

AL HUDA SCIENCE ACADEMY

Prepared By: Sir Muhammad Usman Ali

Guess Paper of Physics Class 11th

اللہ سب کو سچ کہنے کی ہمت عطا فرمائیں۔ آمین

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11th Class Physics Important Short Questions

Question No. 2

1. How many significant figures should be retained in multiplying or dividing several numbers?
2. How many significant figures should be retained in adding or subtracting numbers?
3. Kinetic energy of a body of mass m moving with speed v is given by $\frac{1}{2}mv^2$. What are the dimensions of kinetic energy?
4. Write the dimensions of angular velocity.
5. State the right-hand rule for the vector product of two vectors.
6. Define impulse and show how it is related to momentum.
7. Differentiate between an elastic and an inelastic collision.
8. Show that the rate of change in momentum is equal to the force applied.
9. State the law of conservation of linear momentum.
10. Show that the range of a projectile is maximum at an angle of 45° .
11. What is the effect of changing the position of a diver while diving in the pool?
12. Mass is a measure of inertia in linear motion. What is its analogue in rotational motion?
13. Why is it harder for a car to take a turn at higher speed than at lower speed?
14. When a moving car turns around a corner to the left, in what direction do the occupants tend to fall?
15. How does an astronaut feel weightlessness while orbiting the Earth?
16. Calculate the power of a crane in kilowatts which lifts a mass of 1000 kg to a height of 100 m in 20 seconds.
17. When will you say that a force is conservative?
18. Why is work done against friction non-conservative?
19. Calculate the volume of a sheet with length 2.03 m, breadth 1.22 m, and thickness 0.95 cm.
20. Give the correct number of significant figures for 0.0054 m.
21. Give the correct number of significant figures for 40.0 m.
22. Give the correct number of significant figures for 8.20×10^{-3} m.
23. The mass of a metal box is 3.25 kg. Two coins of masses 10.01 g and 10.02 g are added. What is the total mass?
24. Can a measurement be precise but not accurate?

25. What is the formula for calculating total uncertainty when multiplying two measured values?
26. A car travelling at 10 ms^{-1} accelerates uniformly at 2 ms^{-2} . Calculate its velocity after 5 s.
27. A car travels with initial velocity 15 ms^{-1} . It accelerates at 2 ms^{-2} for 4 seconds. Find the displacement.
28. An iron ball of mass 1 kg is dropped from a tower and reaches the ground in 3.34 s. Find the height of the tower.
29. A 1500 kg car has its velocity reduced from 20 ms^{-1} to 15 ms^{-1} in 3.0 s. How large was the average retarding force?
30. What is the effect of air resistance on projectile motion?
31. Why does a coasting rotating system slow down as water drips into the beaker?
32. Planets move around the Sun in elliptical orbits. Why does orbital velocity increase when nearer the Sun?
33. An electric fan rotating at 3 rev s^{-1} is switched OFF. It comes to rest in 18.0 s. Find its deceleration.
34. A ball is swung in a vertical circle. What is the tension at the top (Point A)?
35. Can you prove that the work done along a closed path by the gravitational force is zero?
36. Does the international space station have gravitational P.E. and/or Kinetic energy?
37. Give the answer to appropriate significant figures: $602 \text{ kg} + 36.02 \text{ kg} + 54.1 \text{ kg}$.
38. How many significant figures are in the measurement 0.00560 g ?
39. Define Scalar Product.
40. Define Vector Product.
41. What is the work done when the angle between force and displacement is 90° ?
42. Derive the first equation of motion $v_f = v_i + at$.
43. Derive the second equation of motion $S = v_i t + \frac{1}{2}at^2$.
44. Derive the third equation of motion $2aS = v_f^2 - v_i^2$.
45. What is the trajectory of a projectile?
46. What is the time of flight of a projectile?
47. What is the maximum height of a projectile?
48. Define Linear Momentum.
49. State Newton's Second Law in terms of momentum.

50. What is a radian?
51. Define Angular Velocity.
52. Define Angular Acceleration.
53. What is the relationship between linear and angular velocity?
54. What is the relationship between linear and angular acceleration?
55. Define Centripetal Force.
56. What is the critical velocity for a satellite?
57. What is Moment of Inertia?
58. Define Angular Momentum (L).
59. State the Law of Conservation of Angular Momentum.
60. What is a Gyroscope?
61. What is Artificial Gravity?
62. Define Work.
63. What is the unit of Work?
64. How is work calculated for a variable force?
65. Define Escape Velocity.
66. State the Work-Energy Theorem.
67. Define Absolute Potential Energy.
68. What is Stress?
69. What is Strain?
70. Define Young's Modulus.
71. What is the Elastic Limit?
72. Differentiate between Ductile and Brittle substances.
73. What is Strain Energy?
74. Define Ultimate Tensile Strength (UTS).
75. What happens when the angle of projection is 90° for a projectile?
76. A ball is thrown at 30° with speed 30 ms^{-1} . Find maximum height.
77. Find the horizontal range for the ball in Q.NO.76.
78. Find the time of flight for the ball in Q.NO.76.

79. Why are banked tracks used?
80. How does a centrifuge work?
81. What is the frequency of rotation for a space station to create artificial gravity (g)?
82. Calculate the orbital speed of a satellite 200 km above Earth (Radius 6400 km).
83. What is the moment of inertia of a solid sphere?
84. What is the moment of inertia of a thin rod?
85. What is the moment of inertia of a solid disc/cylinder?
86. What is the moment of inertia of a thin ring or hoop?
87. A 70g ball collides with a 140g ball at rest. Initial velocity 9 ms^{-1} . Find velocity of first ball after elastic collision.
88. Find velocity of the second ball in Q.NO.87.
89. What is the rotational analogue of Newton's second law ($F = ma$)?
90. What is the relationship between torque and moment of inertia?
91. Explain how a diver uses conservation of angular momentum.
92. A stone whirled in a vertical circle breaks the string. Why?
93. What determines the best position to hold an umbrella in rain with wind?
94. Define Power.
95. A machine gun fires 6 bullets/min, velocity 700 ms^{-1} , mass 40g. Find Power.
96. What is the dimension of Force?
97. What is the dimension of Pressure?
98. What is the dimension of Power?
99. What is the dimension of Density?
100. Check the homogeneity of $S = vit + \frac{1}{2}at^2$.
101. What are the dimensions of the Gravitational Constant (G)?
102. How does instrumental uncertainty arise in measurements?
103. A person falling on a heap of sand does not get hurt as much as falling on a concrete floor. Why?
104. Does a moving object have impulse?
105. Why is electrical power required when an elevator is descending?

