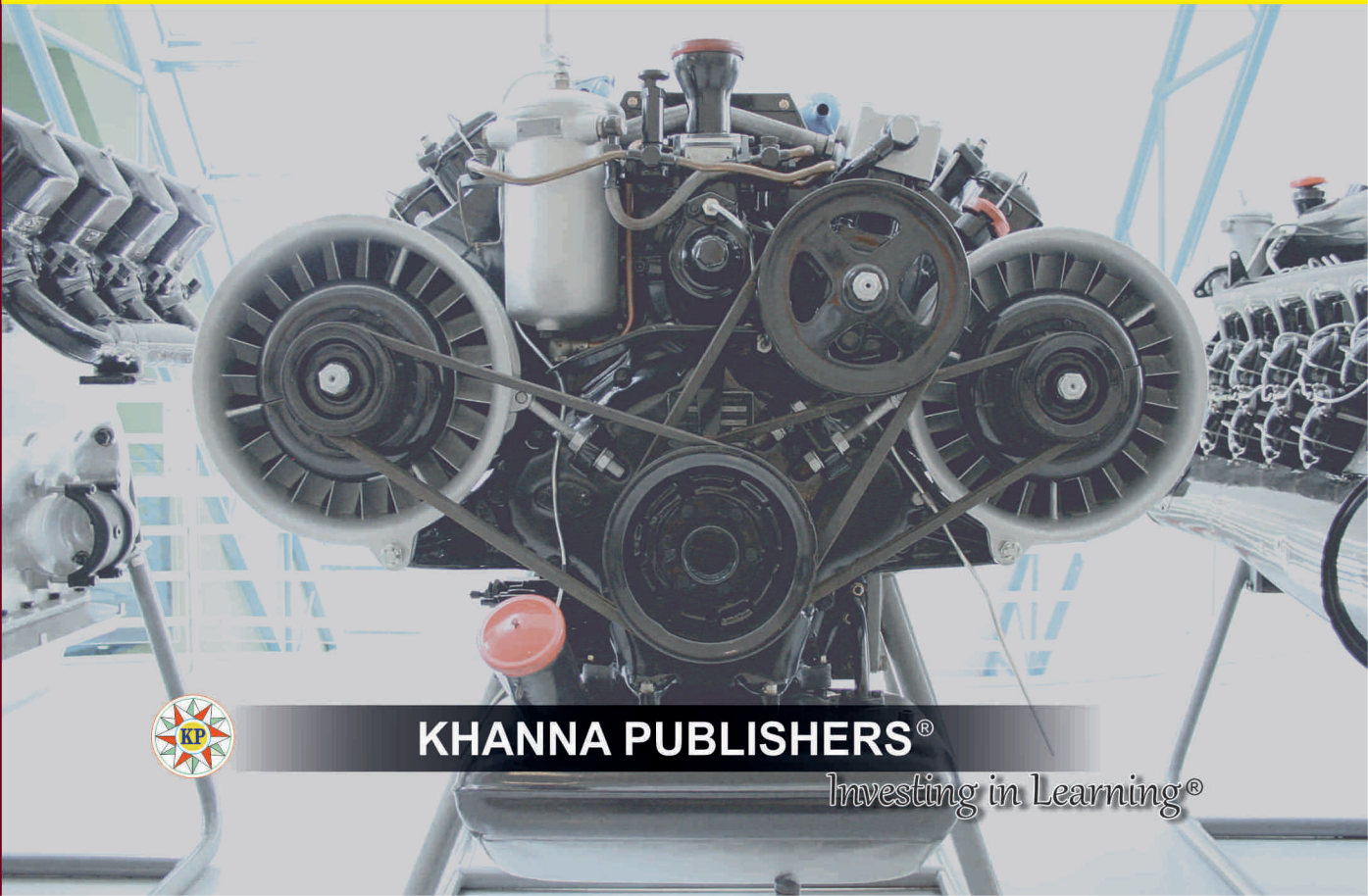




Applied Mechanics

As per AICTE Curriculum for Diploma

I.B. Prasad



KHANNA PUBLISHERS®

Investing in Learning®

Applied Mechanics

(for Diploma Course)

I.B. Prasad

M.A., B.Sc., MISE



KHANNA PUBLISHERS®

Operational Office : Investing in Learning®

4575/15, Onkar House, Opp. Happy School,
Ground Floor, Daryaganj, New Delhi 110 002

