KK11P

nyakumari District

Common Quarterly Examination - September 2024

Standard 11

PHYSICS

Time Allowed: 3.00 Hours Maximum Marks: 70

PART - I

I. **Answer all the questions. Choose the correct answer:** 15×1=15

1) The dimension of $(\mu_0\varepsilon_0)^{-1/2}$ is
a) length b) time c) velocity d) force

2) If the force is proportional to square of velocity, then the dimension of proportionality constant is
a) MLT^0 b) MLT^{-1} c) $ML^{-2}T$ d) $ML^{-1}T^0$

3) 1 CSL is the largest practical unit of
a) temperature b) time c) mass d) length

4) If an object is thrown vertically up with the initial speed u from the ground, then the time taken by the object to return back to ground is
a) $\frac{u^2}{2g}$ b) $\frac{u^2}{g}$ c) $\frac{u}{2g}$ d) $\frac{2u}{g}$

5) If the velocity is $\vec{v} = 2\hat{i} + t^2\hat{j} - 9\hat{k}$, then the magnitude of acceleration at $t = 0.5s$ is
a) 1 ms^{-2} b) 2 ms^{-2} c) zero d) −1 ms^{-2}

6) An insect crawling over the floor of a room is
a) a rectilinear motion b) a motion in two dimension
c) a motion in three dimension d) a helical motion

7) When a car takes a sudden left turn in the curved road, passengers are pushed towards the right due to
a) Inertia of direction b) Inertia of motion
c) Inertia of rest d) Absence of Inertia

8) The centrifugal force appears to exist
a) only in inertial frames
b) only in rotational frames
c) in any accelerated frame
b) both in inertial and non inertial frames

9) The value of work done when a force of 2N acting on a body moves through a distance of 2m in the direction of force is
a) 2J b) 0J c) 8J d) 4J

10) The work done by the conservative force for a closed path is
a) always negative b) zero
c) always positive d) not defined

11) If the linear momentum of the object is increased by 0.1% then the kinetic energy is increased by
a) 0.1% b) 0.2% c) 0.4% d) 0.01%

12) A closed cylindrical container is partially filled with water. As the container rotates in a horizontal plane about a perpendicular bisector; its moment of inertia.
a) increases b) decreases
c) remains constant d) depends on direction of rotation

13) The angular momentum changes from 2 units to 6 units in 4s then the torque is _____ units.
a) $\frac{1}{2}$ b) 4 c) $\frac{3}{2}$ d) 1

14) A couple produces
a) pure rotation b) pure transiation
c) rotation and transiation d) no motion

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15) If the masses of the Earth and Sun suddenly double, the gravitational force between them will be
a) remain the same b) increases 2 times
c) increases 4 times d) decreases 2 times

PART - II

Answer any six questions. Question Number 23 is compulsory: **6×2=12**

16) Briefly explain the types of physical quantities.
17) What are the general features of scientific method?
18) Two vectors are given as $\vec{r} = 2\hat{i} + 3\hat{j} + 5\hat{k}$ and $\vec{F} = 3\hat{i} - 2\hat{j} + 4\hat{k}$. Find the resultant vector $\vec{\tau} = \vec{r} \times \vec{F}$.
19) Write a short note on the scalar product between two vectors.
20) What is Impulse?
21) State Lami's Theorem.
22) Define power. Give its unit.
23) A rolling wheel has velocity of its center of mass as 5 ms^{-1}. If the radius is 1.5m and angular velocity is 3 rad s^{-1} then check whether it is in pure rolling or not.
24) Give any two examples of torque in day-to-day life.

PART - III

Answer any six questions. Question Number 27 is compulsory: **6×3=18**

25) Check the correctness of the equation $\frac{1}{2}mv^2 = mgh$ using dimensional analysis method.
26) Write down the kinematic equations for angular motion.
27) A Swimmer's speed in the direction of flow of a river is 12 Kmh^{-1}. Against the direction of flow of the river the Swimmer's speed is 6 Kmh^{-1}. Calculate the Swimmer's speed in still water and the velocity of the river flow.
28) Define one Newton. State Newtons II law.
29) To move an object, which is easier? Push or Pull?
30) Write the difference between Conservative and Non-Conservative forces. Give two examples each.
31) State and prove perpendicular axis theorem.
32) Derive the relation between Angular momentum and Angular velocity.
33) Prove that at points near the surface of the Earth, the gravitational potential energy of the object is U = mgh.

PART - IV

Answer ALL the questions in detail: **5×5=25**

34) a) Find the expression for Kinetic Energy in Rotation and Derive at the relation between rotational kinetic energy and angular momentum.
(OR)
b) Explain the types of systematic error.
35) a) Explain in detail the triangular law of vector addition.
(OR)
b) State and Explain work - energy principle.
36) a) Prove the law of conservation of linear momentum. Use it to find the recoil velocity of a gun. **(OR)**
b) Derive the expression for moment of inertia of a rod about its centre and perpendicular to the rod.
37) a) Convert 76 cm of mercury pressure into Nm^{-2} using the method of dimensions. **(OR)**
b) Arrive at an expression for K.E loss in inelastic collision.
38) a) Derive the expression for centripetal acceleration.
(OR)
b) Define angle of repose. Describe the method of measuring angle of repos

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