106. What is the sign of work done when a body is lifted vertically upward?
107. Is the total mechanical energy conserved for a body falling in air?
108. A loaf of bread is lying on a rotating plate. If a crow picks it up, what happens to the plate's rotation?
109. What will be the time period of a simple pendulum in an artificial satellite?
110. Is the motion of a satellite in its orbit uniform or accelerated?
111. A light and a heavy body have the same linear momentum. Which one has greater Kinetic Energy?
112. Can a slow-moving truck have less kinetic energy than a fast-moving car?
113. Does wind contain kinetic energy?
114. A force acts on a ball moving with 14 m/s and reduces its speed to 6 m/s. Is the work done positive or negative?
115. Why does a hunter aiming at a distant bird miss if he aims exactly at it?
116. Describe a case where velocity is zero but acceleration is not zero.
117. Describe a case where acceleration is zero but velocity is not zero.
118. Describe a case where velocity and acceleration are perpendicular to one another.
119. Why does the acceleration of a rocket increase as it moves upward?
120. Under what condition is the law of conservation of linear momentum valid?
121. Why does the range of a projectile remain the same when the angle of projection is changed from θ to $90^\circ - \theta$?
122. Calculate the work done by air friction if a body dropped from height H reaches the ground with speed $1.2\sqrt{gH}$.
123. At what angle are the scalar product and vector product of two vectors equal in magnitude?
124. What is the frequency of rotation required to provide artificial gravity equal to Earth's gravity in a spaceship of radius R ?
125. A machine gun fires 6 bullets per minute with a velocity of 700 ms^{-1} . Each bullet has mass 40g. Find the power.

Question No. 3

1. Differentiate between streamline and turbulent flow of a fluid.
2. How does pressure change with depth in fluids?
3. How is variation in pressure related to the speed of a fluid?

4. Why does an object float or sink according to Archimedes' Principle?
5. How did Archimedes reportedly discover the principle that bears his name?
6. Why is standing near a fast-moving train dangerous? Explain briefly.
7. Differentiate between stress, strain, and Young's modulus. Write down their SI units.
8. State 2nd law of thermodynamics in two different forms.
9. Is it possible to construct a heat engine of 100% efficiency? Explain.
10. Differentiate between reversible and irreversible processes.
11. Why is an adiabat steeper than an isotherm? Explain.
12. A refrigerator transforms heat from cold to hot body. Does this violate the second law of thermodynamics?
13. Explain briefly heat death of universe in terms of entropy.
14. How is work done (i) by a gas (ii) on a gas?
15. What are the conditions for interference to occur?
16. Differentiate between constructive and destructive interference of waves.
17. What are coherent waves and coherent sources? Give examples.
18. How would you apply Doppler effect in studying cardiac problems in humans?
19. What is meant by diffraction of waves? For what purpose is the ripple tank used?
20. Why are polaroid sunglasses better than ordinary sunglasses?
21. Is light from the sky partially polarized? How is it so?
22. How is Malus's law used in everyday life?
23. The ratio stress/strain remains constant for small deformation. What will be the effect on this ratio when the deformation made is very large?
24. According to Bernoulli's theorem, the pressure of a fluid should remain uniform in a pipe of uniform radius. But actually, it goes on decreasing. Why is it so?
25. Why are the wings of an aeroplane rounded outward while flattened inward?
26. How does the shape of a curveball in baseball relate to Bernoulli's principle?
27. A steel wire 12 mm in diameter is fastened to a log and pulled by a tractor. The length of the wire is 11 m. A force of 10,000 N is required to pull the log. Calculate the stress in the wire.
28. A wooden cube of sides 10 cm each is dipped completely in water. Calculate the upthrust of water acting on it.

29. Why does a ship made of heavy steel float on water, while a small rock sink?
30. Why does the internal energy of an ideal gas remain constant during isothermal expansion?
31. Why does a deck of cards become more disordered when shuffled?
32. The turbine in a steam power plant takes steam from a boiler at 427°C and exhausts into a low temperature reservoir at 77°C . What is the maximum possible efficiency?
33. A stationary wave is formed on a string with frequency of 100 Hz. If the string is 2 m long, how many nodes and antinodes are formed?
34. Can you find decibel level of a travelling wave whose intensity is 10 W m^{-2} ?
35. A beam of light strikes the surface of a plate of glass with a refractive index of n at the polarizing angle. What will be the angle of refraction?
36. Find the refractive index of a medium if polarizing angle is 54.5° .
37. Polarized light with an intensity of 75 W m^{-2} passes through an analyzer with its axis at 30° to the polarizer's axis. What is the emerging intensity?
38. A polarized light with an amplitude of 5 units passes through a polarizer with its electric field aligned at 60° to the original polarization direction. Find the amplitude of the wave after passing through the analyzer.
39. A beam of unpolarized light passes through a foggy atmosphere. Tell the polarization state of the scattered light.
40. What are ductile and brittle substances? Give an example of each.
41. What is the difference in elasticity and plasticity?
42. If the strain in a wire is doubled, by what factor does the stored energy change?
43. Describe what is Ideal Fluid? Can an Ideal Fluid exist in nature?
44. When there is a change in the width of the river, the speed of the water decreases in wider regions whereas the speed of water increases in the narrower regions. Why?
45. Verify that pressure has units of energy per unit volume.
46. If you lower the window on a car while moving, an empty plastic bag can sometimes fly out the window. Why?
47. If you suddenly turn on your shower water at full speed, why is the shower curtain pushed inward?
48. Define Stoke's law.
49. Why do fog droplets appear to be suspended in air?
50. Define internal energy.

