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HALF YEARLY EXAMINATION -2019

CLASS-XI **FIRST SHIFT**

M.M: 70 **SUBJECT: PHYSICS** **Time: 3 Hours**

GENERAL INSTRUCTIONS:-

1. **There the total 37 questions and all questions are compulsory.**
2. **This question paper contains four sections- Section A carry multiple choice type/very short type 20 questions of one marks each, Section B carry 7 questions of two marks each Section C carry 7 questions of three marks each Section D carry 3 questions of five marks each.**
3. **There is no overall choice but internal choices are provided in one question in section B, two questions in section C and three questions in section D.**
4. **You may use the following values of physical quantities where ever necessary.**

   Acceleration due to gravity (g) =10 m/s^2

SECTION-A(Multiple choice)

1.An acceleration of 10m/s^2 in km/h^2----

(a)1.296 x 10^3 (b) 1.296 x 10^4 (c) 1.296 x 10^5 (d) 3.888 x 10^4

2. If the error in radius is 3%, what is error in volume of sphere---

(a) 3% (b) 6% (c) 9% (d) 27%

3. The basic unit in the given choice is-

(a) m/s (b) Nm (c) kgm/s (d) mol

4. The velocity – time graph for uniform motion is –

(a) Straight line inclined to time axis. (b)Curved line

(c)Straight line parallel to X-axis (d)Straight line parallel to Y-axis

5. If the linear momentum is increased by 50%, its kinetic energy increases by-

(a) 50% (b) 75% (c) 100% (d) 125%

6. A bullet of mass 5g is shot from a gun of mass 5kg. The muzzle velocity of bullet is 500m/s, the recoil speed of gun is -

(a) 0.5 m/s (b) 0.25 m/s (c) 1 m/s (d) data is insufficient

7. An athlete between mass range 40kg-100kg in games covers a distance of 100 m in 10 s. His kinetic energy ranges-

(a)200J-500J (b) 2000J-3000J (c) 20000j-50000J (d) 2000J-5000J

8.If r is the radius of Earth and g the acceleration due to gravity on the surface of earth, the mean density of the Earth is-

(a) $4\pi G/(3gr)$ (b)$3\pi r/(4\pi G)$ (c) $3g/(4\pi rG)$ (d) $\pi rG/(12g)$

9. An object weighs 72N on the earth. Its weight on the centre of Earth will be-

(a)72N (b) 36N (c) 18N (d)0N

10. For which of the following does the centre of mass lie outside the body

(a)Pencil (b) shot put (c) disc (d) bangle

11.The range of the gravitational force is .....

12. The number of significant figures in 0.06900 is .....

13.The angle between $\hat{\imath} + \hat{\jmath}$ and $\hat{\imath} - \hat{\jmath}$ is .....

14.A car covers the first half of the distance between two places at 40 kmh^{-1} and another half of the distance at 60 kmh^{-1}. The average speed of the car is.....

15.The moment of inertia of a solid sphere with radius R and mass M about its diameter is.....

State whether the given statements are True or False: -

16. A body can have acceleration even if its velocity is zero at that instant of time.

17. The maximum range does not depend upon angle of projection.

18. Sliding friction is greater than rolling friction.

19. When a body moves along a circular path, no work is done by the centripetal force.

20. The time- period of a pendulum on a satellite orbiting the earth is infinity.

SECTION- B

21. Show that the acceleration due to gravity decreases when we move above the surface of Earth.

OR

Derive an expression for escape velocity on the surface of earth

22. Two discs of same mass and thickness are made of materials having different densities. Which one of them will have large moment of inertia? Explain.

23. State the theorem of parallel axes and perpendicular axes for determining the moment of inertia.

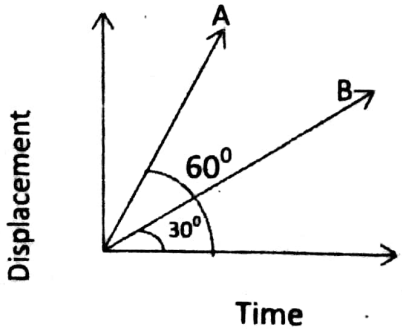
24. State work-energy theorem for variable force and derive an expression for it.

