Question Paper

Haryana Public School

Nangal Choudhary Rd, Narnaul

Date: _____ **Total Marks:** 192 **Time:** 180 minutes

Physics Annual Exam 2024-25 Section 2

1. **A force is given by F = at + bt2, where t is time, the dimensions of a and b are respectively.** **[4 Marks]**

A) MLT-4 and MLT-1

B) MLT-1 and MLT0

C) MLT-3 and MLT-4

D) MLT-3 and MLT0

2. **A ball is travelling with uniform translatory motion. This means that** **[4 Marks]**

A) It is at rest

B) The path can be straight line or circular and the ball travels with uniform speed.

C) All parts of the ball have the same velocity (magnitude and direction) and the velocity is constant.

D) The centre of the ball moves with constant velocity and the ball spins about its centre uniformly.

3. **The number of significant figures in 5.69 × 1015kg is** **[4 Marks]**

A) 1

B) 2

C) 3

D) 18

4. **The dimensional formula of coefficient of viscosity is** **[4 Marks]**

A) MLT-1

B) M-1L2T-2

C) ML-1T-1

D) none

5. **In Vander Waals equation P+aV2 [V-b) = RT; P is pressure, V is volume, R is universal gas constant and T is temperature. The ratio of constants a/b is dimensionally equal to:** **[4 Marks]**

A) PV

B) VP

C) PV

D) PV3

6. **Train A is moving along two parallel rail tracks towards north with speed 72 km/h and train B is moving towards south with speed 108 km/h. Velocity of train B with respect to A and velocity of ground with respect to B are (in ms-1):** **[4 Marks]**

A) -30 and 50

B) -50 and -30

C) -50 and 30

D) 50 and -30

7. **Percentage errors in the measurement of mass and speed are 2% and 3% respectively. The error in the estimate of kinetic energy obtained by measuring mass and speed will be (1995)** **[4 Marks]**

A) 12%

B) 2%

C) 8%

D) 10%

8. **Which of the following assertions is true if two bodies are travelling in same directions with non-zero velocities?** **[4 Marks]**

A) a) Relative velocity > Absolute velocity

B) Relative velocity < Absolute velocity

C) Relative velocity = Absolute velocity

D) Relative velocity <= Absolute velocity

9. **The distance travelled by a particle is related to time t as x = 4t2. The velocity of the particle at t = 5s is.** **[4 Marks]**

A) 40 ms-1

B) 25ms-1

C) 20ms-1

D) 8ms-1

10. **Assertion**
Retardation is directed opposite to the velocity.
Reason
Retardation is equal to the time rate of decrease of velocity. **[4 Marks]**

A) Both Assertion and Reason are correct and Reason is the correct explanation for Assertion

B) Both Assertion and Reason are correct but Reason is not the correct explanation for Assertion

C) Assertion is correct but Reason is incorrect

D) Both Assertion and Reason are incorrect

11. **Aman is walking on the road with a speed 3 m/s. Rain is falling vertically at speed 3 m/s. At what angle from the vertical, man has to hold his umbrella to avoid the rain drops?** **[4 Marks]**

A) 30º

B) 45º

C) 60º

D) 90°

12. **The speed of a swimmer is 4km h-1 in still water. If the swimmer makes his strokes normal to the flow of river of width 1km, he reaches a point 750m down the stream on the opposite bank. The speed of the river water is.....km h-1** **[4 Marks]**

A) 1

B) 2

C) 3

D) 4

13. **At the top of the trajectory of a projectile, the directions of its velocity and acceleration are:** **[4 Marks]**

A) perpendicular to each other

B) parallel to each other

C) inclined to each other at an angle of 45°

D) antiparallel to each other

14. **Two projectiles are thrown with same initial velocity at angle 30° & 45° with horizontal. Find ratio of their ranges.** **[4 Marks]**

A) √5/2

B) √7/2

C) √3/2

D) √6/2

15. **The equation of a projectile is y = ax - bx2. Its horizontal range is** **[4 Marks]**