51. Can we increase the internal energy by mechanical work? Explain.
52. Out of solid, liquid and gas of same mass and temperature, which one has greatest internal energy? And which one has least?
53. How would you explain the sign convention of First Law of Thermodynamics?
54. Prove that: $W = P\Delta V$.
55. Justify! Work and heat are similar.
56. State first law of thermodynamics and give its mathematical form.
57. As we know $PV^\gamma = \text{Constant}$. What do you know about " γ " (gamma) in this relation?
58. Is it possible to convert internal energy into mechanical energy? Explain with an example.
59. What is meant by irreversible process? Give its example.
60. Is it possible, according to the second law of thermodynamics, to construct a heat engine that is free from thermal pollution?
61. Define Carnot theorem in two ways.
62. What is the difference between heat engine and refrigerator?
63. Why does the Entropy of the universe always increase?
64. State second law of thermodynamics in terms of entropy.
65. Entropy has often been called "time arrow". Explain.
66. Does entropy of a system increase or decrease due to friction?
67. What are the conditions on the path difference for constructive interference of two waves?
68. What are the conditions on the path difference for destructive interference of two waves?
69. Does destructive interference of two waves involve a loss of energy? Explain.
70. On what factors does the speed of stationary waves in a stretched string depend?
71. If you blow air across the mouth of an empty soda bottle, you hear a tone. Why does the pitch increase if you put some water in the bottle?
72. Define "BEATS" and "BEATS" frequency.
73. Can you apply Doppler Effect for light waves and source of light?
74. If both the source and the observer are moving in the same direction with the same speed, will there be a Doppler shift?
75. Can sound waves be polarized? Explain.

76. Unpolarized light falls on two polarizing sheets so oriented that no light is transmitted. If a third polarizing sheet is placed between them, can light be transmitted?
77. Differentiate between Tensile and Compressive Modes of Stress and Strain.
78. Draw stress-strain curves for ductile and brittle materials.
79. What are ductile and brittle substances? Give an example of each.
80. Define the term (i) Elastic limit (ii) Ultimate tensile strength from stress strain curve.
81. Explain how swing is produced in a fast-moving cricket ball.
82. Explain what do you understand by the term viscosity.
83. Explain how thermodynamics relates to the concept of energy conservation.
84. Explain how thermodynamics applies to biological systems, such as the human body.
85. A gas is expanding adiabatically. Explain what happens to temperature and pressure of the gas.
86. How can we explain different weather patterns through thermodynamical processes like wind, rain, etc.?
87. Can you compare the compressions and rarefactions of a longitudinal wave with the peaks and troughs of a transverse wave?
88. How should a source of sound move with respect to an observer so that the frequency of its sound does not change? Write two examples.
89. Why is it difficult to recognize beats when the frequency difference is greater than 10 Hz?
90. Which measurement of a wave is the most important when determining the wave's intensity?
91. Can you apply Doppler effect to light waves? Describe briefly.
92. Would it be possible to use a polarizer as an analyzer? If yes, give examples.
93. How will the sky appear without an atmosphere?
94. Explain how Malus's law is used in the design of polarized sunglasses.
95. What is the significance of detecting gravitational waves?
96. How are tidal forces formed?

Question No. 4

1. Define electric intensity and electric potential.
2. Is electron-volt a unit of potential difference or energy? Explain.
3. A copper wire of length L has resistance R . It is stretched to double of its length. What will be the resistance of the new length?

4. Why does the resistance of a conductor rise with an increase in temperature?
5. Is the filament resistance lower or higher in a 500W-220V light bulb than in a 100W-220V bulb?
6. Why does the resistance of a thermistor decrease as temperature increases?
7. An uncharged conducting hollow sphere is placed in the field of a positive charge q . What will be the net flux through the shell?
8. A potential difference is applied across the ends of a copper wire. What is the effect on the drift velocity by (i) increasing the potential difference? (ii) decreasing the length and the temperature of the wire?
9. Why does the terminal potential difference of a battery decrease when the current drawn from it is increased?
10. A square loop of wire is moving through a uniform magnetic field. The normal to the loop is oriented parallel to the magnetic field. Is an emf induced in the loop?
11. Can a single moving proton produce a magnetic field?
12. A magnetic field is necessary if there is to be a magnetic flux through a coil of wire. Yet, just because there is a magnetic field does not mean that a magnetic flux will pass through a coil. Account for this situation.
13. A charge is lying stationary between the opposite poles of two magnets. Is a magnetic force exerted on it? Why?
14. Is it possible to change both the area of the loop and the magnetic field passing through the loop and still not have an induced emf in the loop?
15. Does the application of uniform magnetic field to a moving charged particle result in a change in kinetic energy of the particle?
16. A conductor moves in a magnetic field when a current is passed through the conductor. Would you expect the reverse effect to occur?
17. What will you do if you want to save a sensitive instrument from stray magnetic fields?
18. What are the two postulates of special theory of relativity?
19. Describe why it is impossible for a material particle to move with speed of light.
20. What is meant by proper time, and proper length?
21. What is meant by relativistic mass, length and time?
22. Why does the mass of a moving object increase?
23. Explain that speed of light is an ultimate limit for any object.
24. Give examples where the results of special theory of relativity have been verified.
25. If the speed of light is just 50 m/s, how would everyday events appear?

