional to r^2 and directly as the square of the wave amplitude.

XC. Ephoton $\lambda f = hc/\lambda$

XCI. Speed of light 3×10^8 m/s

XCII. Force of spring F = -kx

k is spring constant

XCIII. Elastic Potential Energy PEelastic = $\frac{1}{2}kx^2$

XCIV. Frequency and period $f = 1/T$; $T = 1/f$

XCV. Frequency of simple harmonic motion f= $(1/2\pi)\sqrt{(k/m)}$

XCVI. Period of SHM $T=(2\pi)\sqrt{(m/k)}$

XCVII. Frequency of simple pendulum $f =(1/2\pi)\sqrt{(g/L)}$

XCVIII. Velocity of waves $v = \lambda f$

XCIX. Beat frequency $f\text{beat}=|f1-f2|$

C. Intensity level in decibles $\beta = 10\log_{10}(I/I_0)$

I_0 = threshold

CI. Doppler Effect: The observed frequency of sound is increased when the source and observer are approaching

each other and is decreased when they are receding from each other.

Doppler Effect Equation: Doppler equation, fd = fs[(v ± vd)/(v ∓ vs)]

If detector is stationary, and source is moving away from the detector: v + vs

If detector is stationary, and source is moving towards it: v - vs

Symbols and Units used in Waves and Optics

Physical Quantity	Symbol	Unit
A. Wavelength	■	m
B. Wave number	*k*	m-1
C. Frequency	*f*	Hz
D. Energy density	■	J/m3
E. Energy flux	*J*	J/m2
F. Intensity	*I*	J/(m2*s)
G. Focal length	*f*	m
H. Luminous intensity	*I*	cd
I. Luminous flux	■	lm=cd*m2
J. Illuminance	*E*	lk=lm/m2
K. Brightness	*L*	cd/m2
L. Linear absorption coefficient	■	m-1

Fluid Mechanics

I. D= Density

II. D = m/v Formula for Density

III. Dsubstance/Dwater= Specific Gravity

IV. P = F/A Formula for Pressure

V. A= area

VI. Pg= Gauge Pressure

VII. P (fluids)= Pressure

VIII. Pg = Ptot – Pat= Formula for Gauge Pressure

IX. $P = P_0 + Dgh$= Pressure at a depth

X. Pin = Pout= Pscal's Principle

XI. Fb= Buoyant Force

XII. Fb = DVg= Formula for Buyoancy

XIII. V= Volume

XIV. *f*= flow rate

XV. *f* = Av equation for flow rate

XVI. $A_1 v_1 = A_2 v_2$ Continuity Equation

Where A1 and V1 are the area and velocity at one point in the pipe, and A2 and V2 are the area and velocity at some other second point in the pipe.

XVII. Archimedes Principle: Buoyancy = the weight of the fluid displaced

XVIII. Equation of continuity: $A_1v_1 = A_2v_2$

XIX. Bernoulli's equation: $P_1 + \rho gh_1 + \frac{1}{2}\rho v_1^2 = P_2 + \rho gh_2 + \frac{1}{2}\rho v_2^2$

Pressure head + Velocity head + Potential head =Total head (total energy per unit weight).

XX. Poiseuille's law: $Q = \pi \Delta P r^4/(8\eta L)$

Where:

η: viscosity r: radius of the vessel. L: length of the vessel. *Q*= ΔP/R. Resistance of flow. R= *8ηL*/πr4

Volume flow rate = *π(pressure difference)*(*pipe radius)4*/[8*(pipe length)*viscosity)**

XXI. Stokes' law: $F = 6\pi\eta rv$

Where F is the force exerted on a sphere of radius r which is moving

through a fluid of viscosity η with a relative velocity v

XXII. Reynolds number: $R = \rho Dv/\eta$

Where: The Reynolds number for the flow of a fluid of density ρ and viscosity η through a pipe of inside diameter d is given by $R=\rho dv/\eta$, where v is the velocity

XXIII. Surface tension, Laplace's law for a spherical membrane: $P_i - P_o = 2\gamma/r$.

Where:
r is the radius of the bubble or drop,
Pi is the internal pressure,
Po is the external pressure and
γ is the surface tension, which is the force per unit length exerted by a surface.

XXIV. Capillary action: The height to which the liquid can be lifted is given by: $h = 2\gamma\cos\theta/(\rho gr)$

γ: liquid-air surface tension (T) (T=energy/area)

θ: contact angle

ρ: density of liquid

g: acceleration due to gravity

r: is radius of tube

XXV. Pressure $p=p_0+\rho gh=F/A$

XXVI. Density of Water= 1000 kg/m^3 = 1 g/cm^3 = 1 kg/L

XXVII. Specific Gravity= Density of Object/Density of Water

XXVIII. Archimedes' Principle Buoyancy Fbuoy = (Density Of Fluid)X(Volume Of Object Submerged)X(Gravity)

XXIX. Pressure $P = F_{\perp} / A$

XXX. Pascal's Law $F_1 / A_1 = F_2 / A_2$

XXXI. Volume flow rate $f = Av$

XXXII. Continuity Equation $A_1 V_1 = A_2 V_2$

XXXIII. Bernoulli's Equation $P_1 + pgy_1 + \frac{1}{2}mv_1^2 = P_2 + pgy_2 + \frac{1}{2}mv_2^2$

XXXIV. Buoyant force Fb=ρVg (V=volume)

XXXV. ρ (density) = m / V

XXXVI. (F / A) = (Patm + ρgh) = mg of fluid displaced

XXXVII. P (pressure)

XXXVIII. Fbuoyant= ρVg

XXXIX. m / V= ρ (density)

XL. (F / A) = (Patm + ρgh) = mg of fluid displaced= P (pressure)

XLI. ρVg= Fbuoyant

XLII. A=area

XLIII. Bernoulli's Equation $P1 + \frac{1}{2}Dv1^2 + Dgh1 = P2 + \frac{1}{2}Dv2^2 + Dgh2$

XLIV. Continuity Equation A1v1 = A2v2

XLV. Fluid Flow:

For incompressible it is: $A_1V_1 = A_2V_2$

For compressible fluid it is: $p_1A_1V_1 = p_2A_2V_2$

where A_1 and A_2 are Areas

p_1 and p_2 are pressures

V_1 and V_2 are Volumes

XLVI. D=Density = m/v

XLVII. Fb=Buoyant Force Fb = DVg

XLVIII. Flow rate=f = Av

XLIX. Formula for Gauge Pressure Pg = Ptot - Pat

Pg Gauge Pressure

L. Pin = Pout= Pscal's Principle

LI. Pressure P = F/A

LII. Torricelli's Law v = v2gh

LIII. V= Volume

LIV. Pressure at depth,$P = P_0 + pgh$.

LV. F(buoy) = pVg Archimedes Principle of Buoyancy

LVI. $P + pgy + \frac{1}{2}pv^2 = const.$ Bernoulli Principal

LVII. Floating Object in Equilibrium on Surface mg = Fbuoy

LVIII. Bernoulli Effect= The pressure is lower where the flow speed is greater

LIX. Torricelli's result= Vefflux = √ 2gD

LX. Fluids Momentum and impulse

Momentum = mass x velocity p = mv

F = Δp /Δt

I = Δp = FΔt

LXI. Center of mass:

Center of mass: *xCM* = ∑*mixi*/*M*

$x_{CM} = \sum m_i x_i / M$

$y_{CM} = \sum m_i y_i / M$

$z_{CM} = \sum m_i z_i / M$

$M = \sum m_i$

LXII. Fluids Rotations :

$\omega_{avg} = (\theta_f - \theta_i)/(t_f - t_i) = \Delta\theta/\Delta t$ **rad/s**

***θi* and *θf* – initial and final angle (angular displacement)**

***α* = Δω / Δt = (*ωf* - *ωi*) / (*tf* - *ti*) where *ωi* and *ωf* – initial and final angular velocity,**

***α* – angular acceleration**

$\omega_f = \omega_i + \alpha(t_f - t_i)$, $\theta_f = \theta_i + \omega_i(t_f - t_i) + \frac{1}{2}\alpha(t_f - t_i)^2$,

$\tau = r \times F = I\alpha = \Delta L/\Delta t$, $L = I\omega$.

