TELANGANA MODEL SCHOOL AND JUNIOR COLLEGES
IPE IMPORTANT QUESTIONS (CHAPTER WISE)
PHYSICS FIRST YEAR
LONG ANSWER QUESTIONS

WORK POWER ENERGY

***1. State and prove law of conservation of energy in case of a freely falling body.

A machine gun fires 360 bullets per minute and each bullet travels with a velocity of 600m/s.If the mass of each bullet is 5gm, find the power of the machine gun?

***2. Develop the notions of work and kinetic energy and show that it leads to work energy theorem.

.   A pump is required to lift 600kg of water per minute from a well 25m deep and to eject it with a speed of 50m/s. Calculate the power required to perform the above task?

***3. What are collisions? Explain the possible types of collisions? Develop the theory of one-dimensional elastic collision.

OSCILLATIONS

*** 4. Define simple harmonic motion. Show that the motion of (point) projection of a particle performing uniform circular motion, on any diameter, is simple harmonic.

    What is the length of simple pendulum which ticks seconds.

*** 5. Show that the motion of a simple pendulum is simple harmonic and hence derive an equation for its time period. What is seconds pendulum?

*** 6. Derive the equation for the kinetic energy and potential energy of a simple harmonic oscillator and show that the total energy of a particle in simple harmonic motion is constant at any point on its path.

THERMODYNAMICS

*** 7. Explain reversible and irreversible processes. Describe the working of Carnot engine. Obtain an expression for the efficiency.

*** 8. State second law of thermodynamics. How is heat engine different from a refrigerator.

SHORT ANSWER QUESTIONS

MOTION IN A STRAIGHT LINE

*** 1.A ball is dropped from the roof of a tall building and simultaneously another ball is thrown horizontally with some velocity from the same roof. Which ball lands first? Explain your answer

***2. Can the velocity of an object be in a direction other than the direction of acceleration of the object? If so, give an example.

***3. A man runs across the roof of a tall building and jumps horizontally on to the roof of an adjacent building. If the speed is 9 m/s and the horizontal distance between the buildings is 10 m and the height difference between the roofs is 9m, will he be able to land on the next building 9 (take g =10m/s^2)

***4. A car travels the first third of a distance with a speed of 10Kmph, the second third at 20Kmph and the last third at 60 Kmph. What is the mean speed over the entire distance?

**5. A parachutist flying in an aero plane jump when it is at a height of 3 Km above the ground. He opens his parachute when he is about 1 Km above ground. Describe his motion.

**6. Explain the terms average velocity and instantaneous velocity. When are they equal?

**7. Derive S = ut +1/2 at^2 using graphical method.

MOTION IN A PLANE

***8. Derive an expression for the magnitude and direction of the resultant of two vectors which are adjacent sides of a parallelogram?

***9. Show that the trajectory of an object thrown at certain angle with horizontal is a parabola.

***10. If | a + b |=| a- b | , then prove that the angle between a and b is 90^0.

***11. Define unit vector, null vector, and position vector.

* 12 Show that maximum height and range of projectile are u2SinΘ/2g , u2Sin2Θ/g .

* 13. A force 2i + j – k newton acts on a body which is initially at rest. At the end of 20 seconds the velocity of the body is 4i + 2j – 2k m/s. What is the mass of the body?

LAWS OF MOTION

*** 14. Mention the methods to decrease the friction.

*** 15. Explain advantages and disadvantages of friction.

*** 16. State the laws of rolling friction.

** 17. Define the terms momentum and impulse. State and explain the law of conservation of linear momentum. Give examples.

**18. Why pulling the lawn roller is preferred than pushing the lawn roller?

**19. Define the terms momentum and impulse. State and explain the law of conservation of linear momentum. Give examples.

** 20. Explain the terms limiting friction, dynamic friction and rolling friction.

**21. Why are shock absorbers used in motorcycles and cars?

SYSTEM OF PARTICLES

*** 22. Distinguish between center of mass and center of gravity.

*** 23.Define vector product. Give its properties and two examples.

*** 24. Define angular velocity. Derive v= rω? .

*** 25. Define angular acceleration and torque. Establish the relation between angular acceleration and torque

** 26. State and prove the principle of conservation of angular momentum. Explain the principle of conservation of angular momentum with examples.

* 27. Explain about the centre of mass of earth-moon system and its rotation around the sun

GRAVITATION

*** 28. What is escape velocity? Obtain an expression for it.

*** 29. What is orbital velocity? Obtain an expression for it.

*** 30. What is a Geo – stationary satellite? State its uses.

*** 31. State Kepler's laws of planetary motion

** 32. Deduce the relation between "g" at the surface of a planet and "G"

MECHANICAL PROPERIES OF SOLIDS

*** 33. Describe the behavior of a wire under gradually increasing load.

*** 34. Define Young's modulus, Bulk modulus and Shear modulus.

*** 35. Define Stress and explain the types of stress.

*** 35. Define Strain and explain the types of strain.

** 36. Define strain energy and derive the equation strain energy.

THERMAL PROPERIES OF MATTER

*** 37. In what way is the anomalous behavior of water advantageous to aquatic animals?

*** 38. Explain conduction, convection and radiation with examples

*** 39. Pendulum clocks generally go fast in winter and slow in summer. Why?

** 40. Explain Celsius and Fahrenheit scales of temperature. Obtain the relation between Celsius and Fahrenheit scales of temperature.

