1.UNITS AND DIMENSIONS(one question-3marks)

Introduction: Our Life(living with the help of energies on earth)

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Arts ⟵ ⟶ Science & Technology

↓ ↓

Economics,Accounts,History,Commerce,Politics------- Maths,**Physics**,Chemisty,Zoology,Botony,Tech------

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It is the branch of science which deals the relation between matter and energy, but to understand the words ‘matter and energy’ we must know the some of the measurements and symbols. For that we should know the below definitions.

Physical quantity:

“ A quantity which is measurable and expressed in numbers is known as physical quantity.”

Ex: Distance, Time, Mass, Force, Area, Length, Volume, Pressure, Density, Speed, Acceleration, Work, Power, Energy, Viscosity, Surface tension, Electric current, Temperature, Heat, Wave length, Frequency, Angle, Strain, Specific heat, Latent heat, Electric Potential, Electric field intensity, Capacitance, Resistance, conductance, Planck’s constant, Boltzmann constant ------------

But Smell, Colour, Touch, Dreams, Ideas are not the physical quantities.

Fundamental (or) Base (or) Primary physical quantities:

A physical quantity which are independent of all other physical quantities and which can be used to express other physical quantities are known as fundamental physical quantities.

Ex: mass, length, time only.

Derived (or) Secondary physical quantities:

The physical quantities which can be derived from fundamental quantities are known as derived physical quantities.

Ex: speed, force, pressure, acceleration, work -------

UNIT:

“It is the standard quantity used to compare and measure the physical quantities.”

The unit which is used to measure the fundamental quantity is called fundamental unit.

Fundamental physical quantity	**Metric (or) MKS system**	**Gaussian (or) CGS system**	**British (or) FPS system**
Length	metre (m)	centimetre (cm)	foot (ft)
Mass	Kilogram (kg)	gram (g)	Pound (ℓb)
Time	second (sec)	second (sec)	second (sec)

The unit which is derived from fundamental quantity is known as derived unit.

Ex: Force = mass x acceleration -→ kg m s^{-2} = 1 newton (MKS system)

-→ g cm s^{-2} = 1 dyne (CGS system)

--→ pound ft s^{-2} = 1 roundel (FPS system)

SI system of units:

In addition to new branches in physics (Electricity, Magnetism, Thermodynamics, Optics----) the International conference introduced a new system of units called the “System of International” (or) “International System” of units. In this system there is seven base units and two supplementary units.

Physical Quantity	UNIT in SI system
1)Fundamental (or) Base quantities	
Length	Metre (m)
Mass	Kilogram (kg)
Time	Second (sec)
Electric current	Ampere (Amp)
Thermodynamic temperature	Kelvin (K)
Luminous intensity	Candela (Cd)
Amount of substance	Mole (mol)
2)Supplementary Quantity	
Plane angle	Radian (rad)
Solid angle	Steradian (Sn)

------>Characteristics of UNITS:

1)The value of UNIT must be reproducible.

2)The UNIT must be well defined.

3)The value of UNIT should be internationally acceptable.

4)It should be invariable. That is do not change with time and space.

------->Advantages (or) uses of SI UNITS:

1)This system is comprehensive, that is it covers all branches of science.

2)SI UNITS are easily reproducible.

3)SI UNITS are invariant. That is do not change with time and space.

4)It is coherent because all derived UNITS are obtained from multiplication (or) division of base UNITS.

Multiples and Submultiples of SI units:

The value (measurement) of physical quantity may be varies from very small to very big. For simplicity a prefix is added before the unit.

Ex: 5 mA ---→ 0.005A , 20KW ---→20 x 10^3W ---→20000W

------ 10^{12}, 10^9, 10^6, 10^3, 10^2, 10^1, 10^{-1}, 10^{-2}, 10^{-3}, 10^{-6}, 10^{-9}, 10^{-12},----------
------- Tera , Giga, Mega, Kilo, Hecta, deca, deci, centi, milli, micro, nano, pico,---------

Rules for writing SI units:

1)Unit must be written in full form. Ex: second ✓ sec ✗
metre ✓ mts ✗
amphere ✓ amp ✗

2)Symbols may be used, Capital letter should be taken as symbol for a unit named after a scientist.

