Chapter - 1

Physics

Answer Key with **Solutions**
Includes: All MCQs + **Extra PYQs** with Detailed Explanations

Solutions

1. (c); Echo is a reflection of sound that arrives at the listener with a delay after the direct sound. The reflecting object must be more than 17m from the sound source for echo to be perceived by a person located at the source.
2. (b); A black board appears black because it absorbs all the colors of white light and reflects none.
3. (d); A tensiometer in soil science is a measuring instrument used to determine the Soil water tension. Such tensiometers are used in irrigation scheduling to help farmers and other irrigation managers to determine when to water. It can also be used in the scientific study of soils and plants.
4. (c); The SI unit of Force is Newton. One Newton is equal to 1 kilogram meter per second squared.
5. (c); Glass is bad thermal conductor and is a good insulator. It has tightly held electrons which did not allow heat to flow through it.
6. (c); LASER (LIGHT AMPLIFICATION BY STIMULATED EMMISSION OF RADIATION) is a device that emits light through a process of optical amplification based on the stimulated emission of electromagnetic radiation. The first laser was built in 1960 by Theodore H. Maiman.
7. (b); An odometer or odograph is an instrument for measuring the distance travelled by a vehicle, such as a bicycle or car. The device may be electronic, mechanical, or a combination of the two.
8. (c); The SI unit for pressure is the pascal (Pa), equal to one newton per square metre (N/m2, or kg•m−1•s−2). This name for the unit was added in 1971. It is named after the French polymath Blaise Pascal.
9. (a); When a beam pass of parallel light rays is incident on a smooth and plane surface, the reflected rays will also be parallel. This type of reflection is called Regular Reflection.
10. (a); The ohm (symbol: Ω) is the SI derived unit of electrical resistance, named after German physicist Georg Simon Ohm.
11. (d); The value of Gravitational Force range from a minimum of 9.78 metre per second squared at the Equator to a maximum of 9.83 metre per second squared at the poles. Hence Gravitational Force is maximum on polls.
12. (b); A hygrometer is an instrument used for measuring the water vapour (humidity) in the atmosphere.
13. (d); Speed is the distance travelled by object in a certain interval of time. Speed is not dependent on direction hence it is a scalar quantity. While Displacement, Momentum and Torque has both magnitude and direction, so they are vector quantity.
14. (b); The temperature at which a liquid freezes is called the Freezing Point. The freezing point of water is 32°F.
15. (b); Newton's first law is other name of Galileo's law of Falling bodies. According to Law of Fall "The distance travelled by falling body is directly proportional to the square of the time it takes to fall". This latter claim states that a body in motion will continue its motion so long as no factor disturbs that motion. This principle is called the principle of inertia which is basis of Newton's first law.
16. (a); A pyrometer is a type of remote-sensing thermometer used to measure the temperature of a surface and inside metallurgical furnaces.
17. (d); In a qualitative way, a property of matter by which it remains at rest or in uniform motion in the same straight line unless acted upon by some external force is called Inertia. In other words, the tendency of undisturbed objects to stay at rest or to keep moving with the same velocity is called Inertia.
18. (c); The time taken by a pendulum to complete one oscillation is called its Time Period.
19. (c); If the mass of an object is 60 kgs, 100N will be its weight on the moon.
20. (a); The convex mirror produces an upright image of any object and offers a wide viewing area as compared to the plane mirror. The usage of this type of mirror can be perceived on the car rear-view mirror, side-view mirror and even the motorcycles.
21. (a); If the speed of an object moving along a straight line is constant, its motion is said to be uniform motion.
22. (d); The strength of a force is usually expressed by its Magnitude.

23. (a); Concave mirrors are used to provide a magnified and inverted image in rear view mirror.
24. (c); The Surface tension of water provides the necessary wall tension for the formation of bubbles with soap water. The tendency to minimize that wall tension pulls the bubbles into spherical shape.
25. (a); In absolute vacuum, there are no particles, no material medium, nothing. So, there is no reflection, refraction, diffraction, etc. That is why it travels the fastest in vacuum.
26. (c); The SI unit for measuring an electric current is the ampere, which is the flow of electric charge across a surface at the rate of one coulomb per second. Electric current is measured using a device called an ammeter.
27. (b); While frequency measures the cycle rate of the physical waveform, pitch is how high or low it sounds when you hear it. Pitch and Frequency are related to each other. A high pitch sound corresponds to a high frequency sound wave and a low pitch sound corresponds to a low frequency sound wave.
28. (c); The photoelectric effect is an phenomenon in which the emission of electrons occurs when a beam of light strikes a metal or a cathode surface. For emissions of electrons frequency of incident light is required to be greater than a minimum value called Threshold Frequency. Thus, show particle nature of light.
29. (b); An electric motor is an electrical machine that converts electrical energy into mechanical energy.
30. (a); Optical fibre work on the principle of Total Internal Reflection of Light. In optical fibre, when light traveling in an optically dense medium hits a boundary at a steep angle (larger than the critical angle for the boundary), the light is completely reflected. This is called total internal reflection.
31. (b); Water Tank appear shallower when viewed from the top due to refraction of light. This virtual depth is known as Apparent depth.
32. (b); Yellow colour is formed when Red and Green are mixed.
33. (d); Ultraviolet (UV) radiation from the sun or sunbeds is the main cause of skin cancer.
34. (b); It may seem that current is a vector because it have a magnitude and a direction. But the thing is, a vector always obey the law of addition of vectors. Since current doesn't obey it and it follows algebraic addition, current is a scalar.
35. (a); The phenomenon of raising outer edge of the curved road above the inner edge is to provide necessary centripetal force to the vehicles to take a safer turn and the curved road is called Banking of Roads.
36. (d); A convex mirror provides for a larger field of view than a plane mirror. They are used whenever a mirror with a large field of view is needed. For example, the passenger-side rear view mirror on a car is convex.
37. (c); Diffraction is defined as the bending of light around the corners of an obstacle or aperture into the region of geometrical shadow of the obstacle.
38. (d); Mirage formation is a result of the refraction and the total internal reflection of light in the air.
39. (c); It is difficult to fix a nail on a freely suspended wooden frame because when the wooden frame is not resting against a support, the frame and nails both move forward on being hit with a hammer. However, when the frame is held firmly against a support, and the nail is hit, an equal reaction of the support drives the nail into the frame. Thus based on Newton's Third Law of Motion.
40. (b); Electromagnetic waves are propagated by oscillating electric and magnetic fields oscillating at right angles to each other. They are not deflected by electric or magnetic field. They can show interference or diffraction, are transverse waves, may be polarized and need no medium of propagation.
41. (c); Zacharias Janssen was a Dutch spectacle-maker from Middelburg associated with the invention of the first Optical telescope. He is also credited for inventing the first truly compound microscope.
42. (b); Supercooling is the process of chilling a liquid below its freezing point, without it becoming solid.
43. (a); Refraction is the bending of light as it passes from one medium to another. The bending is caused by the differences in density between the two substances.
44. (b); A H Taylor and Leo C Young are inventor of first true radar.

