Roll Number		

SET B

INDIAN SCHOOL MUSCAT
FIRST TERM EXAMINATION
PHYSICS

CLASS: XI Sub. Code: 042 Time Allotted: 3 Hrs

23.09.2018 Max. Marks: 70

General Instructions:

1. All questions are compulsory. There are 27 questions in all.
2. This question paper has four sections: Section A, Section B, Section C and Section D.
3. Section A contains five questions of one mark each, Section B contains seven questions of two marks each, Section C contains twelve questions of three marks each 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 marks and all the questions of five marks weightage. You have to attempt only one of choices in such questions.
5. Use log table, if necessary. Use of calculators is not allowed.
6. You may use the following values of physical constants wherever necessary.
   g = 10 m/s^2 , R = 8.31 J/mol/K , Atmospheric pressure = 1.013 x 10^5 Pa

SECTION-A

1. Give the relative strength of various forces in nature. 1

2. Define the term instantaneous velocity. 1

3. Define angle of friction. 1

4. Express the average distance of earth from the sun in parsec. 1

5. Can two vectors of different magnitudes be combined to give zero resultant? 1

SECTION-B

6. State the four advantages of SI system over other systems of unit. 2

7. State and verify commutative law of vector addition. 2

8. Draw the position- time graphs of two objects moving along a straight line, when their relative velocity is (a) zero (b) positive 2

9. 2

   (i) What do you mean by impulse of a force?

   (ii) Explain why a cricketer moves his hands backwards while holding a catch.

OR

(i) Define coefficient of kinetic friction.

(ii) Proper inflation of tyres of vehicles saves fuel. Why?

10. Prove that the maximum horizontal range is four times the maximum height attained by a projectile which is fired along the required oblique direction. 2

11. (i) Draw velocity-time graph for an object thrown vertically upwards returning to the point of projection. 2

(ii) Can a distance – time graph of an object be parallel to time axis? Give reason.

12. (i) Why a gun recoils back when it is being fired? 2

(ii) Why a passenger falls forward when a moving bus suddenly stops?

SECTION-C

13. A gas bubble, from an explosion under water, oscillates with a period T proportional to $p^a\ d^b\ E^c$, where p is the static pressure, d is the density of water and E is the total energy of the explosion. Find the values of a, b and c. 3

14. Derive the following equations of motion for uniformly accelerated motion from velocity-time graph 3

(i) $s = ut + \frac{1}{2} at^2$

(ii) $v^2 = u^2 + 2 a s$

15. Rain is falling vertically with a speed of 30m/s. A woman rides a bicycle with a speed of 10m/s in the north to south direction. What is the relative velocity of rain with respect to the women? What is the direction in which she should her umbrella to protect herself from the rain? 3

16. Show that pulling is easier than pushing with the help of free body diagrams. 3

17. Show that Newton's second law of motion is real law of motion. 3

18. (i) Define principle of homogeneity. 3

(ii) Define dimensional constant. Give their example.

(iii) Distinguish between accuracy and precision.

19. Prove that the distance travelled by a body in the nth second is 3

$S_{nth} = u + \frac{a}{2}(2n-1)$

20. (i) Is the direction of acceleration same as the direction of velocity? Give reason. 1

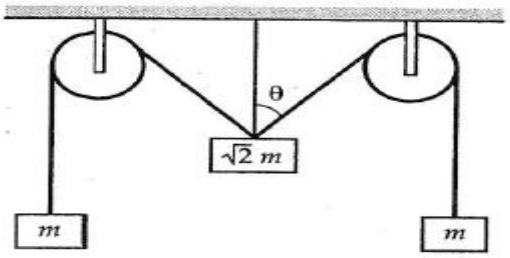
(ii) Can a body have constant speed and still have a varying velocity? Give reason. 1

(iii) Can the relative velocity of two bodies be greater than absolute velocity of either Body? Give reason. 1

21. (i) State parallelogram law of vector addition. 1

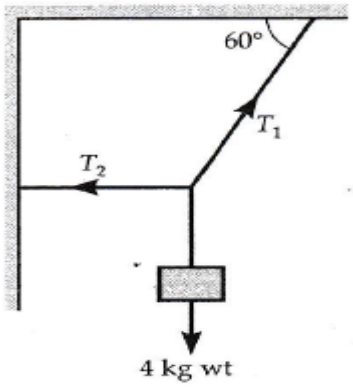
(ii) The sum and difference of two vectors are perpendicular to each other. Prove that the vectors are equal in magnitude. 2

22. The pulleys and strings shown in the figure are smooth and of negligible mass. For the system remains in equilibrium, what should be the angle θ? 3



OR

Determine the tensions T_1 and T_2 in the strings shown in figure.



23. Define angle of repose. Deduce its relation with coefficient of static friction. 3

24. (i) What are concurrent forces? 3

(ii) State the condition for translation equilibrium.

(iii) Obtain a condition for the equilibrium of three concurrent forces.

SECTION-D

25. (i) State and verify law of conservation of linear momentum. 3+2

(ii) A ball moving with a momentum of 5 kgm/s strikes against a wall at an angle of 45^0 and rebounds at the same angle. Calculate the change in momentum,

OR

(i) Define the coefficient of static friction.

Derive an expression for the acceleration of a body sliding down a rough inclined plane.

(ii) A machine gun fires a bullet of mass 40 g with a speed of 1200 m/s. The person holding the Gun can exert a maximum force of 144 N on it. What is the number of bullets that can be fired from the gun per second?

26. (i) A projectile is fired with a velocity u making an angle θ with the horizontal. 3+2

Show that its trajectory is a parabola.

(ii) A projectile is fired horizontally with a velocity of 98m/s from the top of the hill 490 m high.

Find the distance of the target from the hill. (g= 9.8 m/s^2)

OR

(i) Define centripetal acceleration and derive an expression for centripetal acceleration of an object in uniform circular motion.

(ii) An insect trapped in a circular groove of radius 12cm moves along the groove steadily and completes 7 revolutions in 100 s. What is the angular speed and the linear speed of the motion?

27. 3+2

(i) How is random error eliminated?

What do you mean by (a) absolute error (b) mean absolute error (c) relative error and (d) percentage error?

(ii) The radius of a sphere is 1.41 cm. Express its volume to appropriate number of significant Figures.

OR

(i) What do you mean by parallax and parallactic angle? How can you measure the distance of moon by parallax method?

(ii) The angular diameter of the sun is 1920''. If the distance of the sun from the earth is $1.5 \times 10^{11}\ m$, what is the linear diameter of the sun.

End of the Question Paper