Moment of inertia: $I = \sum m_i r_i^2$.

Rolling: $KE_{tot} = (1/2)mv^2 + (1/2)I\omega^2$, $v = r\omega$.

Modern physics

I. **Planck's constant (h)** **6.63*10^-34 Joule Seconds**

II. **Maximum KE of a particle released in nuclear fission: Kmax=hf-Φ**

III. **Energy (E) with respect to Plank's constant (h) and frequency (f)** **E = hf**

IV. **Energy (E) with respect to momentum (p) and the speed of light (c)** **E = pc**

V. **Bragg Law: the fundamental law of x-ray crystallography, nλ = 2dsinθ, where n is an integer, λ is the wavelength of a beam of X-rays incident on a crystal with lattice planes separated by distance *d*, and θ is the Bragg angle.**

VI. **Lambda equation** **lambda= c/f**

VII. **E emitted photon** **absolute value E= Ej-Ei**

Ej= higher energy level

Ei= lower energy level

VIII. **Blackbody Radiation** **an object at any temperature emits electromagnetic radiation**

IX. **Bohr's Resolution** **quantized energy (E=nhf)**

X. **Photoelectric Effect** **photoelectron expelled**

from atom by a photon

XI. Work function the amount of energy required to expel a photoelectron

XII. Maximum kinetic energy k = E-phi

XIII. Stopping potential equation qVs=hf-phi

XIV. KE=hf-Q

XV. Einstein equation E=hf

XVI. Lambda equation lambda= c/f

XVII. E emitted photon absolute value E= Ej-Ei

Ej= higher energy level

Ei= lower energy level

XVIII. de Broglie wavelength of a particle λ=h/p

Lattice Plane Bragg's Plane

Bragg's Law nλ = 2dsinθ (n = integer)

de Broglie wavelength of a particle λ=h/p

XIX. Lattice Plane Bragg's Plane

Bragg's Law nλ = 2dsinθ (n = integer)

XX. Heisenberg's uncertainty principle ΔpΔx=h̄/2

XXI. Probability density= Probability of finding the particle in a given unit volume at a given instant of time, abs[ψ] ^2

XXII. $E=hf$ **lights energy**

XXIII. $P=E/c$ **Momentum of a photon**

XXIV. $c=f\lambda$ **photon frequency**

XXV. **1 Bq=1 Becqueral=1 d/s**

XXVI. $KE=hf-\phi$

XXVII. $KE=eVs$ **Photoelectric effect**

XXVIII. $KE=qV$ **stopping potential**

XXIX. $E=mc^2$ **mass converted to energy**

XXX. **E Photon energy µ Frequency**

XXXI. $E = hf$

XXXII. **Frequency µ 1/ (Wavelength)**

XXXIII. $f = c/l$

XXXIV. **Frequency (f) Number of complete waves per second**

XXXV. **Energy of a Photon (E)**

XXXVI. $E = hf$

XXXVII. **Photon Energy E µ f**

XXXVIII. $E = hf$

XXXIX. **h= Planck's constant**

XL. **F= Frequency of Radiation**

XLI. **E= Energy**

XLII. **h = 6.6 x 10-34 J.s.**

XLIII. **Atomic/Nuclear Transitions** **hf=ΔE**

XLIV. **Activity is A= λN, where N is number of radioactive particles in sample**

XLV. **Decay Equation: -dN/dt = λ N where the constant λ is the decay constant**

A = λN, where λ is the decay constant, and N is the number of atoms.

XLVI. **p=mv**

XLVII. **Wavelength λ=h/mv = h/p**

XLVIII. **E(k max) = hf-Φ**

XLIX. **Φ = work function of surface**

L. E=hf

LI. **p=hf/c = h/λ**

LII. **Radioactive decay law=** **dN/dt α N**

LIII. **Heisenberg Uncertainty Principle** : **ΔxΔp ≥ h⁄(4π)**

ΔxΔp≥h/4π

ΔEΔt≥h/4π

Where:

x ; position
p ; momentum
Δx, Δp ; the standard deviation of x, p

h ; the Planck's constant
If $\Delta x \rightarrow 0$, then $\Delta p \rightarrow \infty$.

LIV. Change of energy of electron $hf = E2 - E1$

LV. Change in energy (E) = hf

LVI. The speed of light c = f(frequency) x w(wavelength)

LVII. Formula for electron volts 1 [eV] = 1.6x10-19 [J]

LVIII. The energy of a photon: $E = h \cdot f$

LIX. Matter wavelength: $\lambda = h/p$

LX. Relativistic factor: $\gamma^2 = 1/(1 - v^2/c^2)$

LXI. De Broglie Wavelength: $\lambda = h/(mv)$

LXII. Half life of radioactive material: $T_{half} = \ln(2)/\lambda$

LXIII. Mass energy equivalence: $E = m_o \cdot c^2$

LXIV. Bohr's model L = $nh/2\pi$

Where:

L = angular momentum

n = principal quantum number = 1,2,3,...n

h = Planck's constant.

Where:

n1 < n2

E0 = 13.6 eV

LXV. Half life of radioactive element t1/2

= ln(2)/λ

LXVI. Nuclear Decay Rate :

$$N_t = N_0 e^{-\lambda t}$$

Where:

N_0 is the initial quantity of radioactive nuclides measured by mass or numbers of atoms

N_t is the number of nuclides remaining after time *t*

λ is the decay constant

***e* is the natural exponential = *2.718*.**

LXVII. Average life of radioactive element :τ = 1/λ

LXVIII. Rydberg Formula: $1/\lambda = RZ^2(1/n_1^2 - 1/n_2^2)$

Where:

λ is the wavelength of the photon (wave number = 1/wavelength)

R = Rydberg's constant ($1.0973731568539(55) \times 10^7$ m^{-1})

Z = atomic number of the atom

n_1 and n_2 are integers where $n_2 > n_1$.

LXIX. The rate of radioactive emissions $A=\lambda N_t$

$A=\lambda N_0 e^{-\lambda t}$

Where A is the activity or frequency of nuclear events or disintegrations per second in Becquerels.

The mean, or average lifetime of a nuclide, (*T*) also called the time constant, is the sum of the lifetimes of all the individual nuclides in a sample, divided by the total number of nuclides present. It is the reciprocal of the decay constant. Thus:

Mean Life $T=1/\lambda$

Quantum/Modern Physics Symbol and units

Name	Symbol	Unit
A. Mass absorption coefficient	■	m^2/kg
B. Radioactive activity	*A*	$Bq=s^{-1}$
C. Absorbed dose/ Total Ionizing Dose, TID	*D*	Gy=J/kg