45. (a); Decibel (dB) is the SI unit of intensity of sound.
46. (a); When blue and green colour combine, the result is cyan.
47. (b); SI unit of power is watts. A watt is the power that it takes to do one joule of work in one second.
48. (d); Pascal's principle states that "a change in the pressure of an enclosed incompressible fluid is conveyed undiminished to every part of the fluid and to the surfaces of its container." For every 10m depth the pressure on the diver increases by 1 atm so at a depth of 10 meters under water, pressure is twice the atmospheric pressure at sea level. Thus, during Scuba diving players must have the knowledge of Pascal's law.
49. (b); Least distance of distinct vision is defined as the minimum distance between the eye lens and the object to form a clear image. For a healthy human eye, the least distance of distinct vision is 25 cm, however it varies with age.
50. (a); In 1742, Swedish astronomer, Anders Celsius invented the Celsius(Centigrade) temperature scale, which was named after the inventor.
51. (b); Pascal's Law states that pressure that is applied to an enclosed fluid is transmitted equally to all other points. A hydraulic pump is a water pump that uses the kinetic energy of flowing water to force a small fraction of that water to a reservoir at a higher level. The hydraulic lift works because of Pascal's law. If force is put on(according to Pascal's Law), that force should be entirely felt on all points throughout the liquid.
52. (a); At -40 degrees, the numerical values on Celsius and Fahrenheit scales become equal.
53. (c); Sublimation is the phase transition of a substance directly from the solid to the without passing through the intermediate liquid phase.
54. (a); When a ball is thrown vertically upwards, energy remains constant during its motion.
55. (a); Heat is the amount of energy that flows spontaneously from a warmer object to a cooler one. In SI system, heat energy is measured in joules (J).
56. (d); The Sun and the planets move around each other with their center of mass lying at the focus of the elliptical orbits. In other words, If the orbit of a planet is an ellipse then the point at which the Sun is located called Focus.
57. (d); The sliding friction is smaller than the static friction.
58. (d); The Kelvin scale is an absolute thermodynamic temperature scale using as its null point absolute zero, the temperature at which all thermal motion ceases in the classical description of thermodynamics. The kelvin (symbol: K) is the base unit of temperature in the International System of Units (SI).
59. (a); Willem Einthoven invented the electrocardiogram (ECG).
60. (d); If the speed of an object moving along a straight line keeps changing with time then its motion is said to be non-uniform motion.
61. (b); A lubricant is a substance, usually organic, introduced to reduce friction between surfaces in mutual contact, which ultimately reduces the heat generated when the surfaces move.
62. (a); Space pen is a ballpoint pen invented by Paul C. Fisher and made to work in zero gravity, underwater, and at any angle (even upside down). It is also known as Zero Gravity Pen and Fisher Space Pen.
63. (c); In the formula of average velocity = (u +v)/2, u is the initial velocity.
64. (c); If the force applied on the object is in the direction opposite to the direction of motion, the speed of the object decreases.
65. (a); The SI unit of acceleration is the meter per second squared.
66. (a); Contact force is another name for Friction.
67. (b); The force of friction between two surfaces will increase if the two surfaces are pressed harder.
68. (a); An image formed by a plane mirror, that cannot be obtained on a screen is called Virtual image.
69. (a); The force exerted by a magnet is an example of Non-contact force.
70. (b); Uniform motion is defined as the motion of an object in which the object travels in a straight line and its velocity remains constant along that line as it covers equal distances in equal intervals of time, irrespective of the length of the time.

71. (c); An image stays on the retina for about 1/16 of a second. This feature is called persistence of vision.
72. (c); Newton's second law of motion can be formally stated as follows: The acceleration of an object as produced by a net force is directly proportional to the magnitude of the net force, in the same direction as the net force, and inversely proportional to the mass of the object.
73. (b); The coil wire is heating element in electric room heater or electric cooking heater to converts electricity into heat through the process of resistive or Joule heating. Electric current passing through the element encounters resistance, resulting in heating of the element.
74. (b); Energy in the form of heat is wasted when a machine is operated. This heat is generated due to Friction between two parts.
75. (c); The law of reflection states that the incident ray, the reflected ray, and the normal at the point of incidence all lie in the same plane.
76. (b); A concave mirror is capable of producing a real image.
77. (c); The distance-time graph for the motion of an object moving with a constant speed is a Straight Line.
78. (a); If the force applied on the object is in the direction of its motion, the speed of the object increases.
79. (a); If an object moves in a circular path with uniform speed, its motion is called uniform circular motion.
80. (c); The reflection formed by the plane mirror is Lateral inversion.
81. (a); A ball rolling along the ground gradually slows down and finally comes to rest is due to friction.
82. (b); The angle between the Normal and the incident ray is called the angle of incidence.
83. (d); James Dewar was inventor of the thermos flask.
84. (a); Friction is caused by the irregularities on the two surface in contact.
85. (a); In general, a uniformly accelerated motion is the one in which the acceleration of the particle throughout the motion is uniform. The motion of a freely falling body is an example of Uniformly accelerated motion.
86. (b); The Melting point of a solid is the temperature at which it changes state from solid to liquid at atmospheric pressure.
87. (d); For an object, the state of rest is considered to be the state of zero speed.
88. (b); The laws which govern the motion of planets are called Kepler's law of planetary motion.
89. (b); Concave and convex are two classes of spherical mirrors. A concave mirror is a spherical mirror in which the reflecting surface and the center of curvature fall on the same side of the mirror. On the other hand, a convex mirror is a spherical mirror in which the reflecting surface and the center of curvature lie on the opposite sides of the mirror.
90. (a); Drag is a kind of frictional force exerted by fluid which opposes the motion of an object through that fluid. Drag force acts in direction opposite to the direction of motion of the object.
91. (d); The SI unit of frequency is the hertz (Hz), named after the German physicist Heinrich Hertz; one hertz means that an event repeats once per second.
92. (b); Wood is a good insulator.
93. (b); Bubbles of air rise up through liquids due to viscosity and buoyancy.
94. (b); Wood is an insulator.
95. (c); Farsightedness (Hypermetropia) as it is medically termed is a vision condition in which distant object are usually seen clearly, but close ones do not come into proper focus. To remove this vision problem one should use a convex lens.
96. (d); When light from stars passes through the atmosphere, it bent due to refraction, which is why stars seem to twinkle. Due to the planets' closeness to Earth, the light coming from these celestial bodies does not bend much due to Earth's atmosphere. Therefore, the light coming from our solar system's planets does not appear to twinkle like stars.
97. (a); The 'Choke' used with a tube light is basically an inductor.
98. (d); The transverse nature of light can be demonstrated through polarization.
99. (c); Rectifier is an electrical device that converts alternating current (AC), which periodically reverses direction, to direct current (DC), which flows in only one direction. The process is known as rectification, since it "straightens" the direction of current.
100. (c); Saw dust is used to cover ice because it is poor conductor of heat. It did not let the ice

melt quickly, as it does not transfer the heat of the surrounding to the ice.

