PHYSICS – MCQ BOOKLET

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1. Measurement/Unit

Derived Units and their Expression

1. Frequency is measured in

A. hertz
B. meter/second
C. radian
D. watt

Ans: A

BPSC Prelims Exam-64th

- Frequency measures the rate of repetition of an event. - The standard SI unit for frequency is the Hertz (Hz). - 1 Hz = 1 cycle/second = 1 s^{-1}. - Other options represent units for speed, angle, and power respectively.

2. The unit of electric power is

A. ampere
B. volt
C. coulomb
D. watt

Ans: D

BPSC Prelims Exam-64th

BPSC Prelims Exam-65th

Electric power is defined as the rate at which electrical energy is transferred or used. Its standard unit in the International System of Units (SI) is the watt (W).

3. What is the unit of pressure?

A. Newton/sq. meter
B. Newton-meter
C. Newton
D. Newton/meter

Ans: A

BPSC Prelims Exam-64th

Pressure is defined as force per unit area. The standard unit of force is the Newton (N), and the standard unit of area is the square meter (m^2). Therefore, the unit of pressure is Newton/sq. meter (N/m^2).

4. The unit of pressure is

A. kg/cm^2
B. kg/cm
C. kg/mm
D. kg/cm^3

Ans: A

BPSC Prelims Exam-65th

Pressure is force per unit area. Kg/cm² (interpreting kg as kg-force) is a unit of pressure.

5. The SI unit of mechanical power is :

A. Joule
B. Watt
C. Newton-second
D. Joule-second

Ans: B

UPSC CDS-1-2016

Power is defined as the rate at which work is done or energy is transferred. In the International System of Units (SI), the unit of work or energy is the Joule (J), and the unit of time is the second (s). Therefore, the unit of power is Joule per second (J/s), which is defined as the Watt (W).

6. The unit of the force constant k of a spring is

A. N-m
B. N/m
C. N-m^2
D. N/m^2

Ans: B

UPSC CDS-1-2020

- Hooke's Law: $F = kx$. - F is force (unit: N). - x is displacement (unit: m). - k is the force constant.

7. The resistivity ρ of a material may be expressed in units of

A. ohm
B. ohm/cm
C. ohm-cm
D. ohm-cm^2

Ans: C

UPSC CDS-1-2020

The unit of resistance (R) is Ohm (Ω). The unit of area (A) is typically square meters (m²) or square centimeters (cm²). The unit of length (L) is typically meters (m) or centimeters (cm). Substituting these units into the formula for ρ: $\text{Units of } \rho = \Omega \times \frac{\text{cm}^2}{\text{cm}} = \Omega \cdot \text{cm}$. Alternatively, using meters: $ \text{Units of } \rho = \Omega \times \frac{\text{m}^2}{\text{m}} = \Omega \cdot \text{m}$. Therefore, the resistivity is commonly expressed in ohm-centimeters ($\Omega \cdot \text{cm}$) or ohm-meters ($\Omega \cdot \text{m}$).

8. 'Joule' is related to energy in the same way as 'Pascal' is related to

A. Mass
B. Pressure
C. Density
D. Purity

Ans: B

CGPSC Prelims Exam-2015

- This question tests the knowledge of standard units for physical quantities. - Energy is the capacity to do work, measured in Joules. - Pressure is force per unit area, measured in Pascals.

9. Which one of the following is NOT a unit of magnetic field strength?

A. Tesla
B. Gauss
C. Ampere - metre
D. Ampere/metre

Ans: C

UPSC Geoscientist-2020

Magnetic field strength can refer to magnetic flux density (B), measured in Tesla (T) or Gauss (G), or magnetic field intensity (H), measured in Amperes per metre (A/m). Ampere - metre (A·m) is the unit for magnetic dipole moment.

10. Which one of the following is NOT the correct unit of 'power'?

A. Joule / second
B. (Newton-metre) / second
C. Watt
D. Newton / metre

Ans: D

UPSC Geoscientist-2021

Power is defined as the rate of doing work or transferring energy. Its standard unit in the SI system is the Watt (W).

11. Which one of the following is NOT a unit of 'Pressure'?

A. Bar
B. Atmosphere
C. N/m^2
D. N/m

Ans: D

UPSC Geoscientist-2021 UPSC CAPF-2022

Pressure is force distributed over an area. Its units reflect this (Force/Area). Common units include Pascal (Pa), N/m^2, Bar, Atmosphere, psi (pounds per square inch), mmHg (millimeters of mercury), etc.