Electricity and magnetism

I. **Electric field strength about a point charge E field = k q1 q2/r**

II. **Electric potential due to charge particle (volts) V=k Σ q/r**

III. **Power dissipated in an electric circuit P=IV**

IV. **Equivalent resistance of resistors in parallel 1/Rtot = 1/R1 + 1/R2 . . .**

V. **Potential Energy in a capacitor Uc= (1/2) QV= (1/2) CV^2**

VI. **Capacitance of two parallel plates C= (εo A)/d**

VII. **Charge on a capacitor C=Q/V**

VIII. **The force a charged particle feels in an electric field F = E q**

IX. **Voltage induced in a rod moving through a uniform magnetic field= BLv**

X. **Magnetic flux =BA**

XI. **Units for voltage other than volts = Joules/Columb**

XII. **Electric potential a distance r from a charge= KQ/r**

XIII. **Total capacitance of capacitors in series= 1/ ((1/C) + (1/C).....)**

XIV. Force a charge in a B field= qVB

XV. ΔU= Q+W

XVI. e= |W/Th|

XVII. dsinθ= mλ

XVIII. x (sub m) =mλL/d

XIX. E =F/q

XX. Potential energy of electric fieldPE=PE $_{12}$ +PE $_{13}$ +PE $_{23}$ =

= kq $_1$ q $_2$ /r +kq $_1$ q $_3$ /r + kq $_2$ q $_3$ /r=…

XXI. V = k {(Q $_1$ / r $_1$) + (Q $_2$ / r $_2$) + (Q $_3$ / r $_3$) } …

XXII. C= Q/V

XXIII. C = ε $_0$ A/D where C is the capacitance between the plates, and A is their area

XXIV. Potential energy of a capacitor ½QV=½CV²

XXV. Average I= ΔQ/Δt

XXVI. R= ρl/A

XXVII. V= IR

XXVIII. P (brightness as well as power) = IV

XXIX. Capacitors in Parallel, C=C $_1$ +C $_2$ +C $_3$ +...

XXX. Capacitors in Series, 1/C=1/C $_1$ +1/C $_2$ +.

XXXI. Resistance in a wire R = ρ (L/A)

XXXII. Resistance in Series R = R $_1$ + R $_2$ + R $_3$ +

XXXIII. Formula for parallel resistances: Rparallel = 1 / (1/R1 + 1/R2 + . . . 1/Rn)

XXXIV. Reactance (X) Xparallel = 1/ (1/X1 + 1/X2 + . . . 1/Xn)

XXXV. Force of Magnetism =qvBsinθ

XXXVI. Force of Magnetism =BIlsinθ

XXXVII. Magnetic flux (Φm) = BAcosθ

XXXVIII. The magnetic field due to a single wire: $B = \mu_0 I / (2 \pi R)$

Where R = perpendicular distance of the field point from the wire.

XXXIX. Magnetic flux (Φm) = $BA\cos\theta$

XL. Max K = $hf-\Phi$

XLI. E= hf=pc

XLII. max K= $hf-\Phi$

XLIII. λ= h/p

XLIV. $\Delta E = (\Delta m) c^2$

XLV. Electric field E=F/q

XLVI. Potential (stored) energy $U=qV= (1/4\pi\varepsilon_0) (q_1 q_2 /r)$

XLVII. Electric field (avg) Eavg=-V/d

XLVIII. Electric Potential $V= (1/4\pi\varepsilon_0) \sum qi/ri$

XLIX. Capacitance $C=Q/V=\varepsilon_0 A/d$

L. Potential (stored) energy of a capacitor Uc= (1/2) QV= (1/2) CV^2

LI. Current (avg) Iavg=$\Delta Q/\Delta t$

LII. Resistance R= (resistivity) l/A (l=length)

LIII. Potential (ohm's law) V=IR

LIV. Power P=IV

LV. Capacitance (parallel) Cp= $\sum$ Ci

LVI. Capacitance (series) 1/Cs= $\sum$ 1/Ci

LVII. Resistors (series) Rs= $\sum$ Ri

LVIII. Resistors (parallel) 1/Rp= $\sum$ 1/Ri

LIX. Force (magnetic field) Fb=$qvB\sin\theta=BIl\sin\theta$

LX. Magnetic field B= $(\mu_0 /2\pi) (I/r)$

LXI. Magnetic flux $\varnothing m=B \cdot A=BA\cos\theta$

LXII. EMF (avg) $\varepsilon_{avg} = -\Delta \varnothing_m / \Delta t$

LXIII. EMF $\varepsilon = Blv$

LXIV. Maximum kinetic energy of a particle $K_{max} = hf - \varnothing$ ($\varnothing$ =work function)

LXV. Wavelength (nuclear physics) $\lambda = h/p$

LXVI. Total torque $\sum \tau = i\alpha$ (i=rotational inertia, α =angular acceleration)

LXVII. Rotational inertia $I = \int r^2 dm = \sum mr^2$

LXVIII. Angular momentum $L = r \times p = I\omega$

LXIX. Kinetic energy (in terms of rotational inertia and angular velocity) $K = (1/2)I\omega^2$

LXX. Gauss' law for electricity $\int E \cdot dA = Q/\varepsilon_0$

LXXI. Gauss' law of magnetism $\int B \cdot dL = \mu_0 I$

LXXII. Potential energy (inductance) $U_L = (1/2) LI^2$ (L is inductance)

LXXIII. $E = F/q = -dV/dr = pJ$

LXXIV. $\int E \cdot dA = Q/\varepsilon_0$

LXXV. $V = (1/(4\pi\varepsilon_0))\sum(q/r) = IR$

LXXVI. $U_e = qV = (1/(4\pi\varepsilon_0))((q_1 q_2)/r)$

LXXVII. $C = Q/V = (\kappa\varepsilon_0 A)/d$

LXXVIII. $C_p = \sum C$

LXXIX. $1/C_s = \sum 1/C$

LXXX. $I = dQ/dt$

LXXXI. $U_c = \frac{1}{2}QV = \frac{1}{2}CV^2$

LXXXII. $R = pl/A$

LXXXIII. $R_s = \sum R$

LXXXIV. $1/R_p = \sum 1/R$

LXXXV. $P = IV$

LXXXVI. $F_m = qv \times B$

LXXXVII. $\int B \cdot dl = \mu_0 I$

LXXXVIII. $dB = (\mu_0/4\pi)((Idl \times r)/r^3)$

LXXXIX. $B_s = \mu_0 nI$

XC. $(phi)m = \int B \cdot dA$

XCI. $\varepsilon = \int E \cdot dl = -d(phi)m/dt = -L(dI/dt)$

XCII. $Ul = \frac{1}{2}LI^2$

XCIII. Electric Force: the force of attraction or repulsion between objects due to charge.

XCIV. Formula for Coulomb's Law $F = K(q_1 q_2/d^2)$,

XCV. Coulomb's Law = the relationship among electrical force, charges, and distance= The electrical force between two charges varies directly as the product of the charges and inversely as the square of the distance between them.

XCVI. Charge of an Electron $e = 1.6 \times 10^{-19}$

XCVII. Electric Field Strength = the force exerted per unit charge in a field (E=F/Q)

XCVIII. Ohm's Law = the current in a circuit varies in direct proportion to the voltage and inversely with the resistance; V = IR

XCIX. Power Formula Watts = Volts x Amps; $Amps^2 \times \Omega$; $Volts^2/\Omega$

C. Voltage Formula Volts = Ω x Amps; Watts/Amps; √Watts x Ω

CI. Ohm's Law = the current in a circuit varies in

direct proportion to the voltage and inversely with the resistance; V = IR

CII. Power Formula Watts = Volts x Amps; Amps² x Ω; Volts²/Ω

CIII. Voltage Formula Volts = Ω x Amps; Watts/Amps; √Watts x Ω

CIV. Current Formula Amps = Volts/Ω; Watts/Volts; √(Watts/Ω)

CV. Resistance Formula Ω = Watts/Amps²; Volts²/Watts; Volts/Amps

CVI. Impedance = the opposition to alternating current (AC) in an electrical conductor

CVII. Electric Power=the rate at which electrical energy is converted to another form of energy;

CVIII. Power = Current x Voltage; Unit => Watts (W)

CIX. Force on a charged particle in motion relative to a magnetic field Fb = qvBsinθ

CX. Force on a current carrying wire due to a magnetic filed Fb = BILsinθ

CXI. Induced electric motive force in a wire in motion relative to a magnetic field V=Blv

CXII. Total Resistance in a Series R (T) = R(1) + R(2) + R(3) + ...+ R(n)

{Each Resistor is measured in Ω}

CXIII. Ohm's Law Formula V = I · R; I = V/R; R = V/I

V = Voltage (V)

I = Current (A)

R = Resistance (Ω)

CXIV. Power in a Transformer P (Primary) = P (Secondary)

CXV. Coulombs Law F=K(q1q2)/d2 For charged particles/objects that are small compared with the distance between them, the force between the charge varies directly as the product of the charges and inversely as the square of the distance between them.