Ex: metre --→m , second --→s, newton --→ N , watt -→ W, hertz-→Hz, pascal --→ Pa

3)plural form should not be used. Ex: 5 metres --→5 m ✓ 5ms ✗

2 kilometres ---→2 kg ✓ 2kg ✗

4)Slash should not be used in writing a compound unit.

Ex: 15 joules per square metre ---→ 15J m^{-2} ✓ 15 J/m^2 ✗

$\frac{\pi}{3}$ radians per second ---→ $\frac{\pi}{3}$ rad s^{-2} ✓ $\frac{\pi}{3}$ rad/sec^2 ✗

Dimensions:

The dimensions of a physical quantity are the powers to which the fundamental UNITS are required to be raised to obtain a derived UNIT. (OR) The standard identification of any system of UNIT is called dimension.

Physical quantity	SI UNIT	Dimension
Length	Metre (m)	L^1
Mass	Kilogram (kg)	M^1
Time	Second (sec)	T^1
Current	Ampere (amp)	I^1 (OR) A^1
Temperature	Kelvin (K)	K^1 (OR) θ^1
Luminous intensity	Candela (cd)	I^1
Amount of substance	Mole (mol)	n
Plane angle	Radian (rad)	
Solid angle	Steradian (sr)	

Dimensional equation:

" It is the symbolic equation of the derived physical quantity in the powers of fundamental dimensions."

(OR) " It is an expression which indicates the relation between a derived UNIT and the fundamental UNITS."

Ex: Speed = $\frac{distance}{time}$ ------> UNITS ---->m s^{-1}, dimensional formula ---> $M^0L^1T^{-1}$

----->UNITS and Dimensions for various physical quantities :

Physical quantity	Formula	UNITS	Dimensions
1)Distance,displacement, length, Breadth, width, height, depth, Amplitude, wavelength, radius, Diameter, arc,	length	metre (m)	$M^0L^1T^0$
2)Area (A , S)	Length x width	m x m ----> m^2	$M^0L^2T^0$
3)Volume (V)	Length x width x height	m x m x m -----> m^3	$M^0L^3T^0$
4)linear density (λ)	$\frac{mass}{length}$	$\frac{kg}{m}$ ---→ kg m^{-1}	$M^1L^{-1}T^0$
5)Surface density (σ)	$\frac{mass}{area}$	$\frac{kg}{m^2}$ ---→ kg m^{-2}	$M^1L^{-2}T^0$
6)Volume density (ρ)	$\frac{mass}{volume}$	$\frac{kg}{m^3}$ ---→ kg m^{-3}	$M^1L^{-3}T^0$
7)Speed (v)	$\frac{Distance}{time}$	$\frac{m}{sec}$ ---→ m s^{-1}	$M^0L^1T^{-1}$
8)Velocity ($\vec{v}$)	$\frac{Displacement}{time}$	$\frac{m}{sec}$ ---→ m s^{-1}	$M^0L^1T^{-1}$
9)acceleration ($\vec{a}$)	$\frac{velocity}{time}$	$\frac{m/second}{second}$ ----> m s^{-2}	$M^0L^1T^{-2}$

