Chapter 1
Measurement

I. Choose the best answer

Question 1.
Which one the following system of units is the British System of unit?
(a) CGS
(b) MKS
(c) FPS
(d) SI
Answer:
(c) FPS

Question 2.
Electric current belongs to ……. quantities
(a) Base
(b) Supplementary
(c) Derived
(d) professional
Answer:
(a) Base

Question 3.
SI unit of temperature is
(a) Celsius
(b) Fahrenheit
(c) kelvin
(d) Ampere
Answer:
(c) kelvin

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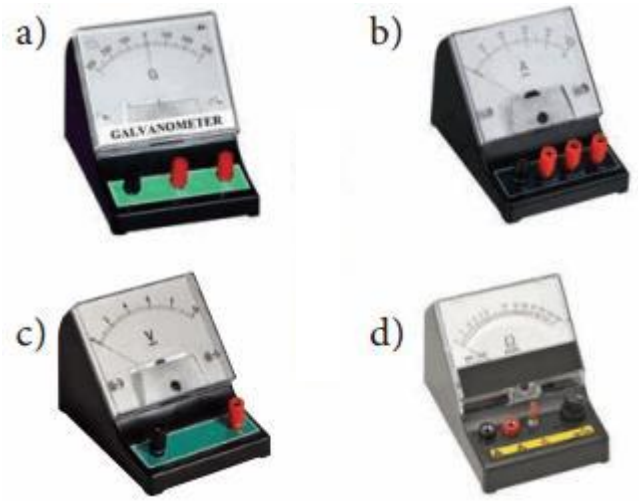
Question 4.
Amount of substance is
(a) Directly proportional to the number of atoms
(b) Inversely proportional to the number of atoms
(c) Directly proportional to the square of number of atoms
(d) Inversely proportional to the square of number of atoms
Answer:
(a) directly proportional to the number of atoms

Question 5.
Luminous intensity is the intensity of
(a) Laser light
(b) UV light
(c) Visible light
(d) IR light
Answer:
(c) visible light

Question 6.
Which one of the following devices is used to measure electric current
Answer:



Question 7.
SI unit stands for
(a) International system of units
(b) Integrated System of units
(c) International symbol of units
(d) Integrated symbol of units
Answer:
(a) International system of units

Question 8.
Closeness of two or more measured values is called as
(a) Accuracy
(b) Precision
(c) Error
(d) Approximation
Answer:
(b) Precision

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Question 9.
Quantities other than base quantities are called as
(a) Supplementary quantities
(b) Derived quantities
(c) Professional quantities
(d) Energy quantities
Answer:
(b) Derived quantities

Question 10.
Which of the following statements about approximation 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.
Answer:
(a) Approximation gives accurate value.

II. Fill in the blanks

1. The solid angle is measured in ……
2. …….. recognized the need of 'Standard Units' for physical quantities.
3. The coldness or hotness of a substance is expressed by ……..
4. …….. is used to measure electric current.
5. ……. of substance, contains 6.023 x 10^{+23} atoms or molecules.
6. Luminous Intensity is the amount of visible light, that is emitted in unit area per unit ……..
7. Quartz clock uses …….. oscillations.
8. The uncertainty in measurement is called as ……..
9. ……. is the closeness of the measured value to the original value.
10. The intersection of two straight lines gives us ……..

Answer:

1. Steradian
2. Scientists
3. Temperature
4. Ammeter
5. One mole
6. Solid angle
7. Electronic
8. Error
9. Accuracy
10. plane angle

III. True or False

Question 1.
SI units are metric system of units.
Answer:
True

Question 2.
Temperature is a measure of total kinetic energy of the particles in a system.
Answer:
False
Correct statement:
Temperature is a measure of average kinetic energy of the particles in a system.

Question 3.
In thermometers, freezing point of water is taken as the Upper Fixed Point.
Answer:
False
Correct statement:
In thermometers, boiling point of water is taken as the Upper Fixed Point.

Question 4.
One coulomb of charge flowing per minute is called 'ampere'.
Answer:
False
Correct statement:
One coulomb of charge flowing per second is called 'ampere'.

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Question 5.
Amount of substance gives the number of particles present in the substance.
Answer:
True

Question 6.
Intensity of light from a candle is approximately equal to one 'candela'.
Answer:
True

Question 7.
Angle formed at the top of a cone is an example of 'Plane Angle'.
Answer:
True

Question 8.
Quartz clocks are used in GPS Devices.
Answer:
False
Correct statement:
Atomic clocks are used in GPS Devices.

Question 9.
Candela is used to express electric field intensity.
Answer:
False
Correct statement:
Candela is used to express luminous intensity.

Question 10.
The number 4.582 can be rounded off as 4.58.
Answer:
True

IV. Match the following

Column A			Column B
1.	Temperature	a	Closeness to the Actual Value
2.	Plane Angle	b	Measure of hotness or coldness
3.	Solid Angle	c	Closeness to two or more measurements
4.	Accuracy	d	Angle formed by the intersection of three or more planes
5.	Precision	e	Angle formed by the intersection of two planes

Answer:

1. b
2. e

3. d
4. a
5. c

V. Assertion & Reason

Question 1.
Direction: Mark the correct choice as

(a) If both assertion and reason are true and reason is the correct explanation of the assertion.
(b) If 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) Assertion is false, but reason is true.