12. The ratio between the circumference of a circle and the perimeter of a square is 11:3. What is the ratio between area of the circle and area of the square ?

A. 121/9
B. 242/9
C. 77/9
D. None of the above

Ans: D

GPSC Prelims CSP-1-2024

Set up equations based on the given ratio of circumference to perimeter and the formulas. Express the ratio of radii to sides. Calculate the ratio of areas using this ratio. Note that the value of π used in the problem might not be the standard \$22/7\$ or \$3.14\$, but one that makes the options work out.

13. If the curved surface area of a sphere is same as the curved surface area of a hemisphere, what is the ratio of the radius of the hemisphere and that of the sphere?

A. 1 : 2
B. $\sqrt{2}$: 1
C. 1 : $\sqrt{2}$
D. None of the above

Ans: B

GPSC Prelims CSP-1-2024

Use the formulas for the curved surface areas of a sphere and a hemisphere and set them equal to each other. Solve the resulting equation for the ratio of the radii.

14. A cone has a height of 12 cm and a base radius of 3.5 cm, what is the volume of the cone?

A. 77 cm^3
B. 308 cm^3
C. 154 cm^3
D. None of the above

Ans: C

GPSC Prelims CSP-1-2024

The formula for the volume of a cone is $V = (1/3)\pi r^2 h$. Given radius (r) = 3.5 cm and height (h) = 12 cm, we calculate $V = (1/3)\ (22/7)\ (3.5)^2\ 12 = (1/3)\ (22/7)\ 12.25\ 12 = (1/3)\ (22/7)\ (49/4)\ 12 = 154$ cm^3.

15. A 5 cm cube is cut into as many 1 cm cubes as possible. What is the ratio of the surface area of the larger cube to that of the sum of surface areas of the smaller cubes ?

A. 1 : 6
B. 1 : 5
C. 1 : 1.25
D. 1 : 25

Ans: B

GPSC Prelims CSP-1-2017

The volume of the large cube is $5^3 = 125$ cm³. The volume of each small cube is $1^3 = 1$ cm³. The number of small cubes is the total volume divided by the volume of each small cube: 125 cm³ / 1 cm³ = 125 cubes. The surface area of the large cube is 6 × side² = 6 × 5² = 6 × 25 = 150 cm². The surface area of one small cube is 6 × side² = 6 × 1² = 6 cm². The sum of the surface areas of all the smaller cubes is the number of small cubes multiplied by the surface area of one small cube: 125 × 6 = 750 cm².

16. In Δ ABC, AD = DB; If DE || BC and area of Δ ABC = 40 then area of Δ ADE is

A. 10
B. 20
C. 30
D. 24

Ans: A

GPSC Prelims CSP-1-2017

By the Midpoint Theorem (or its converse), if a line segment joins the midpoint of one side of a triangle and is parallel to the second side, then it bisects the third side. Since D is the midpoint of AB and DE || BC, E must be the midpoint of AC. Also, Δ ADE is similar to Δ ABC. This is because ∠DAE = ∠BAC (common angle) and ∠ADE = ∠ABC (corresponding angles, since DE || BC).

17. Match List-I with List-II:

List-I	List-II
A. S.I. unit of power of a lens	**1. V**
B. S.I. unit of electric potential difference	**2. Coulomb**
C. Potential difference between two points	**3. Diopter**
D. S.I. unit of electric charge	**4. W/Q**

A. A–4, B–3, C–2, D–1
B. A–3, B–4, C–1, D–2
C. A–2, B–3, C–4, D–1
D. A–2, B–3, C–4, D–1

Ans: B

HPPSC HPAS Prelims-2020

- S.I. unit of power of a lens: Diopter (D), defined as the reciprocal of the focal length in meters (1/f). Thus, A maps to 3 (Diopter). - S.I. unit of electric potential difference: Volt (V). Thus, B maps to 1 (V). - Potential difference between two points: Defined as the work done per unit charge to move a charge from one point to the other. Work (W) divided by charge (Q) is W/Q. Thus, C maps to 4 (W/Q). - S.I. unit of electric charge: Coulomb (C). Thus, D maps to 2 (Coulomb).

