I PUC PHYSICS FINAL EXAMINATION QUESTION BANK 2024-25

2. UNITS, MEASUREMENT AND ERRORS

VSAQs

1. Mention a physical constant having negative dimension of mass
2. Define radian / Steradian
3. Name the physical quantity having the same dimensional formula as Planck's constant
4. Write the dimensional formula of a) universal gravitational constant / coefficient ofviscosity/ stress / strain, b) Force c) Energy d) Planks constant e) Angular momentum
5. State the principle of homogeneity.

SAQs (2 & 3Marks each)

1. What are fundamental and derived physical quantities? Give examples
2. If force, length, and time are taken as fundamental quantities, what will be the dimensional formula of mass?
3. The density of oil is 0.8 gm cm^{-3}. Express the density in MKS system
4. If 'g' is acceleration due to gravity and 'λ' is wavelength. Then what physical quantity does $\sqrt{g\lambda}$ represent?
5. Convert newton into dyne / Convert Joule into erg.
6. What are the limitations of dimensional analysis?
7. What are the significant digits in 1.0023 /0.00046 / 74507.64 / 125 X 10^{22}
8. Write the uses of dimensional analysis.
9. Derive dimensionally the expression for the time period (T) of a simple pendulum depends on the length (*l*) of the simple pendulum and the acceleration due to gravity (g) at a place. Obtain an expression for (T).

3. MOTION IN STRAIGHT LINE

VSAQs

1. Can a body have acceleration without velocity? Give an example
2. Can a body have velocity without acceleration? Give an example
3. What is the ratio of the distances covered by a freely falling body in successive equal intervals of time?
4. What does the area of velocity-time curve give?
5. What does the slope of velocity-time curve give?
6. Define retardation
7. Draw Velocity-time graphs for a body at a) at rest,
b) Moving with uniform velocity, c) moving withacceleration / retardation

SAQs

1. State equations of motion for a freely falling body
2. State equations of motion for a vertically projected body
3. Define rest and motion
4. Write the equations of maximum height (H) & time of flight (T) of a vertically projected body
5. What are the uses of (1) displacement-time graph, (2) velocity-time graph?

LAQs (5 Marks each)

1. Derive $x = ut + \frac{1}{2}at^2$ / $v^2 - u^2 = 2as$ from V-t graph

2. Derive $v=u+at$ or $v=v_0+at$ by graphical method.
3. Derive the expression for relative velocity in the case of the two bodies moving in same direction?

4. MOTION IN A PLANE

VSAQs

1. What is meant by a null vector?
2. What is meant by a unit vector?
3. A body of mass 'm' is projected with velocity 'u' at an angle θ with the horizontal. What is its velocity at the top most point?
4. Give the angular velocity of hours hand in radian/hour
5. Name the force required to keep a body in uniform circular motion.
6. When the resultant of two vectors is maximum and minimum?

SAQs

1. Write laws of vector addition
2. Derive an equation for maximum height of a projectile
3. Derive an equation for time of flight of a projectile
4. Derive an equation for range of a projectile
5. State triangle law of vector addition / polygon law of vector addition.

LAQs

1. State and prove parallelogram law of vector addition.
2. What is a projectile? Show that its path is a parabola.
3. Define centripetal acceleration, derive an expression for it.

5. NEWTON'S LAWS OF MOTION

VSAQs

1. State Newton's third law of motion.
2. Write the S.I. of impulse.
3. Give example for inertia of motion.
4. What is the measure of inertia?
5. Why a cricketer lower his hand while catching a cricket ball?

SAQs

6. Show that impulse is equal to change in linear momentum.
7. Define linear momentum and write an expression for it.
8. Mention the different types of inertia of a body.
9. What is recoil velocity of a gun? Give an expression for it.
10. Explain the condition for equilibrium of a particle.
11. What is impulsive force? Give one example.
12. Why shock absorbers are fitted in vehicles?
13. Mention the types of inertia with examples.

LAQs

14. State and prove law of conservation of linear momentum.
15. Derive F = ma.
16. State Newton's third of motion and give three examples.
17. Derive the expression for maximum velocity of a vehicle on a banked road

6. WORK, ENERGY AND POWER

VSAQs

1. Define work done.
2. Mention the expression for work done in vector form.
3. When is the work done by the force zero?

4. Give an example for the zero work.
5. Give an example for the positive work done.
6. When is the work done by the force negative?
7. Mention the SI unit work done.
8. What is energy?
9. Define kinetic energy of a body.

SAQs

10. State work-energy theorem.
11. What is conservative force? Give one example.
12. What is non-conservative force? Give one example.
13. What is potential energy of a spring?
14. Define power.
15. Show that the power is equal to the dot product of force and velocity.
16. What are collisions?
17. What is elastic collision? Give one example.
18. Mention any two characteristics of elastic collisions.
19. What is inelastic collision? Give one example.
20. Mention any two characteristics of inelastic collisions.
21. Mention the differences between Scalars and vectors.
22. Explain Scalar product and Vector product

LAQs

23. Prove work-energy theorem for a constant force. And variable force
24. Derive an expression for potential energy of a spring (stretched or compressed).
25. Obtain the expressions for final velocities of two bodies in one dimensional elastic collision.

