



## V. & C. Patel English School

### Annual Examination

Date : 8-3-18  
Time : 3 hour

Std. – 11  
Sub.: Physics

Marks-70

#### General Instructions :

All questions are compulsory

Questions 1 to 5 are carrying 1 mark each.

Questions 6 to 10 are carrying 2 marks each.

Questions 11 to 22 are carrying 3 marks each.

Questions 23 is a value based questions carrying 4 marks.

Questions 24 to 26 are carrying 5 marks each.

#### Section – A

1. Name the quantity whose SI unit is  $\text{Wm}^{-1}\text{K}^{-1}$ .
2. Under what conditions, the scalar product of two vectors is zero ?
3. Name the physical quantity which is expressed as force times velocity. It is a scalar or a vector quantity ?
4. Surface tension of water is  $72 \text{ dyn cm}^{-1}$ , what is its value in SI system ?
5. Why do we say that sound waves are mechanical in character ?

#### Section – B

6. What is force ? Give its dimension and Unit.
7. Derive relation between K.E. and momentum p.
8. Given  $g = 9.8 \text{ ms}^{-2}$ ,  $G = 6.66 \times 10^{-11} \text{ Nm}^2\text{kg}^{-2}$  and  $R = 6.4 \times 10^6 \text{ m}$ . Find the mass of the earth.
9. If the distance covered by a moving object varies directly with time, what conclusions could you draw about the motion and the forces.
10. Define acceleration and derive expressions for acceleration and time period in S.H.M.

OR

What is the efficiency of a cannot engine, working between ice point and steam point.

#### Section – C

11. Velocity of sound in a medium depends up on modulus of elasticity and density of the medium, deduce this result with Dimensional analysis.
12. Show that the phase velocity or wave velocity is given by  
Angular velocity / Phase constant
13. Why do gases have two specific heats ? Why is  $C_p > C_v$  ?

14. State the law of conservation of momentum. Derive it from Newton's second law of motion.

**OR**

Show that maximum horizontal range is 4 times the maximum height attained by projectile.

16. State and prove work energy theorem.
17. Audible frequencies have a range 20 Hz to 20,000 Hz. Express this range in terms of (i) Period  $T$  (ii) Wave length  $\lambda$  in air and (iii) angular frequency. Given velocity of sound in air is  $330 \text{ ms}^{-1}$ .
18. What is the effect of depth on value of 'g' ?
19. Derive an expression for the work done during adiabatic expansion.
20. Explain how does a body attain a terminal velocity when it is dropped from rest in a viscous medium. Derive an expression for the terminal velocity of a small spherical body falling through a viscous medium.
21. Derive the expression for acceleration & tension in a string in a connected motion.
22. Derive the relation between linear acceleration and angular velocity,  $a = 4\omega^2$ .

#### **Section-D**

23. Meena's grandmother was reading the epic Mahabharat. She told Meena that Bhim was very powerful and during Kaurav-Pandav's war, when Bhim threw elephants up in the sky, they never came back to earth. Meena was perplexed. In the evening, she asked her father about the power and energy of Bhim and the incident of throwing of elephants by Bhim. His father told her that it is just a small example to explain the power of Bhim and has some link with the physics behind it.
- a) As a student of physics what can you say about this incident.
- b) What are the values displayed by Meena's father ?

#### **Section-E**

24. Discuss stress - strain graph when the load on a metal wire suspended from a rigid support is gradually increased.

**OR**

State and prove Bernoulli's theorem for a liquid having streamline flow.

25. Derive Newton's law of cooling from Stefan's law.

**OR**

Define orbital velocity. Derive expression for  $V_o$ . If escape velocity of an object from the surface of planet is  $V_e$  then prove that  $V_e = \sqrt{2} V_o$ .

26. a) What is a heat engine ? What are its types ?
- b) How do you justify that first law of thermo-dynamics is the law of conservation of energy.

**OR**

Discuss the elastic collisions in one dimension and calculate the velocities of bodies after the collision. Also discuss special case.