FIRST TERM EXAMINATION (2016-17)

Time Allowed :- 3hrs

A11

Max. Marks : 70

General Instructions :

(i) ***All questions are compulsory. There are 26 questions in all.***

(ii) *This question paper has five sections : Section A, Section B, Section C, Section D and Section E.*

(iii) *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.*

(iv) *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 three questions of five marks weightage. You have to attempt only one of the choices in such questions.*

1. Is it possible for a body to be accelerated without speeding up or slowing down? If so , give an example. (1)

2. Prove that vectors $\vec{A} = 2\hat{i}-3\hat{j}-\hat{k}$ and $\vec{B} = -6\hat{i}+9\hat{j}+3\hat{k}$ are parallel. (1)

3. Is the boat pushed away when a man jumps out of the boat? (1)

4. Why has a horse to pull a cart harder during the first few steps of his motion? (1)

5. A light and a heavy body have the same kinetic energy. Which one will have greater momentum? (1)

6. A physical quantity P is related to four observations: a, b, c and d as follows:

$P = a^3 b^2 / \sqrt{c}\, d$

The percentage errors are of measurement in a, b, c and d are 1% ,3%, 4% and 2%. What is the percentage error in the quantity P? If the value of P calculated using the above relation turns out to be 3.763 , to what value should you round off the result. (2)

7. The displacement of particle varies with time t as $x = 4t^2 - 15t + 25$

Find the position , velocity and acceleration of the particle at t=0. When will the velocity of particle become zero?

Can we call the motion of the particle as one with uniform acceleration? (2)

8. State and prove triangle law of vector addition. (2)

9. A cricket player lowers his hands to catch the ball safely. Explain , why? (2)

10. Why it is advisable to hold a gun tight to one shoulder when it is being fired?

OR

Why is it difficult to drive a nail into wooden block without supporting it? (2)

11. Using dimensions , find the value of 60J per min on a system that has 100 g,100cm and 1m in as the base units. (3)

12. A parachutist bails out from an aeroplane and after dropping through a distance of 40 m , he opens the parachute and decelerates at $2m/s^2$. If he reaches the ground with a speed of 2m/s, how long is he in the air? At what height did he bail out from the plane ? (3)

13. Differentiate between speed and velocity. (3)

14. A body covers a distance of 4m in 3rd second and 12m in 5th second. If the motion is uniformly accelerated, how far will it travel in next 3 seconds? (3)

15. Determine a unit vector perpendicular to both $\vec{A}=2\hat{i}+\hat{j}+\hat{k}$ and $\vec{B}=\hat{i}-\hat{j}+2\hat{k}$ (3)

16.Show that a given gun will shot three times as high when elevated at an angle of 60° as when fired at an angle of 30° but will carry the same distance on a horizontal plane.. (3)

17.Give any three methods of reducing the friction. (3)

18.Why does a cyclist lean inward when moving along a curved path ? (3)
Determine the angle through which a cyclists bends from the vertical while negotiating a curve.

19.(a)A soda –water bottle is falling freely. Will the bubbles of the gas rise in the water of the bottle. (1)

(b) Why are the wheels of vehicles are provided with mudguards? (1)

(c) Sand is thrown on tracks covered with snow. Why? (1)

20. Show that the total mechanical energy in a freely falling body remains constant through its fall. (3)

OR

A truck and car are moving with the same kinetic energy on a straight road. Their engines are simultaneously switched off. Which one will stop at a lesser distance?

21.(a) A spark is produced, when two stones are struck against each other. Why? (1.5)

(b)Define Gravitational units of force ? (1.5)

22. State and prove Work-Energy principle. (3)

23. Mrs. Babita Kumari's royal estate had many sprawling lawns. Her grandson Saurabh was visiting her in his summer holidays. One day, just for fun, he started pushing and pulling a lawn roller. He felt that it was easier to pull a lawn roller than to push it. He asked Mr. Thomas, the estate officer, the reason of easier pull and difficult push. Mr. Thomas was surprised at this observation of Saurabh. He talked to the gardeners but they knew nothing. Finally, he approached the Physics teacher of Science college run by Mrs. Babita Kumari. The Physics teacher explained to Thomas that there is more friction at the time of pushing as compared to the friction at the time of pulling. Thomas explained this fact to Saurabh. Saurabh was overjoyed and thanked Thomas

(a) What according to you, are the values displayed by Thomas ?

(b) Why is it easier to pull a body than to push it ? (4)

(2)

24. What is projectile ? Derive the expression for trajectory , time of flight, maximum height and horizontal range for a projectile thrown upwards , making an angle θ with the horizontal direction.

OR

(a) What is projectile motion?

(b) The maximum range of projectile is 2/3 times actual range. What is the angle of projection for the actual range.?

(c) For what angle of projection of a projectile, are the horizontal range and maximum height attained by the projectile equal ? (5)

25.(a)Prove that newton's second law of motion is real law of motion. (3)

(b)Define Impulse and give its any two applications. (2)

OR

(a)Define inertia and its types. Give two example of each type. (3)

(b)Derive Law of conservation of momentum from Newton third law of motion. (2)

26. Define potential energy and kinetic energy. Derive expressions for potential and kinetic energy. (5)

OR

(a)Define term work. What is meant by positive work, negative work and zero work ? Give one example of each. (3)

(b)A gardener pushes a lawn roller through a distance of 20m.If he applies a force of 20kg wt in a direction inclined at 60° to the ground , find work done by him. Take $g=9.8 m/s^2$ (2)

(5)