

11 – STD

Short Answers :

Unit 1 - Measurement

1. Explain about types of physical quantities.
2. How will you measure diameter of moon using parallax method?
3. Write the rules for determining significant figures.
4. What are the limitations of dimensional analysis?
5. Define precision and accuracy. Explain with one example.

Unit 2 - Kinematics

6. What is meant by cartesian coordinate system?
7. Define a vector . Give examples.
8. Define a scalar. Give examples.
9. Write a short note on scalar(dot) product between two vectors.
10. Write a short note on vector(cross) product between two vectors.
11. How do you deduce that two vectors are perpendicular?
12. Define displacement and distance.
13. Define velocity and speed.
14. Define acceleration.
15. What is the difference between velocity and average velocity ?
16. Define radian.
17. Define angular displacement and angular velocity.
18. What is non uniform circular motion?
19. Write the kinematic equation for kinematic equation for angular motion.
20. Write down the expression for angle made by resultant acceleration and radius vector in the non uniform circular motion.

Unit 3 - Laws of Motion

21. Explain the concept of inertia. Write two examples each for inertia of motion , inertia of rest and inertia direction.
22. State Newton's second law.
23. Define one newton.
24. Show that impulse is the change of momentum.
25. Using free body diagram , show that it is easy to pull an object than to push it.
26. Explain various types of friction. Suggest a few methods to reduce friction.
27. What is the meaning by “ pseudo force ” ?
28. State the empirical laws of static and kinetic friction.
29. State Newton's third law.
30. What are inertial frames?
31. Under what condition will a car skid on a levelled circular road?

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Unit – 4 Work , Energy And Power

32. Explain how the definition of work in physics is different from general perception.
33. Write various types of potential energy . Explain the formulae.
34. Write the differences between conservative and non – conservative forces. Give two examples each.
35. Explain the characteristics of elastic and inelastic collisions.
36. Define the following
 - a) Coefficient of restitution
 - b) Power
 - c) Law of conservation of energy
 - d) Loss of kinetic energy in inelastic collision

Unit – 5 Motion of system of particles & Rigid bodies

37. Define centre of mass.
38. Find out the centre of mass for the given geometrical structures
 - a) Equilateral triangle
 - b) Cylinder
 - c) Square
39. Define torque and mention its unit.
40. What are the conditions in which force can not produce torque?
41. Give any two examples of torque in day – to – day life.
42. What is the relation between torque and angular momentum.
43. What is equilibrium ?
44. How do you distinguish between stable and unstable equilibrium ?
45. Define couple.
46. State principle of momentum.
47. Define centre of gravity.
48. Mention any two physical significance of moment of inertia.
49. What is radius of gyration ?
50. State conservation of angular momentum.
51. What are the rotational equivalents for the physical quantities i) Mass and ii) Force.
52. What is the condition for pure rolling ?
52. What is the difference between sliding and slipping ?

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Long Answer :

Unit 1 - Measurement

1. i) Explain the use of screw gauge and vernier calliper in measuring small distances.
ii) Write a short note on triangulation method and radar method to measure larger distance.
2. Explain in detail the various types of errors.
3. What you mean by propagation error? Explain the propagation of error in addition and multiplication.
4. Write short notes on the following a) Unit b) Rounding off c) Dimensionless quantities
5. Explain the principle of homogeneity of dimensions. What are its uses? Give examples.

Unit 2 - Kinematics

6. Explain in detail the triangle law of addition.
7. Discuss the properties of scalar and vector products.
8. Derive the kinematics equations of motion for constant acceleration.
9. Derive the equations of motion for a particle a) falling vertically b) projected vertically
10. Derive the equation of motion, range and maximum height reached by the particle thrown at an oblique angle θ with respect to the horizontal direction.
11. Derive the expression for centripetal acceleration.
12. Derive the expression for total acceleration in the non uniform circular motion.

Unit 3 - Laws of Motion

13. Prove the law of conservation of linear momentum. Use it to find the recoil velocity of a gun when a bullet is fired from it.
14. What are concurrent forces? State Lami's theorem.
15. Explain the motion of blocks connected by a string in i) Vertical motion ii) Horizontal motion
16. Briefly explain the origin of friction. Show that in an inclined plane, angle of friction is equal to angle of repose.
17. State Newton's three laws and discuss their significance.
18. Explain the similarities and differences of centripetal and centrifugal forces.
19. Briefly explain centrifugal force with suitable examples.
20. Briefly explain rolling friction
21. Describe the method of measuring angle of repose.
22. Explain the need for banking of tracks.
23. Calculate the centripetal acceleration of moon towards the earth.