18. Match List I with List II :

List-I (Quantity)	List-II (Unit of Measurement)
(a) Weight	**(i) Cubic meter**
(b) Volume	**(ii) Newton**
(c) Temperature	**(iii) Pascal**
(d) Pressure	**(iv) Kelvin**

Choose the correct answer from the options given below :

A. (a)-(ii), (b)-(iv), (c)-(i), (d)-(iii)
B. (a)-(ii), (b)-(i), (c)-(iv), (d)-(iii)
C. (a)-(ii), (b)-(iii), (c)-(iv), (d)-(i)
D. (a)-(i), (b)-(iii), (c)-(iv), (d)-(ii)

Ans: B

HPPSC HPAS Prelims-2023

Units of measurement for various physical quantities: - Weight is the force exerted on a mass due to gravity. The SI unit of force is Newton (N) (ii). Although weight is often measured using scales calibrated in kilograms, this measures mass based on standard gravity. - Volume is the amount of space occupied by a substance or object. The SI unit of volume is the cubic meter (m³) (i). - Temperature is a measure of the degree of hotness or coldness of an object. The SI unit of thermodynamic temperature is the Kelvin (K) (iv). Celsius and Fahrenheit are also commonly used scales. - Pressure is the force applied perpendicular to the surface of an object per unit area over which that force is distributed. The SI unit of pressure is the Pascal (Pa) (iii).

19. The S.I. unit of acceleration is

A. ms^{-1}

B. ms^{-2}
C. cms^{-2}
D. kms^{-2}

Ans: B

UPSC NDA-1-2016

Acceleration is the rate of change of velocity with respect to time. The S.I. unit for velocity is meters per second (m/s or ms^{-1}) and the S.I. unit for time is seconds (s).

20. Which one of the following physical quantity has the same unit as that of pressure ?

A. Angular momentum
B. Stress
C. Strain
D. Work

Ans: B

UPSC NDA-1-2017

Pressure is defined as force per unit area (P = F/A). Its unit is Newton per square meter (N/m^2), also known as Pascal (Pa). Stress is also defined as force per unit area, representing the internal force per unit area within a material resisting deformation (Stress = F/A). Therefore, stress also has the unit of N/m^2 or Pascal (Pa).

21. 1 dyne (a unit of force in CGS system) equals to

A. 10^3 g cm/s^2
B. 10^{-3} g cm/s^2
C. 10^5 kg m/s^2
D. 10^{-5} kg m/s^2

Ans: D

UPSC NDA-1-2019

- The CGS unit of force is the dyne, defined as 1 g · cm/s^2. - The SI unit of force is the Newton (N), defined as 1 kg · m/s^2. - To convert dyne to Newton, we convert the units: - 1 gram (g) = 10^{-3} kilogram (kg) - 1 centimeter (cm) = 10^{-2} meter (m) - So, 1 dyne = 1 g · cm/s^2 = (10^{-3} kg) · (10^{-2} m) / s^2 = $10^{-3} \times 10^{-2}$ kg · m/s^2 = 10^{-5} kg · m/s^2.

22. Which one of the following cannot be the unit of frequency of a sound wave ?

A. dB
B. s^{-1}
C. Hz
D. min^{-1}

Ans: A

UPSC NDA-1-2021

Frequency measures how often something happens per unit time (cycles/time). Decibel measures relative intensity or amplitude on a logarithmic scale.

23. Which one of the following is the SI unit of the thermal conductivity of a material?

A. Wm'K~!
B. Wm/K
C. WmYK™?
D. Js'm'K

Ans: A

UPSC NDA-2-2015

The SI unit of thermal conductivity (k) is Watt per meter-Kelvin (W/(m·K)) or $W \cdot m^{-1} \cdot K^{-1}$. This unit comes from Fourier's law of heat conduction, which states that the rate of heat flow (Q) is proportional to the area (A), the temperature gradient (dT/dx), and the thermal conductivity (k): Q = -k A (dT/dx). Rearranging for k, k = Q / (A (dT/dx)). The units are W / (m^2 (K/m)) = W / (m K) = W m^{-1} K^{-1}. Assuming the symbols in option A represent W m^{-1} K^{-1}, it is the correct unit.

24. In SI unit of force 'Newton' (N) is given by (where m stands for metre and s stands for second):

A. 1 N = 1 kg/ms^2
B. 1 N = 1 kgm/s^2
C. 1 N = 1 kg s^2/m
D. 1 N = 1 kg m s^2