101. (d); The washing machine works on the principle of Centrifugation.
102. (d); In absence of earth's atmosphere, sky would appear black due to absence of scattering phenomena.
103. (c); Temperature of distant luminous bodies can be determined by Pyrometers.
104. (c); Energy travels from Sun to Earth through Radiation.
105. (b); Heat is transmitted from higher temperature to lower temperature through the actual motion of the molecules in both conduction and convection.
106. (b); If electric resistance is to be decreased, then the number of resistances should be connected in Parallel.
107. (d); A transistor is a semiconductor device used as an amplifying device.
108. (a); The unit of measurement of Noise is Decibel.
109. (c); Total internal reflection is responsible for the glittering of air bubble rising through water.
110. (c); In an optical fibre the signal is transmitted due to total internal reflection.
111. (a); When we see an object, the image formed on the retina is real and inverted.
112. (d); The amount of translational kinetic energy that an object has depends upon two variables: the mass (m) of the object and the speed (v) of the object.
113. (b); Kinetic Energy is form of energy which is the supplied heat energy stored during change in temperature of substance.
114. (c); In order to convert a Galvanometer into voltmeter, a very high resistance known as "series resistance" is connected in series with the galvanometer.
115. (b); Even after sunset, the air near the Earth's surface continue to receive heat due to Terrestrial Radiation.
116. (d); During sunrise and sunset, the rays have to travel a larger part of the atmosphere because they are very close to the horizon. Therefore, light other than red is mostly scattered away. Most of the red light, which is the least scattered, enters our eyes. Hence, the sun and the sky appear red.
117. (b); At hill stations, the boiling point of water will be less than that at sea level due to change in atmospheric pressure.
118. (b); The component used for tuning a radio is basically a variable capacitor.
119. (b); 0°K is equivalent to – 273°C.
120. (d); Air is optically rarer than water, the ray of light bends away from the normal at the point of incidence when moving from water to air while it bends towards the normal while moving from air to water. ... It is clearly visible that the air bubble acts as a DIVERGING LENS (concave lens) in water.
121. (a); DC implies no changes in value. Frequencies of signals are defined by how many changes per time, e.g. 60 cycles per second. In case of DC with there are 0 changes per second. Hence the frequency of DC is zero.
122. (c); The term 'Higgs Boson' is associated with God particle.
123. (c); Candela is not related to sound. It is unit of light intensity.
124. (c); electromagnetic radiation refers to the waves of the electromagnetic field, propagating through space-time, carrying electromagnetic radiant energy. It includes radio waves, microwaves, infrared, visible light, ultraviolet, X-rays, and gamma rays.
125. (a); Graphite is a very good conductor of electricity due to the mobility of the electrons in its outer valence shells.
126. (b); A lactometer is an instrument used to check purity of milk.
127. (d); Diamond is a bad conductor of electricity but good conductor of heat. Electricity is conducted in a crystal by electrons that are relatively free. But in diamond, each carbon atom is covalently bonded with four other carbon atoms and there are no free electrons.
128. (c); Weightlessness experienced while orbiting the earth in space ships is due to Zero gravity.
129. (b); The sextant is an instrument used to measure angles. Mainly used at sea, the tool is so named because its arc is one sixth of a circle – 60 degrees.
130. (d); Since, the projectile is fired at an angle, its velocity can be split into two components - horizontal(Vx) and vertical(Vy).

$Vx = v * \cos\phi$

$Vy = v * \sin\phi$

Gravity is the only force acting on it. And it is acting downwards, so only the vertical component of the velocity is affected by this

and the horizontal component remains constant.

131. (d); Ultrasonic waves cannot be polarised, ultrasonic wave is an example of sound wave and it cannot be polarised.
132. (c); The color of a star which varies from bluish white and yellow to orange and red is primarily due to its composition and effective temperature.
133. (b); An anemometer is a device that is used to measure wind speed. There are many different types of anemometers suited for different environments.
134. (b); Blood pressure is measured by instrument called sphygmomanometer also called asblood pressure meter, it is used to measure the pressure of blood in Arteries.
135. (d); The reverse effect of X-ray emission is Photo-electric effect.
136. (d); Solar panels are those devices which are used to absorb the sun's rays and convert them into electricity or heat. A solar panel is actually a collection of solar (or photovoltaic) cells.
137. (a); Visible light has the lowest frequency among the following electromagnetic radiations.
138. (b); The Theory of relativity is postulated by Albert Einstein.
139. (c); Fathometer is a depth finder that uses sound waves to determine the depth of water.
140. (a); Barograph was invented in 1844 by the Frenchman Lucien Vidi (1805–1866).
141. (c); Power is the ratio of two scalar quatities, and is thus scalar quatities.
142. (b); A Seismometer is an instrument that measures motion of the ground, caused by, for example, an earthquake, a volcanic eruption, or the use of explosives. It was invented by Italian scientist Luigi Palmieri.
143. (c); Newtons third law states that for every action there is an equal and opposite reaction.
144. (d); A Displacement is a vector whose length is the shortest distance from the initial to the final position of a point P. It quantifies both the distance and direction of an imaginary motion along a straight line from the initial position to the final position of the point.
145. (a); Cosmology is the study of the origin, evolution of the universe.
146. (a); When a ball is thrown upwards the acceleration due to gravity remains constant throughout. It comes to rest for a moment at the highest point of motion just before returning back to earth.
147. (d); When a body is moving on a circular path its average velocity when it complete one cycle in one second is zero.
148. (a); Evangelista Torricelli is universally accepted as inventor of Barometer.Charles Xavier Thomas invented mechanical calculator. Edward Teller is known as "the father of the hydrogen bomb". Gustav Tauschek developed numerous improvements for punched card-based calculating machines.
149. (a); Newton's First Law of Motion states that a body at rest will remain at rest unless an outside force acts on it, and a body in motion at a constant velocity will remain in motion in a straight line unless acted upon by an outside force.
150. (d); When an Object is dropped from height and when there is no air resistance the speed of object will increase.
151. (b); George Stephenson built the first steam locomotive to carry passengers on a public rail line, which is between Stockton and Darlington Railway in 1825.
152. (a); Distance=Speed × Time
153. (a); The mole is the unit of measurement for amount of substance in the International System of Units (SI). The unit is defined as the amount or sample of a chemical substance that contains as many constitutive particles.
154. (b); The Arithmometer was the first digital mechanical calculator strong enough and reliable enough to be used daily in an office environment. It was invented by Charles Xavier Thomas.
155. (a); If an object is thrown upwards its velocity will be 0m/s when it reaches at it maximum height.
156. (d); Momentum will be same for object having different masses for the force acting for same amount of time.
157. (a); Telephone exchange was invented by Tivadar Puskas.
158. (b); Two Positive charge will repel to each other so the force will decrease between two positive charge.
159. (d); A seismometer is an instrument that measures motion of the ground, caused by, for example, an earthquake, a volcanic eruption, or the use of explosives.