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Unit – 4 Work , Energy And Power

24. Explain with graphs the difference between work done by a constant force and by a variable force.
25. State and explain work energy principle. Mention any three examples for it.
26. Arrive at an expression for power and velocity. Give some examples for the same.
27. Arrive at an expression for elastic collision in one dimension and discuss various cases.
28. What is inelastic collision ? In which way it is different from elastic collision . Mention few examples in day – to – day life for inelastic collision.

Unit – 5 Motion of system of particles & Rigid bodies

29. Explain the types of equilibrium with suitable examples.
30. Explain the method to find the centre of gravity of a irregularly shaped lamina.
31. Explain why a cyclist bends while negotiating a curve road ? Arrive at the expression for angle of bending for a given velocity.
32. Derive the expression for moment of inertia of a rod about its centre and perpendicular to the rod.
32. Derive the expression for moment of inertia of a uniform ring about an axis passing through the centre and perpendicular to the plane.
33. Derive the expression for moment of inertia of a uniform disc about an axis passing through the centre and perpendicular to the plane.
34. Discuss the conservation of angular momentum with example.
35. State and prove parallel axis theorem.
36. State and prove perpendicular axis theorem.
37. Discuss rolling on inclined plane and arrive at the expression for the acceleration.

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Short Answers :

Unit 6 - Gravitation

1. State Kepler's three laws.
2. State Newton's universal law of gravitation.
3. Will the angular momentum of a planet be conserved ? Justify your answer.
4. Define the gravitational field. Give its unit.
5. What is meant by superposition of gravitational field?
6. Define gravitational potential energy.
7. Is potential energy the property of a single object ? Justify.
8. Define gravitational potential.
9. What is the difference between gravitational potential and gravitational potential energy ?
10. What is meant by escape speed in the case of the earth?
11. Why is the energy of a satellite (or any other planet) negative ?
12. What are geostationary and polar satellite ?
13. Define weight.
14. Why is there no lunar eclipse and solar eclipse every month ?
15. How will you prove that earth itself is spinning?

Unit 7 - Properties Of Matter

16. Define stress and strain.
17. State Hooke's law of elasticity.
18. Define Poisson's ratio.
19. Explain elasticity using inter molecular forces.
20. Which one of these is more elastic , steel or rubber ? Why ?
21. A spring balance shows wrong readings after using for a long time . Why ?
22. What is the effect of temperature on elasticity ?
23. Write down the expression for the elastic potential energy of a stretched wire?
24. State Pascal's law in fluids.
25. State Archimede's principle.
26. What you mean by upthrust or buoyancy?
27. State law of floatation.
28. Define coefficient of viscosity of a liquid.
29. Distinguish between streamlined flow and turbulent flow.
30. What is Reynold's number ? Give its significance.
31. Define terminal velocity.
32. Write down the expression for the Stoke's force and explain the symbols involved in it.
33. State Bernoulli's theorem.

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34. What are the energies possessed by a liquid ? Write down their equation.
35. Two streamlines cannot cross each other. Why ?
36. Define surface tension of a liquid. Mention its S.I unit and dimension.
37. How is surface tension related to surface energy?
38. Define angle of contact for a given pair of solid and liquid.
39. Distinguish between cohesive and adhesive forces.
40. What are the factors affecting the surface tension of a liquid ?
41. What happens to the pressure inside the soap bubble when air is blown into it ?
42. What you mean by capillarity or capillary action ?
43. A drop of oil placed on the surface of water spreads out. But a drop of water placed on oil contracts to a spherical shape. Why ?
44. State the principle and usage of Venturi meter.

Unit 8 - Heat And Thermodynamics

45. ' An object contains more heat ' – is it a right statement ? If not why ?
46. Obtain an ideal gas law from Boyle's and Charles' law.
47. Define one mole.
48. Define specific heat capacity and give its unit.
49. Define molar specific heat capacity.
50. What is an thermal expansion ?
51. Give the expression for linear , area and volume thermal expansion.
52. Define latent heat capacity. Give its unit.
53. State Stefan – Boltzmann law.
54. What is Wein's law?
55. Define thermal conductivity . Give its unit .
56. What is a black body ?
57. What is a thermodynamic system ? Give examples.
58. What are the types of thermodynamic system ?
59. What is meant by thermal equilibrium ?
60. What is meant by state variable ? Give example.
61. What are intensive and extensive variables ? Give example.
62. What is an equation of state ? Give example.
63. State zeroth law of thermodynamics.
64. Define internal energy of the system.
65. Are internal energy and heat energy are the same ? Explain.
66. Define one calorie.
67. Did joule converted mechanical energy to heat energy ? Explain.
68. State first law of thermodynamics.
69. Can we measure the temperature of the of the object by touching it ?
70. Give the sign convention for Q and W?
71. Define the quasi – static process.
72. Give the expression for work done by the gas.
73. What is PV diagram ?

