

Standard 11

PHYSICS

Time: 3.00 Hrs.

Marks: 150

Part - I

Note: Answer all the questions Choose and write the correct answer.

30×1=30

- 1) The force acting on a particle is found to be proportional to velocity. The constant of proportionality is measured in terms of
 a) Kg s^{-1} b) Kg S c) Kg ms^{-1} d) Kg ms^{-2}
- 2) The length of a body is measured as 3.51 m. If the accuracy is 0.01 m, then the percentage error in the measurement is
 a) 351% b) 1% c) 0.28% d) 0.035%
- 3) The velocity of a body is expressed as $v = \frac{x}{t} + yt$. The dimensional formula for x is
 a) ML^0T^0 b) M^0LT^0 c) $\text{M}^0\text{L}^0\text{T}$ d) MLT^0
- 4) _____ have the same dimensional formula
 a) Force and momentum b) Stress and strain
 c) Density and linear density d) Work and energy
- 5) The unit of time is based on the atom
 a) Kr-86 b) Ce-133 c) U-235 d) Ra-226
- 6) The number which as significant digit 4 is
 a) 40800 b) 2435.84 c) 70.00 d) 0.0456
- 7) The distance of the moon from the earth by Laser pulse method is
 a) $\frac{ct}{2}$ b) $\frac{2c}{t}$ c) $\frac{2t}{c}$ d) $2ct$
- 8) A particle at rest starts moving in a horizontal straight line with uniform acceleration. The ratio of the distance covered during the fourth and the third second is
 a) $\frac{4}{3}$ b) $\frac{26}{9}$ c) $\frac{7}{5}$ d) 2
- 9) Two bullets are fired at angle θ and $(90-\theta)$ to the horizontal with some speed. The ratio of their times of flight is
 a) 1:1 b) $\tan \theta : 1$ c) $1 : \tan \theta$ d) $\tan^2\theta : 1$
- 10) A gun fires two bullets with same velocity at 60° and 30° with horizontal. The bullets strike at the same horizontal distance. The ratio of maximum height for the two bullets is in the ratio
 a) 2:1 b) 3:1 c) 4:1 d) 1:1
- 11) Inertia of a body has direct dependence on
 a) velocity b) mass c) area d) volume
- 12) A particle moves along a circular path under the action of a force. The work done by the force is
 a) positive and non zero b) zero
 c) negative and non zero d) none of the above
- 13) If a force F is applied on a body and the body moves with velocity v, the power will be
 a) $F \cdot v$ b) F/v c) Fv^2 d) F/v^2
- 14) A bullet hits and gets embedded in a solid block resting on a horizontal frictionless table. Which of the following is conserved?
 a) momentum and kinetic energy b) kinetic energy alone
 c) momentum alone d) potential energy alone

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- 15) From $V = gt$, the downward vertical velocity of a body in third second is
 a) 39.2 ms^{-1} b) 19.6 ms^{-1} c) 29.4 ms^{-1} d) 2.8 ms^{-1}
- 16) Two same vectors are acting at a point and the resultant vector is equal to one of the above vectors. The angle between the two vectors is
 a) 120° b) 90° c) 60° d) 30°
- 17) The horizontal range is maximum when the angle of projection is
 a) 90° b) 45° c) 60° d) 30°
- 18) The relation between the time of flight and the time taken to attain maximum height of a projectile is
 a) $t_f = 2t$ b) $t_f = T$ c) $t_f = \frac{t}{4}$ d) $t_f = \frac{t}{2}$
- 19) The bending angle of a cyclist round a curve $\tan \theta =$
 a) $\frac{v^2}{g}$ b) $\frac{v^2}{rg}$ c) $\frac{v}{rg}$ d) $\frac{v}{r}$
- 20) The angular speed of minute arm in a watch is
 a) $\frac{\pi}{2160} \text{ rad s}^{-1}$ b) $\frac{\pi}{12} \text{ rad s}^{-1}$ c) $\frac{\pi}{3600} \text{ rad s}^{-1}$ d) $\frac{\pi}{1800} \text{ rad s}^{-1}$
- 21) The moment of inertia of a body does not depend on
 a) angular velocity b) mass c) axis of rotation d) distribution of mass
- 22) A ring of radius r and mass m rotates about an axis passing through its centre and perpendicular its plane with angular velocity w . Its kinetic energy is
 a) $m r \omega^2$ b) $\frac{1}{2} m r \omega^2$ c) $I w^2$ d) $\frac{1}{2} I \omega^2$
- 23) A man is sitting on a rotating stool with his arms outstretched. Suddenly he folds his arm. The angular velocity
 a) decreases b) increases c) becomes zero d) remains constant
- 24) The moment of inertia of a thin uniform rod of mass M and length l about the axis passing through its centre of gravity and perpendicular to its length is
 a) $\frac{M l^2}{12}$ b) $\frac{M l^2}{3}$ c) $\frac{M^2 l}{12}$ d) $\frac{M l^2}{4}$
- 25) If the distance between two masses is doubled, the gravitational attraction between them
 a) is reduced to half b) is reduced to a quarter
 c) is doubled d) becomes four times
- 26) If the Earth stops rotating, the value of 'g' at the equator will
 a) increase b) decrease c) remain same d) become zero
- 27) The escape speed on Earth is 11.2 Kms^{-1} . Its value for a planet having double the radius and eight times the mass of the Earth is
 a) 11.2 Kms^{-1} b) 5.6 Kms^{-1} c) 22.4 kms^{-1} d) 44.8 Kms^{-1}
- 28) Time taken by the moon to moves around the Earth once is
 a) 30 days b) 24 days c) 27.3 days d) 365 days
- 29) The unit of gravitational potential is
 a) $\text{Nm}^2 \text{ Kg}^{-1}$ b) Nm Kg c) $\text{Nm}^{-1} \text{ Kg}^{-1}$ d) NmKg^{-1}
- 30) After the sun, the star nearest to Earth is
 a) Sirius b) Dhruva c) Alpha Centauri d) Spica