Phones : 011-45033819 • Mob. 09811541460

email : contactus@khannapublishers.in

Published by :
Romesh Chander Khanna & Vineet Khanna
for KHANNA PUBLISHERS
2-B, Nath Market, Nai Sarak,
Delhi-110006 (India)

Visit us at : www.khannapublishers.in

Copyright : Author and Publishers Jointly

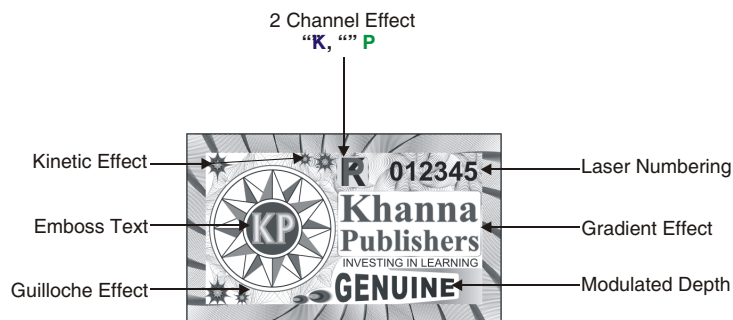
© 1979 and onward.

This book or part thereof cannot be translated or reproduced in any form without the written permission of both Authors and the Publisher. The right to translation, however, reserved with the Authors alone.

Hologram & Description

To all readers of our books, to prevent yourself from being defrauded by pirates, please make sure that there is an Hologram on the cover of our books with the below specifications. If you find any book without Hologram and Description, please mail us at contactus@khannapublishers.in

Thanking you



ISBN No. : 978-81-950287-6-4

First Edition : 2021

Preface

This book “Applied Mechanics” gives us great pleasure in presenting the first edition for the Diploma students for the AICTE curriculum.

The subject matter of the book is arranged and presented such that the entire syllabus has been covered in the same sequence. The book is divided into seven chapters. Various topics have been explained in such a simple way that students can understand easily. The book is written in simple and lucid language.

In spite of our best support, it is possible that some errors might have crept in. We shall acknowledge with gratitude, if any such error is brought in our notice.

Also, any suggestions and comments from students and teachers for improvement of this book are welcome.

I hope the book will be found useful by the readers.

—Author

Contents

1. Introduction	1-12
1.1. Definition	1
1.2. Important Terms	2
1.3. Basics Units and Derived Units	2
1.3.1. Basic Units	2
1.3.2. Derived Units	3
1.4. Different-Systems of Units	3
1.5. Concepts of Rigid Body	6
1.6. Difference Between Rigid body and Resistant Body	6
1.7. Scalars and Vectors Quantity	7
1.8. Vector Addition and Subtraction	7
<i>Multiple Choice Questions</i>	10
<i>Exercise</i>	12
2. Laws of Forces	13-41
2.1. Force	13
2.1.1. Types of Force	13
2.2. Laws of Mechanics	14
2.2.1. Newton's Three Laws of Motion	14
2.2.2. Newton's Law of Gravitation	15
2.2.3. Parallelogram Law of Forces	15
2.2.4. Principle of Transmissibility of Force	16
2.3. S.I. System of Units	16
2.4. Characteristics of Force	17
2.5. Force System	18
2.5.1. Collinear Force System	18
2.5.2. Parallel Force	18
2.5.3. Co-planer Force System	18