10)Force (or) weight ($\vec{F}$)	mass x acceleration	kg . m s^{-2} ---->**newton**	$M^1L^1T^{-2}$
11)Momentum ($\vec{P}$)	mass x velocity	kg . m s^{-1}	$M^1L^1T^{-1}$
12)Impulse ($\vec{I}$)	Force x time	kg . $\frac{m}{sec^2}$ .sec ----> kg m s^{-1}	$M^1L^1T^{-1}$
13)Pressure (p)	$\frac{force}{area}$	$\frac{Newton}{m^2}$---> $\frac{k.g}{m\ s^2}$ --->**pascal**	$M^1L^{-1}T^{-2}$
14)Work (W)	Force x displacement	kg . $\frac{m}{sec^2}$ .m ----> kg m^2 s^{-2}--->**joule**	$M^1L^2T^{-2}$
15)Power (P)	$\frac{work}{time}$	$\frac{\text{kg m}^2\text{ s}^{-2}}{second}$ ----> $\frac{kg\ m^2}{s^3}$ --->**watt**	$M^1L^2T^{-3}$
16)Energy (E)	work	Kg $\frac{m}{s^2}$ m ---> kg m^{2}s^{-2}-->**joule**	$M^1L^2T^{-2}$
17)Stress	$\frac{force}{area}$	$\frac{Newton}{m^2}$---> $\frac{kg}{m\ s^2}$	$M^1L^{-1}T^{-2}$
18)Strain	$\frac{change\ in\ dimensions}{original\ dimensions}$	$\frac{m}{m}$ (or) $\frac{m^2}{m^2}$ (or)$\frac{m^3}{m^3}$ --->constant(no units)	$M^0L^0T^0$ (or) 1
19)Elastic constant	$\frac{stress}{strain}$	$\frac{newton/m^2}{1}$ ---> $\frac{kg}{m\ s^2}$	$M^1L^{-1}T^{-2}$
20)Torque	Force x radius vector	Kg m^2 s^{-2}----> **newton . m**	$M^1L^2T^{-2}$
21)Frequency	$\frac{1}{Time\ Period}$	$\frac{1}{second}$ ----->$second^{-1}$ ---->Hz	$M^0L^0T^{-1}$
22)Angle (or) Angular displacement(θ)	$\frac{arc\ length}{radius}$	$\frac{x\ metre}{y\ metre}$ -----> constant ----->**radians**	$M^0L^0T^0$ (or) 1
23)Angular velocity(ω)	$\frac{angular\ displacement}{time}$	$\frac{radians}{second}$	$M^0L^0T^{-1}$
24)Angular acceleration(α)	$\frac{angular\ velocity}{time}$	$\frac{radians/second}{second}$ ----->radians s^{-2}	$M^0L^0T^{-2}$
25)Moment of inertia(I)	Mass x $radius^2$	kg m^2	$M^1L^2T^0$
26)Angular momentum($\vec{L}$)	Moment of inertia x angular velocity	kg m^2 $\frac{radian}{second}$ --→ kg m^2 s^{-1}	$M^1L^2T^{-1}$
27)Plank's constant (h)	$\frac{energy}{frequency}$	$\frac{kg\ m^2s^{-2}}{1/second}$------>kg m^2 s	$M^1L^2T^{-1}$
28)Gravitational constant(G)	$\frac{force.distance^2}{mass^2}$	$\frac{\frac{kg\ m}{s^2}.\ m^2}{kg^2}$ -->$\frac{m^3}{kg\ s^2}$ ---kg^{-1} m^3 s^{-2}	$M^{-1}L^3T^{-2}$
29)Force constant (k)	$\frac{force}{displacement}$	$\frac{kg\ m\ s^{-2}}{m}$---->kg s^{-2} (or)Newton/m	$M^1L^0T^{-2}$
30)Surface tension (T)	$\frac{force}{length}$	$\frac{kg\ m\ s^{-2}}{m}$---->kg s^{-2}(or)Newton/m	$M^1L^0T^{-2}$
31)Coefficient of viscosity(η)	$\frac{force}{area\ X\ \frac{velocity}{distance}}$	$\frac{kg\ m\ s^{-2}}{m^2.\frac{m/s}{m}}$ ------>$\frac{kg}{m\ .s}$	$M^1L^{-1}T^{-1}$
32)Heat (Q)	Energy ---->work	kg.$\frac{m}{second^2}$ .m---> kg m^2 s^{-2}--->**joule**	$M^1L^2T^{-2}$
33)Specific heat (C)	$\frac{heat}{mass\ X\ temperature}$	$\frac{joule}{kg\ \ kelvin}$ ----->$\frac{m^2}{s^2\ \ kelvin}$	$M^0L^2T^{-2}K^{-1}$
34)Thermal capacity	$\frac{heat}{temperatue\ difference}$	$\frac{joule}{kelvin}$ ------->$\frac{kg\ m^2}{kelvin\ \ s^2}$	$M^1L^2T^{-2}K^{-1}$
35)latent heat(L)	$\frac{heat}{mass}$	$\frac{joule}{kg}$ ----->$\frac{m^2}{s^2}$	$M^0L^2T^{-2}$
36)Universal gas constant(R)	$\frac{pressure\ X\ volume}{temperature}$	$\frac{pascal\ .m^3}{kelvin}$ ------>$\frac{kg\ \ m^2}{s^2\ \ kelvin}$	$M^1L^2T^{-2}K^{-1}$
37)Electric charge (q)	Electric current X time	Ampere x second ----->**coulomb**	$M^0L^0T^1I^1$

