PHYSICS MODEL PAPER FOR INTERVIEW

Units

Units and system:
M.K.S (Meter-Kilogram-Second)
C.G.S (Centimeter-gram-Second)
F.P.S (Foot-Pound-Second)
SI (System international

FUNDAMENTAL UNITS: Units used to expressed fundamental quantities are called fundamental units , the unit of mass length and time are called fundamental unit

Examples: Kilogram (kg) ; unit of mass
Meter (m) ; unit of length
Second (s) ; unit of time

Derived units:

The units which are derived from fundamental units are called derived units .
Examples:

SI System:

S.no.	Physical quantity	symbol of quantity	name of unit	symbol
1	Length	L	Meter	m
2	Mass	m	kilogram	kg
3	Time	t	Second	S
4	Temperature	T	Kelvin	K
5	Amount of substance	n	Mole	mole
6	Electric current	I	Ampere	A
7	Luminous intensity	In	Candela	Cd

Unit Conversion:

Length:
1 meter = 100cm
1 kilometer = 1000m

Mass:
1 kilogram = 1000gm
1 milligram = 0.001 gm

Volume:
1 liter = 1000ml

Time:
1 minute = 60 seconds
1 hour = 60 minutes
60 minutes = 3600 seconds

S.no.	Physical quantity	Symbol of quantity	Name of unit	Symbol for unit
1	Speed	v	meter/second	m/s
2	Acceleration	a	meter/second	m/s^2
3	Force	F	Newton	$kg.m/s^2=N$
4	Work	W	joule	Nm = Joule
5	Pressure	P	Pascal	N/m^2=pascal

Directly proportional

Such relation between two physical quantities in which one is increasing and other is also increasing. Similarly, when one is decreasing and the other is also decreasing, is called directly proportional.
Example:
Volume is directly proportional to temperature.
$V \propto T$
Inversely proportional:

If one physical quantity is increasing then other is decreasing. Similarly, if one is decreasing and the other is increasing, the relation is called inversely proportional.

Example:
Volume is inversely proportional to pressure at constant temperature.

$$V \propto \frac{1}{P}$$

Proportionality constant:
To change the symbol of inversely or directly proportional between two physical quantities, we must use constant which is called proportionality constant.

Definitions

Motion: If a body changes its position with respect to its surroundings then it is said to be in motion.

Example:
A car is moving

Rest:
If a body does not change its position with respect to its surroundings then it is said to be in rest.
Example:
A book is lying on the table.

Speed:
The distance covered by a body in unit time is called its speed. It is a scalar quantity and its S.I unit is meter per second (m/s)

$$v = \frac{s}{t}$$

Velocity:
The speed of a body in a particular direction is called velocity. It is a vector quantity and its S.I unit is meter per second (m/s).

$$\vec{v} = \frac{\vec{s}}{t}$$

Uniform velocity;
The equal distance covered in equal interval of time in particular direction is called uniform velocity.

NEWTON's LAWS OF MOTION

First Law of Motion:
In the absence of an external force, if a body is moving it will remain in motion. If the body is at rest, it will remain at rest.
Example:
A football stops under the action of friction and force of gravity.

Second Law of Motion: If an external force is applied on a body, then the acceleration will take place which will be in the direction of applying force. This acceleration is directly proportional to the applied force and inversely proportional to mass of the body.
Mathematically:

$$a \propto F \text{.....(1)}$$

ACCELERATION: The rate of change of velocity is called acceleration.

$$\vec{a} = \frac{\Delta \vec{v}}{t}$$

Force:
Force is an agent which produces or tries to produce motion in a body or which stops or tries to stop motion of a body. Force is a vector quantity and its S.I unit is Newton. F = ma

INERTIA:
Inertia is that property of the matter which always tries to resist against any external force that tries to change the state of its motion or rest. It depends upon the mass of the body.

MASS:
The quantity of a matter present in a body is called its mass. It remains uncharged everywhere, it is a scalar quantity and its SI unit is kilogram (kg).