2.5.4. Non-coplaner Force System	18
2.5.5. Concurrent Force System	18
2.5.6. Non-concurrent Force System	19
2.5.7. Coplaner and Concurrent Force System	19
2.5.8. Coplanar and Non-Concurrent Force System	19
2.5.9. Non-Coplanar and Concurrent Force System	19
2.5.10. Principle of Transmissibility	19
2.6. Law of Superposition	20
2.7. Triangle Law of Forces	20
2.8. Polygon Law of Forces	20
2.9. Lami's Theorem	21
2.10. Free Body Diagram	22
2.11. Equilibrant Force and its Determination	22
<i>Multiple Choice Question</i>	37
<i>Exercise</i>	39
3. Moment	42—74
3.1. Concept of Moment	42
3.2. Moment of Force and Units of Moment	42
3.3. Varignon's Theorem	42
3.4. Principle of Moment and its Application	44
3.4.1. Levers	45
3.5. Parallel Forces	47
3.5.1. Resultant of Two Like Parallel Forces	47
3.5.2. Resultant of Two Unlike Parallel Forces	48
3.5.3. Center of Parallel Forces	48
3.6. Concepts of Couple, its Properties and Effect	49
3.7. Resultant of Spatial Forces	59
3.8. General Conditions of Equilibrium of Bodies under Coplanar Forces	60
3.9. Trigonometrical Theorems	61
3.10. Position of Resultant Force by Moment	69
<i>Multiple Choice Question</i>	71
<i>Exercise</i>	73
4. Friction	75—125
4.1. Concept of Friction	75
4.1.1. Types of Friction	75
4.1.2. Laws of Friction	76
4.1.3. Definitions	76

Introduction

1.1. DEFINITION

Mechanics is the physical science concerned with the behaviour of bodies that are acted upon by force. Kinetics deals with the motion of bodies with the application of external force.

The branch of physical science that deals with the state the of rest or the state of the motion is termed as mechanics.

Starting from the analysis of the rigid bodies under gravitational force and simple applied forces the mechanics has grown to the analysis of robotics, aircraft, spacecrafts under dynamics forces, atmosphere forces, temperatures forces etc.

Do you know?

Hydromechanics is the study which deals with the conditions of fluid under which it can remain at rest or in motion.

Thus mechanics is the physical science concerned with the behaviour of bodies that are acted upon by forces.

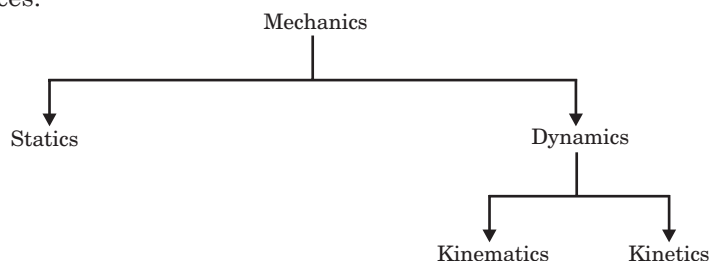


Fig. 1.1

1. **Statics:** In this section we discuss about the condition of bodies in equilibrium subjected to external force.

In other words, we can say that the force system acting on a body is balanced, the system has no external effect on the body, the body is in equilibrium.

2. **Dynamics:** It is also branch of mechanics in which the forces and their effects on the bodies in motion are studied. Dynamics is sub-divided into two parts (i) kinematics and (ii) kinetics.

3. **Kinematics :** It deals with the geometry of motion of bodies without and application of external forces.

4. **Kinetics :** It deals with the motion of bodies with the application of external forces.

5. **Hydromechanics :** is the study of fluid at rest.

6. **Hydrodynamics** : is the study of fluid in motion.

Rigid Body : A body is said to be rigid if it retain its shape and size even if the external forces are applied on it. It is called a rigid body.

1.2. IMPORTANT TERMS

1. **Mass** : The quantity of the matter possessed by a body is called mass. The mass of a body can change unless the body is damaged and part of it is physically separated.

2. **Time** : Time is the measure of succession of events. The successive event selected is the rotation of earth about its own axis that is called a day.

3. **Length** : It is a concept to measure linear distances.

4. **Space** : A geometric region in which the study of a body has been done is called space.

5. **Displacement** : It is defined as the distance moved by a body/particle in the specified direction.

6. **Velocity** : The rate of change of displacement with respect to time is defined as velocity.

7. **Acceleration** : It is the rate of change of velocity with respect to time.

8. **Momentum** : The product of mass and velocity is called momentum.

9. **Particle** : It has only mass and no size, such a body cannot exist theoretically.

When we deal with the problems involving distances considerably large compared to the size of the body, the body may be treated as particle.

Applied mechanics is a branch of physical sciences and the practical application of mechanics. Pure mechanics describes the responses of bodies (solid and fluids) or systems of bodies to external behaviour of a body, in either a beginning state of rest as of motion subjected to the action of forces.

1.3. Basics Units and Derived Units

1.3.1. Basic Units

Basic quantity in the general sense is property ascribed to phenomena, bodies or substances that can be quantified for, or assigned to, a particular phenomenon, body or substance. Ex. Mass, electric charge.

