I PUC ANNUAL EXAMINATION FEBRUARY/MARCH-2023

Time : 3 Hrs. 15 Mins. SUBJECT : PHYSICS (33) Max. Marks : 70

Instructions :

1) **All parts are compulsory.**
2) **Part-A questions have to be answered in the first two pages of the answer -booklet. For Part-A questions, first written - answer will be considered for awarding marks.**
3) **Answers without relevant diagram/figure/circuit wherever necessary will not carry any marks.**
4) **Direct answers to the numerical problems without detailed solutions will not carry any marks.**

PART - A

I Pick the correct option among the four given options for ALL of the following questions: 15x1=15

1) The smallest value that can be measured by the measuring instrument is called
a) Systematic error b) Least count c) accuracy d) Significant digits

2) The slope of velocity time graph gives
a) Velocity b) Position c) Displacement d) Acceleration

3) For a particle performing circular motion choose the incorrect statement from the following
a) Angular momentum is constant in magnitude but direction keeps changing
b) Magnitude of particle velocity (speed) remains constant
c) Particle velocity remains directed perpendicular to radius vector
d) Direction of acceleration keeps charging as particle moves

4) An external force is required to keep a body in motion. This is known as
a) Inertia b) Aristotile's fallacy c) Newtons I Law d) Momentum

5) During inelastic collision between two bodies which of the following quantities always remain conserved
a) Total kinetic energy b) Total Machanical energy
c) Speed of each body d) Total linear momentum

6) For which of the following does the centre of mass lie outside the body
a) A bangle b) A pencil c) A shot put d) A dice

7) Acceleration due to gravity for small heights 'h' above the earth's surface decreased by a factor
a) $\left(1-\frac{h}{R_E}\right)$ b) $\left(1-\frac{2R_E}{h}\right)$ c) $\left(1-\frac{R_E}{h}\right)$ d) $\left(1-\frac{2h}{R_E}\right)$

8) A spring is stretched by applying a load to its free end. The strain produced in the spring is
a) Volumetric b) Shear c) Longitudinal and Shear d) Longitudinal

9) Hydraulic lift based on
a) Pascal's law b) Bernoulli's principle c) Torricelli's law d) Stoke's law

10) Heat is associated with
a) Kinetic energy of random motion of molecules
b) Kinetic energy of orderly motion of molecules
c) Total Kinetic energy of random and orderly motion of molecules
d) Kinetic energy of random motion in some cases and kinetic energy of orderly motion in other

11) S.I unit of thermal conductivity
a) $m^{-1}k^{-1}$ b) $m^{-1}k^{-1}s^{-1}$ c) $Js^{-1}m^{-1}$ d) $Wm^{-1}k^{-1}$

12) Isochoric process is one in which
a) Temperature remains constant b) Volume remains constant
c) Heat remains constant d) Pressure remains constant

(P.T.O.)

13) The total internal energy of a mole of monatomic gas is

a) $\frac{3}{2}RT$ b) $\frac{5}{2}RT$ c) $\frac{2}{5}RT$ d) $\frac{2}{3}RT$

14) Motion of an oscillating liquid column in a U-tube is

a) Periodic but not simple harmonic

b) non-periodic

c) Simple harmonic and time period is independent of the density of the liquid

d) Simple harmonic and time period is directly proportional to the density of the liquid

15) The distance between a node and next antinode is

a) λ b) $\frac{3\lambda}{2}$ c) $\frac{\lambda}{4}$ d) $\frac{\lambda}{2}$

II Fill in the blanks by choosing appropriate answer given in the brackets, for ALL the questions: **5x1=5**

(Laplace, Magnus effect, callision, decreases, isolates system)

16) The total momentum of an _____ of interacting particles is conserved.

17) As depth increases from the surface the value of acceleration due to gravity _____.

18) The dynamic lift due to spinning is called _____.

19) The average distance a molecule can travel without _____ is called mean free path.

20) The modification of Newton's formula for velocity of sound is _____ correction.

PART-B

III Answer any FIVE of the following questions: **5x2=10**

21) Name any two fundamental forces in nature.

22) Distinguish between distance and displacement.

23) State and explain triangle law of vector addition.

24) What are nonconservative forces ? Give an example.

25) State and explain parallel axes theorem of moment of Inertia.

26) Write the expression for escape speed and explain the terms.

27) State first law of thermodynamics and hence write the mathematical equation.

28) State and explain law of equipartition of energy of gas molecule.

29) What are longitudinal waves ? Give an example.

PART - C

IV Answer any FIVE of the following questions: **5x3=15**

30) Check the correctness of the equation $F = \frac{mv^2}{r}$ using dimensional analysis (symbols have usual meanings)

31) Derive the expression for range of a projectile.

32) State and explain Newton's III law of motion.

33) Calculate the power of a crane in watts which lifts a mass of 100 Kg to a height of 10m in 20s.

34) Derive the relationship between torque and angular momentum.

35) Draw stress strain curve and mention permanent set, yield point and fracture point.

36) Write Bernoulli's equation and explain the terms.

37) Mention three methods of heat transfer from one place to other.

38) Obtain the equation for resultant displacement of a particle at any instant in a stationary wave.

(P.T.O.)

PART - D

V Answer any THREE of the following questions: **3x5=15**

39) What is velocity time graph ? Derive $v^2 = u^2 + 2ax$ using v-t graph.

40) State and prove the law of conservation of momentum in case of mutually colliding two bodies.

41) Show that Mechanical energy is conserved in case of freely falling body.

42) (i) State and explain Newton's law of gravitation. **(2)**

(ii) Derive the relation between acceleration due to gravity (g) and universal gravitational constant (G) **(3)**

43) Derive an expression for workdone in isothermal process.

44) (i) What is simple harmonic motion ? **(1)**

(ii) Mention any three characteristics of SHM. **(3)**

(iii) Write an expression for time period of oscillating loaded spring. **(1)**

VI Answer any TWO of the following questions: **2x5=10**

45) A cricket ball is thrown at a speed of $20\,ms^{-1}$ in a direction 30^o above the horizontal, calculate

a) The maximum height

b) The time taken by the ball to return to the same level.

46) A rope of negligible mass is wound round a hollow cylinder of mass 3 Kg and radius 40 cm. What is the angular acceleration of the cylinder if the rope is pulled with a force of 30 N ? What is the linear acceleration of the rope ? Assume that there is no slipping.

47) When 0.15 Kg of ice at 0^oC mixed with 0.30 Kg of water at 50^oC in a contained the resulting temperature is 6.7^oC. Calculate the heat of fusion of ice ($S_{water} = 4186\ J\,kg^{-1}\,K^{-1}$)

48) A train standing at the outer signal of a railway station blows a whistle of frequency 400 Hz in still air what is the frequency of whistle for a platform oberserver when the train

a) approaches the platform with speed $10\,ms^{-1}$?

b) receeds from the platform with speed $10\,ms^{-1}$?

(Speed of sound in still air = 330 ms^{-1})

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