Units and Measurements

1. **Assertion (A):** A displacement can be added with a distance.
Reason (R): Adding a scalar to a vector of the same dimensions is a meaningful algebraic operation.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

2. **Assertion (A):** Mass, length and time may be taken as fundamental quantities.
Reason (R): Mass, length and time are independent of one another.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

3. **Assertion (A):** If $\vec{r}$ is the position vector then dimensions of $\frac{d^2\vec{r}}{dt^2}$ is $[M^0L^1T^{-2}]$.
Reason (R): Dimensions of $\int\left(\frac{d^2\vec{r}}{dt^2}\right)dt$ is $[M^0L^1T^{-1}]$ where $\vec{r}\rightarrow$position vector, $t\rightarrow$ time.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

4. **Assertion (A):** The error in measurement of radius of the sphere is 0.3%. The permissible error in its surface area is 1.2%.
Reason (R): Area of sphere, $A = 4\pi r^2 \Rightarrow \frac{\Delta A}{A} = 4\frac{\Delta r}{r}$.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

5. **Assertion (A):** Mean absolute error of a measurement is always positive.
Reason (R): Mean absolute error is defined as the magnitude of difference between true value and measured value.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

6. **Assertion (A):** In mechanics the method of dimensions can't be applied to derive formula of a physical quantity which depends on more than three physical quantities.
Reason (R): We can derive relation of a physical quantity with other physical quantities out of which two have same dimensions.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

7. **Assertion (A):** Only like quantities can be added or subtracted from each other.
Reason (R): Velocity can be subtracted from the velocity gradient.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

8. **Assertion (A):** If a physical quantity has a unit it must have dimension.
Reason (R): There may exist a physical quantity which has dimension but no unit.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

9. **Assertion (A):** Pressure at height (z) and temp (q) is given by $P = \frac{\alpha}{\beta} e^{\frac{\alpha z}{k\theta}}$, K is Boltzmann constant then b may represent volume.
Reason (R): Acceleration, force and work
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

10. **Assertion (A):** When we change the unit of measurement of a quantity, its numerical value changes.
Reason (R): Smaller the unit of measurement smaller is its numerical value.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

11. **Assertion (A):** If the measuring instruments used are perfect, then measurements made will be perfect.
Reason (R): Measurements depend upon only on the instruments.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

12. **Assertion (A):** When an algebraic equation has been derived, it is advisable to check it for dimensional consistency.
Reason (R): This guarantees that the equation is correct.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

13. **Assertion (A):** eV and joule are the S.I. units of energy used in modern physics and mechanics respectively.
Reason (R): Different types of energies require different units in S.I. units.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

14. **Assertion (A):** Pressure and energy density have same units in SI.
Reason (R): Dimensions of energy density and pressure are same.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

15. **Assertion (A):** The dimensions of base (fundamental) quantity in other base quantities is always zero.
Reason (R): All derived quantities may be represented dimensionally in terms of fundamental quantities.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

16. **Assertion (A):** A unitless quantity never has a non-zero dimension.
Reason (R): A dimensionless quantity never has a unit.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

17. **Assertion (A):** Light year and wavelength have same dimensions.
Reason (R): Light year represent time while wavelength represent distance.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

18. **Assertion (A):** Angle and strain are dimensionless.
Reason (R): Angle and strain have no unit.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

ANSWER KEY																		
Que.	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**
Ans.	4	1	2	4	3	3	3	4	4	3	4	3	4	1	2	3	3	3