A quantity in the particular sense is a quantifiable or assignable property ascribed to a particular phenomenon, body or substance.

All physical quantities can be expressed in terms of seven base units.

<i>Base Quantity</i>	<i>Name</i>	<i>Symbol</i>
Length	Meter	m
Mass	Kilogram	kg
Time	Second	s
Electric current	Ampere	A
Thermodynamic temperature	Kelvin	K
Amount of substance	Mole	mol
Luminous intensity	Candela	Cd

1.3.2. Derived Units

These units are, other than basic units are called Derived Units. The SI derived units for these derived quantities are obtained from these equations and the seven SI units.

<i>Derived quantity</i>	<i>Name</i>	<i>Expression in terms of SI units</i>
area	square meter	m^2
volume	cubic meter	m^3
speed, velocity	meter per second	m/s
acceleration	meter per second squared	m/s^2
mass density	kilogram per cubic meter	kg/m^3
force	newton (N)	$m\ kg\ s^{-2}$
pressure	pascal	$m^{-1}\ kg\ s^{-2}$
energy, work	Joule (J) N-m	$m^2\ kg\ s^{-2}$
electric potential	volt	$m^2\ kg\ s^{-3}\ A^{-1}$
current density	ampere per square meter	A/m^2
electric resistance	ohm	$m^2\ kg\ s^{-3}\ A^{-2}$
dynamic viscosity	pascal second	$m^{-1}\ kg\ s^{-3}$
surface tension	newton / meter	$m\ kg\ s^{-2}/m$
magnetic field strength	ampere per meter	A/m
electric charge	coulomb (c)	S.A

1.4. DIFFERENT-SYSTEMS OF UNITS

(i) **FPS.** The FPS system has two variants, known as the American version and the Imperial version. Neither scheme is often used by scientists now a days, the International Systems of units (SI) is preferred. However, FPS units are used to some extent by the general public, especially in the United States.

The foot-pound-second system of FPS system of units built on three fundamental units.

Farenhite is the unit of temperature in FPS system.

(ii) **M.K.S. Units.** The units of mass, distance and time are called fundamental units. All other units are known as derived units.

In the M.K.S. system, mass is measured in kilograms, distance in metres and time in seconds. The abbreviations for them are respectively kg, m and sec.

The weight of a body is the force of attraction exerted on it by the earth. If the mass of a body is m , then its weight is $m \times g$, where g is the acceleration due to gravity. The value of g on the earth's surface is approximately 9.81 metres per sec per sec which is written as $9.81\ m/sec^2$. Sometimes we take $g = 9.8\ m/sec^2$.

If the mass of a body is m kg then its weight is $m \times 9.81$ Newtons. Since weight is a force, the unit of force is also Newton. The abbreviation for Newton is N.

Now a force of mg Newtons is equal to the weight of a body of mass m kg. We say that mg Newtons = weight of m kg

$$\begin{aligned} \text{or} & & & = m\ \text{kg-wt} \\ \text{or} & & & = m\ \text{kgf.} \end{aligned}$$

Thus if a force in Newtons is divided by $g = 9.81$, then the force is obtained in kg-wt. or kgf. Kg-wt or kgf is called the gravitational unit of force. In the gravitational system, mass and weight are equal numerically. Newton is called the absolute unit of force.

(iii) **CGS Units.** In the C.G.S. system mass is measured in grams (gm), length in centimetres (cm) and time in seconds. Weight and force are measured in dynes. Thus if the mass of a body is m gm, then its weight is mg dynes, where $g = 981 \text{ cm/sec}^2$. The gravitational unit of force and weight, is gmf.

Pressure is force per unit area. It is measured in kgf/cm^2 , or $\text{kgf/square millimetre (mm}^2\text{)}$, or N/cm^2 , or N/mm^2 and so on.

When the point of application of a force F moves through a distance x along its line of action, work is said to be done and its magnitude is $F \cdot x$. When F is measured in kgf and x in metres, the work done = $F \cdot x$ kgf-m. When F is measured in Newtons and x in metres, the work done = $F \cdot x$ N-m = $F \cdot x$ Joules. One Newton-metre is called one Joule.

The unit for energy is the same as for work.

