VNR11P

Virudhunagar District
Common Half Yearly Examination - 2023

Standard 11
PHYSICS
Part - I

Time: 3.00 Hours Marks: 70

Choose the correct answer: **15×1=15**

1) The number 248337 is mind off to 3 digits, the value is
a) 248.337 b) 248.000 c) 248.4 d) 248447

2) If a particle executes uniform circular motion, choose the correct statement
a) The velocity and speed are constant
b) The acceleration and spped are constant
c) The velocity and acceleration are constant
d) The speed and magnitude of acceleration are constant

3) If a person moving from pole to the equator, the centrifugal force acting on him
a) increases b) decreases
c) remains the same d) increases and decreases

4) A variable force $F = Kx^2$ acts on a particle producing the displacement from x = 0 m to x = 4m. The work done by the force is (assume $K = 1\ Nm^{-2}$)
a) $^{64}/_{3}$ Nm b) $^{16}/_{3}$ Nm c) 64 Nm d) zero

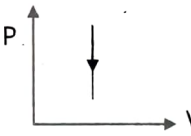
5) A couple produces
a) pure rotation and pure translation b) no motion
c) pure translation d) pure rotation

6) If the mass and radius of earth is doubled, the value of acceleration due to gravity 'g' is
a) 2g b) $^{g}/_{2}$ c) 4 g d) remain unchanged

7) Water flows with a velocity 1 ms^{-1} through one end of a tube of diameter 20 cm. The diameter of tube at a point where the velocity is 1.5 ms^{-1} is
a) 8 b) 16 c) 24 d) 32

8) The efficiency of heat engine working between freezing point and boiling point of water is
a) 6.25% b) 20% c) 26.8% d) 12.5%

9) The P–V diagram of a Thermo dynamic process is shown in the graph. The value of work done is equal to
a) PV b) PdV c) VdP d) Zero



10) The process in which heat transfer is by actual movement of molecules in fluids such as liquids and gases is called
a) Thermal conductivity b) Convection
c) Conduction d) Radiation

11) A mass 'm' is attached to a spring oscillates vertically with time period 'T'. If the spring is cut into two equal parts and the same mass 'm' is attached to one of the part of spring the time period of vertical oscillation is
a) $T' = \sqrt{2}T$ b) $T' = {}^{T}/_{2}$ c) $T' = {}^{T}/_{\sqrt{2}}$ d) $T' = \sqrt{{}^{T}/_{2}}$

12) Which of the following has the dimension as velocity?
a) $\frac{\mu_0}{\epsilon_0}$ b) $\mu_0 \epsilon_0$ c) $\sqrt{\mu_0 \epsilon_0}$ d) $\frac{1}{\sqrt{\mu_0 \epsilon_0}}$

13) Which one of the following physical quantities cannot be represented by a scalar?
a) mass b) length c) momentum d) magnitude of velocity

14) If the linear momentum of the object is increased by 0.1% then the kinetic energy is increased by
a) 0.1% b) 0.2% c) 0.4% d) 0.01%

15) Temperature of a gas is increased from 27°C to 327°C, the rms speed of molecules of gas becomes
a) half of initial values b) double of initial value
c) remain unchanged d) becomes $\sqrt{2}$ times initial value

Part - II

Answer any 6 of the following questions. Question No. 24 is compulsory. 6×2=12

16) Write any two limitations of dimensional method.
17) What are the differences between distance and displacement?
18) State Newton's second law.
19) A cyclist while negotiating a circular path with speed 10 ms^{-1} is found to bend an angle by 30° with vertical. What is the radius of the circular path? Take g = 10 ms^{-2}.
20) When will the weightlessness appear in a lift? Why?
21) Write the applications of capillarity.
22) A refrigerator has COP of 3. How much work must be supplied to a refrigerator in order to remove 200 J of heat from its interior?
23) State the law of equipartition of energy.
24) A body executing SHM, has velocity 4.4 ms^{-1} and amplitude 7 mm, calculate its time period of oscillation.

Part - III

Answer any 6 questions. Question No. 33 is compulsory. 6×3=18

25) Write any six properties of scalar product of two vectors.
26) Explain impulsive force.
27) What are the differences between elastic and inelastic collission?
28) A circular disc of mass 100 gram and diameter 10 cm is rolling on a horizontal table with velocity 20 cms^{-1}. Calculate the total energy.
29) Define escape speed. Deduce an expression for it.
30) Derive an expression for excess of pressure inside a liquid bubble.
31) Heat energy of 6×10^5 J is given to gaseous system at normal atmosophoric pressure its volume change from 4 m^3 to 6 m^3, then calculate the work done by gas and change in internal energy.
32) Write down six postulates of kinetic theory of gases.
33) Pressure gauge attached to a tube closed with lid shows 5×10^5 Nm^{-2}. When the lid is opened, the pressure gauge shows 4.5×10^5 Nm^{-2}. Calculate the velocity of flow of water.

Part - IV

Answer all the questions. 5×5=25

34) a) Obtain an expression for the time period of a simple pendulum. The time period depends upon (a) mass 'm' of the bob (b) length 'ℓ' of the pendulum and (c) acceleration due to gravity g. (constant K = 2π)

(OR)

b) State and explain Newton's law of cooling.

35) a) Derive the kinematic equations of motion for constant acceleration.

(OR)

b) State and prove work-kinetic energy theorem.

36) a) Define angle of friction and angle of repose. Show that in an inclined plane angle of friction is equal to angle of repose.

(OR)

b) Show that the oscillations of simple pendulum for small amplitudes are simple harmonic. Hence derive an expression for Time Period of oscillation.

37) a) Derive an expression for pressure exerted by molecules of gas inside a container.

(OR)

b) Define terminal velocity. Derive an equation for terminal velocity of a body using stoke's equation.

38) a) State and prove parallel axes theorem of moment of inertia.

(OR)

b) Describe the variation of acceleration due to gravity
(i) with altitude (ii) depth

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