160. (b); "The ocean looks blue because red, orange and yellow (long wavelength light) are absorbed more strongly by water than is blue (short wavelength light). So when white light from the sun enters the ocean, it is mostly the blue that gets returned.
161. (a); John Logie Baird was a Scottish engineer, innovator, one of the inventors of the mechanical television, demonstrating the first working television system on 26 January 1926.
162. (a); An electroscope is an early scientific instrument that is used to detect the presence and magnitude of electric charge on a body. It was the first electrical measuring instrument. The first electroscope, a pivoted needle called the versorium, was invented by British physician William Gilbert around 1600.
163. (d); Wavelength of red colour is largest and violet colour has the shortest wavelength.
164. (a); Glass is sometimes called a super cooled liquid because it does not form a crystalline structure, but instead forms an amorphous solid that allows molecules in the material to continue to move.
165. (b); Friction is the force resisting the relative motion of solid surfaces, fluid layers, and material elements sliding against each other.
166. (c); In a streamline flow, velocity at every point in the fluid remains same.
167. (b); Postage Meter was invented by Arthur Pitney.
168. (b); Igor Sikorsky, a Russian is recognized as father of modern helicopters.
169. (b); The water level remains the same when the ice cube melts. A floating object displaces an amount of water equal to its own weight. Since water expands when it freezes, one ounce of frozen water has a larger volume than one ounce of liquidwater.
170. (b); A scalar quantity is a one dimensional measurement of a quantity, like temperature, or weight, it has only magnitude and no direction.
171. (b); Angular momentum is a vector quantity.
172. (c); When the ice melts to liquid water, the structure collapses and the density of the liquid increases. At temperatures well above freezing, the molecules move faster and get further apart. The density decreases as temperature increases thus, the density of water is a maximum at 4 °C.
173. (a); Work done due to displacement caused by a force is a scalar quantity.
174. (b); Terminal velocity is the constant speed that a freely falling object eventually reaches when the resistance of the medium through which it is falling prevents further acceleration.
175. (b); ON September 10, 1846, Elias Howe was granted a US patent for his invention of the sewing machine.
176. (a); The impulse-momentum theorem states that the change in momentum of an object equals the impulse applied to it.
177. (a); ISRO built India's first satellite known as Aryabhata.
178. (c); Accelaration due to gravity, g = (G×M)/R2, Thus, Accelaration due to gravity at a distance 2R,
g'=(G×M)/(2R+R)2
=(G×M)/9R2
=g/9 (Since g={G×M}/R2).
179. (a); Pascal is not unit of Moment of Inertia. Moment of inertia may be expressed in units of kilogram metre squared (kg. m2) in SI units.
180. (a); Atmospheric pressure is measured by Barometer.
181. (c); Hyetometer is the instrument used to measure rainfall.
182. (a); Max Planck was a German theoretical physicist, considered to be the initial founder of quantum theory, and one of the most important physicists of the 20th Century.
183. (c); In physics, spin is the velocity of rotation of something around a particular axis.
184. (b); If an object, on a free fall from a certain height, reaches the ground in 1 second, its velocity on the impact with the ground 9.8 m/s.
185. (d); The Orbital Motion Interactive is simulates the elliptical motion of a satellite around a central body. In this type of motion axis of the rotation does not pass through the object.
186. (b); Spin and Orbital motion are the two kinds of Rotatory motion.
187 (a); The moment arm or lever arm is the perpendicular distance between the line of action of the force and the center of moments. Moment Arm is the perpendicular distance between point of application of force and axis of rotation.

188. (b); Longsec is not the unit of distance.
189. (c); The apparent weight of a person in a lift which is moving down with uniform acceleration is less than the weight when the person is stationary.
190. (c); Robert Hutchings Goddard (October 5, 1882 – August 10, 1945) was an American engineer, professor, physicist, and inventor who is credited with creating and building the world's first liquid-fueled rocket.
191. (d); Weight of a person at a height of 2R from the centre of the earth, where R is the radius of the earth became one-fourth.
192. (d); A hydrometer is an instrument used to measure the specific gravity (or relative density) of liquids. It is also used to measure specific gravity of milk.
193. (a); Enrico Fermi was an Italian-American physicist and the creator of the world's first nuclear reactor, the Chicago Pile-1. He has been called the "architect of the nuclear age" and the "architect of the atomic bomb".
194. (a); The angle between centripetal acceleration and tangential acceleration is 90°.
195. (c); A rectifier is an electrical device composed of one or more diodes that converts alternating current (AC) to direct current (DC).
196. (d); The Nobel Prize in Physics 1930 was awarded to Sir Chandrasekhara Venkata Raman "for his work on the scattering of light and for the discovery of the effect named after him.
197. (b); The Siemens (symbol S) is the derived unit of electric conductance.
198. (c); The rate of change of momentum of an object is directly proportional to the resultant force applied and is in the direction of the resultant force. The resultant force is equal to the rate of change of momentum.
199. (a); Scottish inventor and veterinary surgeon John Boyd Dunlop developed the pneumatic (air-filled) rubber tire. He was one of the founders of the rubber company that bore his name, Dunlop Pneumatic Tyre Company. In 1888, Dunlop patented his pneumatic tyre.
200. (b); When net torque is zero, angular momentum will be constant.
201. (c); Newton's first law of motion is also known as the law of inertia. Newton's First Law of Motion states, "A body at rest will remain at rest, and a body in motion will remain in motion unless it is acted upon by an external force."
202. (c); The cooling by a desert cooler is based on evaporative cooling. These coolers are also known as swamp coolers.
203. (b); Most of the air conditioner uses compressed gas, which can cool the room or other places.
204. (d); If salt is added to the water then the boiling point of water will increases. This happens as the boiling point is the temperature at which the vapor pressure of solvent becomes equal to the external atmospheric pressure. Similarly it also decreases the freezing point, which in turn will interfere with the frozen solution's crystal structure. That means the temperature will have to be colder to overcome it and freeze the mixture anyway.
205. (c); Universal Standard time, as originally proposed by Scottish-Canadian Sir Sandford Fleming in 1879, divided the world into twenty-four time zones, each one covering 15 degrees of longitude.
206. (d); Kirchhoff's First Law. Kirchhoff's First Law states that the total current entering a junction is equal to the total current leaving the junction. In other words, the algebraic sum of currents at a junction is zero.
207. (d); Acceleration due to gravity on a planet decreases with increase in altitude from surface of the planet.
208. (d); Angular Velocity is same on every point on a rotating body.
209. (c); Trajectory is the path followed by a projectile flying or an object moving under the action of given forces, a curve or surface cutting a family.
210. (b); Adolf Gaston Eugen Fick was credited with invention of the Contact Lens.
211. (c); Electrons move around the nucleus in orbital motion.
212. (b); Sphygmomanometers is an instrument for measuring blood pressure, particularly in arteries. The two types of sphygmomanometers are a mercury column and a gauge with a dial face.
213. (b); The reflecting telescope invented by Sir Isaac Newton in 1671.
214. (c); Whenever a force is applied to an object, causing the object to move, work is done by the force. Work done due to displacement caused by a force is a scalar quantity. Work can be either positive or negative. The unit of work is the unit of energy, the joule (J). 1 J = 1 N m.