Question 2.
Assertion : The SI system of units is the suitable system for measurements.
Reason : The SI unit of temperature is kelvin.
Answer:
(b) Both assertion and reason are true but reason is not the correct explanation of the assertion
Correct explanation :
In SI system the units are precisely defined and have the same value everywhere.

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Question 3.
Assertion : Electric current, amount of substance, Luminous Intensity are the fundamental physical quantities.
Reason : They are independent of each other.
Answer:
(a) Both assertion and reason are true and reason is the correct explanation of the assertion

Question 4.
Assertion : The seconds hand of a clock is having least count of one second.
Reason : Least count is the maximum measurement that can be measured accurately by an instrument.
Answer:
(c) Assertion is true, but reason is false
Correct explanation :
Least count is the minimum measurement that can be measured accurately by an instrument.

Question 5.
Assertion : Avogadro's number is the number of atoms in one mole of substance.
Reason : Avogadro's number is a constant.
Answer:
(a) Both assertion and reason are true and reason is the correct explanation of the assertion

Question 6.
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.
Answer:
(d) Assertion is false, but reason is true]
Correct explanation :
Radian is the unit of plane angle.

VI. Answer in a word or two (Very Short Answer)

Question 1.
What is the unit of mass in FPS system?
Answer:
Pound.

Question 2.
How many base quantities are included in SI system?
Answer:
Seven.

Question 3.
Give the name of the instrument used for the measurement of temperature.
Answer:
Thermometer.

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Question 4.
What is the 'Lower Fixed Point' of the Fahrenheit scale?
Answer:
32°F.

Question 5.
What is the SI unit of Luminous Intensity?
Answer:
Candela (cd).

Question 6.
What is the value of Avogadro's number?
Answer:
6.023 x 1023.

Question 7.
What type of oscillations are used in atomic clocks?
Answer:
Periodic vibrations.

Question 8.
Mention the types of clocks based on their display.
Answer:
Analog clock and digital clock.

Question 9.
How many times will the 'minute hand' rotate in one hour?
Answer:
One time.

Question 10.
How many hours are there in a minute?
Answer:
60 minutes = 1 hr
1 minute = $\frac{1}{60}$ = 0.0167 hours.

VII. Answer the Questions given below (Short Answer)

Question 1.
What is measurement?
Answer:
Measurement is the process of finding an unknown physical quantity by using a standard quantity.

Question 2.
Name some common systems of measurement.
Answer:
Some common systems of units are:

1. FPS – System (Foot for length, Pound for mass and Second for time)
2. CGS – System (Centimetre for length, Gram for mass and Second for time)
3. MKS – System (Metre for length, Kilogram for mass and Second for time)

Question 3.
Define – Temperature.

Answer:
Temperature is a measure of the average kinetic energy of the particles in a system.

Question 4.
Define – ampere.
Answer:
One ampere is defined as one 'coulomb' of charge moving in a conductor in one second.

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Question 5.
What is electric current?
Answer:
The magnitude of an electric current is the amount of electric charges flowing through a conductor in one second.

Question 6.
What is luminous Intensity?
Answer:
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.

Question 7.
Define – mole.
Answer:
Mole is defined as the amount of substance, which contains 6.023×10^{23} entities.

Question 8.
What are the differences between Plane angle and solid angle?
Answer:
Difference between Plane Angle and Solid Angle:
Plane Angle:

- Angle between the intersection of two lines or planes.
- It is two dimensional
- Unit is radian.

Solid Angle:

- Angle between the intersection of three or more planes at a common point.
- It is three dimensional.
- Unit is steradian.

Question 9.
What are errors?
Answer:

The value of every measurement contains some uncertainty. These uncertainties are called as 'Errors'.

VIII. Answer in detail

Question 1.
List out the base quantities with their units.
Answer:
Base Quantities and 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

Question 2.
Write a short note on different types of clocks.
Answer:
Types of clocks based on display:

1. Analog clocks
2. Digital clocks

1. Analog clocks:
It looks 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.
  Analog clocks can be driven either mechanically or electronically.

Analog Clock

2. Digital clocks:

- A digital clock displays the time directly. It shows the time in numerals or other symbols. It may have a 12 hours or 24 hours display.
- Recent clocks are showing Date, Day, Month, Year, Temperature etc.
- Digital clocks are often called as Electronic Clocks.

Différent types of clocks based on working mechanism:

1. 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, the quartz clock is more accurate than the mechanical clock.
- These clocks have an accuracy of one second in every 10^9 seconds.

Quartz Clock

2. Atomic Clock:

- These clocks are making use of periodic vibrations occurring within the atom.
- These clocks have an accuracy of one second in every 10b seconds.
- Atomic clocks are used in Global Positioning System (GPS), Global Navigation Satellite System (GLONASS) and International time distribution services.

Atomic Clock

IX. Higher Order Thinking Question

Question 1.
Your friend was absent yesterday. You are enquiring about his absence. He told, he was affected by a fever of 100°C and went to a hospital for treatment. Is it possible of 100°C fever? If it is wrong, try to make him to understand his mistake.
Answer:

- No. It is not possible of 100°C fever. The normal temperature of human body is between 98.4°F and 98.6°F.
- So, he should say that, he was affected by a fever of 100°F and it is not 100°C.