A) a/b

B) b/a

C) a + b

D) b - a

16. **A particle moves in two dimensions such that its displacement in the x-direction and y-direction at time ttt is given by the equations: x=3t2+2t and y=4t3-5t. Calculate the velocities in the x-direction and y-direction at time t=2 seconds.** **[4 Marks]**

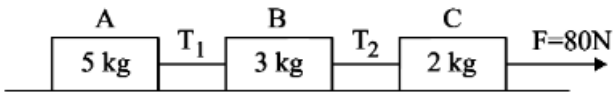
A) Vx= 12 m/s, Vy= 14 m/s

B) Vx= 16 m/s, Vy= 48 m/s

C) Vx= 14 m/s, Vy= 43 m/s

D) Vx= 14 m/s, Vy= 48 m/s

17. **Three blocks A, B and C are pulled on a horizontal smooth surface by a force of 80 N as shown in figure**



[4 Marks]

The tensions T1 and T2 and in the string are respectively:

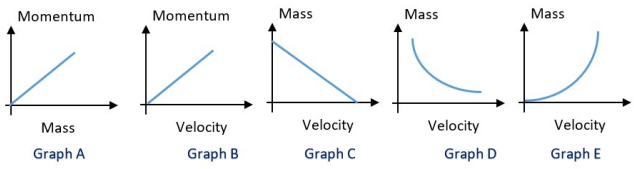
A) 40 N, 64 N

B) 60 N, 80 N

C) 88 N, 96 N

D) 80 N, 100 N

18. **Which of the following Graph(s) is/are correct for momentum of a particle?**



[4 Marks]

A) Graph A, B and E only

B) Graph B, C and E only

C) Graph A, B, and D only

D) Graph C and D only

19. **Based on Galileo's inclined plane experiment, what happens to the ball after it leaves the inclined plane and moves on the horizontal surface** **[4 Marks]**

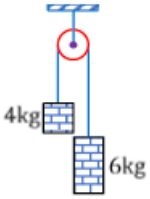
A) The ball will come to a stop immediately.

B) The ball will continue to move with constant speed indefinitely, assuming no friction.

C) The ball will accelerate on the horizontal surface.

D) The ball will reverse direction and roll back up the inclined plane

20. **Two bodies of mass 4 kg and 6kg are tied to the ends of a massless string. The string passes over a pulley which is frictionless (see figure). The acceleration of the system in terms of acceleration due to gravity (g) is :** **[4 Marks]**



A) g/10

B) g

C) g/2

D) g/5

21. **A 0.5 kg ball moving with a speed of 12 m/s strikes a hard wall at an angle of 30° with the wall. It is reflected with the same speed and at the same angle. If the ball is in contact with the wall for 0.25 seconds, the average force acting on the wall is :-** **[4 Marks]**

A) 48 N

B) 24 N

C) 12 N

D) 96 N

22. **A horizontal force F acts on the block of mass m and the block remains stationary, the value of friction force on the block is :-** **[4 Marks]**

A) μmg

B) μmg – F

C) F

D) zero

23. **Statement 1: The angle of repose is the steepest angle at which a pile of material can stay without sliding down.**

Statement 2: The angle of repose depends only on the surface area of the material, not its properties. **[4 Marks]**

A) Statement 1 is true, and Statement 2 is false.

B) Statement 1 is false, and Statement 2 is true.

C) Both Statement 1 and Statement 2 are true.

D) Both Statement 1 and Statement 2 are false.

24. **A 0.5 kg block moving at a speed of 12 ms-1 compresses a spring through a distance 30 cm when its speed is halved. The spring constant of the spring will be Nm-1.** **[4 Marks]**

A) 600

B) 650

C) 700

D) 750

25. **Assertion (A): A person does zero work while holding a heavy object stationary.**
Reason (R): The force exerted by the person is balanced by the weight of the object. **[4 Marks]**

A) Both A and R are true, and R is the correct explanation of A.

B) Both A and R are true, but R is not the correct explanation of A.

C) A is true, but R is false.