38)Electric potential (V)	$\frac{work}{charge}$	$\frac{kg.m^2}{sec^3.Amp}$---->joule/coulomb--->**volt**	$M^1L^2T^{-3}I^{-1}$
40)Electric Resistance (R)	$\frac{potential}{current}$	$\frac{kg.m^2}{sec^3.Amp^2}$--->Volt/Amp--->**ohm(Ω)**	$M^1L^2T^{-3}I^{-2}$
41)Electric field intensity($\vec{E}$)	$\frac{force}{charge}$	$\frac{kg\ .m}{sec^3 Amphere}$----- >Newton/Coulomb	$M^1L^1T^{-3}I^{-1}$
42)Capacitance (C)	$\frac{Charge}{Potential}$	$\frac{amphere\ \ second}{\frac{kg\ \ m^2}{second^3.amphee}}$-->$\frac{A^2s^4}{kg\ \ m^2}$-- **>Farad**	$M^{-1}L^{-2}T^4I^2$
43)Boltzman's constant(K)	$\frac{energy}{temperature}$	$\frac{kg.m^2}{sec^2.kelvin}$ ---->Joule/Kelvin	$M^1L^2T^{-2}K^{-1}$
44)Specific resistance(ρ)	$\frac{Resistance.Area}{Length}$	$\frac{kg.m^3}{s^3 amphere^2}$ ---->**ohm .metre**	$M^1L^3T^{-3}I^{-2}$
45)Pole Strength(m)	----	amphere . metre	$M^0L^1T^0I^1$
46)Magnetic Moment($\vec{M}$)	Pole strength X magnetic length	amphere . metre^2	$M^0L^2T^0I^1$
47)Coefficient of friction(μ)	$\frac{frictional\ force}{normal\ force}$	$\frac{x\ Newtons}{y\ Newtons}$--->constant(no units)	$M^0L^0T^0$ (or) 1
48)Magnetic induction($\vec{B}$)	$\frac{force}{current\ .\ length}$	$\frac{kg}{s^2 amphere}$--->Weber/m^2-- **>Tesla**	$M^1L^0T^{-2}I^{-1}$
49)Magnetic flux (ϕ)	Magnetic induction X area	$\frac{kg\ \ m^2}{s^2\ amphere}$--->**Weber**	$M^1L^2T^{-2}I^{-1}$

Physical Quantity having same dimensional formula:

1)Distance, Displacement, radius, arc, light year, wavelength, diameter, height, radius of gyration, length ,width, depth, breadth ..... [$M^0L^1T^0$]

2)Speed, velocity, change in velocity, velocity of light, velocity of sound ----- [$M^0L^1T^{-1}$]

3)acceleration(a), acceleration due to gravity(g), intensity of gravitational field,

centripetal acceleration ----[$M^0L^1T^{-2}$]

4)linear momentum, impulse -----[$M^1L^1T^{-1}$]

5)force, tension, weight, normal reaction, restoring force, frictional force, viscous force, thrust-----[$M^1L^1T^{-2}$]

6)work, all forms of energy, moment of force, torque, moment of couple ------[$M^1L^2T^{-2}$]

Dimensional quantity & Dimensionless quantity:

1) Dimensional constant: a physical quantity having fixed value and posses dimensional formula.

Ex: Planck's constant, gravitational constant, gas constant, velocity of sound, velocity of light

2)Dimensional variable: A physical quantity having variable values and possess dimensional formula.

Ex: force, velocity, pressure, density, surface tension, area, time.......