In the F.P.S. system, the three fundamental units are the pound (lb), the foot (ft) and the sec. Force is measured in poundals, which are obtained by multiplying lb by $g = 32.2 \text{ ft/sec}^2$. The gravitational unit is lb-wt.

(iv) **S.I. Units.** The following are the base units in this system as required in this book :

Quantity	Name	Abbreviation or symbol
Length	Metre	m
Mass	Kilogram	kg
Time	Second	s
Force	Newton	N
Moment	Newton-metre	N-m
Work and energy	Joule	J
Power	Watt	W
Area	Square metre	m^2
Velocity	Metre per second	m/s or ms^{-1}
Acceleration	Metre per second per second	ms^2 or ms^{-2}
Density	Kilogram per cubic metre	kg/m^3
Pressure and stress	Pascal	Pa

One Newton is that force which acting on a mass of one kilogram will produce in it an acceleration of one metre per second per second Newton-metre.

One Joule is the work done when the point of application of a force of one Newton is displaced through one metre along its line of action. One Joule is also called one Newton-metre.

$$1 \text{ J} = 1 \text{ N-m.}$$

Power is rate of doing work A rate of one Joule per second is called one Watt.

$$1 \text{ W} = 1 \text{ J/s}$$

Pressure, and also stress, is force per unit area. A pressure of one Newton per square metre is called one Pascal.

$$1 \text{ Pa} = 1 \text{ N/m}^2$$

S.I. prefixes for multiples

<i>Factor</i>	<i>Prefix name</i>	<i>Symbol</i>
10	deca	<i>da</i>
10 ²	hecto	<i>h</i>
10 ³	kilo	<i>k</i>
10 ⁶	Mega	M
10 ⁹	Giga	G
10 ¹²	Tera	T

S.I. prefixes for sub-multiples

<i>Factor</i>	<i>Prefix name</i>	<i>Symbol</i>
10 ⁻¹	deci	<i>d</i>
10 ⁻²	centi	<i>c</i>
10 ⁻³	mili	<i>m</i>
10 ⁻⁶	micro	μ
10 ⁻⁹	nano	<i>n</i>
10 ⁻¹²	pico	<i>P</i>

The use of the prefixes hecto, deca, deci and centi is not recommended.

Compound prefixes should be avoided. For example, 25000 kg should be written as 25 × 10³ kg or 25 × 10⁶ g or 25 Mg (Mega gram), but not as 25 *k* kg.

The following symbols are written in Roman type, lower case : m, kg, s.

The following symbols, which have been derived from the names of persons, are written in Roman type, capital letters :

N, J, W, Pa.

The prefixes M, G, T are written in Roman type, capital letters.

The prefix k for kilo is written in Roman type, lower case.

The following prefixes are written in italics, lower case :

h da, d, c, μ, n, P

Correct way of writing S.I. units

The S.I. units names and symbols do not change in plural. The symbols are not followed by a full stop. No space should be left between prefix symbols and unit symbols. Compound prefix are not used.

Some examples are given below.

Alternative unit for pressure. As already mentioned, the unit for pressure and stress is Pascal (Pa). For convenience, the unit N/mm² is also used.

Since 1000 mm = 1 m, and 1 Pa = 1 N/m², it follows that

$$\begin{aligned}
 1 \text{ N/mm}^2 &= 1000^2 \text{ N/m}^2 = 10^6 \text{ N/m}^2 \\
 &= 10^6 \text{ Pa} = 1 \text{ MPa (one Mega Pascal)} \\
 1 \text{ kN/mm}^2 &= 10^6 \text{ kN/m}^2 = 10^9 \text{ N/m}^2 = 10^9 \text{ Pa} \\
 &= 1 \text{ GPa (one Giga Pascal)}
 \end{aligned}$$

Quantity	Correct	Incorrect
Force	250 Newton or 250 N	250 Newtons
Length	10 m 15 mm	10 m. 15 mm.
Length	20 metre or 20 m	20 metres
Volume	20 m ³	20 cu m
Volume	50 ml	50 cc
Velocity	5 m/s or 5 ms ⁻¹	5 m/sec
Velocity	40 km/h	40 kmph
Acceleration	0.5 m/s ² or 0.5 ms ⁻²	0.5 m/sec ²
Force	10 kN	10 kN or 10 k-N
Mass	2000 kg or 2 × 10 ³ kg	2 k kg

1.5. CONCEPTS OF RIGID BODY

A rigid body is a solid body in which deformation is zero or so small it can be neglected. The distance between any two given points on a rigid body remains constant in time regardless of external forces exerted on it.