26. If the speed of light were infinite, what would the equations of special theory of relativity reduce to?
27. According to Einstein's equation $E = mc^2$, is it possible to create a single electron from energy?
28. What do different isotopes of a given element have in common? How are they different?
29. Fill in the missing particle or nucleus.
30. Why must a neutrino be released in the positron emission?
31. Distinguish between fermions and bosons.
32. Can there be pair production for photons having energy 20 keV?
33. What is the difference between beta particle and electron?
34. How do a proton and a neutron convert to each other?
35. Differentiate between hadrons and leptons with examples.
36. What are Mesons? Give example.
37. Is a meson a boson or fermion? Give reason.
38. Which is more energetic — alpha decay or beta decay?
39. Why do α -particles not make physical contact with the nucleus when headed directly toward it?
40. Does an electrostatic force exist between a charged and an uncharged body?
41. Why is it advised to wear rubber soled shoes while handling electric appliances?
42. A particle carrying a charge of $2e$ falls through a potential difference of 3.0 V. Calculate the energy required by it.
43. A copper wire has a cross-sectional area of $2 \times 10^{-5} \text{ m}^2$ and carries a current of 3A. If the number of electrons per unit volume is $8.5 \times 10^{28} \text{ m}^{-3}$, calculate the drift velocity.
44. 0.75 A current flows through an iron wire when a battery of 1.5 V is connected across its ends. The length of the wire is 5.0 m and its cross-sectional area is $2.5 \times 10^{-7} \text{ m}^2$. Compute resistivity.
45. Why is a three pin plug used in some electric appliances?
46. A 20.0 cm wire carrying current of 10.0 A is placed in a uniform magnetic field of 0.30 T. If the wire makes an angle of 40° with the field, find the force.
47. Why does a picture become distorted when a magnetic bar is brought near to the screen of TV, Computer, Monitor or Oscilloscope?
48. Find the mass m of a moving object with speed $0.8c$.
49. Repulsion is sure test for electrification. Explain.
50. What is the effect of medium between the charges upon Coulomb's force?

51. If the electric force between two charges is 20 N when they are 5 meters apart, what will be the force when they are 2 meters apart?
52. Define electric flux. Write its SI units.
53. Does the total flux depend upon the shape or geometry of the closed surface?
54. Define and give the SI units of electric potential.
55. Derive relation for potential gradient $E = \Delta V / \Delta r$.
56. What is the potential gradient? Write its units.
57. Show that $1 \text{ N/C} = 1 \text{ V/m}$.
58. Define electron volt.
59. Show that: $1 \text{ eV} = 1.6 \times 10^{-19} \text{ J}$.
60. What are the difficulties in testing whether the filament of a lighted bulb obeys Ohm's law?
61. Differentiate between resistance and resistivity, their units.
62. Define temperature co-efficient of resistance and write its formula.
63. What is the negative co-efficient of temperature? Give two substances.
64. A wire of length 10 m has resistance 100Ω . If the wire is stretched to increase its length three times, what will be its new resistance?
65. Prove that: Volt $\times$ Ampere = Watt.
66. Three bulbs 40 W, 60 W and 100 W are connected to 220 V mains. Which bulb will glow brightly if they are connected in series?
67. Three bulbs 40 W, 60 W and 100 W are connected to 220 V mains. Which bulb will glow brightly if they are connected in parallel?
68. What is meant by an electromotive force (emf)? Give its unit.
69. Under what conditions do emf of a cell and terminal potential difference become equal?
70. Distinguish between electromotive force and potential difference.
71. What is short-circuit and open circuit?
72. Under what circumstances can the terminal potential difference of a battery exceed its emf?
73. Write down the rules for finding the potential changes along a circuit.
74. Give statement of Kirchhoff's 1st rule and 2nd rule.
75. Why does no current pass through galvanometer in a balanced Wheatstone bridge although the two keys in the circuit are closed?

76. Why do we prefer potentiometer in place of voltmeter for measuring potential difference?
77. Define motional emf. Give its unit.
78. On what factors does the induced current due to motional emf depend?
79. State Faraday's law of electromagnetic induction.
80. A particle which produces more ionization is less penetrating. Why?
81. If you swallowed an α -source and a β -source, which would be more dangerous to you?
82. If ${}_{92}^{233}\text{U}$ decays twice by α -emission, what is the resulting isotope?
83. How many α -decays occur in the decay of Thorium ${}_{90}\text{Th}^{230}$ into ${}_{82}\text{Pb}^{214}$?
84. State and Explain Coulomb's Law.
85. What are the factors upon which the electric flux depends?
86. State Gauss's law.
87. Give similarity and difference between Coulomb and Gravitational forces.
88. Define Electronic and Conventional current.
89. What is the importance of minus sign in the expression $\epsilon = -N\Delta\Phi/\Delta t$?
90. Define Flux and Flux Density.
91. How do you express Magnetic Flux? On what factor does it depend?
92. Differentiate between inertial and non-inertial frame of reference.
93. When the switch in the circuit is closed, a current is established in the coil and the metal ring jumps upward. Why? Describe what would happen to the ring if the battery polarity were reversed.
94. A nucleus undergoes Gamma decay, emitting Gamma ray photon with energy 1.5 MeV. Calculate: (i) frequency (ii) wavelength (iii) momentum.

11th Class Physics Important Long Questions

Question No. 5

1. What is meant by significant figures? Write two reasons for using them in measurements. How to find the uncertainty in timing experiment such as the time period of a simple pendulum?
2. Check the homogeneity of the relation: $v = \sqrt{T \times \ell / m}$ where v is the speed of transverse wave on a stretched string of tension T , length ℓ and mass m .
3. Define and explain scalar product. Write down its important characteristics.
4. Define and explain vector product of two vectors. Discuss important characteristics of vector product.