3)Dimensionless constants: A physical quantity having value but do not possess dimensions.

Ex: numbers, ...

4)<u>Dimensionless variable</u>: A physical quantity having variable value but do not possess dimensions & units.

Ex: strain, specific gravity, refractive index, trigonometric, logarithmic, exponential functions.

5)<u>Dimensionless quantity but having units</u> ---→ plane angle, solid angle.

<u>Homogeneity Principle:</u>

All terms of physical quantities in any equation must have the same dimensions.

Ex: Take $S = Ut + \frac{1}{2}at^2$ equation.

Here Dimensional formula of S is $[M^0L^1T^0]$

Dimensional formula of Ut is $[M^0L^1T^{-1}] \times [M^0L^0T^1] = [M^0L^1T^0]$

Dimensional formula of $\frac{1}{2}at^2$ is $[M^0L^0T^0] \times [M^0L^1T^{-2}] \times [M^0L^0T^2] = [M^0L^1T^0]$

So dimensional formula for each term is same, So the given equation is correct.

<u>Applications of Homogeneity Principle: (or) Advantages (or) uses of Dimensional analysis:</u>

It is used 1)to check the correctness of physical equation.

2)to derive the relation among different physical quantities.

3)to convert one system of UNITS into another other system of UNITS.

1)Correctness of physical equation:

If we want to check the correctness of the equation F = ma, here 'F' is force, 'm' is mass, 'a' is acceleration.

Dimensional formula for F is $[M^1L^1T^{-2}]$ ------>L.H.S

Dimensional formula for m is $[M^1L^0T^0]$

Dimensional formula for a is $[M^0L^1T^{-2}]$

Now ma ----->$[M^1L^0T^0] \times [M^0L^1T^{-2}]$ ----->$[M^1L^1T^{-2}]$ ----->R.H.S

From above dimensions of L.H.S = dimensions of R.H.S, So given equation is correct.

Ex: Check the equation for time $t = 2\pi\frac{l}{g}$, here l is length, g is acceleration due to gravity.

Dimensional formula for t is $[M^0L^0T^1]$ -------->L.H.S

Dimensional formula for 2π is $[M^0L^0T^0]$

Dimensional formula for l is $[M^0L^1T^0]$

Dimensional formula for g is $[M^0L^1T^{-2}]$

Dimensional formula for $2\pi\frac{l}{g}$ is $[M^0L^0T^0] \times \frac{[M^0L^1T^0]}{[M^0L^1T^{-2}]}$ ------> $[M^0L^0T^2]$------->R.H.S

From above dimensions of L.H.S = dimensions of R.H.S, So given equation is correct.

2)Derive the relation among different physical quantities:

If we want to find the equation for velocity of sound through a gas by dimensional method.

Velocity of sound through a gas will depends on density 'ρ' and pressure 'P'.

So velocity V $\propto \rho^a$, V $\propto P^b$ here a, b are constants.

Therefore V = k $\rho^a P^b$ here k is proportionality constant.

Dimensional formula for velocity V is ----- [$M^0 L^1 T^{-1}$]

Dimensional formula for density ρ is ----- [$M^1 L^{-3} T^0$]

Dimensional formula for pressure P is ----- [$M^1 L^{-1} T^{-2}$]

Therefore from V = k $\rho^a P^b$ ----> [$M^0 L^1 T^{-1}$] = k $[M^1 L^{-3} T^0]^a$ x $[M^1 L^{-1} T^{-2}]^b$

[$M^0 L^1 T^{-1}$] = k [$M^a L^{-3a} T^0$] x [$M^b L^{-b} T^{-2b}$]

[$M^0 L^1 T^{-1}$] = k [$M^{a+b} L^{-3a-b} T^{0-2b}$]

Compare the individual terms, we have a + b = 0 , –3a–b = 1 , –2b = –1

From above we get , b = $\frac{1}{2}$, a = $\frac{-1}{2}$

Therefore V = k $\rho^{-\frac{1}{2}} P^{\frac{1}{2}}$ ------> V = k$\sqrt{\frac{\rho}{P}}$, k value from experiment

3)conversion of one system of UNITS into another:

If we want to convert 'Newton' into 'dyne', that is 1 Newton = ------- dyne.

