

V. & C. Patel English School

Half Yearly Examination

Date: 15/09/2017 Time: 3 Hrs

Std. - 11th Sub.: Physics Mark-70

General Instructions

All questions are compulsory. There are 26 questions in all.

- Section A contains 5 questions of 1 Mark each. 1)
- Section B contains 5 questions of 2 Markes each. 2)
- 3) Section C contains 12 question of 3 marks each.
- Section D contains 1 value based question of 4 marks. 4)
- Section E contains 3 question of 5 marks each. 5)

SECTION - A

- Is the measure of an angle dependent upon the unit of length? 1)
- What is the time period of a simple pendulum at the centre of the earth? 2)
 - What is femto second equal to? 3)
- 4) Can a body be simultaneously at rest and in motion?
 - Define Resolution of vector. 5)

SECTION - B

- 6) Prove the workenergy theorem.
- Define relative velocity. Draw position time graph for two objects having zero 7) relative velocity.
- An electron and proton have equal momentum. Which one has more kinetic energy 8) and what is the ration between K.E. of electron and proton?
- State parallelogram law of vectors. Find its resultant. 9)

OR

Show that vector addition is commutative. What do you mean by vector subtraction?

10)State Universal law of gravitation and hence define Gravitational constant and dimensional formula of G.

SECTION -C

- 11) (i) Define collinear vectors.
 - (ii) Find the value of λ so that the vectors $\vec{A} = 4\hat{i} 2\hat{j} 2\hat{k}$ and $\vec{B} = 2\hat{i} + \lambda\hat{j} + \hat{k}$ are perpendicular to each other.
- 12)

Give uses and limitations of dimensional analysis name the physical quantities

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(P. T. O.)

whose dimensional formula are (i) $M^{1}I^{-1}T^{-2}$ (ii) $M^{1}T^{-2}$

(i) Define systematic error.

(ii) Joule's law of heatting gives heat dissipated in a resistance, $H = I^2Rt$

If the maximum errors in the measurement of current, resistance and time are 2%, 1% and 1% respectively. What would be the maximum error in the dissipated heat?

14) Show that sum of P. E. and K.E. of a freely folling body is conserved.

OR

What do you mean by conservative and non-conservative forces? Prove that gravitational force is conservative force.

- 15) What causes variation in velocity ? If the distance travelled by a moving object varies directly as the cube of time, how does the acceleration of the body depend on time ?
- 16) Define 'gravity' Discuss the variation of 'g' with depth.
- 17) Find the vector whose length is 14 and which is perpendicular to each of the vectors. $\overrightarrow{A} = 2\hat{i} 3\hat{j} + 6\hat{k}$ and $\overrightarrow{B} = \hat{i} + \hat{j} \hat{k}$
- 18) Derive the expression for acceleration in a string in connected motion. show that value of acceleration 'a' is always less than acceleration due to gravity 'g'.
- 19) State Newton's first law of motion Derive it from second law why Newton's second law of motion is the real law?
- 20) A passenger arriving in a new town wishes to go from the station to a hotel located 10km a way on a straight road from the station. A dishonest cabman takes him along a circuitous path 23 km long and reaches the hotel in 28 min what is (a) The average speed of the taxi, (b) The magnitude of average velocity? Are the two equal?
- 21) Why is G called universal gravitotional constant? what is the force between two spheres weighing 40k each and placed 5 m apart? Take $G = 6.67 \times 10^{-11} \text{ Nm}^2 \text{kg}^{-2}$
- 22) Deduce an expression for the time period of simple pendulum dimensionally. The time period (T) of a simple pendulum depends on mass (m) of the bob, lenght (l) of the pendulum and acceleration due to gravity (g)

SECTION - D

23) Bhimsingh is a driver and driving truck for the last 15 years. Yesterday he got the opportunity to drive a car. He found that truck required larger initial effort for putting it in to motion as compared to car. He discussed this phenomenon with his son Rohit who was in 11th class. Rohit explained the reason to his father.

(i) Why do bodies of large masses need large initial effort for putting them in to motion.

(ii) What values were displayed by Bhim Singh?

<u>SECTION - E</u>2.... Define centripetal acceleration. Derive an expression for the centripetal acceleration of a particle moving with uniform speed 'v' along a circular path of radius 'r'. Discuss the direction of this acceleration.

OR

What do you mean by 'Impulse of force'? Prove that the impulse of a force is equal to the change in momentum produced by the force. Show measurement of Impulse when constant force acts on a body by graphical method.

A projectile is fired with a velocity 'u' making an angle 'θ' with the horizontal.
Derive expression for (a) Time of flight (b) maximum height (c) Range of Projectile.

OR

Define escape velocity obtain an expression for the escape velocity of a body from the surface of the earth show that the escape velocity of a body from the earth's surface is $\sqrt{2}$ times its velocity in a circular orbit just above the earth's surface.

26) Prove that in an elastic one-dimensional collision between two bodies. the relative velocity of approach before collision is equal to the relative velocity of separation after the collision.

OR

(a) Explain explosion of a bomb.

24)

(b) Derive the law of conservation of linear momentum from newton's third law of motion.

Best Of Luck

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