7. SYSTEM OF PARTICLES AND ROTATIONAL MOTION

VSAQs

1. What is a rigid body?
2. What is translational motion of a body? Give one example.
3. What is rotational motion of a body? Give one example.
4. What is centre of mass?
5. What is the importance of centre of mass of system of particles?
6. What is centre of gravity?
7. Define angular displacement.
8. Write the S.I. unit of angular displacement.
9. Define angular velocity.
10. Write the S.I unit of angular velocity.
11. Define angular acceleration.
12. Define torque or Define moment of a force.
13. Define angular moment.

SAQs

14. State the law of conservation of angular momentum for the system of particles (rigid body).
15. Mention the general conditions of equilibrium of a rigid body.
16. Define moment of inertia of a particle.
17. Define radius of gyration.
18. Mention the relation between linear velocity and angular velocity.
19. Mention the relation between linear acceleration and angular acceleration.
20. Mention the relation between angular momentum and moment of inertia.
21. Mention relation between torque and moment of inertia.
22. Mention the expression for Moment of inertia of uniform ring uniform disc about an access passing through it centre and perpendicular to its plane.

LAQs

23. Derive relation between torque and angular momentum.

08.GRAVITATION

VSAQs

1. Mention the relation between escape velocity and orbital velocity and explain the symbols.
2. Which physical quantity is conserved in the case of law of areas?
3. How does the escape speed of a body vary with the mass of the body?
4. How does speed of the earth changes when it is nearer to the sun?

SAQs

1. Define gravitational potential energy of a particle. Give an expression for it.
2. State and explain universal law of gravitation.
3. Derive the relation between g and G
4. State and explain Kepler's laws of planetary motion.
5. Derive an expression for orbital velocity of a satellite.
6. Derive an expression for gravitational potential energy in bringing a particle from infinity.

5 marks questions

1. Derive an expression for acceleration due to gravity at a point above the surface of the earth.
2. Derive an expression for acceleration due to gravity at a point below the surface of the earth.
3. Derive an expression for escape speed.
4. Derive the expression for total energy of staelite.

09.MECHANICAL PROPERTIES OF SOLIDS

VSAQs

1. Define stress and mention its SI unit.
2. Draw stress-strain curve.
3. Define elastic energy in a stretched wire. Mention the expression for elastic energy per unit volume of a stretched wire and explain the symbols.
4. Define Poisson's ratio.
5. Define strain.
6. State and explain Hooke's law.
7. Define modulus of elasticity or define coefficient of elasticity.
8. Define Young's modulus, bulk modulus and shear modulus of elasticity.

SAQs

1. Mention the three elastic module.
2. Explain stress-strain curve. Indicate proportionality limit yielding point and fracture point.
3. Derive the expression for energy density stored in a wire.

10.MECHANICAL PROPERTIES OF FLUIDS

VSAQs

1. Mention the SI unit of pressure.
2. Is fluid pressure scalar or vector?
3. State Pascal's law. Mention any two applications of it.
4. Define surface tension and angle of contact.
5. What is streamline flow and turbulent flow. Give an example for each.

SAQs

1. State principle of continuity. Mention equation of continuity and explain the symbols.
2. State Bernoulli's principle. Explain Bernouli's equation and give two examples.
3. Define viscosity, coefficient of viscosity and mention the SI unit of it.
4. Write the differences between streamline flow and turbulent flow.
5. State and explain Stoke's law.
6. What is Magnus effect.

LAQs

1. Derive an expression for liquid pressure at a point inside the liquid.

2. Mention an expression for excess pressure inside a liquid drop for a concave surface towards air/rarer medium and explain the symbols.
3. Mention an expression for excess pressure inside a soap bubble for a convex surface towards air/rarer medium and explain the symbols.
4. Using Torricelli theorem derive expression for speed of efflux.

11. THERMAL PROPERTIES OF MATTER

VSAQs & SAQs:

1. Define heat
2. Define temperature
3. Mention different temperature scales
4. Write the ideal gas equation
5. Define triple point of water
6. Define coefficient linear expansion
7. Define coefficient of area expansion
8. Define coefficient of volume expansion
9. At what temperature density of water is maximum?
10. Show that $\alpha_V = \frac{1}{T}$ for ideal gas
11. Define specific heat capacity of a substance. Write S.I. unit and dimensional formula for it
12. Define molar specific heat capacity of a substance. Write its S.I. unit & dimensional formula
13. Define specific heat of gas at: (a) Constant volume and (b) Constant pressure
14. Define and explain principle of calorimetry
15. What do you mean by the change of state of a substance?
16. Define fusion, vaporization, condensation and sublimation.
17. Define: (a) Latent heat of a substance, (b) Latent heat of fusion and (c) Latent heat of vaporization
18. Define conduction. Distinguish between good conductor and bad conductor of heat
19. Define and explain convection mode of heat transfer.
20. Explain the formation of: (a) Sea breeze, (b) Land breeze
21. What are thermal radiations?
22. Write the properties of thermal radiation
23. What is perfect black body?
24. Define Stefan's law of radiation. Write the value of Stefan's constant
25. Define Wien's displacement law and write the value of Wien's constant
26. What is regelation? Mention one of its practical application.

