...ENTIAL SCHOOL,TIRUVALLA
FIRST TERMINAL EXAMINATION 2019-'20

STD XI

PHYSICS

MARK:70
TIME:3h

(Candidates are allowed additional 15 minutes for only reading the paper.
They must NOT start writing during this time.)
All questions are compulsory.
The intended marks for questions are given in brackets [ ].

SECTION A

A. i) The average distance between the earth and the sun.
A)Light year b)Parsec c)Astronomical unit d)Angstrom

ii) The dimensional formula of efficiency is

a) $M L^{2}T^{-2}$ b) $M L^{2}T^{-1}$ C)$M L^{2} T^{-3}$ d) $M^{0} L^{0} T^{0}$

iii) The number of significant figures in $0.007m^2$
a) 1 b) 2 c) 3 d) 4

iv) First law of thermodynamics corresponds to

a) Conservation of energy b)Heat flow from hotter to colder body

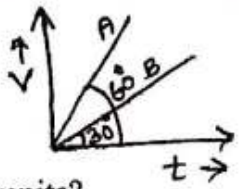
c)Law of conservation of angular momentum d)Newton's law of cooling

v) A black body is at 727°C .It emits energy at a rate, which is proportional to

a)$(727)^2$ b) $(1000)^2$ c) $(7827)^4$ d)$(1000)^4$

B. i)The percentage errors in the measurement of l and t are 1% and 2% respectively.Calculate percentage error in the determination of $g=4\pi^2 l / t^2$.

ii) The velocity time graph of the two objects A& B is shown below. Find the ratio of their acceleration .



iii) State parallelogram law of vectors .

iv) . What is the relation connecting R &K_B. Write its value with proper units?

v).State second law of thermodynamics.

vi). What are the necessary conditions for a process is reversible ?

vii). Define the terms:

i) Absorptive power

ii) Emissive power

iii) Emissivity

(12)

SECTION –B

2. Check the dimensional consistency of the relation
$v = 1/\ell\,(\sqrt{P/\rho})$ where v-velocity, p-pressure, ℓ-length ,ρ-density. (2)

3i) Define instantaneous velocity & relative velocity.

ii)A jet travelling at the speedof 500km/hr ejects burnt gases at the speed of 1100 km/hr relative to the jet plane.Find the speed of theburnt gases with respect to the stationary observer on earth. (2)

4 a) If the displacement of a body is S= (200±5) m and the time taken by t is (20±0.2) s, what is the velocity of the body with percentage error?

OR

b)What are the limitations of dimensional analysis. (2)

5. Convert25 J into a new system which has 1Km, 1 g and 1minute are the basic units. (2)

6. With the help of a position –time graph , explain how will you find the average velocity.(2)

7.Can a body have zero average velocity,but non zero average speed ?Explain your answer with an example. (2)

8 .i)Define the efficiency of heat engine? (2)

ii)Write an expression for coefficient of performance of a refrigerator?

9.State any two limitations of first law of thermodynamics . (2)

10. Write two practical applications of anomalous expansion of water? (2)

11.Find the efficiency of Carnot engine working between ice point & steam point?

OR

Can Carnot engine be realised in practise? (2)

12.Derive perfect gas equation from kinetic theory of gases? (2)

SECTION –C

13. Differentiate one,two and three dimensional motion.Give example for each. (3)

14.a) i) What are the uses of velocity-time graph?

ii) The position of an object varies with time as $x=5t^2-8t=20$ m.Find its instantaneous velocity at 2 sec.

OR

b) Obtain the expression for distance travelled by an object in the n^{th} secondof its motion.,if it is in uniform accelerated motion. (3)

ii) From the top of a tower 100m in height a ball is dropped and at the same time another ball is projected vertically up from the groundwith a velocity of 25m/s.Find when and where the two balls will meet? ($g=9.8\ m/s^2$) . (3)