F=K (q1q2)/d2

CXVI. Resisters in Parallel $Req = R_1 R_2 /(R_1 + R_2)$

CXVII. Power in Circuit $P = I^2R = V^2/R$

CXVIII. Power in AC P = Vrms×Irms

CXIX. $Vrms = Vmax/\sqrt{2}$

CXX. $Irms = Imax/\sqrt{2}$

CXXI. Capacitance C = Q/V

CXXII. Capacitors in series $Ceq = C_1 C_2 /(C_1 + C_2)$

CXXIII. Capacitors in parallel Ceq = C1 + C2

CXXIV. Magnetic force created by wire and solenoid wire= $B \propto I/r$ where I is current, r is distance from wire.

CXXV. Solenoid= $B \propto I \times N/L$ where N = # coils, L = length

CXXVI. Current I = Q/t

CXXVII. Units= A

CXXVIII. Resistance R = V/I

CXXIX. R = pL/A

p is resistivity, L is length of wire, and A is cross-sectional area of wire

CXXX. Resistors in series $Req = R_1 + R_2 ...$

CXXXI. Resisters in Parallel $Req = R_1 R_2 /(R_1 + R_2)$

CXXXII. Power in Circuit $P = I^2R = V^2/R$

CXXXIII. Power in AC $P = V_{rms} \times I_{rms}$

CXXXIV. Vrms = Vmax/ √ 2

CXXXV. Irms = Imax/ √ 2

CXXXVI. Capacitance $C = Q/V$

CXXXVII. Cparallel-plate $C = \varepsilon_0 A/d$

CXXXVIII. Cparallel-plate with dielectric $C = K\varepsilon_0 A/d$

CXXXIX. Coulomb's Law $F = k_0 (Qq/r^2)$

CXL. Coulomb's Constant $k_0 = 9 \times 10^9 \ N \cdot m^2/C^2$

CXLI. Electric field due to Q $E = k_0 (Q/r^2)$

CXLII. Electric field between two plates $E = V/d$

CXLIII. Capacitors in series $C_{eq} = C_1 C_2 /(C_1 + C_2)$

CXLIV. Capacitors in parallel $C_{eq} = C1 + C2$

CXLV. Elementary charge 1.6×10^{-19} C

CXLVI. Work done by electric field $-\Delta PE_{elec}$

CXLVII. Change in KE electrostatic $\Delta KE = -\Delta PE$

CXLVIII. Energy energy= power × time

CXLIX. Kirchhoff's Rules:

1) **The sum of the voltage-drops across the resistors in any complete path is equal to the voltage of the battery.**
2) **The amount of current entering a parallel combination of resistors is equal to the sum of currents that pass through the individual resistors.**

CL. Magnetic force created by wire and solenoid wire= $B \propto I/r$ where I is current, r is distance from wire

CLI. Solenoid= $B \propto I \times N/L$ where N = Number of coils, L =

length

CLII. Intensity in terms of Energy I=E/At

CLIII. Capacitance C = q/V

CLIV. Energy stored in a Capacitor E = 1/2qΔV = 1/2CΔV^2

CLV. Electric Current I = Δq/Δt

CLVI. Resistance Potential Difference and Current R = ΔV/I

CLVII. Resistivity ρ = R A/L or R = (ρ L)/A

CLVIII. Force on a current carrying wire F=BIl

CLIX. Left hand rule= Thumb Motion

Left hand rule= first finger Magnetic field (N to S)

Left hand rule= second finger Current (+ to -)

CLX. Right Hand Rule= Thumb Current

Right Hand Rule= Fingers Magnetic Fields

CLXI. Flux in a area Φ=BA

CLXII. Induced e.m.f: faraday only e.m.f=ΔΦN/Δt

Induced e.m.f: lens and faraday e.m.f=δΦN/δt

V (voltage in a coil) V=N (dΦ/dt)

CLXIII. Ideal transformer equation (linking V and N) Vp/Vs=Np/Ns

CLXIV. Permeance (Λ) = μA/L (units: Wb/A)

Where μ is the permeability of the iron in the core, A the cross-sectional area of the core and. L the length of the magnetic circuit.