215. (a); Inertia is a property of matter that causes it to resist changes in velocity (speed and/or direction).
216. (d); The atmospheric pressure decreases with altitude because gas molecules which make up the air concentrate near lower altitude in response to Earth's gravity. Hence, air pressure is low at higher altitudes. Due to this difference in air pressure, the air inside the pen forces the ink to come out.
217. (b); An anemometer is a device used for measuring the speed of wind.
218. (a); Rakesh Sharma was the first Indian to travel in Space. He was born on 13th January 1949 in Punjab, India. He flew to the Salyut 7 Space Station.
219. (b); According to the equation of continuity Av = constant. Where A =cross-sectional area and v=velocity with which the fluid flows. It means that if any liquid is flowing in streamline flow in a pipe of non-uniform cross-section area, then rate of flow of liquid across any cross-section remains constant.
220. (c); A body which is in equilibrium is either moving at constant velocity in a straight line, or it is not moving.
221. (c); The viscosity of an ideal fluid is Zero.
222. (a); The SI unit of intensity, which includes sound intensity, is the watt per square meter (W/m2).
223. (c); The glass or steel which is used in thermos bottle is coated with a silver layer to keep drinks at the same temperature for some time.
224. (a); The atmosphere exerts enormous pressure on us but we do not feel it, because our blood exerts pressure slightly more than that of the atmosphere. We feel this pressure in water because the pressure underwater is greater than our normal blood pressure.
225. (d); The temperature dependence of liquid (Glycerin etc) viscosity is the phenomenon by which liquid viscosity tends to decrease as its temperature increases. The increase in temperature causes the kinetic or thermal energy to increase and the molecules become more movable.
226. (b); Food can be cooked faster in a pressure cooker since the boiling point of water increases with pressure. As the water boils, the steam produced cannot evaporate so the pressure inside the cooker increases. At higher elevations, atmospheric pressure is lower and therefore water boils at lower temperature.
227. (c); We know that the mass of liquid displaced by the floating ice equals to the mass of the object. That's why the ice caps float on water. Similarly, when an ice cube melts in a glass of water, the water level does not change as the melted water will occupy exactly the same amount of space as the ice under the water level previously occupied.
228. (a); According to the law of gases
From formula = $\frac{V_1}{V_2} = \frac{T_1}{T_2}$
$V_1 = \frac{V}{2}$ and $V_2 = V$[given]
$T_1 = 273 + 27 = 300K$
$T_2 = ?$
$\frac{V/2}{V} = \frac{300}{T_2} \Rightarrow T_2 = 600K$
$\therefore T_2 = 600 - 273 = 327°C$.
229. (d); Benoit Fourneyron is the Inventor of Water Turbine.
230. (c); The Intensity of waves is defined as the power delivered per unit area of a Wave.
231. (d); The motion of an object is said to be translatory if the position of the object is changing with respect to a fixed point or object. All the particles of a body excuting translatory motion move in the same direction traversing parallel paths. Train is an example of Translatory motion.
232. (d); PlayStation was the brainchild of Ken Kutaragi, a Sony executive who had just finished managing one of the company's hardware engineering divisions at that time and would later be dubbed as "The Father of the PlayStation".
233. (a); Lucimeter is an instrument used for measuring light intensity.
234. (a); The gravitational constant, symbolized G , is a physical constant that appears in the equation for Newton's law of gravitation.This is different from 'g' which is denotes the acceleration due to gravity.
235. (d); In a projectile motion, a large angle with the horizontal produces high trajectory.
236. (c); Electric motor is a device which converts electrical energy into mechanical energy. Electric motors involve rotating coils of wire which are driven by the magnetic force exerted by a magnetic field or an electric current.
237. (a); Electric motors operating at low voltage tend to burn out because they draw more current which is inversely proportional to the voltage.
238. (a); The Pascal is SI unit of pressure.

239. (b); The absorption of ink by blotting paper involves Capillary action phenomenon.
240. (c); Georges Claude invented Neon Lamp.
241. (d); Chronometer is an instrument for measuring time accurately in spite of motion or variations in temperature, humidity, and air pressure.
242. (b); If the radius of the earth decreases and its mass remains the same, then the value of "acceleration due to gravity" will increase.
243. (c); Nicolaus Copernicus was a Polish astronomer who put forth the theory that the Sun is at rest near the center of the Universe, and that the Earth, spinning on its axis once daily, revolves annually around the Sun. This is called the heliocentric, or Sun-centered, system. Copernican heliocentrism is the name given to the astronomical model developed by Nicolaus Copernicus and published in 1543.
244. (d); Angular Velocity is same on every point on a rotating body.
245. (b); The SI unit of electric charge is Coulomb.
246. (c); When the bus is running, the whole body of the passenger is in the state of motion. When the bus stops suddenly, the lower part of the passengers body which is in contact with the bus, comes to rest. But the passengers upper portion remains in the state of motion due to the inertia of motion. This is the reason for the passenger to lean forward when the bus stops suddenly.
247. (c); If a boy is sitting in a train, which is moving at a constant velocity throws a ball straight up into the air, the ball will fall into his hand.
248. (c); A person is hurt on kicking a stone due to reaction. Here Newton third law of motion is applied which states that every action has equal and opposite reaction.
249. (c); For a body moving with non-uniform acceleration, the velocity -time graph is non linear.
250. (c); A parachute descends slowly because it has a larger surfaace area and air resistance is more.
251. (b); Concave mirror is used as Shaving mirror.
252. (c); The spoon dropped by an astronaut in a satellite will continue to follow the motion of the satellite.
253. (b); The sensation of weightlessness in a spacecraft in an orbit is due to the acceleration in the orbit which is equal to the acceleration due to gravity outside.
254. (c); It is easier to carry two buckets of water in one hand each, than to carry only one in one hand because centre of gravity and centre of equilibrium fall within the feet.
255. (b); Uranium is used as fuel in nuclear reactors.
256. (a); Sonar is a technique that uses sound propagation to navigate, communicate with or detect objects on or under the surface of the water, such as other vessels.
257. (a); The forces inside the molecules of water also pulls in the hair on the shaving brush as they have less mass, and due to this surface tension in the surface of the water the hair sticks together.
258. (c); When pressure is increased, the melting point of ice decreases.
259. (a); Sprayer functions are based on Bernoulli's principle.
260. (c); The fabrication of the transistor is the process of creating the transistor that is used in electrical and electronics circuit. Transistors are made from very pure silicon or germanium, but certain other semiconductor materials can also be used.
261. (a); Respiration is the process in which energy is released.
262. (a); The technique of collecting information about an object from a distance without making physical contact with it, is Remote Sensing.
263. (a); The Curie (symbol Ci) is a non-SI unit of radioactivity.
264. (c); Sun generates its energy by nuclear fusion of hydrogen nuclei into helium.
265. (c); Strong nuclear force is the strongest force. It is present inside the atom responsible for binding the protons and neutrons and also inside the proton and neutron in binding up the quarks.
266. (c); Heavy water is basically used as a moderator in nuclear reactors to slow down the neutrons so that they are captured and become effective to bring about the fission reaction.
267. (a); An electric current is a flow of electric charge which is often carried by moving electrons.
268. (a); Electric fuse is a protective device which protects electrical equipment in the circuit by breaking the circuit when there is a short circuit. It has low melting point.
269. (b); A transformer is used to bring voltage up or down in an AC electrical circuit.

