Himachal Pradesh Board of School Education Dharamshala

Model Question Paper

Class XI PHYSICS

Time :- 3hrs **M.M. 60**

NOTE : - **Candidate are required to give their answers in their own *words as far as possible.***

Special Instruction:-

(1) All questions are compulsory.

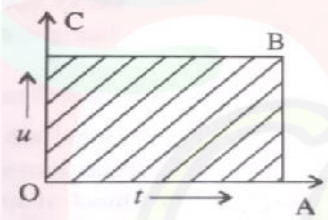
(2) Answer should be brief and to the point.

(3) While answering the questions, you must indicate on answer book the same question no. as appears in your question paper.

(4) Question no. 1-12 are MCQ carry 1 marks, question no. 13-18 are very short answer type carrying 2 marks, question no. 19-26 are of short answer type carrying 3 marks, question no. 27-29 are of long answer type carrying 4 marks each.

(1x12=12)

1. What does area of a OABC in the following graph represents:-



a)Displacement (b) Velocity (c) Acceleration (d) Force

Q 2 and Q 3 , consist of two statements assertion(A) and reason (R) .
Answer these questions selecting the appropriate option given below
a. Both A and R are true and R is the correct explanation of A
b. Both A and R are true and R is not the correct explanation of A
c. A is true but R is false
d. A is false but R is true

2. Assertion: The lift of an aero plane is based on Bernoulli's Principle
Reason: Due to difference invelocity at upper end and lower end, the aeroplane takes lift

3. Assertion: If three forces F_1, F_2 and F_3 are represented by 3 sides of a triangle and $F_1 + F_2 = -F_3$, then these 3 forces are concurrent forces and satisfy the condition for equilibrium.

Reason : A triangle made up of 3 forces F_1, F_2 and F_3 as its sides taken in the same order satisfy the condition for translatory equilibrium.

Q 4 and Q 5 are case study:
Read the following passage and answer:
When a particle moves in a horizontal circle with uniform speed it's kinetic energy remains the same everywhere. Now the particle moves in a vertical circle of radius r.

4. The kinetic energy of the particle of mass m at the lowest point of the vertical circle is

a. Same as at other points. b. 5/2 mgr c. 1/2 mgr d. zero

5. The kinetic energy of the particle of mass m at the highest point of the vertical circle is.

a. Same as at other points. b. 5/2 mgr c. 1/2 mgr d. zero

6. Match the physical quantities given in Column with the corresponding analogs in rotational motion given in column 2

Column I	**Column II**
(A) Mass (m)	(p) $\tau = dL/dt$
(B) Force (F)	(q) $L = Iw$
(C) P = mv	(r) I
(D) F = dp/dt	(s) τ

(a) A-r, B-s,C-q, D-p (b) A-s,B-r,C-q,D-p
(c)A-s, B-r, C-p, D-q (d) A-p, B-q, C-r, D-s

7. Match the heavy objects given in column I with the escape speeds given in column 2

Column I	**Column II**
(A) Sun	(p) 2.3 km/s
(B) Jupiter	(q) 11.2 km/s
(C) Earth	(r) 60.0 km/s
(D) Moon	(s) 6180 km/s

(a) A-r, B-s,C-p, D-q (b) A-s,B-r,C-q,D-p
(c)A-p, B-q, C-r, D-s (d) A-q, B-p, C-r, D-s

8. S.I. unit of coefficient of viscosity is :

(a) Ns^{-1} $m^{-1.}$ (b) $Nsm^{-2.}$ (c) Nsm^{-1} (d) Nsm

9. A gas in a vessel expands, it's internal energy decreases. The process involved is :

(a) Isothermal (b) Isobaric (c) Adiabatic (d) Isochoric

10. The degree of freedom of a diatomic gas is

(a) 3 (b) 4 (c) 5 (d) 6

11. A particle executes S.H.M. , the graph of velocity as a function of displacement is :

(a) A circle (b) A parabola (c) An ellipse (d) A helix

12.. For what value of displacement the kinetic energy and potential energy of a simple harmonic oscillation become equal?

(a) x = 0 (b) x = A (c) A /√2. (d) A/2

(2x6=12)

13. Define average and Instantaneous velocity?
14. A ball is thrown vertically upwards. What is its velocity and acceleration at the top?
15. Why does a mango fall down when the branch of the tree is shaken?
16. It is easier to pull than to push a body. Explain?
17. Prove Bernoulli's Theorem.

OR

Show that surface energy is numerically equals to surface tension.

18. Define Young's Modulus and Bulk Modulus?

(3x8=24)

19. The energy (E) of photon depends upon its wavelngth 'λ', Planck's constant ' h ' and velocity ' c'. Derive the formula for energy using dimensional analysis.
20. Show that the total mechanical energy of a body falling freely under gravity is conserved.

OR

State and Prove work energy theorem.

21. State the theorems of Parallel and Perpendicular Axis

22. Define orbital velocity and time period of a satellite. Find the expression for these.

OR

Show that the value of acceleration due to gravity decreases with depth .

23. A body of mass 10 kg is attached to one end of a wire of length 0.3 m . What is the maximum angular speed (in rad per s) with which it can be rotated about its other end in space station . (Breaking stress of wire is 4.8×10^7 N/ m^2 and area of cross section of the wire is 0.01 cm^2)

24. What is an Isothermal process? Derive an expression for work done during an Isothermal process .

25. State the assumptions of kinetic theory of gases. Calculate the r.m.s. velocity of oxygen molecule at 27°C. Given the atomic weight of oxygen molecule is 32.

26. Derive an expression for displacement, velocity and acceleration of a particle executing S.H.M.

(4x3=12)

27. State Triangle law of vector addition. Give its analytical treatment to find the magnitude and direction of a resultant vector.

OR

What do you mean by projectile?. A projectile is fired at some angle with the horizontal. Show that its path is parabolic. Also find the expression for maximum height and horizontal range.

28. State Newton's third law of motion. Derive the principle of conservation of linear momentum from it.

OR

a. A bullet of mass 20 g has an initial speed of 1 m/s just before it starts penetrating a mud wall of thickness 20 cm. If the wall offers a mean resistance of 0.025 N, then find the speed of bullet after emerging from the other side of the wall.

b. Show that Newton's second law is real law of motion.

29. (a) Derive the relation given by Newton to find the speed of a longitudinal wave in an ideal gas.

(b) Derive an expression for elastic potential energy of a spring.

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