Here 'Newton' is the UNIT of force in SI system and 'dyne' is the UNIT of force in CGS system.

Dimensional formula for force is $M^1 L^1 T^{-2}$, in SI system it is [$M_1^1\, L_1^1\, T_1^{-2}$]

In CGS system it is [$M_2^1\, L_2^1\, T_2^{-2}$]

Here M_1 ----->kg L_1 ----->metre(m) T_1 ----->sec
M_2 ----->g(gram) L_2 ----->cm T_2 ----->sec
Let n_1 UNITS of force is SI = n_2 UNITS of force is CGS

n_1 [$M_1^1\, L_1^1\, T_1^{-2}$] = n_2 [$M_2^1\, L_2^1\, T_2^{-2}$] -------> (1)

Let $n_1 = 1$ that is 1 Newton. Therefore 1 [$M_1^1\, L_1^1\, T_1^{-2}$] = n_2 [$M_2^1\, L_2^1\, T_2^{-2}$] ----> $n_2 = \frac{[\,M_1^1\, L_1^1\, T_1^{-2}]}{[\,M_2^1\, L_2^1\, T_2^{-2}]}$

$$n_2 = [\frac{M_1}{M_2}]^1 [\frac{L_1}{L_2}]^1 [\frac{T_1}{T_2}]^{-2} = [\frac{kg}{g}]^1 [\frac{m}{cm}]^1 [\frac{sec}{sec}]^{-2}$$

$$n_2 = \frac{1000\,g}{g} . \frac{100cm}{cm} .1 = 1000 \text{ x } 100 = 10^5$$

Therefore from eq(1) 1 Newton = 10^5 dynes , similarly 1 dyne = 10^{-5} Newton

---->Limitations of dimensional analysis:

1)This method cannot give the values of proportionality constants.

2)In this method the functions having logarithmic, Trigonometric, Exponentials are not determined.

3)This method cannot give relation for equation containing more than three quantities.

Error: These are the uncertainties that are present in the measurement made with any measuring instrument.

Accuracy: It is a closed measurement to the true value.

True value: In order to minimize the errors we repeat the observations a large number of times and take the arithmetic mean of all the readings.

If a1 , a2 ,a3 --------an are the 'n' observations during an experiment

Then $a_{mean} = \frac{a_1+a_2+-----+a_n}{n} = \frac{\sum a_i}{n}$

Absolute error: It is the difference between true value and individual value of the measured physical quantity. It is always positive value. $\Delta a_i = |a_{mean} - a_i|$

Mean absolute error: It is the arithmetic mean of all the absolute errors.

$$\Delta a_{mean} = \frac{\Delta a_1+\Delta a_2+-----+\Delta a_n}{n} = \frac{\sum \Delta a_i}{n}$$

Relative error: It is the ratio of the mean absolute error to the mean value of the physical quantity.

Relative error = $\frac{\Delta a_{mean}}{a_{mean}}$ ----→ no units

Percentage error: it is the % of relative error. ---→ [$\frac{\Delta a_{mean}}{a_{mean}}$ X 100] %

Ex: 1) if the length of an object is 20cm with relative error is 5% -------20x5/100 = 1cm

That is the length of an object is in between 19cm to 21cm.

Ex: 2)The measured values of refractive index of a prism are 1.54,1.53,1.44,1.54,1.56,1.45, then find relative error.

True value (average)---- $a_{mean} = \frac{1.54+1.53+1.44+1.54+1.56+1.45}{6} = \frac{9.06}{6} = 1.51$

Absolute errors ---- $\Delta a_i = |a_{mean} - a_i|$ ------ $\Delta a_1 = |1.51 - 1.54| = 0.03$

$\Delta a_2 = |1.51 - 1.53| = 0.02$

$\Delta a_3 = |1.51 - 1.44| = 0.07$

$\Delta a_4 = |1.51 - 1.54| = 0.03$

$\Delta a_5 = |1.51 - 1.56| = 0.05$

$\Delta a_6 = |1.51 - 1.45| = 0.06$

Mean absolute error ------ $\Delta a_{mean} = \frac{0.03+0.02+0.07+0.03+0.05+0.06}{6} = \frac{0.26}{6} = 0.0433$