270. (d); Graphite is soft and slippery because there are only weak inter molecular forces between its layers. Graphite is a good conductor of heat and electricity.
271. (d); Tungsten is used for the manufacture of the filament of an electric bulb due to its high melting point of 3422 °C.
272. (a); A charged particle moving without acceleration produces an electric as well as a magnetic field.
273. (a); Silicon is a semiconductor material. When it is doped with the impurities gallium and arsenic its ability to capture the sun's energy and convert it into electricity. Hence it is used in Solar cells.
274. (b); Red is used an as emergency or danger signal because it has longest wavelength. It scattered the least by air molecules. The effect of scattering is inversely related to the fourth power of the wavelength of a color. So red light is able to travel the longest distance.
275. (d); Pascal is the unit of pressure in the international system of units (SI). Dyne is unit of force in CGS system. Clearly, option (d) is not correctly paired.
276. (b); Ozone layer thickness is expressed in terms of Dobson units, which measure, what its physical thickness would be if compressed in the earth's atmosphere. 1 Dobson unit is defined to be 0.01 mm thickness STP (Standard Temperature and Pressure).
277. (c); Lactometer is used for the measurement of the density of milk. Butyrometer is used to measure fat content in milk or milk products.
278. (d); It is very difficult to walk on the ice than on the road because ice has a lesser friction than the road. The roughness of road's surface gives you much frictional force which enables you to move forward on road.
279. (b); Centripetal force is a real force that counteracts the centrifugal force and prevents the object from "flying out," keeping it moving instead with a uniform speed along a circular path.
280. (d); The escape velocity of earth is 11.2 km/sec.
281. (c); Kerosene oil rising in the wick of the stove is due to the surface tension of oil. The wick of the lamp has many holes which act as capillaries. So kerosene keeps on rising in the capillaries.
282. (d); The mirage is caused by the Total internal reflection of light at layers of air of different densities.
283. (a); The wavelength of red colour is highest while of violet colour is lowest. Dispersal is inverse to wavelength so it is seen more clear. That's why the red colour is used in traffic.
284. (b); National Science Day is celebrated in India on 28 February each year to mark the discovery of Raman effect by Indian physicist C.V.Raman on 28 February 1928.
285. (c); Swedish scientist Alfred Nobel invented dynamite. The famous Nobel Foundation was established on the basis of his last will in 1900.
286. (c); The half life of a radioactive substance is 10 days; it means in next 10 days there will be half of the remaining radioactive substance. Thus, total 20 days, there will be decay of 75% or ¾ part of substance.
[1/2+1/4=3/4]
287. (a); The electrical conductivity of a semiconductor at absolute zero temperature is zero and they behave like an insulator. At this temperature the electric resistivity becomes infinite.
288. (a); Electrical conductivity is a measure of the amount of electrical current under a material can carry. The most electrically conductive element is silver followed by copper, aluminium and iron.
289. (c); Velocity of sound is maximum in metal and minimum in gases.
290. (d); Light year is not a unit of measuring time, but a unit of measuring distance. The remaining pairs are correctly matched.
291. (d); The watt is a derived unit of power in the International System of Units (SI). Rest of all are the units of heat.
292. (b); Sphygmomanometer is used to measure blood pressure.
293. (a); Momentum is a vector quantity while rest of the options are scalar quantity.
294. (a); If the gravitational force of the earth suddenly disappears, then the weight of an object will become zero but the mass will remain the same.
295. (b); Statics is a branch of mechanics associated with the situation or rest.
296. (b); The colour of the stars reflects the age of stars. Colour is reflected from the temperature is high, then the star is young. The star will be blue during young stage

which indicates high temperature. If star is red the temperature is low.

297. (a); The power of the sunglass is 0 dioptre.

298. (b); Ethylene glycol is an organic molecule most widely used as antifreeze in automobile engines and as an industrial solvent.

299. (a); As we know that the speed of sound is different for different types of medium. In general, sound travels faster in liquids than gases and faster in solids than in liquids.

300. (b); The repetition of sound produced due to the reflection from a large surface like wall, hill or mountain is called echo. Minimum distance between source of sound and reflecting surface be 17 meter so that an echo can be heard.

301. (d); Sound waves are divided into three categories that cover different frequency range; Audible waves (20 Htz- 20,000 Htz), Infrasonic waves (<20 Htz) and Ultrasonic waves (>20,000 Htz). Ultrasonic waves are used to destroy insects, clean clothes by removing dust, treat diseases, control automatic doors, detection of aircraft and submarine, determination of depth of sea etc.

302. (b); We know that-
Number of unit = kilowatt hour = watt x hour /1000
=(60×30×5)/1000=9 unit.

303. (b); According to a report of Department of Atomic Energy in India, there are approximately 10.70 million tons of monazite, which contains 9,63,000 tons of Thorium Oxide (ThO_2). India is one country that has an abundance of thorium. Andhra Pradesh has 35% of thorium reserve of India.

304. (b); Kalpakkam is a small town in Tamilnadu. Narora is located on the bank of river Ganga in district Bulandshahar, Uttar Pradesh. Kakrapara atomic power station is a nuclear power station in India, which lies in the state of Gujarat. Trombay is a northeastern suburb in Mumbai, India. It is famous for Bhabha Atomic Research Centre (BARC).

305. (b); A pyrometer is a type of remote sensing thermometer used to measure the temperature of a surface. In the modern usage, it is a device that from a distance determines the temperature of a surface from the spectrum of the thermal radiation it emits, a process known as pyrometry.

306. (c); The SI unit of power is the Watt (w), which is equal to one joule per second. Knot is the unit of measuring of speed of a ship. Nautical mile is a unit of distance used by navigators in sea. Calorie is a unit of measuring heat and energy.

307. (d); SONAR [Sound Navigation and Ranging is used for locating submerged objects in an ocean.

308. (d); A vector quantity is a quantity that is fully described by both magnitude and direction. On the other hand, a scalar quantity is a quantity that is fully described by its magnitude. Thus displacement, velocity and force are the example of vector quantity while volume is a scalar quantity.