74. Explain why the specific heat capacity at constant pressure is greater than specific heat capacity at constant volume.
75. Give the equation of state for an isothermal process.
76. Give an expression for work done in an isothermal process.
77. Express the change in internal energy in terms of molar specific heat capacity.
78. Apply the first law for a) isothermal process b) adiabatic process c) isobaric process.
79. Give the equation of state for an adiabatic process.
80. Give the equation of state for an isochoric process.
81. If the piston of a container is pushed fast inward. Will the ideal gas equation be valid in the intermediate stage ? If not why ?
82. Draw the PV diagram for a) isothermal process b) adiabatic process c) isobaric process d) isochoric process.
83. What is a cyclic process ?
84. What is meant by a reversible and irreversible process ?
85. State Clausius form of the second law of thermodynamics.
86. State Kelvin – Planck statement of second law of thermodynamics.
87. Define heat engine.
88. What are the processes involve in a Carnot engine?
89. Can the given heat energy be completely converted to work in a cyclic process? If not , when can the heat can completely converted to work ?
90. State the second law of thermodynamics in terms of entropy.
91. Why does heat flow from a hot object to a cold object ?
92. Define the coefficient of performance.

Unit 9 - Kinetic Theory Of Gases

93. What is the microscopic origin of pressure ?
94. What is the microscopic origin of temperature ?
95. Why moon has no atmosphere ?
96. Write the expression for rms speed , average speed and most probable speed of a gas molecule.
97. What is the relation between the average kinetic energy and pressure ?
98. Define the term degrees of freedom.
99. State the law of equipartition of energy.
100. Define mean free path and write down its expression.
101. Deduce Charle's law based on kinetic theory .
102. Deduce Boyle's law based on kinetic theory .
103. Deduce Avogadro's law based on kinetic theory .
104. List the factors affecting the mean free path.
105. What is the reason for Brownian motion ?

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Unit 10 - Oscillations

106. What is meant by periodic and non – periodic motion ? Give any two examples for each motion .
107. What is meant by force constant of a spring ?
108. Define time period of simple harmonic motion.
109. Define frequency of simple harmonic motion.
110. What is an epoch ?
111. Write a short notes on two springs connected in series .
112. Write a short notes on two springs connected in parallel .
113. Write down the time period of simple pendulum ?
114. State the laws of simple pendulum .
115. Write down the equation for time period linear harmonic oscillator.
116. What is meant by free oscillation ?
117. Explain damped oscillations. Give an example.
118. Explain forced oscillations. Give an example.
119. What is meant by maintained oscillation ? Give an example .
120. Explain resonance . Give an example.

Unit 11 - Waves

121. What is meant by waves ?
122. Write down the types of waves.
123. What are the transverse waves . Give one example.
124. What are longitudinal waves . Give one example.
125. Define wavelength.
126. Write down the relation between frequency , wavelength and velocity of a wave.
127. What is meant by interference of waves ?
128. Explain the beat phenomenon.
129. Define intensity of sound and loudness of sound .
130. Explain Doppler effect.
131. Explain red shift and blue shift in Doppler effect.
132. What is meant by end correction in resonance air column apparatus?
133. Sketch the function $y = x + a$. Explain your sketch.
134. Write down the factors affecting velocity of sound in gases.
135. What is meant by an echo ? Explain.

Long Answers :

Unit 6 - Gravitation

1. Discuss the important features of the law of gravitation.
2. Explain how Newton arrived at his law of gravitation from Kepler's third law.
3. Explain how Newton verified his law of gravitation.
4. Derive the expression for gravitational potential energy.
5. Prove that at points near the surface of the earth, the gravitational potential energy of the object is $U = m g h$.
6. Explain in detail the idea of weightlessness using lift as an example.
7. Derive an expression for escape speed.
8. Explain variation of g with latitude.
9. Explain variation of g with altitude.
10. Explain variation of g with depth from the earth surface.
11. Derive the time period of satellite orbiting the earth.
12. Derive an expression for energy of satellite.
13. Explain in detail the geostationary and polar satellite.
14. Explain how the geocentric theory is replaced by heliocentric theory using the idea of retrograde motion of planets.
15. Explain the Eratosthenes method of finding the radius of earth.
16. Describe the measurement of earth shadow (umbra) radius during total lunar eclipse.

Unit 7 - Properties Of Matter

17. State Hooke's law and verify it with the help of an experiment.
18. Explain the different types of modulus of elasticity.
 19. Derive an expression for the elastic energy stored per unit volume of a wire.
 20. Derive an equation for the total pressure at a depth ' h ' below the liquid surface.
21. State and prove Pascal's law in fluids.
22. State and prove Archimedes principle.
23. Derive an expression for the terminal velocity of a sphere moving in a high viscous fluid using Stokes force.
24. Derive Poiseuille's formula for the volume of a liquid flowing per second through a pipe under streamlined flow.
25. Obtain an expression for the excess of pressure i) liquid drop ii) liquid bubble iii) soap bubble
26. What is capillarity ? Obtain an expression for the surface tension of a liquid by capillary rise method.
27. Obtain an equation of continuity for a flow of fluid on the basis of conservation of mass.
28. State and prove Bernoulli's theorem for a flow of incompressible, non - viscous and streamlined flow of fluid.
29. Describe the construction and working of Venturi meter and obtain an equation for the volume of liquid flowing per second through a wider entry of the tube.