5. Derive the following expressions for projectile motion: (i) time of flight (ii) height attained (iii) range for projectile.
6. Explain elastic collision in one dimension. Show that magnitude of relative velocities before and after collision are equal.
7. Define orbital velocity and derive an expression for the same.
8. Define moment of inertia. Prove that torque acting on rotating rigid body is equal to the product of its moment of inertia and angular acceleration.
9. What is meant by angular momentum? Explain the law of conservation of angular momentum with daily life examples.

Question No. 6

1. Define conservative field. Show that gravitational field is conservative in nature.
2. Define escape velocity. Show that an expression for escape velocity can be expressed as $\sqrt{2Rg}$. Also find its numerical value near the surface of the Earth.
3. State and derive equation of continuity.
4. State and prove Bernoulli's equation.
5. Why are wings of an aeroplane rounded outward while flattened inward?
6. Define terminal velocity of a body and show that terminal velocity is directly proportional to the square of radius of the body ($v_t \propto r^2$).
7. Explain first law of thermodynamics in detail. Give an example in support of your explanation. Give its two applications.
8. What is Carnot engine? Describe Carnot cycle. State Carnot theorem and derive an expression for efficiency of Carnot engine.
9. Define and explain the term "Entropy".

Question No. 7

1. State and explain the principle of superposition of waves. Apply this principle to elaborate the working of noise canceling headphones.
2. What are standing waves? Illustrate a detailed experiment that demonstrates the standing waves using stretched strings.
3. Find the frequencies of the harmonics produced in an organ pipe when it is open at both ends and when it is closed at one end.
4. What is meant by the term beats? Prove that number of beats per second is equal to the difference between the frequencies of vibrating tuning forks.

5. Keeping in mind "Doppler effect", analyze the following cases: (a) when source of sound moves away from stationary observer (b) when source moves towards stationary observer.
6. State Malus's law. Explain the intensity formula.

Question No. 8

1. Explain the electric potential and prove that electric field intensity is equal to the negative of potential gradient.
2. State and explain Kirchhoff's rules.
3. What is a Wheatstone bridge? Explain its working with the help of a diagram.
4. What is a potentiometer? Describe its working.
5. State and derive Faraday's Law of electromagnetic induction.

Question No. 9

1. State two postulates of special theory of relativity. Give its three consequences (Time dilation, length contraction, mass variation).
2. Explain the phenomenon of pair annihilation with an example. Explain the utility of its principle in the medical field.
3. What is meant by radioactivity? Compare the properties and behaviour of three types of radiations (α , β , γ).
4. Differentiate between hadrons and leptons with examples.
5. Describe four fundamental forces in nature.

11th Class Physics Important Numerical Problems

NUMERICAL PROBLEMS

1. Show that the expression $v_f^2 - v_i^2 = 2aS$ is dimensionally correct.
2. Show that the famous "Einstein equation" $E = mc^2$ is dimensionally consistent.
3. The magnitude of cross and scalar products of two vectors are $4\sqrt{3}$ and 4, respectively. Find the angle between the vectors.
4. A helicopter is ascending vertically at the rate of 19.6 m/s. When it is at a height of 156.8 m above the ground, a stone is dropped. How long does the stone take to reach the ground?
5. A cricket ball is hit upward with velocity of 20 m/s at an angle of 45° with the ground. Find its: (a) time of flight (b) maximum height (c) how far away it hits the ground.
6. An aeroplane is moving horizontally at a speed of 200 m/s at a height of 8 km to drop a bomb on a target. Find horizontal distance from the target at which the bomb should be released.

7. A 70 g ball collides with another ball of mass 140 g. The initial velocity of the first ball is 9 m/s to the right while the second ball is at rest. If the collision were perfectly elastic, what would be the velocity of the two after the collision?
8. A car is moving with a speed of 108 km/h. If its wheel has a diameter of 60 cm, find its angular speed in rad/s and rev/s.
9. A satellite is orbiting the Earth at an altitude of 200 km. Assuming the Earth's radius is 6400 km, calculate the orbital speed of the satellite.
10. The flywheel of an engine is rotating at 2100 rev/min when the power source is shut off. What torque is required to stop it in 3 minutes? The moment of inertia of the flywheel is $36 \text{ kg}\cdot\text{m}^2$.
11. A diver comes off a board with arms straight up and legs straight down, giving him a moment of inertia of $18 \text{ kg}\cdot\text{m}^2$ about his rotation axis. Then tucks into a small ball, decreasing his moment of inertia to $3.6 \text{ kg}\cdot\text{m}^2$. While tucked, he makes two complete rotations in 1.0 second. If he had not tucked at all, how many revolutions would he have made in 1.5 s from board to water?
12. An object weighing 98 N is dropped from a height of 10 m. Its speed just before hitting the ground is 12 m/s. What is the frictional force acting on it?
13. A force acts on a ball moving with 14 m/s speed and brings its speed to 6 m/s. Has the force done positive or negative work? Explain your answer.
14. A 70 kg man runs up a long flight of stairs in 4.0 s. The vertical height of the stairs is 4.5 m. Calculate his power output in watts.
15. A machine gun fires 6 bullets per minute with a velocity of 700 m/s. If each bullet has a mass of 40 g, find power developed by the gun.
16. A motorcycle rider weighing 60 kg is coasting down a 24° slope. The weight of motorcycle is 30 kg. At the top of the slope, the speed of motorcycle is 3.2 m/s. If the kinetic frictional force is 100 N, what will be the speed of the motorcycle 72 m downhill?
17. An object weighing 98 N is dropped from a height of 10 m. Its speed just before hitting the ground is 12 m/s. What is the frictional force acting on it?
18. A steel wire of length 2 metres and cross-sectional area of $2 \times 10^{-6} \text{ m}^2$ is stretched by a force of 400 N. If the Young's modulus of steel is $2 \times 10^{11} \text{ N/m}^2$, calculate the extension of the wire.
19. A tiny water droplet of radius 0.010 cm descends through air from a high building. Calculate its terminal velocity, given that η for air = $19 \times 10^{-6} \text{ kg/m}\cdot\text{s}$ and density of water $\rho = 1000 \text{ kg/m}^3$.
20. A tank filled with water has a hole at a depth of 5 m from the water surface. Calculate the velocity of water flowing out of the hole.
21. A Carnot engine is operating between a high temperature reservoir at 600 K and a low temperature reservoir at 300 K. Calculate: (i) the maximum possible efficiency. (ii) the amount of work output if the engine absorbs 500 J of heat from the high temperature reservoir.