15. Define the following:

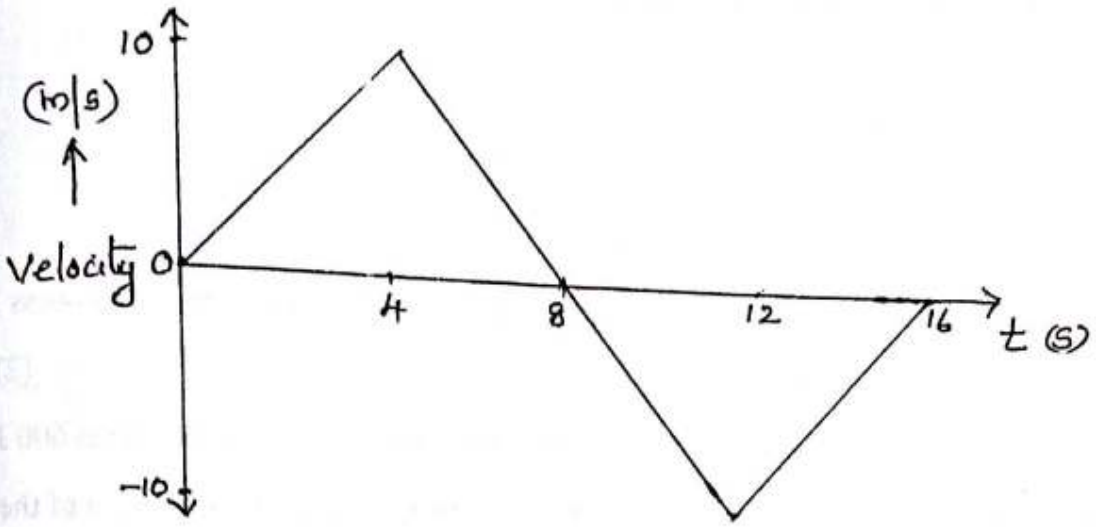
a)Unit vector ii) Zero vector iii) Equal vector iv)Negative vector v) Resultant vector vi) Collinear vectors. (3)

16. Using the following velocity time graph ,find

i)acceleration in the interval 0-4 sec.

ii) Distance travelled in the interval 0-16 sec.

iii) Displacement in the interval 0-16 sec. (3)



17. i) What is an isothermal process ?

ii) Derive an expression for work done for an ideal gas in an isothermal process? (3)

18. i)Write any six fundamental postulates of kinetic theory of an ideal gas?

ii)State Boyle's law, Charles law ,Gay-Lussac's Law with the help of graph.

19. a)Derive the relation between coefficient of linear expansion, superficial expansion & cubical expansion?

OR

b)Calculate the fall in temperature of helium initially at 15^0C,when it is suddenly expanded to 8 times its volume .Given $\gamma = 5/3$. (3)

SECTION –D

20. a) i) Define uniformly accelerated motion. (1/2)

ii) Derive the equation of motion using any method. (3)

iii) A bird flies for 4 s with a velocity = (t – 2) m/s in a straight line. Calculate the displacement and distance travelled by the bird . (1 ½)

OR

b) *i)* State triangle law of vector addition.

*ii)*Derive the expression for magnitude and direction of the resultant vector $\vec{R}$. (1½)

iii) Find the magnitude and direction of $\vec{R}$ if $\vec{A}$ =50N and $\vec{B}$ = 30 N θ=60° using (2½)
analytical method and graphical method.

21. a) *i)* State mathematically first law of thermodynamics. (2)

ii) Prove that $C_P - C_V = R$ (C_P- Specific heat at constant pressure, C_v –Specific heat (1)
at constant volume)

iii) Calculate the difference in efficiencies of a Carnot engine working between (2)

i) 400 K ,350 K

ii)Between 350 K & 200 K

(2)

OR

b) *i)*Draw P – V diagram for Carnot cycle. Write the name of thermodynamic process carried out by each part of the cycle.

*iii)*A Carnot engine absorbs 1000 J of heat from a reservoir at 127°C and rejects 600 J (2)
of heat during each cycle. Calculate i) efficiency of the engine ii) temperature of the sink *iii)* amount of the useful work done during each cycle .

(3)

22. a) *i)* State Newton 's law of cooling?

ii) Express it mathematically .How can this law be verified experimentally? (1)

iii) On heating a glass block of 10,000cm^3, from 25 ° C to 40 °C ,its volume increases (2)
by 4 cm ^{3} .Calculate coefficient of linear expansion of glass.

(2)

OR

b) *i)* State and explain three modes of transference of heat .

ii) State Stefan –Boltzmann law. Write the CGS & SI units of Stefan –Boltzmann (1)
iii) State the factors on which the conduction of heat through a substance depends. Obtain an expression for the heat conducted and hence define coefficient of thermal conductivity.

iv) Give its units& dimension . (2)

(1)