Relative error = $\frac{\Delta a_{mean}}{a_{mean}} = \frac{0.0433}{1.51} = 0.02867$

Percentage error -----→ [$\frac{\Delta a_{mean}}{a_{mean}}$ X 100] % = 0.02867 x 100 % = 2.867 %

That is 1.51 X 2.867% = 0.04329cm

Hence the refractive index is in between (1.51 – 0.04329)cm to (1.51+0.04329)cm

That is in between 1.46671 cm to 1.55329 cm.

Significant figures:

These are the number of digits in a value which gives information about the accuracy of a measurement.

Rules: 1) all the non zero digits are significant.

1842.5 , 184.25 , 18.428 , 1.8425 --------→ have 5 significant digits

2) All the zeros between two non zero digits are significant.

106008 , 106.008 , 1.06008 -------→ 6 significant digits

3) if the number is less than one (1) , all the zeros to the right side to the decimal point are not significant. 0.000408 ----→ 3 significant figures.

4) all zeros to the right of a decimal point are significant. 30.00 ---→ 4 significant figures

5) all zeros to the right of the last non zero digit after the decimal point are significant.
0.05600 -----→ 4 significant figures

Ex: 0.007 has one significant figure ----- that is 7

2.64 x 1024 has three significant figures -----2,6,4

0.2370 has four significant figures -------2,3,7,0

6.320 has four significant figures ------ 6,3,2,0

6.032 has four significant figures ------- 6,0,3,2

0.0006032 has four significant figures ------6,0,3,2,

S.NO	CHAPTER	Type of QUESTIONS	WEIGTAGE 3	REPEATED TIMES
1	DIMENSIONS	Write the dimensional formula for force, power, stress.....	3	3
2	DIMENSIONS	State the limitations of dimensional analysis	3	2
3	DIMENSIONS	Write three advantages of SI units	3	3
4	DIMENSIONS	Write the base and supplementary units of SI system .	3	2

Problems:(Extra)

1)equation for velocity V = At^2+Bt+C where t is time .find dimensions for A,B,C.

2)Vandarwall equation (P+$\frac{a}{v^2}$)$(V-b)=RT$,find dimensions of a and b. V is volume, P is pressure, v is velocity.

3)Distance x = At+Bt^2 here t is time, find dimensions of A and B.

4)Refractive index $\mu = A + \frac{B}{\lambda^2}$, λ is wavelength, find A,B dimensions.

5)which quantity represents $\sqrt{\frac{2GM}{R}}$, here G is gravitational constant, M is mass, R is radius

6)which quantity represents $\frac{GM}{R^2}$, here G is gravitational constant, M is mass, R is radius

7)which quantity represents $\sqrt{\frac{P}{d}}$, P is pressure and d is density.

8)which quantity represents 2L$\sqrt{\frac{m}{T}}$, here L is length, m is linear density, T is tension force.

9) Acceleration a = At^2 +Bt , here t is time, find dimensions of A and B.

10)density of mercury is 13.6 gm/cm^3 **,** What is this value in SI system?

11)which quantity represents $\sqrt{g\lambda}$ **,** g is acceleration and λ is wavelength.

12)What are the units and dimensions for S_n = U+ a(n$-\frac{1}{2}$) , here U is velocity, a is acceleration, n is time.

13)Product of two quantities P and Q is $M^1L^2T^{-2}$ and division of that two quantities is $M^1L^0T^{-2}$. what are the dimensions of P and Q.

14)If the Unit of length is tripled, mass is doubled, time is unchanged then how force will change.

15)If the Unit of length is halved, mass is doubled, time is doubled then how pressure will change.

16)Force depends on Pressure, velocity, time then equation for force is?

17)Force depends on Area, velocity, density then equation for Force is ?

18)Force depends on mass, velocity, radius then equation for Force is ?

19)Time T ∝ $P^a d^b E^c$ find a, b, c values. Here P is pressure, d is density, E is energy.