LAQs:

1. What are thermal expansions of a body?
2. Define: (a) Linear expansion, (b) Area expansion, (c) Volume expansion
3. What do you understand by thermal stress? Derive an expression for it
4. What is anomalous expansion of water? Discuss the role played by anomalous expansion of water for aquatic life
5. Explain and define thermal conductivity of a substance. Write S.I. unit and dimensional formula of thermal conductivity.
6. State and explain Newton's law of cooling.

12. THERMODYNAMICS

VSAQs:

1. State zeroth law of thermodynamics.
2. Write the equation of state of an ideal gas.
3. On which factor internal energy depends?

SAQs:

1. Define: a) isobaric, b) isochoric, c) isothermal,
   d) adiabatic process.
2. Define reversible and irreversible process. Give example for each.
3. Why $C_p > C_v$?
4. Define efficiency of heat engine.
5. State and explain first law of thermodynamics.
6. State and explain second law of thermodynamics.
7. Define molar specific heats of a gas.
8. What is cyclic process?

LAQs:

1. Derive an expression for work done in isothermal process.
2. Derive an expression for work done in adiabatic process.
3. Explain Carnot's engine. Write the expression for its efficiency.
4. Explain PV diagram of Carnot's cycle
5. Derive Cp--Cv=R

13. KINETIC THEORY OF GASES

1. Mention the equation of state of perfect gas or perfect gas equation and explain the symbols.
2. Define mean free path.
3. Mention an expression for mean free path of a gas molecule in a gas and explain the symbols used.
4. How does an average kinetic energy of gas molecule depend on the absolute temperature?
5. Define degrees of freedom.
6. Mention an expression for average kinetic energy of a molecule in terms of absolute temperature and explain the symbols.
7. write an expression for pressure exerted by ideal gas.
8. Write the relation between pressure and kinetic energy.
9. How RMS velocity of a gas depends on the temperature?

2 marks questions

1. Define rms speed of gas molecule. Mention the formula for rms speed of gas molecule and explain the symbols.
2. State the law of equipartition of energy.
3. Write the relation between pressure and kinetic energy.
4. Define degrees of freedom. Mention number of degrees of freedom for:
   (a) Monoatomic, (b) Diatomic, (c) Triatomic gases

3 marks questions

1. Give the molecular picture of matter related to kinetic theory of gases.
   Or
   State the assumptions of kinetic theory of gases.
2. Mention the number of degrees of freedoms of gas molecules and hence calculate its value for monoatomic, diatomic and triatomic molecules.
3. Show that specific heat of solids C = 3R.
4. Define different velocities of molecules and write expressions for it

14. OSCILLATIONS

1 mark questions

1. What is periodic motion? Give one example.
2. What is frequency of oscillation?

3. Define phase, frequency and time period.
4. What is oscillatory motion? Give one example.

2 marks questions

1. What is simple harmonic motion? Give one example.
2. Mention any two characteristics of SHM.
3. How does the time period of simple pendulum vary with the length of the pendulum and acceleration due to gravity?
4. Where is the potential energy of a particle executing SHM (i) minimum and (i) maximum.
5. Mention an equation for time period of oscillating loaded spring and derive the terms.

3 marks questions

1. Give the graphical representation of displacement, velocity and acceleration with time for SHM.

5 marks questions

1. Derive an expression for kinetic energy, potential energy and total energy of a particle executing SHM.
2. Derive an expression for frequency and time period of oscillating bob of simple pendulum.

15.<u>WAVES</u>

1 mark questions

1. What is a wave?
2. What is wave amplitude?
3. Mention the relation between v, f and λ.
4. Define angular wave number/propagation constant.
5. What are beats?

2 marks questions

1. Mention Newton's formula for speed of sound in gases and explain the symbols.
2. What is a stationary wave? How much energy is transported by a stationary wave?
3. How does the frequency of stretched string vibrating string depend on lengths and tension in the string?

3 marks questions

1. Give any five differences between progressive and stationary waves.
2. Give any five differences between transverse and longitudinal waves.

5 mark questions

1. Explain Laplace correction to Newton's formula.
2. Discuss the modes of vibrations of air column in a closed pipe.
3. Discuss the modes of vibrations of air column in an open pipe.
4. Give the theory of beats

   Or

   Two waves of nearly equal frequencies f_1 and f_2 of same amplitude are sounded together. Show that the beat frequency, $f_b=f_1-f_2$