22. A refrigerator extracts 1200 J of heat from its interior and releases 1800 J of heat to the surrounding environment during each cycle. Calculate: (i) the work input required per cycle. (ii) the coefficient of performance (COP) of the refrigerator.
23. An organ pipe has a length of 1 m. Determine the frequencies of the fundamental and the first two harmonics: (a) if the pipe is open at both ends and (b) if the pipe is closed at one end. (Speed of sound in air is 340 m/s)
24. A tuning fork A produces 4 beats per second with another tuning fork B. It is found that by loading B with some wax, the beat frequency increases to 6 beats per second. If the frequency of A is 320 Hz, determine the frequency of B when loaded.
25. A train is approaching a station at 90 km/h sounding a whistle of frequency 1000 Hz. What will be the apparent frequency of the whistle as heard by a listener sitting on the platform? What will be the apparent frequency heard by the same listener if the train moves away from the station with the same speed? (Speed of sound is 340 m/s)
26. We wish to use a glass plate of refractive index of 1.5 in air as a polarizer. Find the polarizing angle and angle of refraction.
27. What angle is required between the direction of polaroid light and the axis of a Polaroid filter to reduce its intensity by 85%?
28. A particle of charge $+20 \mu\text{C}$ is placed between two parallel plates, 10 cm apart and having a potential difference of 0.5 kV between them. Calculate the electric field between the plates, and the electric force exerted on the charged particle.
29. The copper winding of an electric fan has a resistance of 50Ω at 30°C . After running for some time, the resistance becomes 52Ω . How much is the increase in temperature of the winding? [For copper $\alpha = 0.0039 \text{ K}^{-1}$]
30. A coil of 10 turns and 35 cm^2 area is in a perpendicular magnetic field of 0.5 T. The coil is pulled out of the field in 1.0 s. Find the induced emf in the coil as it is pulled out of the field.
31. An electron is accelerated to a speed of $0.995c$ which passes down an evacuated tube 500 m long. How long will the tube appear to the electron?
32. The period of a pendulum is measured to be 3.0 s in the inertial reference frame of the pendulum. What is its period measured by an observer moving at a speed of $0.95c$ with respect to the pendulum?
33. Uranium-238 is an alpha emitter. In the process, it is transmuted into a daughter nucleus. What is the mass number A and charge number Z of the daughter nucleus? What is its chemical symbol?
34. Calculate the Q-value for the reaction taking place in Rutherford's experiment on artificial disintegration of nitrogen by bombardment with alpha particles. Relative masses are: $\text{N}^{14} = 14.007515\text{u}$, $\text{He}^4 = 4.003837\text{u}$, $\text{O}^{17} = 17.004533\text{u}$, $\text{H}^1 = 1.008142\text{u}$.

11th Class Physics Important MCQs with solution

#	Question	Option A	Option B	Option C	Option D	Answer
1	Computer chips are made of:	Silicon	Germanium	Iron	Cadmium	Silicon
2	The branch of science which deals with the property of matter and energy is called:	Chemistry	Biology	Geology	Physics	Physics
3	The branch of physics which deals with velocities approaching the velocity of light is called:	Quantum mechanics	Relativistic mechanics	Classical mechanics	Wave mechanics	Relativistic mechanics
4	The products of chips developed from the basic ideas of physics are:	The radio networks	The television networks	Computer networks	None of the above	Computer networks
5	Which of the following is a derived quantity?	length	mass	time	force	force
6	Light year is a unit of:	Light	Time	Velocity	Distance	Distance

#	Question	Option A	Option B	Option C	Option D	Answer
7	The quantity 1 (km)^2 is equal to:	$1 \times 10^6 \text{ m}^2$	$1 \times 10^5 \text{ m}^2$	$1 \times 10^7 \text{ m}^2$	$1 \times 10^4 \text{ m}^2$	$1 \times 10^6 \text{ m}^2$
8	The percentage uncertainty in radius of a sphere is 2%. The total percentage uncertainty in the volume of sphere is:	2%	4%	8%	6%	6%
9	Zero error belongs to:	Systematic error	Random error	Personal error	Collective error	Systematic error
10	The diameter of a steel ball is measured using a Vernier Callipers... What is the diameter?	1.30 cm	1.39 cm	1.40 cm	1.31 cm	1.31 cm
11	Significant figures in 0.04060 are:	2	3	4	5	4
12	Significant figures in 0.0010 are:	four	two	three	one	two
13	Significant figures in 0.000846 are:	six	four	three	two	three

#	Question	Option A	Option B	Option C	Option D	Answer
14	The quantity of 0.00467 has significant figures:	3	4	5	6	3
15	A precise measurement is the one which has:	Greater precision	Less precision	Medium precision	More % error	Less precision
16	Which of the following measurement is more precise?	3127 s	312.7 s	31.27 s	3.127 s	3.127 s
17	Number of colours used in process of colour printing to produce the entire range of colours are:	7	6	5	4	4
18	The absolute uncertainty for vernier callipers of L.C = 0.01 cm is:	0.1 mm	0.01 m	0.001 cm	0.001 mm	0.001 mm
19	There are four readings of a micrometer to measure the diameter of a wire in mm: 1.21, 1.23, 1.25, 1.23. The	0.02 mm	0.01 mm	0.10 mm	0.20 mm	0.01 mm