309. (c); In 1687, Isaac Newton published his Law of Gravitation in "Mathematical Principles of Natural Philosophy". He gave the Theory of Gravity.

310. (b); A pendulum clock runs faster in winter because in winter the length of the pendulum or the swing become smaller due to contraction and the clock begin to run fast.

311. (d); Oil spreads on water surface because the surface tension of oil is less than water.

312. (a); A sudden fall in barometer reading indicates that the weather will be stormy.

313. (d); Density of an object depends on its mass and volume. Density can be found by using the equation:
Density = Mass/Volume

314. (d); 1 Micron = 10-6 metre
1 Nanometre = 10-9 metre
1 Angstrom = 10-10 metre
1 Fermimetre = 10-15 metre
Thus, the smallest unit of length in the given options is fermi metre.

315. (c); The sunlight takes about 500 second or 8.5 minutes to reach to the earth.

316. (c); 'Fat Man' was the code name for the type of bomb which was dropped on the Japanese city of Nagasaki by the United States of America. Plutonium was used as fissionable material in this bomb.

317. (c); GPS means Global Positioning System, is a space-based navigation system. It was developed by the U.S. Department of defence.

318. (a); The Noble Prize in Physics in 1921 was awarded to Albert Einstein for his services to Theoretical Physics and especially for his discovery of the "Law of the Photoelectric Effect".
319. (b); Penicillin was discovered by Scottish scientist Alexander Fleming.
320. (b); Manometer is an instrument that uses a column of liquid to measure pressure, commonly referred as pressure measuring instrument.
321. (b); Mainly there are two types of devices that are used to measure solar radiations these are: (i) Pyrheliometer (ii) Pyranometer.
322. (b); The shape of a drop of rain is constrained by the surface tension, which tries to give it the shape for which the surface area is minimum for the given volume. The spherical shape has the minimum surface area. That's why rain drops acquire spherical shape.
323. (a); Soap bubbles are large because when soap dissolved in water its surface tension is reduced. The pressure inside a soap bubble is more than atmospheric pressure.
324. (c); This is because of a phenomenon is known as winter stratification in water bodies. In the winter season, the water at the top layer of water bodies will be ice cold (0°C) and are gradually frozen. But still, the bottom layers will have liquid water and maintain a temperature (4°C) which supports the life there. Thus, fishes and other aquatic animals are saved from the frozen top layer of water.
325. (b); The color of light is determined by its wavelength. Different colors have different wavelengths. The wavelength of red colour is largest and violet colour has shortest wavelength.
326. (d); Due to the refraction of light, the sun is visible to us a few minutes before sunrise and a few minutes after sunset.
327. (a); The concept of expanding universe is based on Doppler effect. It was named after Christian Doppler, who first came up with the idea in 1942. Edwin Hubble used the Doppler Effect to determine that universe is expanding. Hubble found that the light from distant galaxies was shifted towards lower frequencies, to the red end of the spectrum. This is known as a red Doppler shift or a red-shift.
328. (a); Steam has more heat energy than boiling water because it requires Latent Heat of Vapourization for boiling water to change phase from liquid to vapour. Therefore our body comes in contact with more heat when exposed to steam than boiling water
329. (c); Latent heat of Melting = 80 calorie/gram
The heat required for ice at 0°C to convert in water = 80 calorie
Required heat to enhance the temperature of water from 0°C to 100°C = 100 calorie
Latent heat of vaporization = 540 calorie/gram
Hence the energy required to convert water into vapour at
100°C = 540 calorie.
Total heat required = 80 + 100 + 540
= 720 calorie.
330. (b); Absolute zero is the lowest possible temperature at which point the atoms of a substance transmit no thermal energy. They are completely at rest. It is 0 degrees on the Kelvin scale, which translates to-273.15 degree Celsius.
331. (b); Elements such as cast iron, ice, antimony, bismuth, and brass when melts, their volume decreases. These type of solids floats in their own melted fluid.
332. (c); Farsightedness (Hypermetropia) as it is medically termed is a vision condition in which distant object are usually seen clearly, but close ones do not come into proper focus. To remove this vision problem one should use a convex lens.
333. (d); Air is optically rarer than water, the ray of light bends away from the normal at the point of incidence when moving from water to air while it bends towards the normal while moving from air to water. ... It is clearly visible that the air bubble acts as a DIVERGING LENS (concave lens) in water.
334. (b); "The ocean looks blue because red, orange and yellow (long wavelength light) are absorbed more strongly by water than is blue (short wavelength light). So when white light from the sun enters the ocean, it is mostly the blue that gets returned.
335. (d); Wavelength of red colour is largest and violet colour has the shortest wavelength.
336. (c); The cooling by a desert cooler is based on evaporative cooling. These coolers are also known as swamp coolers.

337. (b); Most of the air conditioner uses compressed gas, which can cool the room or other places.
338. (d); The correctly matched options is given below:
John Guttenberg – Printing Press
John Roentgen – X-ray
Michael Faraday – Dynamo
Alexander Graham Bell – telephone
339. (c); According to the options given in the question, only liquid hydrazine is not used as a rocket propellant. Remaining options such as liquid hydrogen, liquid oxygen, and kerosene oil are used as rocket propellant.
340. (d); The black boxes are actually painted with a heat-resistant bright orange colour in order to make them easier to find in wreckage resulting from the crash.
341. (d); If salt is added to the water then the boiling point of water will increases. This happens as the boiling point is the temperature at which the vapor pressure of solvent becomes equal to the external atmospheric pressure. Similarly it also decreases the freezing point, which in turn will interfere with the frozen solution's crystal structure. That means the temperature will have to be colder to overcome it and freeze the mixture anyway.
342. (c); The glass or steel which is used in thermos bottle is coated with a silver layer to keep drinks at the same temperature for some time.
343. (c); The Magnetron tube is a high-powered vacuum tube which is used to produce high microwave energy.
344. (b); Many of the nuclear reactors use graphite as a moderator. Graphite is not as effective as heavy water, but it is cheaper and it also has a low degree of neutron capture like heavy water.
345. (b); Indira Gandhi Centre for Atomic Research (IGCAR) was established in the year 1971 at Kalpakkam (Tamilnadu), under the department of Atomic Energy, Government of India.
346. (a); The conversion of light energy into electrical energy is based on the phenomenon called photovoltaic effect. A photovoltaic cell is the basic unit of the system where the photovoltaic effect is utilized to produce electricity from light energy. Silicon is most widely used semiconductor material for construction photovoltaic cell.
347. (d); Germanium and silicon are semiconductor materials.
348. (d); Fluorescent lamps are filled with the low pressure gases specially Mercury and noble gases like Argon, Neon, Xenon and Krypton.
349. (a); C.F.L. is short for Compact Fluorescent Lamp. CFL uses significantly less energy than traditional light bulbs (75% less).
350. (b); Blue light which has the least wavelength of all the visible radiations is scattered most. The blue appearance of the sky is due to scattering of sunlight from the atmosphere. Light of shorter wavelength is scattered by air molecules which because of their smaller size follow Rayleigh's scattering. Blue light is strongly scattered by the air molecules and reach the observer. This explains the blue colour of the sky.
351. (c); The eye lens is composed of a fibrous, jelly-like material. Its curvature can be modified to some extent by the ciliary muscles. The change in the curvature of the eye lens can thus change its focal length. When the muscles are relaxed, the lens becomes thin. Thus its focal length increases. This enables us to see distant objects clearly. When you are looking at objects closer to the eye, the ciliary muscles contract. This increases the curvature of the eye lens. The eye lens then becomes thicker. Consequently, the focal length of the eye lens decreases. This enables us to see nearby objects clearly.
352. (d); All the above
353. (c); A dynamo, which is also known as an electrical generator produces direct current through a commutator. It is basically a device which converts mechanical rotation into electric current according to Faraday's law.
354. (c); Television broadcasts emit two types of signals, audio and visual. These two signals require modulation to transmit both signals at the same time. Analog television requires transmission that uses specific modulation methods employing AM and FM signals in its transmission. Frequency modulation or FM is used for the audio part of the transmission. Amplitude modulation or AM is used in the video transmission.
355. (c); A dynamo is an electrical generator that produces direct current with the use of a commutator. It converts mechanical energy into electrical energy.