CLXV. Coulombs Law (F between two point charges) $F=KQ_1Q_2/r$

CLXVI. K (in charge and field senses) = 1/4πε

CLXVII. Electric field strength in a linear field E=F/q

CLXVIII. Electric field strength in a radial field $E=kQ/r^2$

CLXIX. V (electric potential energy per unit charge) $V=kQ/r$

CLXX. Field strength at a point d $E=V/d$

CLXXI. Radius of a particles path $r=mv/Bq$

CLXXII. Conservation of energy $E=mc^2$

CLXXIII. γ factor $\gamma=Etot/Erest$

CLXXIV. Potential energy of electric field= $kq_1 q_2 /r= qV$

CLXXV. $V= k(q_1 /r_1 +q_2 /r_2 +...)$

CLXXVI. $C= Q/V$

CLXXVII. $C= \varepsilon_0 A/d$

CLXXVIII. Potential energy of a capacitor $=½QV=½CV^2$

CLXXIX. Average $I= \Delta Q/\Delta t$

CLXXX. $R= \rho l/A$

CLXXXI. $V =IR$

CLXXXII. P (brightness/ power) = IV

CLXXXIII. $Cparallel= C_1 +C_2 +...$

CLXXXIV. $1/Cseries= 1/C_1 +1/C_2 +...$

CLXXXV. $Rseries= R_1 +R_2 +...$

CLXXXVI. $1/Rparallel= 1/R_1 +1/R_2 +...$

CLXXXVII. Force of Magnetism= $qvB\sin\theta$

CLXXXVIII. Force of Magnetism= $BIl\sin\theta$

CLXXXIX. $B= (\mu_0 /2\pi)(I/r)$

CXC. Magnetic flux (Φm) = $BA\cos\theta$

CXCI. Average $\in$ $-\Delta\Phi m/\Delta t$

CXCII. $\in =$ Blv

CXCIII. $E=$ hf=pc

CXCIV. max K hf-Φ

CXCV. λ= h/p

CXCVI. ΔE = (Δm) c^2

CXCVII. W = q V electrical work = charge x voltage

CXCVIII. V= Voltage (measures electrical potential difference)

CXCIX. C= Coulomb (measure electrical charge)

CC. J= Joule (measures work 1J = 1Nm)

CCI. I = q/t Current = charge/time

CCII. I= current (measured in Amperes)

CCIII. q= electrical charge (measured in Coulombs)

CCIV. A= Ampere (measure of electric current

CCV. W = V x I x t Electrical Work = Voltage x current x time

CCVI. P= Power (measured in watts)

CCVII. J/s= Watt (unit of power)

CCVIII. W= Watt (J/s unit of power)

CCIX. P = V I Power = voltage x current

CCX. J/C= a Volt (V)

CCXI. C/s= an ampere (A)

CCXII. Watts for electric power = Amp*Volt

CCXIII. Parallel Resistance total = 1/RT=1/R1+1/R2+1/R3

CCXIV. Parallel Current total = IT=I1+I2+I3

CCXV. Parallel Voltage total = VT=V1=V2=V3

CCXVI. Series Resistance total = RT=R1+R2+R3

CCXVII. Series Current total IT=I1=I2=I3

CCXVIII. Series Voltage total VT=V1+V2+V3

CCXIX. Electrical power = Current*Voltage

CCXX. Current = Voltage/Resistance

CCXXI. Coulomb's constant k = 1/4πε0 = 9E9

CCXXII. Coulombs law - or Electric force Fe = k q1 q2 / r^2

CCXXIII. Electric potential Energy Ue = k q1 q2 / r = qV

CCXXIV. Capacitance C = Q/V

CCXXV. Electric potential of a capacitor V=Q/C

CCXXVI. Ohms Law V = IR

CCXXVII. Current I = V/R

CCXXVIII. Resistance R = V/I

CCXXIX. Power P = IV

CCXXX. V or E Unit of Electrical Potential V = I × R

CCXXXI. I or i Unit of Electrical Current I = V ÷ R

CCXXXII. R or Ω Unit of DC Resistance R = V ÷ I

CCXXXIII. G or ʊ Reciprocal of Resistance G = 1 ÷ R

CCXXXIV. C Unit of Capacitance C = Q ÷ V

CCXXXV. Q Unit of Electrical Charge Q = C × V

CCXXXVI. L or H Unit of Inductance VL = -L(di/dt)

CCXXXVII. W Unit of Power P = V × I or I2 × R

CCXXXVIII. Z Unit of AC Resistance Z2 = R2 + X2

CCXXXIX. Hz Unit of Frequency *f* = 1 ÷ T

Electricity and magnetism symbols and units

	Physical Quantity	**Symbol**	**Unit**
A.	Current	*I*	A
B.	Charge	*Q, q, e*	C=A*s

C. Current density	j	A/m^2
D. Volume charge density	■	C/m^3
E. Surface charge density	■	C/m^2
F. Voltage	V	Volt
G. emf	■	
H. Electric field	E	N/C, V/m
I. Electric flux	■	V*m
J. Electric moment	p_e	C*m
K. Capacitance	C	F=C/V
L. Magnetic field	B	T=N/(A*m)
M. Magnetic flux	■	$Wb=T*m^2=V*$
N. Inductance	L	
O. Mutual-inductance	M	H=Wb/A
P. Magnetic moment	p_m	$A*m^2$
Q. Polarization	P	C/m^2
R. Magnetization	I	A/m

Thermal physics

Thermal physics Symbols:

	Physical Quantity	Symbol	Unit
A.	Temperature	T	K
B.	Substance quantity	M	mol
C.	Pressure	P	Pa
D.	Heat	Q	J
E.	Heat capacity	C	J/K
F.	Entropy	S	
G.	Specific heat	c	J/(kg*K)
H.	Molar heat	c_m	J/(mol*K)
I.	energy flux	j	W/m^2
J.	Surface tension	■	N/m
K.	Stress	■	$Pa=N/m^2$
L.	Elasticity modulus	E	Pa or N/m^2

I. **Heat transfer: Q=mcΔT,**

Where Q is the symbol for heat transfer, m is the mass of the substance, and ΔT is the change in temperature. C the specific heat is the amount of heat necessary to change the temperature of 1.00 kg of mass by 1.00ºC. The specific heat c is a property of the substance; its SI unit is J/(kg · K) or J/(kg · ºC).

II. **Ideal-gas equation: PV = nRT, P = pressure, V = volume, n = number of moles, R = gas constant, T = Temperature**

(absolute-temperature scale, Kelvin)

III. Ideal Gas Law PV = nRT = NKbT

IV. Kinetic energy of a molecule Kavg = (3/2)KbT

V. Root mean square velocity vrms = √3RT / M = √3KbT / μ

VI. Work done by gas W = -PΔV

VII. Specific Latent Heats are measured in JKg^{-1}

VIII. Specific latent heat: Energy = mass × specific latent heat: E = m × L

IX. Equation of state for an ideal gas PV = nRT

X. P = pressure; V=volume; n = number of moles; R = constant; T = temperature

XI. Adiabatic Compression: ΔU = - W => work done on the gas will lead to an increase in internal energy =>an increase in temperature.

XII. The internal energy of a system= Change of U = Q - W

XIII. Thermal Efficiency (e) = |W| / |Qh| = { |Qh| - |Qc| } / |Qh| = 1 - { |Qc| / |Qh| }

XIV. Fahrenheit to Celsius Conversion T(F) = (9/5)T(C) + 32

XV. Triple-Point of Water when three phases of water

coexist: T = 273.16

XVI. Kelvins (K) absolute temperature scale T(K) = T(C) + 273.15

XVII. Equation for Heat in Phase Change Q = mL

Where:

m = mass

L = Latent Heat of transformation

Latent Heat of Transformation: heat for sample of mass to completely undergo a phase change.

XVIII. alpha= coefficient of linear expansion (1/C)

XIX. Ideal Gas Law PV = nRT

R = universal gas constant = 8.314 J / mol*K

n = number of moles of gas

XX. Average Translational Kinetic Energy of gas molecules U = (3/2)nRT = (3/2)kT

XXI. k = Boltzmann's constant = 1.38 x 10^-23 J/K

XXII. k = R/Na

XXIII. Atomic Mass Unit=1.6605 x 10^-27 kg

XXIV. 1 mole at STP = 22.4 L

XXV. T = 273 K

XXVI. P = 1.013 x 10^5 Pa = 1 atm

XXVII. Co efficiency of Performance for refrigeration/AC unit and heat pumps Refrig/AC unit= |Qc| / |W|

XXVIII. Heat pumps= |Qh| / |W|

XXIX. Total internal energy in a molecule and atom U = Ek + Ep

XXX. Expansion due to heat $\Delta l = \alpha l_0 \Delta T$

XXXI. Heat Transfer $H = (kA\Delta T)/L$

XXXII. Pressure $P = F/A$

XXXIII. Gas Law $PV = nRT = NkT$

XXXIV. Average Molecular Kinetic Energy $K = 3/2(kT)$

XXXV. Root-mean-square Velocity $v = \sqrt{((3RT)/(M))}$

XXXVI. Work done on a system $W = -P\Delta V$

XXXVII. Change in potential energy of a system $\Delta U = Q + W$

XXXVIII. Efficiency of a engine $e = abs(W/Q)$

XXXIX. H (rate of heat transfer)= $kA\Delta T / L$

XL. PV= nRT (moles) = NkbT (particles)

XLI. Average molecular kinetic energy= (3/2) kbT

XLII. $\sqrt{(3RT / M)} = \sqrt{3kbT / \mu)}$ **vrms**

XLIII. KEmax (of a photon knocked off a metal)= hf - Wo

XLIV. Heat transfered to a system $Q=mL=mc\Delta T=nc\Delta T$ **(m=mass of sample, c=specific heat, n=number of moles)**

XLV. Ideal gas law $pV=nRt$ **(n=number of moles)**

XLVI. Average molecular kinetic energy Kavg= $(3/2)kbT$ **(kb=boltzmann constant)**

XLVII. Root-mean-square velocity $vrms= \sqrt{(3RT/M)}= \sqrt{(3kbT/ \mu)}$ **(μ =mass of molecule)**

XLVIII. Work done on a system $W=-p\Delta V$ **(V=volume)**

XLIX. Change in internal energy $\Delta U=Q+W=ncv\Delta T$ **(cv=specific heat in volume)**

L. Efficiency $e=abs(W/Qh)=(Th-Tc)/Th$

LI. Thermal Expansion:

Solids

ΔL	=	L0	α	ΔT	linear
ΔA	=	A0	2α	ΔT	areal
ΔL	=	L0	3α	ΔT	volumetric

α (li)ΔT Δl (thermal expansion)