#	Question	Option A	Option B	Option C	Option D	Answer
	mean of deviations is:					
20	The time taken by light from moon to earth is:	1 min 10 sec	1 min 20 sec	1 min 30 sec	1 min 40 sec	1 min 20 sec
21	The percentage of uncertainty for V and I is 2% and 6% respectively. Hence, total uncertainty to the value of $R = V/I$ is:	8%	1/3%	3%	4%	8%
22	The dimension of the relation $\sqrt{Fx}/m$ is equal to the dimension of:	Force	Momentum	Acceleration	Velocity	Velocity
23	The dimensions of frequency are:	[LT]	[T ⁻¹]	[MLT]	[LT ⁻¹]	[T⁻¹]
24	Dimensions of viscosity are:	[ML ⁻¹ T]	[ML ² T ⁻¹]	[ML ⁻¹ T ⁻¹]	[ML ⁻¹ T ⁻²]	[ML⁻¹T⁻¹]
25	The dimensions of torque are:	[ML ⁻¹ T]	[ML ² T ⁻¹]	[ML ² T ²]	[ML ² T ⁻²]	[ML²T⁻²]

#	Question	Option A	Option B	Option C	Option D	Answer
26	A scalar is a physical quantity which is completely specified by:	a number	a direction only	a number with proper units	a number with direction	a number with proper units
27	An example of scalar quantity:	Speed	Displacement	Velocity	Acceleration	Speed
28	A typical rocket consumes fuel at a rate of (ejecting gas at speed of 4000 ms^{-1}):	10000 kg/s	15000 kg/s	800 kg/s	660 kg/s	10000 kg/s
29	A typical rocket consumes about $10,000 \text{ kgs}^{-1}$ of fuel and ejects the burnt gases at speeds of over:	2000 ms^{-1}	3000 ms^{-1}	4000 ms^{-1}	5000 ms^{-1}	4000 ms^{-1}
30	A typical rocket eject the burn gases at speeds of over:	400 m/sec	4000 m/sec	8000 m/sec	10000 m/sec	4000 m/sec
31	A vector in space has components:	1	2	3	4	3

#	Question	Option A	Option B	Option C	Option D	Answer
3 2	A force of 10 N makes an angle 30° with y-axis. Then magnitude of x-component is:	5 N	8.66 N	10N	Zero	5 N
3 3	The resultant of two forces 3N and 4N acting at right angle to each other is:	5 N	6 N	1 N	7 N	5 N
3 4	If magnitude of cross product and dot product of two vectors are equal. The angle between the vectors is:	0°	90°	180°	45°	45°
3 5	If two non-zero vectors a and b are parallel to each other, then:	$a \cdot b = 0$	$a \cdot b = ab$	$a \cdot b < ab$	$a \cdot b > ab$	$a \cdot b = ab$
3 6	The cross product of $i \times j$ is equal to;	zero	one	-k	k	k
3 7	A body having uniform acceleration of 10 ms^{-2} has	8sec	10sec	12sec	14sec	10sec

#	Question	Option A	Option B	Option C	Option D	Answer
	a velocity of 100 ms^{-1} . In what time its velocity will be doubled?					
38	Mark the correct relation:	$a = v_f - v_i/t$	$a = v_f^2 - v_i^2/2s$	$a = 2(S - v_i/t)/t^2$	all of them	all of them
39	The distance covered by a body with uniform acceleration "a" in time "t" starting from rest is:	$1/2 at^2$	vt	$1/2 vt$	$1/2 at$	$1/2 at^2$
40	A bullet shot straight up, returns to its starting point in 10 sec. Its initial speed was:	9.8 ms^{-1}	24.5 ms^{-1}	49 ms^{-1}	98 ms^{-1}	49 ms^{-1}
41	The distance covered by free falling body in 2 seconds is:	9.8 m	19.6 m	4.9 m	49 m	19.6 m
42	The range of projectile is same for:	$0^\circ, 45^\circ$	$30^\circ, 75^\circ$	$15^\circ, 60^\circ$	$35^\circ, 55^\circ$	$35^\circ, 55^\circ$

#	Question	Option A	Option B	Option C	Option D	Answer
4 3	Time of flight of a projectile is:	$v_1 \sin\theta/g$	$v_1 \sin\theta/2g$	$2v_1 \sin\theta/g$	$v_1 \sin\theta/g$	$2v_1 \sin\theta/g$
4 4	The distance covered by a freely falling body in first 2 seconds, when its initial velocity was zero:	9.8 m	39.2 m	19.6 m	4.9 m	19.6 m
4 5	The motion of the rocket in space is according to the law of conservation of:	energy	linear momentum	mass	angular momentum	linear momentum
4 6	A force of 50N acts on a body for 10 seconds. What will be the change in momentum?	200 Ns	500 Ns	800 Ns	5 Ns	500 Ns
4 7	The SI unit of impulse is:	kgms^{-1}	Ns	Newton	both a and b	both a and b
4 8	Time rate of change in momentum of a body is equal to:	impulse	pressure	applied force	tension	applied force

#	Question	Option A	Option B	Option C	Option D	Answer
49	When a massive body of mass m_1 collides with lighter stationary body of mass m_2 , the velocity of massive body after collision will be:	$v_1' = 2v_1$	$v_2' = v_1$	$v_1' = v_1$	$v_2' = 2v_1$	$v_1' = v_1$
50	Elastic collision involves:	loss of energy	gain of energy	no gain, no loss of energy	no relation	no gain, no loss of energy
51	100 radians are equal to:	57.3°	573°	5730°	5.73°	5730°
52	When a body moves along a circular path, its velocity:	Remains the same	Becomes zero	Changes continuously	Sometimes changes	Changes continuously
53	The relation between linear velocity and angular velocity is:	$v = w \times r$	$v = w \times r$	$w = v \times r$	$w = r \times v$	$v = w \times r$
54	A body travelling in a circle at constant speed:	has constant velocity	has an inward radial acceleration	is not accelerated	has an outward radial acceleration	has an inward radial acceleration