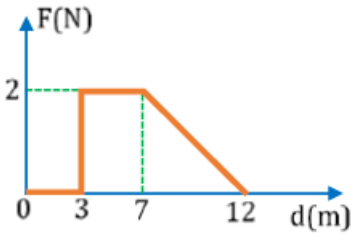
D) A is false, but R is true

26. **A force (3x2 + 2x – 5) N displaces a body from x = 2m to x = 4 m. Work done by this force is _____J** **[4 Marks]**

A) 58 B) 60

C) 62 D) 64

27. **Force F on a particle moving in a straight line varies with distance d as shown in the figure. The work done on the particle during its displacement of 12 m is: -** **[4 Marks]**



A) 18 J B) 21 J

C) 26 J D) 13 J

28. **The distance between Sun and Earth is R. The duration of year if the distance between Sun and Earth becomes 3R will be :** **[4 Marks]**

A) 3 years B) 3 years

C) 9 years D) 33 years

29. **A force F→ = (4i^ - 4j^ - 2k^) N displaces a particle by d→ = (3i^+2j^ - 2k^) m, calculate work done.** **[4 Marks]**

A) Zero B) 8 J

C) 4 J D) 12 J

30. **A raindrop of mass 1 g falling from a height of 1 km hits the ground with a speed of 50 ms–1. Which of the following statements is correct ? (Take g = 10 m s–2)** **[4 Marks]**

A) The loss of potential energy of the drop is 10 J. B) The gain in kinetic energy of the drop is 1.25 J.

C) The gain in kinetic energy of the drop is not equal to the loss of potential energy of the drop. D) All of these.

31. **The expression 13i^+13j^+13k^ is a** **[4 Marks]**

A) Unit vector B) Null vector

C) Vector of magnitude 3 D) Scalar

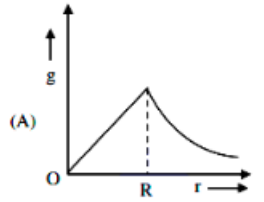
32. **Assertion**
If a spring is compressed, energy is stored in spring and when it is elongated,energy is released
Reason
The energy stored in a spring is proportional of the square of linear deformationof spring **[4 Marks]**

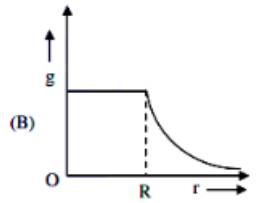
A) Both Assertion and Reason are correct and Reason is thecorrect explanation for Assertion B) Both Assertion and Reason are correct but Reason is not thecorrect explanation for Assertion

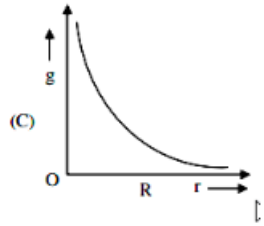
C) Assertion is correct but Reason is incorrect D) Both Assertion and Reason are incorrect

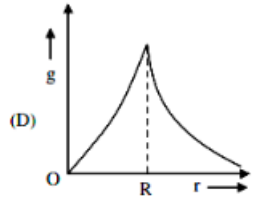
The variation of acceleration due to gravity (g) with distance (r) from the center of the earth is correctly represented by: (Given R = radius of earth)

33. **[4 Marks]**









A) A

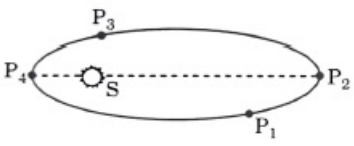
B) B

C) C

D) D

Figure shows a planet in an elliptical orbit around the sun S. Where is the kinetic energy of the planet maximnum?