Liquids

ΔV = βV0ΔT

Liquids have higher expansivities than solids

LII. **β ≈ 10−3/K, 3α ≈ 10−5/K**

LIII. **H (rate of heat transfer)= kAΔT / L**

LIV. **nRT (moles) = NkbT (particles) PV**

LV. **Root mean square velocity of gas particles vrms = √ 3RT/M = √ 3kbT/ μ**

LVI. **Average molecular kinetic energy=(3/2)kbT**

LVII. **√ (3RT / M) = √3kbT / μ) vrms**

LVIII. **PΔV work is done by system (volume increase). Temperature (heat) in system increases.**

LIX. **(Internal energy)=Q + W ΔU**

LX. **H = (kAΔT)/L Thermal Conductivity**

LXI. **P = F/A General Pressure**

LXII. **PV = nRT = NkT Ideal Gas Law**

LXIII. **K = (3/2)kT Average Molecular Kinetic Energy**

LXIV. **v = √ (3RT)/M = √ (3KT)/μ Average Speed of each Molecule**

LXV. **W = -PΔV Work in a Heat Engine**

LXVI. **ΔU = Q + W First Law of Thermodynamics**

LXVII. **e = abs (W/Q) Efficiency of a Heat Engine**

LXVIII. **e = (T (hot) - T (cold))/T (hot)**

LXIX. $\Delta l \quad \alpha l_0 \Delta T$

LXX. $H \quad kA\Delta T/L$

LXXI. $P \quad F/A$

LXXII. $PV \quad nRT=Nk(sub\ b)T$

LXXIII. Average Kinetic energy $3/2k(sub\ b)T$

LXXIV. Average speed $\sqrt{(3RT/M)} = \sqrt{(3k(sub\ b)T-\mu)}$

LXXV. $W \quad -P\Delta V$

LXXVI. Root mean square velocity of gas particles: vrms = v3RT/M = v3kbT/μ

LXXVII. $\Delta l \quad \alpha l_0 \Delta T$

LXXVIII. $H \quad kA\Delta T/L$

LXXIX. $P \quad F/A$

LXXX. $PV \quad nRT=Nk(sub\ b)T$

LXXXI. Average Kinetic energy $3/2k(sub\ b)T$

LXXXII. Average speed $\sqrt{(3RT/M)} = \sqrt{(3k(sub\ b)T-\mu)}$

LXXXIII. $W \quad -P\Delta V$

LXXXIV. $\Delta U \quad Q+W$

LXXXV. $e \quad |W/Th|$

LXXXVI. Efficiency of carnot $Th-Tc/Th$

LXXXVII. $P_1 V_1 /T_1 \quad P_2 V_2 /T_2$

LXXXVIII. $\Delta l=\alpha\ lo\ \Delta T$:linear thermal epansion

LXXXIX. $B=(\mu_o I) / (2 \pi r)$ Strength of magnetic field about a current carrying wire

XC. $R = \rho l / A$ Resistance in a long current carrying wire.

XCI. $\Delta A=2\alpha A_o \Delta T$ Area thermal expansion

XCII. $\Delta V=3\alpha V_o \Delta T$ Volumetric thermal expansion

XCIII. $P_1V_1/T_1=P_2V_2/T_2$ Combined Gas Law

XCIV. Entropy- Micro: $S=K_b(\ln W)$

XCV. Change in Entropy- Micro: $\Delta S=K_b * \ln(W_2 / W_1)$

XCVI. Change in Entropy- Macro: $\Delta S=Q/T$

XCVII. Heat engines equation: $Q_h=Q_c+W$

XCVIII. Efficiency (with work): $e=W/Q_h$

XCIX. Efficency $e = 1 - Q_c/Q_h$

C. Carnot Efficiency $e_c = 1 - T_c/T_h$

CI. Change in Internal Energy $\Delta U = Q + W$

CII. Total Energy $U= 3/2 nRT$ or $U = 3/2 PV$

CIII. Heat when Pressure is Constant $Q_p = nC_p\Delta T$

CIV. Heat when Volume is Constant $Q_v = nC_v\Delta T$

CV. Stefan-Boltzmann Law:

The energy radiated by a blackbody radiator per second = P

$P = A\sigma T^4$

Where,

σ = Stefan-Boltzmann constant

σ = 5.6703 × 10-8 watt/m2K4

Efficiency of Carnot cycle

CVI. $\eta = 1 - Tc/Th$

CVII. Ideal Gas Law:

$P V = n R T$

P = Pressure (Pa i.e. Pascal)

V = Volume (m3)

n = number of of gas (in moles)

R = gas constant (8.314472 .m3.Pa.K-1mol-1])

T = Temperatue (in Kelvin [K])

CVIII. Boyles law (for ideal gas)

P1 V1 = P2V2

T (temperature is constant)

CIX. Charles law (for ideal gas):V1/T1 = V2/T2

P (pressure is constant)

CX. R = gas constant (8.314472 .m3.Pa.K-1mol-1])

CXI. Root Mean Square Speed of Gas:

$\mu_{rms} = (3RT/M)^{½}$

where

μ_{rms} **= root mean square velocity in m/sec**

R = ideal gas constant = 8.3145 (kg·m^2/sec^2)/K·mol

T = absolute temperature in Kelvin

M = mass of a mole of the gas in kilograms.

The temperature must be converted to Kelvins and the molar mass must be found in kg to complete this problem.

CXII. k = 1.38066 x 10-23 J/K Boltzmanns constant

CXIII. Ratio of specific heat (γ)

γ = Cp/Cv

Cp = specific heat capacity of the gas in a constant pressure process

Cv = specific heat capacity of the gas in a constant volume process

CXIV. Internal energy of ideal gas (U) = cv nRT

CXV. In Adiabatic process no heat is gained or lost by the

system.

Under adiabetic condition

PVγ = Constant

TVγ-1 = Constant

Where γ is ratio of specific heat.

γ = Cp/Cv

CXVI. Isobaric process: pressure is constant, work done is

$W = P\Delta V = P(V_i - V_f)$

CXVII. In an isovolumeric (isochoric) process the volume is constant:

$W = P\Delta V = 0$

CXVIII. Isothermal process: $W = nRT\ln(V_i/V_f)$

CXIX. **Entropy: The entropy increase δS is the heat transfer to a substance δQ divided by the absolute temperature of the substance (T) during a reversible heat-transfer process.**

$$\Delta S = \frac{Q}{T}$$ units = J/K or cal/K

If heat is absorbed, then □ S > 0.
If heat is lost, then □ S < 0.

CXX. Efficiency of a heat engine =Ratio of the net work done during the cycle to the heat absorbed

$$e = \frac{W}{|Q_{in}|}$$

$$W = |Q_{in}| - |Q_{out}|$$

CXXI. Boyle's law: volume of a fixed quantity of gas maintained at constant temperature is inversely proportional to the pressure.

CXXII. PV = constant. Where P = pressure, V = volume

CXXIII. Charles's law: volume of a fixed amount of gas maintained at constant pressure is directly proportional to its absolute temperature.

CXXIV. V / T = constant .Where V = volume, T = Temperature

CXXV. Avogadro's hypothesis: equal volumes of gases at the same temperature and pressure contain equal number of molecules

CXXVI. Avogadro's law: The volume of a gas maintained at constant temperature and pressure is directly proportional to the number of moles of the gas .V = constant x *n*
Where: V = volume, *n* = number of moles

CXXVII. Isometric=Constant Volume

CXXVIII. Efficiency of a heat engine using work

out= (Wnet)/(Qin)

CXXIX. Efficiency not using work out= ((Qin)-

(Qout))/(Qin)

CXXX. Carnot efficiency= ((Th)-(Tl))/(Th)

CXXXI. Equation for the first law of

thermodynamics: deltaU = deltaQ + deltaW

CXXXII. 1st Law of Thermodynamics: $\Delta U = Q + W$

CXXXIII. Efficiency: $e = | W / QH |$

CXXXIV. Carnot efficiency: $e = (TH - TC) / TH$

CXXXV. Linear / Thermal Expansion: $\Delta l = a(lo)\Delta T$

CXXXVI. Heat Transfer $H = KA\Delta T / L$

Sound

I. **Sound =Longitudinal, Mechanical Wave**

II. **Speed of a Wave = $v=f\lambda$**

III. **Sound Intensity=Amount of energy that a sound wave brings to a unit area every second=I = P/A = watts / m^2**

IV. **Power of Sound=the Quality of Acoustic Energy as Measured In Watts=P = IA**

V. **Frequency = v / wavelength**

VI. **Fundamental Frequency = v / 2L**

VII. **For the simplest wave f1 = v/2L= fundamental frequency=the lowest frequency of vibration of a standing wave.**

i. **V is the speed of the waves on the string and not the speed of the sound wave.**

ii. **V= Square Root of T/M or Fwavelength**

iii. **M= m/l**

VIII. **Constructive Interference S1-S2=nwavelength**

IX. **Doppler Effect f1=f[(V +/-Vo)/(V+/-Vs)]**

X. **Relationship of Intensity with Pressure and Velocity:**

I = PV

Where P is the pressure and
V is the velocity.

