COUNCIL OF CBSE AFFILIATED SCHOOL IN THE GULF
GULF SAHODAYA (SAUDI CHAPTER) EXAMINATION - 2018

CLASS – XI

PHYSICS

Time Allowed : 3 hours ***Maximum Marks : 70***

SET-'B'

GENERAL INSTRUCTIONS:

1. *All questions are compulsory.* ***There are 26 questions in all.***
2. *Question paper contains five sections: section A, section B, section C, section D and section E.* ***Total number of printed pages is 4.***
3. *Section A contains five questions of one mark each, Section B contains five questions of two marks each, Section C contains twelve questions of three marks each, Section D contains one value based question of four marks and Section E contains three questions of five marks each*
4. *There is no overall choice. However an internal choice has been provided in one question of two marks, one question of three mark and all three questions of five marks each. You have to attempt only one of the given choices in such questions.*
5. *Use of calculators is not permitted. However you may use log tables if necessary.*
6. *You may use the following values of physical constants wherever necessary.*
7. *Attempt all parts of a question together. Symbols have their usual meaning.*
8. *Draw necessary diagrams to explain your answer.*

SECTION - A

1. Draw speed-Time & velocity-time graphs for a body thrown from ground with a speed v in vertically upward direction and after attaining maximum height(height much less than the radius of earth) it returned back to ground. 1

2. Wet hairs cling together. Why? 1

3. What is kinetic friction? How will it change when speed of the body is doubled? 1

4. Define impulse? Write its unit. 1

5. What is Systematic error? 1

SECTION – B

6. The two resistances $R_1 = 20 \pm 0.1\ \Omega$ and $R_2 = 5 \pm 0.25\ \Omega$ are connected in series in a circuit. Find the percentage error in the measurement of equivalent resistance of the circuit. 2

OR

The time period of oscillation (T) of the simple pendulum depends on length (l) and acceleration due to gravity(g). By using method of dimension, establish a formula for the time period. Take constant of proportionality K = 2π. 2

7. What is Refrigerator? Write expression of its coefficient of performance in terms of temperatures of cold and hot bodies. 2

8. Obtain an expression for the orbital speed of earth, in terms of mass of the earth and its radius. 2

9. Write expressions for the displacement and velocity of the body in S.H.M. Show their variation with time graphically. 2

10. Why do the gases have two specific heat? 2

SECTION - C

11. A body thrown from ground with speed u at an angle θ with horizontal
Obtain expression for the horizontal range of this body. Show that this range is maximum when projected at angle 45^0 for the same speed of projection. 3

OR

11. Show that the path of a projectile, thrown from ground with speed u at an angle θ with horizontal, is parabolic. 3

12. A ball is thrown vertically upward with a velocity of 40 m/s from the ground. At the same time another ball is dropped from a height of 40m on the same line. When and where do these two ball hit each other? (g = 10 m/s^2) 3

13. What do you understand by conservation of angular momentum? On the basis of this explain the following,
(i) Gymnasts fold their bodies while taking loops in air.
(ii) Duration of day will increase when polar ice melts due to global warming. 3

14. State theorem of parallel axes. Moment of inertia of rod is I about an axis passing through centre and perpendicular to its length. Find its moment of inertia, in terms of I, about an axis passing through its one end and perpendicular to its length. 3

15. Show that the value of g is independent of mass of the falling body.Weight of a person on earth surface is 72 kgwt. At what height his weight becomes 32 kgwt? Radius of earth is 6400 km. 3

16. Write two points of difference between elastic and inelastic collisions? A spheres moving with speed u collide head on elastically with another identical sphere at rest. Show, by using formula, that during this process first sphere comes to rest and the other starts moving with the same speed u. 3

17. Justify that the motion of a simple pendulum is simple harmonic.
Obtain expression for its time period also. 3

18. What is centripetal acceleration? Obtain its expression in terms of angular velocity ω and radius r of the circle. 3

19. State first law of thermodynamics. Apply this law to explain that adiabatic expansion results cooling. 3

20. What is banking of track? Obtain expression for the maximum velocity with which a vehicle can take turn safely over banked but smooth track? 3

21. A body is dropped from a height h. By using the concept that during the fall the body's total mechanical energy remains constant, find its speed when the body is at height h/4. (ignoring air resistance). 3

22. Define specific heat capacity. Obtain expression for the molar specific heats of a diatomic gas (with vibrating molecules) at constant volume and at constant pressure. 3

SECTION - D

23. Sonu was very famous for his naughty attitude. One day, he brought a rubber catapult from the market and started hitting passerby. When his father came to know about this, he immediately called Sonu and talked to him very politely and made him realise that what damage his act could do. Sonu realised his mistake and promised not to do this again.

(i) What values do you associate with Sonu's father?

(ii) A rubber cord catapult has a cross-section area of 1 mm^2 and total unstretched length 10 cm. it is stretched by 2 cm and then released to project a small ball of mass 5 gm. Find the tension developed in the cord, if value of Y of rubber is $5x\ 10^8\ N/m^2$.

(iii) Find the strain developed in the rubber cord with this extent of stretching. 4

SECTION – E

24. (a) What is average and instanteneous velocities? Establish formula $v^2 = u^2 + 2ax$, where u and v are initial and final velocities , x is distance travelled and a is uniform acceleration, by using velocity-time graph.

(b) A body is dropped from a hot air balloon which is ascending with constant speed of 4 m/s. At the time of drop the balloon was at the height 80 m from the ground. Find (i) the time it took to reach ground (ii) the speed with which it hit the ground. 5

OR

24. (a) State parallelogram law of vector addition. Obtain an expression for the magnitude and direction of the resultant of two vectors **a** and **b ,** if the angle between them is θ.

(b) If $|\mathbf{a} \times \mathbf{b}| = \mathbf{a} \cdot \mathbf{b}$, find the angle between vectors **a** and **b**. 5

25. (a) State Bernoulli's theorem and prove this theorem by using equation of continuity.

(b) How this theorem explains the taking-off principle of an aeroplane. 5

OR

25. (a) Pressure on the concave side of a liquid drop is more than the pressure on its convex side, explain why?

(b) Show that $p_i - p_o = 2S/R$, for a liquid drop, where p_i & p_o are its inside and outside pressures, S is the surface tension and R is the radius of the drop. 5

26. (a) How are stationary waves formed? Obtain expression for the fundamental frequency of a stationary wave along a stretched string.

(b) The speed of a transverse wave along a stretched string is 40 m/s when a load of 20 kg is suspended through the string. How much load is to be suspended so that the speed of this wave becomes 20 m/s. 5

OR

26. (a) What is Doppler effect in sound? Derive an expression for the apparent frequency when a observer is moving towards stationary source.

(b) A source is producing a sound of frequency 100 Hz. With what speed this source should move towards a stationary observer so that the observer can hear the sound of frequency 110 Hz. The speed of sound in air is 330 m/s. 5

Some important constants:
$G = 6.67 \times 10^{-11}\ Nm^2kg^{-2}$
$g = 10\ ms^{-2}$
K (Boltzmann constant) $= 1.38 \times 10^{-23}\ JK^{-1}$
Mass of the earth $= 6 \times 10^{24}$ kg
Radius of the earth = 6400 km