Part - II

Note: Answer any fifteen questions:

15×3=45

- 31) Give three rules and conventions with example followed while writing SI units.
 32) What are the limitations of dimensional analysis?

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- 33) Find the value of π^2 correct to significant figures; if $\pi = 3.14$.
- 34) What is meant by equal and like vectors?
- 35) State Lami's theorem.
- 36) What is elastic collision? Give example.
- 37) A motor boat moves at a steady speed of 8 ms^{-1} , If the water resistance to the motion of the boat is 2000 N , calculate the power of the engine.
- 38) What is meant by non conservative force? Give example.
- 39) State parallelogram law of vectors.
- 40) What is centrifugal reaction?
- 41) Define - centre of gravity.
- 42) A system consisting of two masses connected by a massless rod lies along the x-axis. A 0.4 Kg mass is at a distance $x = 2\text{m}$ while a 0.6 kg mass is at $x = 7 \text{ m}$. Find the x co-ordinate of the centre of mass.
- 43) State perpendicular axes theorem.
- 44) A cat is able to land on its feet after a fall. Which principle of Physics is being used? Explain.
- 45) Define - Radius of gyration.
- 46) Define gravitational constant. Give its unit and dimensional formula.
- 47) What are the factors affecting the 'g' value?
- 48) Differentiate between inertial mass and gravitational mass.
- 49) What are constellations?
- 50) Two spheres of masses 10 Kg and 20 Kg are 5 m apart. Calculate the force of attraction between the masses.

Part - III

Answer the question 53 compulsorily of the remaining 11 questions answer any

Questions:

7×5=35

- 51) Write a note on the basic forces in nature.
- 52) Convert 76 cm of mercury pressure in to Nm^{-2} using the method of dimensions.
- 53) Two forces act at a point in directions inclined to each other at 120° . If the bigger force is 5 Kg wt and their resultant is at right angles to the smaller force, find the resultant and the smaller force.

(OR)

The horizontal range of a particle is $4\sqrt{3}$ time its maximum height. Find the angle of projection.

- 54) Derive the equations for time of flight and range of a projectile thrown horizontally.
- 55) Explain the different types of inertia with examples.
- 56) State the principle of impulse and momentum and give three examples.
- 57) Starting from rest, the fly wheel of a motor attains an angular velocity 100 rad s^{-1} from rest in 10 s . Calculate angular acceleration and angular displacement in 10 seconds.
- 58) Explain the motion of centre of mass of a system with an example.
- 59) Obtain an expression for the angular momentum of a rotating rigid body.
- 60) Show that the orbital radius of a geo-stationary satellite is 3600 km .
- 61) Write a note on Milky Way.
- 62) Deduce an expression for gravitational potential energy near the surface of the Earth.

Note: Answer any four questions in detail.

- 63) State and prove law of conservation of linear momentum.
- 64) Obtain an expression for resultant of concurrent forces.
- 65) State and prove work-energy theorem.
- 66) Obtain an expression for centripetal acceleration.
- 67) What is orbital velocity? Obtain an expression for it.
- 68) Explain the theories of origin of the universe.
- 69) Compare linear motion and rotational motion.
- 70) State and prove parallel axes theorem.