VERY SHORT ANSWER QUESTIONS

CHAPTER: 1 PHYSICAL WORLD

***1. What is Physics?

***2. What is the discovery of C.V. Raman?

***3. What are the fundamental forces in nature?

***4. What is the contribution of S. Chandra Sekhar to Physics?

CHAPTER 2: UNITS AND MEASUREMENTS

*** 5 Distinguish between accuracy and precision.?

*** 6. How can systematic errors be minimized or eliminated?

*** 7. Distinguish between fundamental units and derived units.?

*** 8. Why do we have different units for the same physical quantity?

** 9. What are the different types of errors that can occur in a measurement?

** 10. What is dimensional analysis?

** 11. Express unified atomic mass in Kg.

CHAPTER: 4 MOTION IN A PLANE

*** 12 The vertical component of a vector is equal to its horizontal component. What is the angle made by the vector with X-axis?

*** 13. Two forces of magnitudes 3 units and 5 units act at 600 with each other. What is the magnitude of their resultant?

*** 14. $A= i- j$. What is the angle between the vector and x-axis?

*** 15. When two right angled vectors of magnitude 7 units and 24 units combine, what is the magnitude of their resultant?

*** 16. If P=2i + 4j + 14k and Q=4i + 4j + 10k find the magnitude of P+Q.

** 17. What is the acceleration of a projectile at the top of its trajectory?

** 18. Can two vectors of unequal magnitude add up to give the zero vector? Can three unequal vectors add up to give the zero vector?

CHAPTER:5 LAWS OF MOTION

*** 19. What is inertia? What gives the measure of inertia?

*** 20. When a bullet is fired from a gun, the gun gives a kick in the backward direction. Explain.

*** 21. If a bomb at rest explodes into two pieces, the pieces must travel in opposite directions. Explain

*** 22. Why does the car with a flattened tire stop sooner than the one with inflated tires?

*** 23. A horse must pull harder during the start of the motion than later. Explain.

*** 24. Can the coefficient of friction be greater than one?

** 25. What happens to the coefficient of friction if weight of the body is doubled.

** 26. Define force. What are the basic forces in nature?

CHAPTER: 11 MECHANICAL PROPERITIES OF FLUIDS

*** 27 What is the principle behind the carburettor of an automobile.

*** 28. Why are drops and bubbles spherical?

*** 29. Give the expression for the excess pressure in an air bubble inside the liquid.

*** 30. Give the expression for the excess pressure in a liquid drop.

  *** 31. Give the expression for the excess pressure in a soap bubble in air.?

** 32. Define coefficient of viscosity. Write its units and dimensional formula?

 ** 33. What is magnus effect?

  ** 34. What is angle of contact?

  ** 35. What are water proofing agents and water wetting agents? What do they do?

 ** 36. Define viscosity. What are its units and dimensions?

** 37. When water flows through a pipe, which of the layers moves fastest and slowest.

** 38. Define average pressure. Mention its units and dimensions.

CHAPTER :12 THERMAL PROPERITIES OF MATTER

*** 39. Distinguish between heat and temperature.

*** 40. Can a substance contract on heating? Give an example.

 *** 41. Why gaps are left between rails on a railway track?

  *** 42. Ventilators are provided in rooms just below the roof. Why?

 *** 43. The roof of building are often painted white during summer. Why?

*** 44. Why utensils are coated black? Why the bottom of the utensils is made of copper?

*** 45. What is greenhouse effect?

*** 46. State Wein's displacement law?

** 47. What is latent heat of fusion?

** 48. What is latent heat of vaporization?

** 49. State newton's law of cooling?

** 50. Does a body radiate heat at 0 K? Does it radiate heat at 00C.

 ** 51. State the conditions under which Newton's law of cooling is applicable.

 ** 52. State the different modes of transmission of heat. Which of these modes require medium?

CHAPTER: 14 KINETIC THEOR OF GASES

*** 53. Define mean free path?

*** 54. State Boyle's Law and Charles Law.

*** 55. State Dalton's law of partial pressures.?

*** 56. When does a real gas behave like an ideal gas?

*** 57. The absolute temperature of a gas is increased 3 times. What will be the increase in rms velocity of the gas molecule?

*** 58. What is the law of equipartition of energy?

MOST IMPORTANT PROBLEMS

1.The error in measurement of radius of a sphere is 1%. What is the error in the measurement of volume?

2.The percentage error in the mass and speed are 2% and 3%respectively. what is the maximum error in kinetic energy?

3.State the number of significant figures in the following

a) 6729 b) 0 .024 c) 0 .08240 d) 4.57 x 10^6

4.A batsman hits back a ball straight in the direction of bowler without changing the initial speed of 12m/s. If the mass of the ball is 0.15 kg determine the impulse.

5.Calculate the time needed for a net force of 5N to change the velocity of a 10Kg mass by 2m/s.

6.Find the torque of a force 7i+3j-5k about the origin. The force acts on a particle whose position vector is i-j+k.

7.Find the scalar and vector products of two vectors a=3i-4j+5k and b =-2i+j-3k

8.Calculate the change in the length of a simple pendulum of length 1m, when its period of oscillation changes from 2s to 1.5 s?

9.what happens to the time period of a simple pendulum if its length is increased to four times?

10.The mass and radius of a planet are doubled that of the earth. If the time period of simple pendulum on the earth is T, Find the time period on the planet?

11.If the diameter of a soap bubble is 10mm and its surface tension is 0.04 N/m. Find the excess pressure inside the bubble.

12.If the maximum intensity of radiation for a black body is found at 2.65 micro meter. what is the temperature of the radiating body (Wein's constant =2.9 x 10^{-3}mK)

13. Find the center of mass of three particles at the vertices of an equilateral triangle. The masses of the particles are 100g, 150g, and 200g respectively. Each side of the equilateral triangle is 0.5m long.

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