VNR11P

Virudhunagar District

Common Half Yearly Examination - December 2024

Standard 11

PHYSICS

Time: 3.00 Hrs.   Marks: 70

Part - I

Note: i) Answer all the questions.   15×1=15
     ii) Choose the most appropriate answer from the given four alternatives and write the option code and the corresponding answer.

1) If the force is proportional to square of velocity, then the dimensions of proportionality constant is
   a) $[MLT^0]$ b) $[MLT^{-1}]$ c) $[ML^{-2}T]$ d) $[ML^{-1}T^0]$

2) An athlete covers 3 rounds on a circular track of radius 50m. The displacement of the athlete is
   a) 942 m   b) zero   c) 6π m   d) 1500 m

3) An object is dropped in an unknown planet from a height 50m, it reaches the ground in 2s. The acceleration due to gravity in this unknown planet is
   a) $20\ ms^{-2}$ b) $25\ ms^{-2}$ c) $15\ ms^{-2}$ d) $30\ ms^{-2}$

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

5) The work done by the conservative force for a closed path is
   a) always positive   b) always negative
   c) infinite   d) zero

6) The coefficient of restitution for a material body is 0.6. When it undergoes collision with another body, the type of collision is
   a) perfectly inelastic   b) perfectly elastic
   c) inelastic   d) all the above

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

8) If the mass and radius of the Earth are both doubled, then the acceleration due to gravity (g)
   a) remains same   b) g/2   c) 2g   d) 4g

9) The ratio between the time periods of a geo-stationary satellite and a polar satellite around the Earth is nearly
   a) 14.4   b) 72   c) 144   d) 7.2

10) For a given material, the rigidity modulus is $(1/3)^{rd}$ of Young's modulus. Its poisson's ratio is
    a) 0   b) 0.25   c) 0.3   d) 0.5

11) The four thermodynamical processes (A, B, C, D) one represented in a P-V diagram. In which case, the work done by the system is maximum?
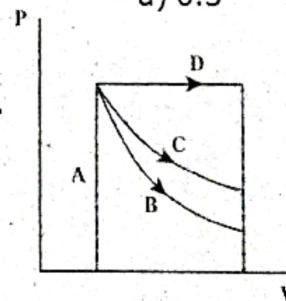
   a) A   b) B   c) C   d) D

12) Which of the following gases will have least rms speed at a given temperature?
    a) Hydrogen   b) Nitrogen   c) Oxygen   d) Carbondi oxide

13) A distant star emits radiation with maximum intensity at 350 nm. The temperature of the star is
    a) 8280 K   b) 5000 K   c) 7260 K   d) 9044 K

14) In a simple harmonic oscillation, the acceleration against displacement for one complete oscillation will be
    a) an ellipse   b) a circle   c) a parabola   d) a straight line

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15) The time period of a simple pendulum is 2 seconds. The time taken by the pendulum to displace from the mean position ($x = 0$) to $x = A/2$ is (A = Amplitude).

　　a) 1s　　　　b) $\frac{1}{6}$ s　　　　c) $\frac{1}{3}$ s　　　　d) $\frac{1}{2}$ s

Part - II

Note: 1. Answer any six questions.　　　　　　　　6×2=12
　　　　2. Question No. 24 is compulsory.

16) Write any two rules for determining significant figures.
17) Write down the Kinematic equation for angular motion.
18) State Newton's Second Law and Third Law of motion.
19) Define: Co-efficient of restitution.
20) Two point masses 3 kg and 5 kg are at 4m and 8m from the origin on x-axis. Locate the position of centre of mass of the two point masses from the origin.
21) State Newton's universal law of gravitation.
22) Distinguish between cohesive and adhesive forces.
23) The displacement equation for a particle executes SHM along x-axis is $x = A \sin \omega t + B \cos \omega t$. Prove that the equation represents SHM.
24) A refrigerator has co-efficient of performance 3. How much work must be supplied to the refrigerator in order to remove 200J of heat from its interior?

Part - III

Note: 1. Answer any six questions.　　　　　　　　6×3=18
　　　　2. Question No. 33 is compulsory.

25) Write a note on triangulation method to measure larger distances.
26) Prove that the angle of repose is equal to the angle of friction.
27) What are the differences between elastic collision and inelastic collision?
28) State Kepler's laws of planetary motion.
29) Water rises in a capillary tube to a height of 2 cm. How much will the water rise through another capillary tube whose radius is one third of the first tube?
30) State the following Laws:
　　i)　Stefan - Boltzmann's law
　　ii)　First law of thermodynamics and
　　iii)　Newton's law of cooling
31) Write a note on (i) forced oscillations and (ii) Resonance.
32) Find the 'rms' speed of oxygen molecule at 27°C. Molar mass of oxygen is 32 g mol^{-1} and universal gas constant R = 8.32 J mol^{-1} K^{-1}.
33) A particle moves along the x-axis in such a way that its co-ordinates 'x' varies with time 't' according to the equation $x = 2-5t+6t^2$. What is the initial velocity of the particle?

Part - IV

Note: Answer all the questions.　　　　　　　　5×5=25

34) a) Explain in detail the various types of errors in measurement.　　(OR)
　　　b) Obtain the Meyer's Relation.
35) a) Explain in detail the triangle law of addition of two vectors.　　(OR)
　　　b) Obtain the expression for total energy in Simple Harmonic Motion.
36) a) Explain the similarities and differences of centripetal force and centrifugal force.　　(OR)
　　　b) Derive the expression for pressure exerted by the gas on the walls of the container.
37) a) State and prove work - kinetic energy theorem.　　(OR)
　　　b) Obtain an expression for the surface tension of a liquid by capillary rise method.
38) a) State the prove parallel axes theorem.　　(OR)
　　　b) Obtain the expressions for time period of the satellite orbiting around the Earth.