XI. **Sound intensity relationship with distance:**

$$I \alpha \ 1 r 2$$

XII. Harmonic series of a pipe:

Closed at one end: fn = n(v/4l)

Open at both ends fn = n(v/2l)

XIII. Harmonic series of standing waves on a vibrating string fn = n(v/2l)

XIV. Frequency Equation F= 1/ T

XV. T= 1/ F

XVI. Fundamental frequency=the lowest frequency of vibration of a standing wave

XVII. Harmonic Series of a Pipe Closed at one End Fn= n(v/ 4L)

XVIII. Harmonic Series of a Pipe Open at Both Ends Fn= n(v/ 2L)

XIX. Harmonic Series of Standing Waves on a Vibrating String Fn= n (v/ 2L)

Where n= 1, 2, 3...

XX. The relative intensity or intensity level is a comparison of a sound to the threshold of hearing. This is calculated by a logarithmic equation:
B = 10 log I/Io , B is measured in decibels, and I is measured in W/m^2.

XXI. No. of beats = f1 - f2

NonTechnical/
Personal/
HR interview: Complimentary

Bottom Line Job interview?

Bottom-line: You will learn to answer any questions in such a way that you match your qualifications to the job requirements.

Interview Question?

Example response. Try to customize your answers to fit the requirements of the job you are interviewing for.

What are your greatest strengths?

I. Articulate.
II. Achiever.
III. Organized.
IV. Intelligence.
V. Honesty.
VI. Team Player.
VII. Perfectionist.
VIII. Willingness.
IX. Enthusiasm.
X. Motivation.
XI. Confident.
XII. Healthy.
XIII. Likeability.
XIV. Positive Attitude.
XV. Sense of Humor.
XVI. Good Communication Skills.
XVII. Dedication.
XVIII. Constructive Criticism.
XIX. Honesty.
XX. Very Consistent.
XXI. Determination.
XXII. Ability to Get Things Done.
XXIII. Analytical Abilities.
XXIV. Problem Solving Skills.
XXV. Flexibility.
XXVI. Active in the Professional Societies.
XXVII. Prioritize.
XXVIII. Gain Knowledge by Reading Journals.

XXIX. Attention to details.
XXX. Vendor management skills.
XXXI. Excellent Project Management skills.
XXXII. Self-disciplined.
XXXIII. Self-reliant.
XXXIV. Self-starter.
XXXV. Leadership.
XXXVI. Team-building.
XXXVII. Multitasking.
XXXVIII. Prioritization.
XXXIX. Time management.
XL. Can handle multiple projects and deadlines.
XLI. Thrives under pressure.
XLII. A great motivator.
XLIII. An amazing problem solver.
XLIV. Someone with extraordinary attention to detail.
XLV. Confident.
XLVI. Assertive.
XLVII. Persistent.
XLVIII. Reliable.
XLIX. Understand people.
L. Handle multiple priorities.
LI. Build rapport with strangers.

What are your greatest weaknesses?

I. I am working on My Management skills.
II. I feel I could do things on my own in a faster way without delegating it.
III. Currently I am learning to delegate work to staff members.
IV. I have a sense of urgency and I tend to push people to get work done.
V. I focus on details and think thru the process start to finish and sometimes miss out the overall picture, so I am improving my skills by laying a schedule to monitor overall progress.

Had you failed to do any work and regret?

I. I have No Regrets.
II. I am Moving on.

Where do you see yourself five years from now?

I. I am looking for a long-term commitment.
II. I see a great chance to perform and grow with the company.
III. I will continue to learn and take on additional responsibilities.
IV. If selected I will continue rise to any challenge, pursue all tasks to completion, and accomplish all goals in a timely manner.
V. I am sure if I will continue to do my work and achieve results more and more opportunities will open up for me.
VI. I will try to take the path of progression, and hope to progress upwards.
VII. In the long run I would like to move on from a technical position to a management position where I am able to smoothly manage, delegate and accomplish goals on time.
VIII. I want to Mentor and lead junior-to-mid level reporting analysts.

IX. I want to enhance my management experience in motivating and building strong teams.
X. I want to build and manage relationships at all levels in the organization.
XI. I want to get higher degree, new certification.

How Will You Achieve Your Goals?

Advancing skills by taking related classes, professional associations, participating in conferences, attending seminars, continuing my education.

Why are you leaving Your Current position?

I. More money
II. Opportunity
III. Responsibility
IV. Growth
V. Downsizing and upcoming merger, so I made a good, upward career move before my department came under the axe of the new owners.

Why are you looking for a new job?

I have been promoted as far as I can go with my current employer.
I'm looking for a new challenge that will give me the opportunity to use my skills to help me grow with the company.

Why should I hire you?

I. I know this business from ground up.
II. I have Strong background in this Skill.
III. Proven, solid experience and track record.
IV. Highest level of commitment.
V. Continuous education on current technical issues.
VI. Direct experience in leading.
VII. Hands-on experience.
VIII. Excellent Project Management skills.
IX. Demonstrated achievements.
X. Knowledge base.
XI. Communications skills.
XII. Ability to analyze, diagnoses, suggests, and implements process changes.
XIII. Strong customer service orientation.
XIV. Detail oriented, strong analytical, organizational, and problem solving skill.
XV. Ability to interact with all levels.
XVI. Strong interpersonal, relationship management skills.
XVII. Ability to work effectively with all levels, cultures, functions.
XVIII. I am a good team player.
XIX. Extensive Technical experience.
XX. Understanding of Business.
XXI. Result and customer-oriented.
XXII. Strong communication skills.
XXIII. Good Project and Resource management skills.

XXIV. Exceptional interpersonal and customer service skills.
XXV. Strong analytical, evaluative, problem-solving abilities.
XXVI. Good management and planning skills.
XXVII. Good Time Management skills.
XXVIII. Ability to work independently.
XXIX. I've been very carefully looking for the jobs.
XXX. I can bring XX years of experience.
XXXI. That, along with my flexibility and organizational skills, makes me a perfect match for this position.
XXXII. I see some challenges ahead of me here, and that's what I thrive on.
XXXIII. I have all the qualifications that you need, and you have an opportunity that I want. It's a 100% Fit.

Aren't you overqualified for this position?

I. In My opinion in the current economy and the volatile job market overqualified is a relative term.
II. My experience and qualifications make me do the job right.
III. I am interested in a long term relationship with my employer.
IV. As you can see my skills match perfectly.
V. Please see my longevity with previous employers.
VI. I am the perfect candidate for the position.
VII. What else can I do to convince you that I am the best candidate? There will be positive benefits due to this.
Since I have strong experience in this ABC skill I will start to contribute quickly. I have all the training and experience needed to do this job. There's just no substitute for hands on experience.

Describe a Typical Work Week?

I. Meeting every morning to evaluate current issues.
II. Check emails, voice messages.
III. Project team meeting.
IV. Prioritize issues.
V. Design, configure, implement, maintain, and support.
Perform architectural design. Review and analysis of business reports.
VI. Conduct weekly staff meetings.
VII. Support of strategic business initiatives.
VIII. Any duties as assigned. Implementation.
IX. Monitor and analyze reports.
Routine maintenance and upgrades.
X. Technical support.
XI. Deploy and maintain.
XII. Provide day-to-day support as required.
Work with customers and clients.
XIII. Documentation.
XIV. Standard operating procedures.
XV. Tactical planning.
XVI. Determine and recommend.
XVII. Plan and coordinate the evaluation.
XVIII. Effective implementation of technology solutions.

XIX. To meet the business objectives.
XX. Participation in budget matters.
XXI. Readings to Keep Abreast Of Current Trends and Developments in the Field.

Are You Willing to Travel?

I. For the right opportunity I am open to travel.
II. I'm open to opportunities so if it involves relocation I would consider it.

Describe the pace at which you work?

I. I work at a consistent and steady pace.
II. I try to complete work in advance of the deadline.
III. I am able to manage multiple projects simultaneously.
IV. I am flexible with my work speed and try to conclude my projects on time.
V. So far I have achieved all my targets
VI. I meet or exceeded my goals.

How Did You Handle Challenges?

I. Whenever the project got out of track I Managed to get the project schedules back on the track.
II. Whenever there was an issue I had researched the issues and found the solutions.
III. We were able to successfully troubleshoot the issues and solve the problems, within a very short period of time.