#	Question	Option A	Option B	Option C	Option D	Answer
55	If linear velocity and radius are both made to half of a body moving around a circle. Then its centripetal force becomes:	F_c	$F_c/2$	$F_c/4$	$2F_c$	$F_c/2$
56	Which one of the following is not directed along the axis of rotation?	Angular acceleration	Angular momentum	Centripetal acceleration	Angular displacement	Centripetal acceleration
57	The acceleration of a body undergoing uniform circular motion is constant in:	Magnitude only	Direction only	Both	Neither	Magnitude only
58	20 N centripetal force revolving a body along a circular path of radius 1 m, the work done by the centripetal force is:	20 Joule	40 Joule	10 Joule	Zero Joule	Zero Joule

#	Question	Option A	Option B	Option C	Option D	Answer
59	Satellites are held in orbit by the gravitational pull of:	Moon	Sun	Earth	Star	Earth
60	Satellites are the objects that orbital around the:	Moon	Sun	Earth	Star	Earth
61	The frequency of rotation of a spaceship about its own axis to create artificial gravity like that on earth is:	$f = 2\pi v g/R$	$f = 1/2\pi v g/R$	$f = 1/2\pi v g/R$	$1/2\pi v g/R$	$1/2\pi v g/R$
62	A man inside the artificial satellite feels weightlessness because the force of attraction due to the Earth is:	zero at pole	balanced by moon	equal to centripetal force	non-effective	equal to centripetal force
63	The mud flies the tyre of a moving bicycle in the direction of:	Towards the center	Radius	Tangent to the tyre	Motion	Tangent to the tyre
64	Moment of inertia of 100 kg sphere	10 kg m ²	5 kg m ²	500 kg m ²	2.5 kg m ²	10 kg m²

#	Question	Option A	Option B	Option C	Option D	Answer
	having radius 50 cm will be:					
65	Moment of inertia for a particle is given by:	m^2r^2	mr^2	m^2r	mr^2	mr^2
66	The relation for moment of inertia of the thin ring is:	mr^2	$1/2mr^2$	$2/5mr^2$	$2/3mr^2$	mr^2
67	Angular momentum of a rigid body is given by:	$I^2\omega$	$I\omega^2$	$I^2\omega^2$	$I\omega$	$I\omega$
68	The angular momentum L is given by:	$r^2 \times p$	$L \times r^2$	$r^2 \times F$	$F \times p^2$	$r^2 \times p$
69	In rotational motion, the torque is equal to rate of change of:	Angular velocity	Linear momentum	Angular momentum	Angular acceleration	Angular momentum
70	Angular momentum of a body under a centripetal force is:	Zero	Maximum	Minimum	Constant	Constant
71	The rate of change of linear momentum of	Moment of force	The applied force	The applied torque	Impulse	The applied force

#	Question	Option A	Option B	Option C	Option D	Answer
	a body is equal to:					
7 2	When a torque acting on a system is zero, which of the following will be correct:	Linear momentum	Force	Angular momentum	Linear impulse	Angular momentum
7 3	The rate of change of angular momentum of a body is:	The applied force	The moment of inertia	The applied torque	Impulsive force	The applied torque
7 4	Angular momentum is conserved under:	Central force	Constant force	Variable force	Uniform force	Central force
7 5	If external torque on a body is zero, then which of these quantities is constant?	Force	Linear Momentum	Linear Velocity	Angular Momentum	Angular Momentum
7 6	The dimensions of work are:	$[MLT^{-1}]$	$[MLT^{-2}]$	$[ML^2T^{-2}]$	$[MLT]$	$[ML^2T^{-2}]$
7 7	If 50 kg crate is pushed through 2 m across the	245 J	150 J	200 J	100 J	100 J

#	Question	Option A	Option B	Option C	Option D	Answer
	floor with a force of 50 N, the work done will be:					
78	When a body is lifted through a height 'h', the work done on the body appears in the form of	kinetic energy	potential energy	force	work	potential energy
79	The work done is said to be negative when force and displacement are:	parallel	anti-parallel	perpendicular	none	anti-parallel
80	Area under force-displacement graph gives:	Velocity	Power	Work done	Acceleration	Work done
81	A field in which the work done in moving a body along closed path is zero is called:	electrical field	nuclear field	electromagnetic field	conservative field	conservative field
82	In Earth's gravitational field, work	Maximum	Positive	Negative	Zero	Zero

#	Question	Option A	Option B	Option C	Option D	Answer
	done is a closed path is:					
83	Which one is a conservation force?	Elastic spring force	Frictional force	Air resistance	Tension in the spring	Elastic spring force
84	An example of non-conservative force is:	elastic force	gravitational force	frictional force	magnetic force	frictional force
85	The dimension of power is:	MLT^{-1}	ML^2T^{-2}	ML^2T^{-3}	MLT^{-2}	ML^2T^{-3}
86	The SI unit of product of pressure and volume is:	Watt	Joule	Pascal	Nm	Joule
87	A dry battery can deliver 3000 J of energy to a 2 W small electric motor before the battery is exhausted. For how many minutes does the battery run?	1500 min	100 min	50 min	25 min	25 min
88	Mass is highly concentrated form of:	Inertia	Energy	Plasma	Charge	Energy

#	Question	Option A	Option B	Option C	Option D	Answer
89	The escape velocity can be determined by relation:	$v_{esc} = gR$	$v_{esc} = 2gR$	$v_{esc} = \sqrt{2gR}$	$v_{esc} = \sqrt{gR/M}$	$v_{esc} = \sqrt{2gR}$
90	The value of escape velocity is:	$11.6 \times 10^3 \text{ ms}^{-1}$	$11 \times 10^3 \text{ ms}^{-1}$	$11.5 \times 10^3 \text{ ms}^{-1}$	$12 \times 10^3 \text{ ms}^{-1}$	$11.2 \times 10^3 \text{ ms}^{-1}$

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