WEIGHT:
The force with which the earth attracts a body towards its center is called weight. It does not remain constant every where it depends upon the value of 'g', it is a vector quantity and its S.I unit is Newton (N)

W= mg

$$a \propto \frac{1}{m} \text{.....(2)}$$

Combining equation 1 and 2,

$$a = k\frac{F}{m}$$

In M.K.S system k=1,

$$F = ma$$

Third Law of Motion:
Action and reaction between two bodies are equal but opposite to each other.
Example:
If a person throws a Tennis ball towards the wall is the action and rebounded back of ball is reaction.

MOMENTUM

Definition:

The product of mass and velocity is called momentum. It is denoted by 'P'. The S.I unit of the momentum is kilogram meter per second (kg-m/s) and is also written as (N-S).

P=mv

LAW OF CONSERVATION OF MOMENTUM:

"The momentum of an isolated system always remains constant."

Isolated System:

Isolated system is a system which is not acted upon it by any external force.

Example:

A system of two balls that are colliding with each other.

SCALAR QUANTITIES:

Such physical quantities which are completely described by magnitude and unit are called scalar quantities.

Example:

Mass, speed and work.

VECTOR QUANTITIES:

Such physical quantities which are completely describe by magnitude and direction are called vector quantities.

Example:

Displacement, velocity and force.

RESOLUTION OF VECTOR:

Process of splitting a single vector into two or more vectors is called resolution of vector.

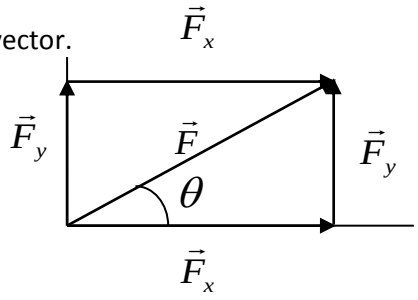
Rectangular Components:

Horizontal Component:

$Fx = FCos\theta$

Vertical Component:

$Fy = FSin\theta$



NEWTON'S LAW OF GRAVITATIONAL:

Everybody in this universe attracts the other body towards its center, which is directly proportional to the product of their masses and inversely proportional to square of the distance between them.

$$F = \frac{Gm_1m_2}{r^2}$$

WORK:

When a force act on body, it moves the body in the direction of its displacement work is said to be done. or the product of force and displacement is called work.

WORK = (FORCE). (DISPLACEMENT)

$$W = \vec{F}.\vec{d}$$

ENERGY: The ability of a body to do work or overcome resistance is called energy .its unit is same as work (Joule)

Power: The rate of doing work is called power.

$$\text{Power} = \frac{workdone}{time} = \frac{w}{t}$$

S.I unit watt

1 watt = 1 J/s

CAPACITOR:

Capacitor is a device used to store electric charge and energy.

Charge "q" stored on any one plate of the capacitor is directly proportional to the potential difference "V" across the two plates.

$q \alpha V$

$q = CV$

Where "C" is a constant of proportionality, it represents "Capacitance of the capacitor".

Capacitance of a Capacitor (C):

Capacitance of the capacitor may be defined as,

"The ability of a capacitor to store electric charge".

Unit of Capacitance:

Unit of capacitance is "Farad".

Farad:

Capacitance of the capacitor is said to be one Farad (1F) if on giving one volt P.d between the plates each plate stores one Coulomb (1C) charge.

$$1 \text{ Farad} = \frac{1 \text{ Coulomb}}{1 \text{ Volt}}$$

SIMPLE HARMONIC MOTION

The periodic motion of a body is said to be simple harmonic motion if the acceleration possessed by the body is directly proportional to the displacement and directed towards the mean position.

Simple harmonic motion is mathematically expressed as;

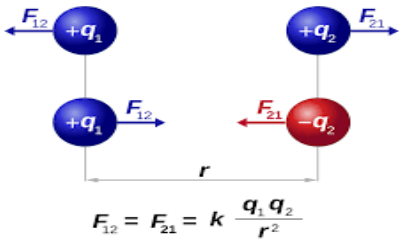
$$a \propto -x$$

Where, x represents displacement and negative sign shows that the direction of acceleration is towards mean position.

COULOMB'S LAW:

Statement:

The force of attraction or repulsion between two static point charges is directly proportional to the product of the magnitude of the charges and inversely proportional to the square of the distance between their centers.



Mathematically:

$$F = k \frac{q_1 q_2}{r^2}$$

where "k" is the constant of proportionality. Its value depends upon the nature of medium between two charges.