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SET A



**INDIAN SCHOOL MUSCAT  
FIRST TERM EXAMINATION  
PHYSICS**

CLASS: XI  
23.09.2018

Sub. Code: 042

Time Allotted: 3 Hrs  
Max. Marks:70

**General Instructions:**

- (i) All questions are compulsory.
- (ii) Question numbers 1 to 5 are very short answer type questions, carrying one mark each.
- (iii) Question numbers 6 to 12 are short answer type questions, carrying two marks each.
- (iv) Question numbers 13 to 24 are also short answer type questions, carrying three marks each.
- (v) Question numbers 25 to 27 are long answer type questions, carrying five marks each.
- (vi) Use of calculators is not permitted. However, you may use log tables, if necessary.

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| 1  | Write the four fundamental forces in the ascending order of their strength?   | 1 |
| 2  | Arrange in ascending order- astronomical unit, parsec and light year.   | 1 |
| 3  | Write down the dimensional formula for universal gravitational constant.  | 1 |
| 4  | State the number of significant figures in (a) 0.007m (b) $2.67 \times 10^{-24}$ kg   | 1 |
| 5  | A body of mass 3Kg moves with an acceleration $3\text{ms}^{-2}$ for 2 seconds. Calculate the change in momentum.  | 1 |
| 6  | Convert 100N into dyne using dimensional analysis.  | 2 |
| 7  | (a)The v-t graphs of two objects make angles of $30^\circ$ and $60^\circ$ with time axis. Find the ratio of their accelerations.<br>(b)If the displacement –time graph for a particle is parallel to time axis, how much is the velocity of the particle? | 2 |
| 8  | Two bodies are projected at angles $\theta$ and $(90^\circ - \theta)$ to the horizontal with the same speed. Find the ratio of their times of flight.   | 2 |
| 9  | Using velocity time graph, derive $v^2 - u^2 = 2as$ .   | 2 |
| 10 | A cricketer can throw a ball to a maximum horizontal distance of 100m. How high above the ground can the cricketer throw the same ball?   | 2 |
| 11 | Show that Newton's second law motion is the real law of motion.   | 2 |

- 12 A monkey of mass 40Kg moving in a row up and down. If the rope can withstand max.tension of 600N in which of the following cases the rope may break. 2
- (i) Climbing up with an acceleration of  $6\text{m/s}^2$
  - (ii) Climbing down with uniform velocity  $5\text{m/s}$
  - (iii) Climbing down with an acceleration of  $4\text{m/s}^2$
  - (iv) Freely falls down the rope. (  $a = g$  )

**OR**

Find the relation between Impulse and momentum.

- 13 Assuming that the mass  $m$  of largest stone that can be moved by a flowing river depends on the velocity  $v$ , the density of water  $\rho$  and acceleration due to gravity  $g$ . Show that  $m$  varies as the sixth power of the velocity of flow. 3
- 14 (a) Define light year and express it in meters. 3  
 (b) If  $x = a + bt + ct^2$ , where  $x$  is in metres and  $t$  is in seconds.  
 What are the units of  $b$  and  $c$ ?
- 15 Explain Parallax method for determining the distance of a nearby star? 3

**OR**

The time period of oscillations of a simple pendulum in an experiment is recorded as 2.56s, 2.62s, 2.70s, 2.58s, and 2.45s respectively. Find the mean time period, absolute error in each observation and the percentage error

- 16 Draw the following graphs between distance – time of an object in case of 3
- (i) For a body at rest.
  - (ii) For a body moving with uniform velocity.
  - (iii) For body moving constant acceleration.
- 17 A race car accelerates on a straight road from rest to a speed of 180kmph in 25 seconds. Assuming uniform acceleration of the car throughout, find the distance covered in this time. 3
- 18 Prove that maximum horizontal range is four times the maximum height attained by the projectile, when fired at an inclination so as to have maximum horizontal range. 3
- 19 (a) Define unit vector. 1+2  
 (b) Prove that the vectors  $A = 2i - 3j - k$  and  $B = -6i + 9j + 3k$  are parallel.
- 20 Define angle of repose. Deduce its relation with coefficient of static friction. 3
- 21 A man of mass 75Kg is standing on a weighing scale on the floor of the elevator. Find 3
- (i) Apparent weight
  - (ii) Reading of the scale when the elevator is at rest.
  - (iii) Reading of the scale when the elevator has downward acceleration  $5\text{m/s}^2$

- 22 Explain why it is easier to pull a lawn roller than to push it? 3
- 23 State Newton's second law of motion and derive the relation  $F = ma$  3
- 24 Derive an expression for the acceleration of a body sliding down a rough inclined plane. 3
- 25 (i) Define relative velocity of one object w.r.t. another object. Draw position-time graphs for two Objects moving along a straight line: When their relative velocity is (a) zero and (b) positive. 3+2  
(ii) A jet plane travelling at the speed of 500kmph ejects its products of combustion at the speed of 1500kmph relative to jet plane. What is the speed of the latter with respect to an observer on the ground?

**OR**

- (i) Derive an equation for the distance covered by a uniformly accelerated body in  $n^{\text{th}}$  Second of its motion.
- (ii) A body covers a distance of 20m in the 7<sup>th</sup> second and 24m in the 9<sup>th</sup> second. How much shall it cover in 15<sup>th</sup> second?
- 26 (i) What is a projectile? Show that the path followed by a projectile is parabolic, when it is projected at an angle  $\Theta$  with the horizontal. 3+2  
(ii) What are the angles of projection of a projectile projected with a velocity of 30m/s, so that the horizontal range is 45m? ( Take  $g = 10\text{m/s}^2$ )

**OR**

- (i) A projectile is projected with velocity  $u$  making an angle  $\Theta$  with horizontal Direction, find: (a) time of flight (b) horizontal range.
- (ii) A body is projected at an angle of  $45^\circ$  with a velocity of 9.8m/s. what will be its Horizontal range? (Take  $g=9.8\text{m/s}^2$ )
- 27 (i) State and prove law of conservation of linear momentum. 3+2  
(ii) A shell of mass 0.02Kg is fired by a gun of mass 10Kg. If the muzzle speed of the shell is 80m/s, what is the recoil speed of the gun?

**OR**

- (i) Obtain an expression for the centripetal force required to make a body of mass  $m$ , moving with a velocity  $v$  around a circular path of radius  $r$ .
- (ii) Derive an expression for velocity of recoil of a gun.

**End of the Question Paper**