34. **[4 Marks]**



A) P4

B) P3

C) P2

D) P1

35. **If ve is escape velocity and v0 is orbital velocity of a satellite for orbit close to the earth's surface, then these are related by:** **[4 Marks]**

A) 4e = 4v0

B) ve = 2v0

C) v0 = 2ve

D) v0=ve

36. **Two particles of mass 1 kg and 0.5 kg are moving in the same direction with speed of 2m/s and 6m/s respectively on a smooth horizontal surface. The speed of centre of mass of the system is :** **[4 Marks]**

A) 103 m/s

B) 107 m/s

C) 112 m/s

D) 123 m/s

37. **Two bodies of mass 1 kg and 3 kg have position vectors i^+2j^+k^ and -3i^-2j^+k^, respectively. The centre of mass of this system has a position vetor** **[4 Marks]**

A) -2i^+2k^

B) -i^+j^+k^

C) 2i^-j^-2k^

D) -2i^-j^+k^

38. **In an inelastic collision-** **[4 Marks]**

A) momentum is conserved but kinetic energy is not

B) momentum is not conserved but kinetic energy is conserved

C) neighter momentum nor kinetic energy is conserved

D) both the momentum and kinetic energy are conserved

39. **A body moves with constant velocity v in a straight line parallel to x-axis. The angular momentum with respect to origin is:** **[4 Marks]**

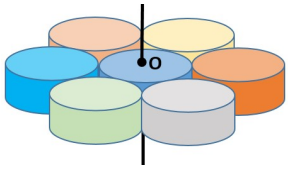
A) zero

B) constant

C) continuously increases

D) continuously decreases

40. **Seven identical circular planar disks, each of mass M and radius R are welded symmetrically as shown. The moment of inertia of the arrangement about the axis normal to the plane and passing through the point O is X4mR2. The value of X is** **[4 Marks]**



A) 45

B) 110

C) 55

D) 90

41. **Let F→ be the force acting on a particle having position vector r→, and T→ be the torque of this force about the origin. Then [2003]** **[4 Marks]**

A) r→·T→=0 and F→·T→ ≠0

B) r→·T→≠0 and F→·T→ =0

C) r→·T→≠0 and F→·T→ ≠0

D) r→·T→=0 and F→·T→ =0

42. **A tap can be operated easily using two fingers because:** **[4 Marks]**

A) The force available for the operation will be more

B) This helps application of angular forces

C) The rotational effect is caused by the couple formed

D) The force by one finger overcomes friction and other finger provides the force for the operation

43. **The speed of a uniform spherical shell after rolling down an inclined plane of vertical height h from rest is:** **[4 Marks]**

A) 10gh7

B) 6gh5

C) 4gh5

D) 2gh

44. **The Dimension formula of Stress and Strain respectively are** **[4 Marks]**

A) M1L1T1, No Dimension

B) M1L-1T-2, M0L1T0

C) M1L-1T-2, No Dimension

D) M-1L-1T-2, M0L1T-1

45. **A wire is stretched to double of its length. The strain is** **[4 Marks]**

A) 0.5

B) 0.1

C) 1

D) 2

46. **Assertion (A): Elastic materials regain their original shape and size after the removal of the deforming force.**
Reason (R): Elastic materials have a high modulus of elasticity. **[4 Marks]**

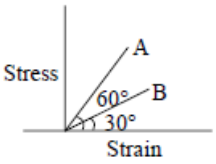
A) Both Assertion (A) and Reason (R) are true, and Reason (R) is the correct explanation of Assertion (A).

B) Both Assertion (A) and Reason (R) are true, but Reason (R) is not the correct explanation of Assertion (A).

C) Assertion (A) is true, but Reason (R) is false.

D) Assertion (A) is false, but Reason (R) is true.

47. **The stress versus strain graphs for wires of two materials A and B as shown is the figure. If YA and YB are the young's modulus of the materials, then-** **[4 Marks]**



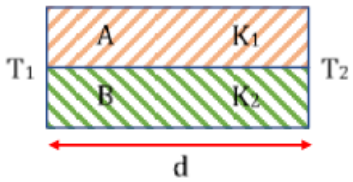
A) $Y_B = 2Y_A$

B) YA = YB

C) $Y_B = 3Y_A$

D) YA = 3YB

48. **Two rods A and B of different materials are welded together as shown in figure. Their thermal conductivities are K1 and K2 . The thermal conductivity of the composite rod will be: -** **[4 Marks]**



A) 3K1+K22

B) K1+K2

C) 2K1+K2

D) K1+K22