How do you handle pressure? Stressful situations?

I. In personal life I manage stress by going to a health club.
II. I remain calm in crisis.
III. I can work calmly with many supervisors at the same time.
IV. I use the work stress and pressure in a constructive manner.
V. I use pressure to stay focused, motivated and productive.
VI. I like working in a challenging environment.
VII. By Prioritizing.
VIII. Use time management
IX. Use problem-solving
X. Use decision-making skills to reduce stress.
XI. Making a "to-do" list.
XII. Site stress-reducing techniques such as stretching and taking a break.
XIII. Asked for assistance when overwhelmed.

How Many Hours Do You Work?

I enjoy solving problems and work as much as necessary to get the job done.
The Norm is 40 hour week.

Why are you the best person for the job?

I. It’s a perfect fit as you need someone like me who can produce results that you need, and my background and experience are proof.

II. As you can see in My resume I've held a lot of similar positions like this one, and hence I am a perfect fit as all those experiences will help me here.
III. I believe this is a good place to work and it will help me excel.

What are you looking for in a position?

I. I'm looking for an opportunity where I may be able to apply my skills and significantly contribute to the growth of the company while helping create some advancement and more opportunities for myself.
II. It seems this organization will appreciate my contributions and reward my efforts appropriately to keep me motivated.
III. I am looking for job satisfaction and the total compensation package to meet My Worth that will allow me to make enough money to support my lifestyle.

What do you know about our organization?

I. This is an exciting place to work and it fits my career goals.
II. This company has an impressive growth.
III. I think it would be rewarding to be a part of such a company.

What are your short term goals?

I'd like to find a position that is a good fit and where I can contribute and satisfy my professional desires.

What Salary are you looking for?

I. Please provide me the information about the job and the responsibilities involved before we can begin to discuss salary.
II. Please give me an idea of the range you may have budgeted for this position.
III. It seems my skills meet your highest standards so I would expect a salary at the highest end of your budget.
IV. I believe someone with my experience should get between A and B.
V. Currently I am interested in talking more about what the position can offer my career.
VI. I am flexible but, I'd like to learn more about the position and your staffing needs.
VII. I am very interested in finding the right opportunity and will be open to any fair offer you may have.

Tell me more about yourself.

I. I'm an experienced professional with extensive knowledge.
II. Information tools and techniques.
III. My Education.
IV. A prominent career change.
V. Personal and professional values.
VI. Personal data.
VII. Hobbies.
VIII. Interests.
IX. Describe each position.

X. Overall growth.
XI. Career destination.

Why did you leave your previous job?

I. Relocation.
II. Ambition for growth.
III. This new opportunity is a better fit for my skills and/or career ambitions.
IV. To advance my career and get a position that allows me to grow.
V. I was in an unfortunate situation of having been downsized.
VI. I'm looking for a change of direction.
VII. I want to visit different part of the country I'm looking to relocate.
VIII. I am looking to move up with more scope for progression.

What relevant experience do you have?

I have these XYZ related experience.
I have these skills that can apply to internal management positions et al.

If your previous co-workers were here, what would they say about you?

Hard worker, most reliable, creative problem-solver, Flexible, Helping

Where else have you applied?

I am seriously looking and keeping my options open.

What motivates you to do a good job?

Recognition for a job well done.

Are you good at working in a team?

Yes.

Has anything ever irritated you about people you've worked with?

I've always got on just fine with all my co-workers.

Is there anyone you just could not work with?
No.

Tell me about any issues you've had with a previous boss.
I never had any issues with my boss.

Any questions?

Please explain the benefits and bonus.
How soon could I start, if I were offered the job?

Why did you choose this career?

I. Life style.
II. Passion.
III. Desire.
IV. Interesting.
V. Challenging.
VI. Pays Well.
VII. Demand.

What did you learn from your last job experience?

I gained experience that's directly related to this job.

Why is there a gap in your resume?

Because of Personal and family reasons I was unable to work for some time.
Unemployed.
Job hunt.
Layoffs.

How do you keep current and informed about your job and the industries that you have worked in?

I. I pride myself on my ability to stay on top of what is happening in the industry.
II. I do a lot of reading.
III. I belong to a couple of professional organizations.
IV. I have a strong network with colleagues.
V. I take classes and seminars.
VI. I have started and participated in many technical blogs.

Tell me about a time when you had to plan and coordinate a project from start to finish?

I. I headed up a project which involved customer service personnel and technicians.
II. I organized a meeting and got everyone together.
III. I drew up a plan, using all best of the ideas.
IV. I organized teams.
V. We had a deadline to meet, so I did periodic checks with various teams involved.
VI. After four weeks, we were exceeding expectations.
VII. We were able to begin implementation of the plan.
VIII. It was a great team effort, and a big success.
IX. I was commended by management for my managing capacity.

What kinds of people do you have difficulties working with?

I. I have worked in very diverse teams.
II. Diversity means differences and similarities with men and women from very diverse backgrounds and culture. It helps us grow as a human being.
III. The only difficulty was related to work related dishonesty by a person.
IV. He was taking credit for all the work our team accomplished.

What do you want to be in 5 years?

I hope to develop my management skills by managing a small staff.

Ideal career?

I. I would like to stay in a field of ABC.
II. I have been good at ABC.
III. I look forward to ABC.

Responsibilities?

I would expect expanded responsibilities that could make use of my other skills.

Dream job?

Includes all of the responsibilities and duties you are trying to fill.
I also thrive in the fast changing environment where there is business growth.

Skills?

I was very pleased to develop the A, B, C skills that you are seeking.

What sets you apart?

I. Once I am committed to a job or project I take it with tremendous intensity.
II. I want to learn everything I can.
III. I am very competitive and like to excel at everything I do.

If the project not gone as planned?
Backup and identify precautions.

If unable to meet deadlines?

I. Negotiate.
II. Discussion.
III. Restructure.
IV. Redefine Optimum goal.
V. Show a price structure.

Interpersonal skill?

I. I had to learn to say no.
II. Helpful to other staff.
III. Help in return.

Improve?

In any job I hold I can usually find inefficiencies in a process, come up with a solution.

What do you feel has been your greatest work-related accomplishment?

I. Implemented an idea to reduce expenses, raised revenues.
II. Solved real problems.
III. Enhanced department's reputation.

Have you ever had to discipline a problem employee? If so, how did you handle it?

Problem-solving skills, listening skills, and coaching skills.

Why do you want this position?

I. I always wanted the opportunity to work with a company that leads the industry in innovative products.
II. My qualifications and goals complement the company's mission, vision and values.
III. I will be able to apply and expand on the knowledge and experience, and will be able to increase my contributions and value to the company through new responsibilities.

Why are you the best person for this job?

I. I have extensive experience in XYZ (Skill they are looking for)
II. I'm a fast learner.
III. I adapt quickly to change.
IV. I will hit the ground running.
V. I'm dedicated and enthusiastic.
VI. I'm an outstanding performer.
VII. I may be lacking in this specific experience but I'm a fast learner and I'll work harder.

What about Technical writing?

I. I can convert any complex technical information into simple, easy form.
II. I can write reports to achieve maximum results.

How versatile you are? Can you do other works?

I am flexible and can adapt to any changing situations.

How do you manage time?

I. I am very process oriented and I use a systematic approach to achieve more in very less time.
II. I effectively eliminate much paperwork.

How do you handle Conflicts?

I. I am very tactful;
II. I avoid arguments and frictions and

III. I establish trust and mutual understanding.

What kind of supervisory skills you have?

I. I make sure that everyone understands their responsibilities.
II. I try to be realistic in setting the expectations and try to balance the work among all.

Any Bad Situation you could not solve?

I've never yet come across any situation that couldn't be resolved by a determined, constructive effort.

Anything else?

I. I am excited and enthusiastic about this opportunity
II. I am looking forward to working with you.

About the author/editor/compiler:
Brian Y Glenn is an author, educator, and IT professional. He has been involved in the education space for the past 10 years.

Reference:
References were made from journals and manuals.
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