25. Find the dimensions of A and B from the following expression-

$$F = \frac{A + t^2}{B^3}$$

Where F is force and t is time.

26. Displacement –Time graph of two cars A and B is plotted on same graph as given below-



(i) Which car has greater velocity? Give reason.

(ii) What is the ratio of velocities of two cars?

27.Derive the relation between linear velocity and angular velocity

SECTION-C

28. What is a satellite? Obtain expression for orbital velocity and angular momentum of a satellite of mass m revolving around earth at height h above its surface.

OR

Define gravitational potential energy of a body. Derive an expression for the gravitational potential energy of a body of mass m, located at a distance r from the centre of earth.

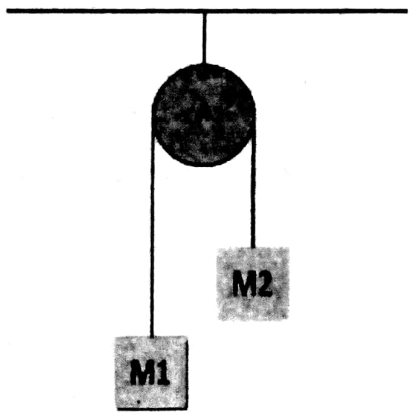
29. Establish a relation between torque and angular momentum for a system of particles.

30.The speed of a motor wheel increases from 600 rpm to 1200 rpm in 20s.

(i) What is its angular acceleration?

(ii) How many revolutions does the wheel make during this time?

31. Find the acceleration of mass and tension in the string when masses are released in the given fig. where M1= 12 kg and M2=8 kg



32.State parallelogram law of vector addition. Two vectors **A** and **B are** inclined to each other at an angle θ. Using parallelogram law of vector addition, find its magnitude and direction of their resultant.

OR

The sum of the magnitudes of two forces acting at a point is 18 N and the magnitude of their resultant is 12 N. If the resultant makes an angle of 90^0 with the force of smaller magnitude, what are the magnitudes of the two forces?

33. Draw velocity – time graph of a uniformly accelerated motion and derive equation of motion $s = u t + \frac{1}{2} at^2$ from it.

34. The wavelength λ associated with a moving particle depends upon its mass m; velocity v and plank's constant h. Derive a relation for wavelength dimensionally.

SECTION-D

35.a) what do you mean by projectile? A projectile is fired with velocity 'u' making an angle θ with the horizontal. Show that its path is parabolic.

b) Also find the expression for-

(i) Time of flight (ii) Maximum height

OR

Name the acceleration possessed by a body in uniform circular motion. What is its direction? Derive an expression for it.

36. What is meant by banking of roads ? What is the need for banking a road?

Obtain an expression for the maximum speed with which a vehicle can safely negotiate a curved road banked an angle θ. The coefficient of friction between the wheels of the vehicle and the road is μ.

OR

(a) Show that Newton's second law of motion is the real law of motion.

(b) Define angle of repose. Prove that the coefficient of static friction is 'tangent' of the angle of repose

37. What is a perfectly inelastic collision? If an object of mass m_1 and speed u_1 collides with another object of massm_2 which is in rest. If the collision is perfectly inelastic, then derive an expression for change in kinetic energy.

OR

(a)What are Conservative and Non-Conservative forces, Explain with example?

(b) A particle moves from a point $\overrightarrow{r1} = (2\hat{\imath} + 3\hat{\jmath})$ to anotherpoint $\overrightarrow{r2} = (3\hat{\imath} + 2\hat{\jmath})$ during which a certain force $\vec{F} = (5\hat{\imath} + 5\hat{\jmath})$ acts on it. Calculate work done by the force on the particle during this displacement.

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