Unit 8 - Heat And Thermodynamics

30. Explain the meaning of heat and work with suitable examples.
31. Discuss the ideal gas laws.
32. Explain in detail the thermal expansion.
33. Describe the anomalous expansion of water . How is it helpful in our lives ?
34. Explain the Calorimetry and derive an expression for final temperature when two thermodynamics systems are mixed.
35. Discuss the various modes of heat transfer.
36. Explain in detail Newton's law of cooling.
37. Explain Wein's law and why our eyes are sensitive only to visible rays ?
38. Discuss the a) Thermal equilibrium b) Mechanical equilibrium c) Chemical equilibrium d) Thermodynamic equilibrium
39. Explain Joule's experiment of the mechanical equivalent of heat.
40. Derive the expression for the work done in a volume change in a thermodynamic system.
41. Derive Mayer's relation for an ideal gas.
42. Explain in detail the isothermal process.
43. Derive the work done in an isothermal process.
44. Explain in detail the adiabatic process.
45. Derive the work done in adiabatic process.
46. Explain in detail the isobaric process and d derive the work done in isobaric process.
47. Explain in detail the isochoric process.
48. What are the limitations of the first law of thermodynamics ?
49. Explain the heat engine and obtain its efficiency .
50. Explain in detail Carnot heat engine.
51. Derive the expression for Carnot engine efficiency.
52. Explain the second law of thermodynamics in terms of entropy.
53. Explain in detail the working of a refrigerator.

Unit 9 - Kinetic Theory Of Gases

54. Write down the postulates of kinetic theory of gases.
55. Derive the expression of pressure exerted by the gas on the walls of the container.
56. Explain in detail the kinetic interpretation of temperature .
57. Describe the total degrees of freedom for monoatomic molecule , diatomic molecule and triatomic molecule.
58. Derive the ratio of two specific heat capacities of monoatomic molecule , diatomic molecule and triatomic molecule.
59. Explain in detail the Maxwell Boltzmann distribution function.
60. Derive the expression for mean free path of the gas.
61. Describe the Brownian motion.

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Unit 10 - Oscillations

62. What is meant by simple harmonic oscillation ? Give examples and explain why every simple harmonic motion is a periodic motion whereas the converse need not be true.
63. Describe simple harmonic motion as a projection of uniform circular motion.
64. What is meant by angular harmonic oscillation ? Compute the time period of angular harmonic oscillation.
65. What is meant by angular harmonic oscillation ? Compute the time period of angular harmonic oscillation.
66. Write down the differences between simple harmonic motion and angular harmonic motion.
67. Discuss the simple pendulum in detail.
68. Explain the horizontal oscillations of a spring.
69. Explain the vertical oscillations of a spring.
70. Write a short notes on the oscillations of liquid column in U - tube.
71. Discuss in detail the four different types of oscillations.

Unit 11 - Waves

72. Discuss how ripples are formed in still water.
73. Briefly explain the differences between travelling waves and standing waves.
74. Show that the velocity of a travelling wave produced in a string is $v = T / \mu$.
75. Describe Newton's formula for velocity of sound waves in air and also discuss the Laplace's correction.
76. Write short notes on reflection sound waves from plane and curved surfaces.
77. Briefly explain the concept of superposition principle.
78. Explain how the concept of interference of waves is formed.
79. What are stationary waves ? Explain the formation of stationary waves and also write down the characteristics of stationary waves.
80. Discuss the laws of transverse vibrations in stretched strings .
81. Explain the concepts of fundamental frequency , harmonics and overtones in detail.
82. What is a sonometer ? Give its construction and working . Explain how to determine the frequency of tuning fork using sonometer.
83. Write a short notes on intensity and loudness .
84. Explain how overtones are produced in a) closed organ pipe b) open organ pipe.
85. How will you determine the velocity of sound using resonance air column apparatus?
86. What is meant by Doppler effect ? Discuss the following
 - (1) Source in motion and observer at rest.
 - i) Source moves towards observer
 - ii) Source moves away from observer

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(2) Observer in motion and Source at rest.

- i) Observer moves towards Source
- ii) Observer resides away from Source

(3) Both are in motion

- i) Source and observer approach each other
- ii) Source and observer resides form each other
- iii) Source chase observer
- iv) Observer chases Source

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