A rigid body is usually considered as a continuous distribution of mass.

Thus when force is applied on a rigid body, there will be no change in the shape or size of the rigid body. In case of a *non rigid body* the force will distort shape and/or size of the body.

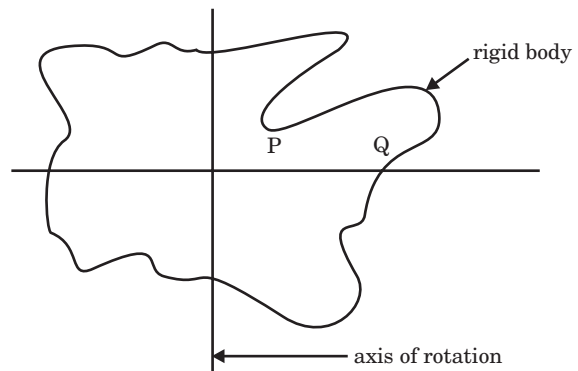


Fig. 1.2

1.6. DIFFERENCE BETWEEN RIGID BODY AND RESISTANT BODY

Rigid Body	Resistant body
<p>Diagram of a rigid body (circle) with eight forces F_1 through F_8 applied at various points around its circumference. F_1 is downward, F_2 is up-right, F_3 is left, F_4 is down-right, F_5 is up, F_6 is down-left, F_7 is left, and F_8 is up-left.</p>	<p>Diagram of a resistant body (belt) wrapped around a pulley. The belt is shown as a circle with a horizontal line passing through its center. The pulley is a larger circle below the belt. Tension forces T are applied to the ends of the belt, and a downward force is applied to the top of the belt.</p>
<p>If the distance between A & B does not change then the body is called Rigid body.</p>	<p>Normally belt is non-rigid body. When we apply tensile force on the belt then belt like rigid body. Body which is rigid for purposed they have to serve. But naturally they are non-rigid body.</p>

1.7. SCALARS AND VECTORS QUANTITY

Scalars Quantity : These quantities which have only magnitude and no direction are called scalar quantities : some examples of scalar quantities are : mass, distance, time speed, volume density pressure, work, energy, power, charge, electric current, temperature, scalar potential, specific heat, frequency.

Vector Quantity : The ordinary quantities that have a magnitude but not a direction are called scalars. In vector quantities magnitude and direction both are necessary. Displacement velocity and acceleration are vector quantities, while speed (magnitude of velocity), time and mass are scalars.

Difference between Scalar and Vector Quantity

	<i>Vector Quantity</i>	<i>Scalar Quantity</i>
<i>Representation</i>	A number (magnitude), direction using unit cap or arrow at the top and unit.	A number (magnitude) and unit.
<i>Symbol</i>	Quantity symbol in bold and an arrow sign above.	Quantity symbol
<i>Direction</i>	Yes	No
<i>Example</i>	Velocity and acceleration	Mass and temperature

1.8. VECTOR ADDITION AND SUBTRACTION

The addition and subtraction of vector quantities (addition) does not follow the simple arithmetic rules. A special set of rules are followed for the addition and subtraction of vectors. Following are some points to be noted while adding vectors:

- Addition of vectors means finding the resultant of a number of vectors acting on a body.
- The component vectors whose resultant is to be calculated are independent of each other. Each vector acts as if the other vectors were absent.
- Vectors can be added geometrically but not algebraically.
- Vector addition is commutative in nature, *i.e.*, $\vec{A} + \vec{B} = \vec{B} + \vec{A}$

Now, talking about vector subtraction, it is the same as adding the negative of the vector to be subtracted. To better understand, let us look at the example given below.

Let us consider two vectors \vec{A} and \vec{B} as shown in the figure 1.3. We required to subtract \vec{B} from \vec{A} . It is just the same as adding \vec{A} and $-\vec{B}$. The resultant is shown in the figure below.

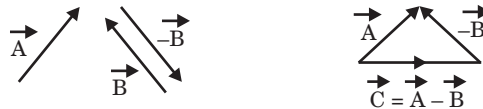


Fig. 1.3

Vector Notation

For vector quantity usually, an arrow is used on the top like \vec{v} which represents the vector value of the velocity and also explains that the quantity has both magnitudes as well as direction.

