Unit -1
Measurement

I. Choose the best answer.

1. Which one the following systems of unit is the British System of unit?
   a) CGS b) MKS **c) FPS** d) SI
2. Electric current is a _____quantity
   a) base b) supplementary c) derived d) professional
3. SI unit of temperature is _____
   a) celsius b) fahrenheit **c) kelvin** d) ampere
4. Luminous intensity is the intensity of _____
   a) laser light b) UV light **c) visible light** d) IR light
5. Closeness of two or more measured values is called as _____
   a) accuracy b) precision c) error **d) approximation**
6. Which one of the following statement is wrong?
   a) Approximation gives accurate value.
   b) Approximation simplifies the calculation.
   c) Approximation is very useful when little information is available.
   d) Approximation gives the nearest value only.

II. Fill in the blanks.

1. The solid angle is measured in **steradian.**
2. The coldness or hotness of a substance is expressed by **temperature.**
3. **Ammeter** is used to measure electric current.
4. One mole of a substance contains $\mathbf{6.023 \times 10^{23}}$ atoms or molecules.
5. The uncertainty in measurement is called as **error.**
6. The closeness of the measured value to the original value is **accuracy.**
7. The intersection of two straight lines gives us **plane angle.**

III. State true or false. If false, correct the statement.

1. Temperature is a measure of total kinetic energy of the particles in a system. **[False]**

   Correct Statement : *Temperature is a measure of* ***average kinetic energy*** *of the particles in a system.*

2. If one coulomb of charge is flowing in one minute, it is called 'ampere'. **[False]**

   Correct Statement : *If one coulomb of charge is flowing in* ***one second,*** *it is called 'ampere'.*

3. Amount of substance gives the number of particles present in a substance. **[True]**
4. Intensity of light coming from a candle is approximately equal to one 'candela'. **[True]**
5. Quartz clocks are used in GPS devices. **[False]**

   Correct Statement : Atomic clocks *are used in GPS devices.*

6. Angle formed at the top of a cone is an example for 'plane angle'. **[True]**
7. The number 4.582 can be rounded off as 4.58. **[True]**

IV. Match the following.

	Column I	Column II	Answer
a.	Temperature	Closeness to the actual value	**a)Measure of hotness or coldness**
b.	Plane angle	Measure of hotness or coldness	**b)Angle formed by the intersection of two planes**
c.	Solid angle	Closeness to two or more measurements	**c)Angle formed by the intersection of three or more planes**
d.	Accuracy	Angle formed by the intersection of three or more planes	**d)Closeness to the actual value**
e.	Precision	Angle formed by the intersection of two planes	**e)Closeness to two or more measurements**

V. Consider the statements given below and choose the correct option.

a. Both assertion and reason are true and reason is the correct explanation of the assertion.
b. Both assertion and reason are true but reason is not the correct explanation of the assertion.
c. Assertion is true, but reason is false.
d. Both assertion and reason are false.

1. **Assertion :** The SI system of units is the suitable system for measurements.
   Reason : The SI unit of temperature is kelvin.
   Ans. (b) ***Both assertion and reason are true but reason is not the correct explanation of the assertion.***
   Correct reason : *In SI system the units are precisely defined and have the same value everywhere.*
2. **Assertion :** Electric current, amount of substance, luminous intensity are the fundamental physical quantities.
   Reason : They are independent of each other.
   Ans. (a) ***Both assertion and reason are true and reason is the correct explanation of the assertion.***
3. **Assertion :** Radian is the unit of solid angle.
   Reason : One radian is the angle subtended at the centre of a circle by an arc of length equal to its radius.
   Ans. (a) ***Assertion is false, but reason is true.***
   Correct Assertion : *Radian is the unit of plane angle.*

VI. Answer very briefly.

1. How many base quantities are included in SI system?
There are seven base quantities are included in SI system. They are length, mass, time, temperature, electric current, amount of substances and luminous intensity.

2. Give the name of the instrument used for the measurement of temperature.
The instrument used for the measurement of temperature is thermometer.

3. What is the SI unit of luminous intensity?
The SI unit of luminous intensity is Candela and is denoted as 'cd'.

4. What type of oscillations are used in atomic clocks?
The type of oscillations are used in atomic clocks is periodic vibrations.

5. Mention the types of clocks based on their display.
The types of clocks based on their display are,
➔ Analog clocks ➔ Digital clocks

6. How many times will the 'minute hand' rotate in one hour?

The 'minute hand' rotate one time in one hour.

