

MAR THOMA RESIDENTIAL SCHOOL, THIRUVALLA
FIRST TERMINAL EXAMINATION 2017-18

STD XI

PHYSICS

MARKS:80

TIME: 3h

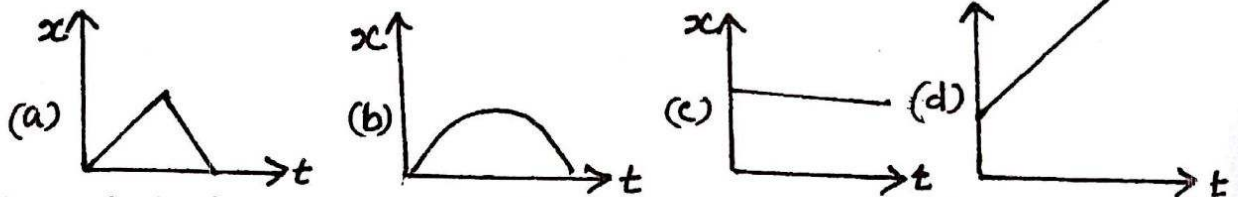
SECTION A (Answer all questions)

Question 1

A. Choose the correct alternative for each of the questions given below . (10)

- (i) The dimensions of impulse are equal to that of
(a) Pressure (b) linear momentum (c) force (d) angular momentum

- (ii) Which of the following graphs represents uniform motion?



- (iii) Which of the following measurement is most accurate?

(a) 5.00cm (b) 0.005cm (c) 50.00cm (d) 500cm

- (iv) The displacement of a body is proportional to the square of time. The acceleration of the body is

(a) Increasing with time (b) decreasing with time

(c) constant (d) zero

- (v) Which of the following is not a fundamental quantity?

(a) Electric current (b) Electric charge

(c) Temperature (d) luminous intensity

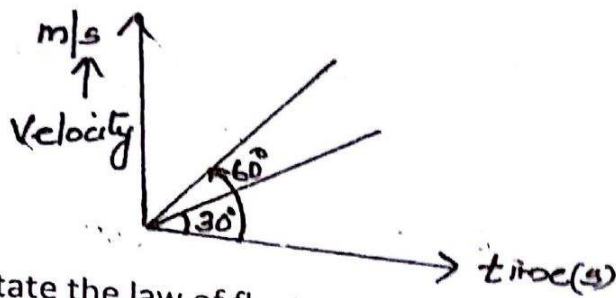
- (vi) The S.I unit of compressibility is

(a) Nm^{-2} (b) $\text{N}^{-1}\text{m}^{-2}$ (c) N^{-1}m^2 (d) Nm^2

- (vii) The pressure of a medium is changed from $1.01 \times 10^5 \text{ Pa}$ to $1.165 \times 10^5 \text{ Pa}$ and change in volume is 10% keeping temperature constant.
The bulk modulus of the medium is
(a) $204.8 \times 10^5 \text{ Pa}$ (b) $1.55 \times 10^5 \text{ Pa}$ (c) $102.4 \times 10^5 \text{ Pa}$ (d) $51.2 \times 10^5 \text{ Pa}$
- (viii) As the area of the vessel increases liquid pressure
(a) decreases (b) increases (c) remains the same (d) none of these
- (ix) The dimensional formula for surface tension is
(a) MLT^2 (b) ML^{-2} (c) MT^{-2} (d) LT^{-2}
- (x) An ideal fluid is one which is
(a) viscous, incompressible and flow is steady and rotational
(b) viscous, compressible and flow is steady and rotational
(c) viscous, incompressible and flow is not steady and rotational
(d) non-viscous, incompressible and flow is steady and irrotational

Answer the following questions briefly and to the point.

- (i) A ball hits a wall with a velocity of 20 m/s and rebounds with same speed. is the change in its velocity?
- (ii) Can a body have eastward velocity but westward acceleration? Explain.
- (iii) State the principle of homogeneity of dimensions.
- (iv) Define instantaneous acceleration.
- (v) Convert one watt into a system where the base units are 1kg, 1m and 1minute
- (vi) The velocity-time graphs of two objects A and B are as shown in the figure. Calculate the ratio of their accelerations.