SOLVED NUMERICAL PROBLEMS

Example 1.1. Calculate the volume of a cylinder with a diameter of 9.9 cm and a height of 13.5 cm.

Solution. Volume of cylinder $V = \text{area of base} \times \text{height}$

$$= \pi r^2 h$$

$$= \pi \times \left(\frac{D}{2}\right)^2 \times h = \frac{\pi}{4} \times (9.9)^2 \times 13.5$$

$$= 1039.19 \text{ cm}^3 = 1.0391 \times 10^3 \text{ cm}^3$$

Since the least precise quantity is the diameter is known to 2 significant figures. So answer must be expressed two significant figures.

Example 1.2. 5.75 gram of the substance occupies 1.2 CC. Find the density of the substance to correct significant figures.

Solution. Density = $\frac{\text{mass}}{\text{volume}} = \frac{5.75}{1.2} = 4.7916 \text{ g/cc}$

Since the least precise quantity is the volume (1.2 cc) and is known to two significant figure, the answer must have two significant figures.

$$\text{Density} = 4.8 \text{ g/cc}$$

Example 1.3. Perform the following operation to correct number of significant figures, $6.8 \times 10^4 \text{ s} + 3.1 \times 10^5 \text{ second}$.

Solution. As we know that to add quantities of different exponents, we must first express then same exponent.

$$\therefore 6.8 \times 10^4 + 3.1 \times 10^5 = 6.8 \times 10^4 + 31 \times 10^4$$

$$= 37.8 \times 10^4 \text{ second}$$

Since the least precise term is known to one decimal place the final result must be expressed to one decimal place. After rounding off the answer is $3.8 \times 10^5 \text{ second}$.

Example 1.4. Find the value of 10 Joules on a system which has 10 cm, 100 g and 30 seconds as the fundamental units.

Solution. Joule is the SI unit of work.

Let n_1 is the SI unit where as n_2 is the new unit.

SI unit	New system of Units
$n_1 = 10 \text{ J}$	$n_2 = ?$
$m_1 = 1 \text{ kg}$	$m_2 = 100 \text{ g}$
$L_1 = 1 \text{ m}$	$L_2 = 10 \text{ cm}$
$T_1 = 1 \text{ S}$	$T_2 = 30 \text{ S}$

Now we know that

$$[\text{work}] = [F \times S] = [ML^2 T^{-2}]$$

$$a = 1, b = 2, c = 2$$

$$n_2 = \left[\frac{m_1}{m_2}\right]^a \left[\frac{L_1}{L_2}\right]^b \left[\frac{T_1}{T_2}\right]^c = 10 \left[\frac{1 \text{ kg}}{100 \text{ g}}\right]^1 \left[\frac{1 \text{ m}}{10 \text{ cm}}\right]^2 \left[\frac{1 \text{ s}}{30 \text{ s}}\right]^{-2}$$

$$\begin{aligned}
&= 10 \left[\frac{1000 \text{ g}}{100 \text{ g}} \right]^1 \left[\frac{100 \text{ cm}}{10 \text{ cm}} \right]^2 \left[\frac{1 \text{ S}}{30 \text{ S}} \right]^{-2} \\
&= 10 [10]^1 [10]^2 \left[\frac{1}{30} \right]^{-2} \\
&= 10 \times 10 \times 100 \times 900 = 9 \times 10^6 \text{ New units}
\end{aligned}$$

Example 1.5. Test by method of dimensions, the accuracy of the relation $t = 2\pi \sqrt{(k^2 + t^2) lg}$ for the line period of a compound pendulum.

Solution. If the relation be correct, the dimensions of the terms an either side of the sign of equality must be the same.

Let us put in relation as

$$t = 2\pi \sqrt{\frac{K^2}{lg} + \frac{l}{g}}$$

Now the dimension of t $[T]$

and the dimension $k^2 [L^2]$ k being the radius of ratio

The dimension of $l = [L]$

So, the dimension of the term

$$= \sqrt{\frac{L^2}{LLT^{-2}} + \frac{L}{LT^{-2}}} = \sqrt{T^2 + T^2} = \sqrt{2T^2} = T\sqrt{2}$$

Example 1.6. The circular scale of a spherometer is divided into 200 equal divisions. If its least count is 0.005 mm then what is the distance between two consecutive threads of the spherometer screw?