7. How many hours are there in a minute?

$$60\ minutes = 1\ hr$$

$$1\ minute = \frac{1}{60} = 0.0167\ hours$$

$\mathbf{0.0167}\ \boldsymbol{hours}$ in a minute.

VII. Answer briefly.

1. What is measurement?

Measurement is the process of finding an unknown physical quantity by using a standard quantity. **For example**, the length of the book be 30 cm. Here, the length is the physical quantity, ruler is the instrument, 30 is the magnitude and 'cm' is the unit. This process is called **measurement**.

2. Name the three scales of temperature.

Scales of temperature,

- ➔ Celsius
- ➔ Fahrenheit
- ➔ Kelvin

3. Define - Ampere.

If one coulomb of charge is flowing through a conductor in one second, then, the amount of current flowing is said to be **one ampere**.

4. What is electric current?

- ❋ Flow of electric charges, in a particular direction is known as 'electric current'.
- ❋ The magnitude of electric current is the amount of electric charges flowing through a conductor in one second.

$$\text{Electric current} = \frac{\text{Amount of electric charge}}{\text{unit}}$$

$$I = \frac{Q}{t}$$

- ❋ Electric charge is measured in coulumb. The SI unit of electric current is *ampere* and it is denoted as A.

5. What do you mean by luminous intensity?

- ❋ The measure of the power of the emitted light, by a light source in a particular direction, per unit solid angle is called as luminous intensity.
- ❋ The SI unit of luminous intensity is candela and is denoted as 'cd'.

6. Define - Mole.

- ❋ Mole is defined as the amount of substance, which contains 6.023×10^{23} entities. It is denoted as 'mol'.
- ❋ The number of atoms or molecules in a substance is measured in mole.

7. What are the differences between plane angle and solid angle?

Plane angle	Solid angle
It is the angle made at the point of intersection of two lines or planes.	It is the angle by the intersection of three or more planes at a common point.
It is two dimensional.	It is three dimensional.
Its unit is radian.	Its unit is steradian.

VIII. Answer in detail.

1. List out the base quantities with their units.

Quantity	Unit	Symbol
Length	metre	m
Mass	kilogram	kg
Time	second	s
Temperature	kelvin	K
Electric current	ampere	A
Amount of substance	mole	mol
Luminous Intensity	candela	cd

2. Write a short note on different types of clocks.

Types of clocks based on display :

- ❋ Analog clocks
- ❋ Digital clocks

➔ **Analog Clocks :**

Analog clocks look like a classic clock. It has three hands to show the time.

- ➢ **Hours hand** - It is short and thick. It shows 'hour'.
- ➢ **Minutes hand** - It is long and thin. It shows 'minute'.
- ➢ **Seconds hand** - It is long and very thin. It shows 'second'. It makes one rotation in one minute and 60 rotations in one hour.

➔ **Digital Clocks :**

- ❋ A **digital clock** displays the time directly. It shows the time in numerals or other symbols.
- ❋ It may have 12 hours or 24 hours display.
- ❋ Recent clocks are showing date, day, month, year, temperature etc.
- ❋ Digital clocks are often called as **electronic clocks**.

Types of clocks based on working mechanism :

- ❋ Quartz clock
- ❋ Atomic clock

➔ **Quartz clock :**

- ❋ These clocks are activated by 'electronic oscillations', which are controlled by a 'quartz crystal'.
- ❋ The frequency of a vibrating crystal is very precise. So, quartz clock is more accurate than mechanical clock.
- ❋ These clocks have an accuracy of one second in every 10^9 seconds.

➔ **Atomic clock :**

- ❋ These clocks make use of periodic vibrations occurring within the atom.
- ❋ These clocks have an accuracy of one second in every 10^{13} seconds.
- ❋ Atomic clocks are used in Global Positioning System (GPS), Global Navigation Satellite System (GLONASS) and International Time Distribution Services.

IX. Higher Order Thinking Question.

1. **Your friend was absent to school yesterday. You are enquiring about his absence. He told that he had fever and it was measured to be 100℃. Is it possible to have 100℃ fever? If he is wrong, try to make him understand.**

    - ❋ No, it is not possible of 100℃ fever. The normal temperature of human body is between 98.4℉ and 98.6℉.
    - ❋ So, he should say that, he was affected by a fever of 212℉ and it is not 100℃.
    - ❋ Always we should tell our body temperature in fahrenheit and not in celsius.