- (vii) State the law of floatation.
- (viii) Define coefficient of viscosity.
- (ix) State Hooke's law.
- (x) Define surface tension.
- (xi) Calculate the work done in stretching a steel wire 120cm in length and of cross-sectional area 0.04cm^2 when a load of 20kg is slowly applied without the elastic limit being reached. Young's modulus of steel is $2 \times 10^{11}\text{Nm}^{-2}$
- (xii) Water wets the walls of the glass container. Give reason.

SECTION B

Question 2

Which are the different types of errors in the measurement of physical quantities? (2)

Question 3

State the advantages of SI units over other system of units. (2)

Question 4

The velocity v of a particle depends on time ' t ' as $v = At^2 + Bt + C$, where v is in m/s and t is in second. What are the dimensions of A, B and C. (2)

Question 5

a) 5.74g of a substance occupies 1.2cm^3 . Express its density keeping significant figures in view

OR

OR

b) The measure of diameter of a cylinder is (1.20 ± 0.01) cm and its length is (8.0 ± 0.1) cm. Calculate the percentage error in its volume.

Question 6

A steel rod has a radius of 10mm and a length of 1m. A 100kN force stretches it along its length and the elongation produced is 1.59mm.

Calculate i) stress ii) Young's modulus of the steel.

Question 7

Why are bridges declared unsafe after long use?

Question 8

Why are rain drops spherical in shape.

Question 9

What is a streamline? Why do two stream lines not cross each other?

Question 10

Why does deep water run slow?

Question 11

Why is it dangerous to stand near the edge of the platform when a fast train is crossing it?

Question 12

Why do clouds seem to be floating in the sky?

OR

In a car lift compressed air exerts a force F_1 on a small piston having a radius of 5cm. This pressure is transmitted to a second piston of radius 15cm. If the mass of the car to be lifted is 1350kg, what is F_1 ?

What is the pressure necessary to accomplish this task? $g = 9.8 \text{ m/s}^2$

(2)

SECTION C

Question 13

- i) Draw the position-time graph of uniformly accelerated motion of an object.
- ii) Explain using this graph how you will obtain average speed and instantaneous speed. (

Question 14

- a) Show that distance travelled in the n^{th} second of a uniformly accelerated motion is $S_n = u + a(n - \frac{1}{2})$, where the symbols have their usual meanings.

OR

- b) The displacement of a particle moving along a straight line is given by $x = 5t^2 + 3t + 4 \text{ m}$. Obtain its :i) initial velocity ii) velocity and acceleration at $t = 3\text{s}$.

Question 15

- i) What do you mean by relative velocity of object A with respect to object B?
- ii) Two trains 120m and 80m in length are running in opposite directions with velocities 42km/hr and 30 km/hr. In what time will they completely cross each other?
- iii) The velocity of projection of an object is doubled. How would this affect the maximum height reached and the time of flight?

Question 16

- i) State Stoke's law.
- ii) State any two conditions under which Stoke's law is valid.

Question 17

- i) What do you mean by critical velocity of a liquid?

ii) State two factors on which critical velocity of a liquid flowing through a tube depends.

Question 18

What is Reynolds number? State its importance.

Question 19

Water is conveyed through a horizontal tube 8cm in diameter and 4km in length at the rate of 20litres/s. Assuming only viscous resistance, calculate the pressure required to maintain the flow. Coefficient of viscosity of water is 0.001 Pa s

OR

On the basis of Bernoulli's principle explain the lift of an aircraft wing.

SECTION D

Question 20

- a) i) Draw the velocity – time graph of a particle in uniformly accelerated motion. Using the graph derive the equations of motion.
- ii) A stone falls from a cliff and travels 24.5m in the last second before it reaches the ground at the foot of the cliff. Find the height of the cliff. ($g=9.8 \text{ m/s}^2$)

OR

- i) The velocity 'v' of water waves depends on the wavelength ' λ ', density of water ' ρ ', acceleration due to gravity 'g'. Deduce by the method of dimensions the relation between the quantities.
- ii) Obtain the dimensional formula of:
- 1) coefficient of viscosity (η)
 - 2) universal gravitational constant (G)

Question 21

A gas bubble of diameter 2cm rises steadily at the rate of 2.5mm/s through a solution of density 2.25 g/cm^3 . Calculate the coefficient of viscosity of the liquid. Neglect the density of the gas

OR

Name a device used for measuring the volume of liquid flowing out per second and derive an expression for it.

(5)

Question 22

What is meant by terminal velocity? Derive an expression for terminal velocity.

OR

Derive an expression for excess pressure inside a liquid drop

(5)