Solution. We know that the distance between two consecutive thread is known as pitch of the spherometer.

$$\text{Least count} = \frac{\text{Pitch}}{\text{no. of circular scale division}}$$

$$0.005 \text{ mm} = \frac{\text{Pitch}}{200}$$

$$\begin{aligned}
\text{Pitch} &= 200 \times 0.005 \text{ mm} \\
&= 1000 \text{ mm}
\end{aligned}$$

Example 1.7. In a given side callipers 10 divisions its vernier coincides with its 9 main scale division. If one main scale division is equal to 0.5 mm then find its least count.

Solution.

\therefore 10 divisions of vernier scale = 9 main scale divisions

\therefore 1 division of vernier scale = $\frac{9}{10}$ main side divisions.

Now that = $\frac{9}{10} \times 0.5 = 0.45 \text{ mm}$.

$$\begin{aligned}
\text{Least count of slide callipers} &= \text{value of 1 MSD} - \text{Value of VSD} \\
&= 0.5 \text{ mm} - 0.45 \text{ mm} = 0.005 \text{ mm}
\end{aligned}$$

Therefore the least count of slide callipers equal to 0.005 mm.

MULTIPLE CHOICE QUESTIONS

- Which is fundamental quantity ?
 (a) length (b) velocity
 (c) acceleration (d) force
- How many significant digits are in 0.04058 ?
 (a) 4 (b) 5
 (c) 6 (d) 3
- A unitless quantity.
 (a) never has a non zero dimension
 (b) always has a non-zero dimension
 (c) may have a non-zero dimension
 (d) does not exist
- Choose the incorrect statement.
 (a) A dimensionally correct equation may be correct
 (b) A dimensionally correct equation may not be correct
 (c) A dimensionally incorrect equation may be correct
 (d) A dimensionally incorrect equation may be incorrect
- The length of a rod is (11.05 ± 0.05) cm. Which is the total length of the two such rods?
 (a) (22.10 ± 0.15) cm (b) (22.10 ± 0.10) cm
 (c) (22.10 ± 0.05) cm (d) (22.15 ± 0.10) cm
- The significant figure in 3400 is
 (a) 1 (b) 2
 (c) 3 (d) 4
- The correct number of significant figures in 0.0003056 is
 (a) Six (b) Four
 (c) Seven (d) Eight
- A student measured the thickness of a glass slab using a spherometer with least count 0.001 cm. The correct listing is
 (a) 0.234 cm (b) 0.234 m
 (c) 0.234 m (d) 2.34 cm
- The dimension of $\frac{1}{\sqrt{\mu_0 \epsilon_0}}$ the same as that of
 (a) velocity (b) time
 (c) capacitance (d) distance
- Plane angle and solid angle are
 (a) primary fundamental unit (b) secondary fundamental unit
 (c) supplementary units (d) derived units
- A thin copper wire of length L increase in length by 2% when heated from T_1 to T_2 . If a copper cube having side $10 L$ is heated from T_1 to T_2 , what will be the percentage error in area of one face of the cube?

Applied Mechanics

About the Book:

This textbook “Applied Mechanics” presents the subject matter in full conformity with the syllabi prescribed by AICTE. This book is written in simple and lucid manner. Whole text arranged strictly according to diploma engineering pattern.

This book provides an insight and proper grip over the topics as one learns it. The subject matter has been explained in the simplest possible way for easy assimilation by the student. This book has been reinforced by a large number of solved examples. All the topics have been explained with practical examples wherever necessary. The subject matter of the book will reveal all numerical values of various physical properties have been given.

Contents:

- ☞ Introduction
- ☞ Laws of Forces
- ☞ Moment
- ☞ Friction
- ☞ Centre of Gravity
- ☞ Moment of Inertia
- ☞ Simple Machines



KHANNA PUBLISHERS®

ISO 9001:2015

4575/15, Onkar House, Opp. Happy School,
Ground Floor, Daryaganj, New Delhi-110002

Phones: 011-45033819, 9811541460

E-mail: contactus@khannapublishers.in



Website:
www.khannapublishers.in



9 788195 028764