356. (d); The transformer is used to step up and step down the alternating current. There are two types of coils in transformers (i) Primary coil (2) Secondary coil. Alternate current flows through the primary coil which inflicts the potential in he secondary coil.
357. (d); All options except chromium are being used as nuclear fuel of radioactive elements.
358. (d); All the radioactive elements are used as the nuclear fuel except helium because it is inert in nature. It does not form compounds or react with any other element.
359. (c); Pokhran-II was the series of five nuclear bomb tests conducted by India under operation "Shakti" at the Indian Army's Pokhran test range on May 11, 1998. It was the second Indian nuclear test after Pokhran-I.
360. (c); Narora power station is located in the IV Seismic Zone. Kalpakkam is located into the II Seismic Zone. Kaiga and Tarapur are located into the III Seismic Sone.
361. (c); The reactor's design is based on the French reactor Rhapsody, with several modifications. Plutonium-uranium mono-carbide developed indigenously as the driver fuel and went critical on 18th October, 1985.
362. (d); Radioactive elements are elements that have an unstable nucleus. When the nuclei are considered unstable, they radiate alpha, beta and Gamma radiation and is converted into a stable element. This type of radiation is invisible for naked eye.
363. (a); Dhruva, Purnima, and Cirus are Indian research reactors.
364. (b); Control rod constitutes a real-time control of fission Process which is crucial for both keeping the fusion chain reaction active and preventing it from accelerating beyond control. These rods are composed of chemical elements such as boron, silver, indium and cadmium.
365. (d); Technetium is a chemical element with atomic number 43. It was the first artificially produced element. Technetium was isolated by Carlo Perrier and Emilio segre in 1937.
366. (a); When the water is heated, its density decreases. The density of the water at 100°C is at the lowest, so the body will sink. Water density is maximum at 4°C, so the body will float.
367. (a); It is easier to swim in sea water than in a river because, the sea water contains salt which increases the density of water and also increases its upthrust so, the chances of sinking get reduced and one can easily swim in such water.
368. (c); The sunlight takes about 500 second or 8 minutes (apx) to reach to the earth.
369. (d); When light passes from air to glass or one medium to another, then the frequency of the light remains constant but wavelength and velocity are changed.
370. (a); Total internal reflection takes place when a ray of light is travelling from denser to thinner medium and angle of incidence is greater than the critical angle, the ray is completely reflected from surface and meet each other as if the surface is a mirror. So according to options, the situation of option (a) is correct where total internal reflection takes place, it is because diamond is denser than glass.
371. (c); The optical fibre is a very thin strand of glass or plastic cable for transmitting light from one point to another. They work on he principle of total internal reflection. There is no loss of signal through an optical fibre.
372. (d); An endoscope is a medical device consisting of a long, thin, flexible (or rigid) tube which has a light source and a video camera. Images of the inside of the patient's body can be seen on a screen. It is not suitable to categorize endoscope as a type of a camera.
373. (a); The refractive index of diamond is very high. Diamond achieves brilliance partially from total internal refraction. It has been cut or designed in such a way that if light enters into it, incident light strikes many of the internal surfaces.
374. (b); Holography is a technique of producing a three-dimensional image of an object. Holography can work with sound, light or any wavelength. It is also been used for three-dimensional natural films.
375. (c); The colour of the sky for an astronaut is black. It is because of the fact that in the space there is no atmosphere. Hence light doesn't get scattered at all. In addition to this, in space, there are no air particles against which the sunlight can strike, get reflected or scattered. Hence, astronaut see everything black.
376. (a); Red has the maximum wavelength. During sunrise and sunset, the rays have to travel a

larger part of the atmosphere because they are very close to the horizon. Therefore light other than red is mostly scattered away. Most of the red light which is least scattered enters our eyes. Hence, the sun and the sky appear red.

377. (b); A convex lens is thicker in the middle and thinner at the edges. Rays of light that pass through the lens are brought closer together. A convex lens is also called a converging lens. A convex lens is also used in reading glasses & it also used to remove the defect of farsightedness.

378. (a); The refractive or bending power of the cornea and humor is constant. However, that of the lens can be changed by changing its shape. That is making it more or less convex so that light can be properly focused on the retina. The greater the lens convexity or bulge the more bends the light. The flatter the lens, the less it bends that light.

379. (a); Concave mirror is used in the headlights of cars and in searchlights. A light placed at the focus of a concave lens can form a parallel beam and is used in car headlights and searchlights.

380. (b); A hygrometer is an instrument used to measure the moisture content in the atmosphere which is also called as humidity in the air.

381. (d); The viscous force is the force between a body and a fluid (liquid or gas) moving past it, in a direction so as to oppose the flow of the fluid past the object.

382. (c); Fathometer is an instrument used to determine the depth of water or a submerged object by means of ultrasound waves.

383. (b); The kinetic energy in the energy in moving objects or mass. The kinetic energy of the wind (wind energy) can be converted into electrical or mechanical energy.

384. (d); A hydrophone is a microphone designed to be used underwater for recording or listening to underwater sound

385. (b); Sunlight is the mixture of different colours. When it passes through the atmosphere it is scattered by the air molecules, particles of dust and other subtle materials which are present in the pathway.

386. (d); If a plane mirror is rotated through a certain angle, then the reflected ray rotates through twice of that angle. So if a mirror is rotated by an angle θ, the reflected ray will rotate by 2θ.

387. (c); Adhesive forces are the attractive forces between unlike molecules.

388. (a); Refrigerator temperatures do not destroy pathogenic or spoilage microorganisms. The lower temperature slows the growth of microorganisms already in the food. According to international standards, the recommended temperature of the refrigerator is 36°F to 38°F (1.7°C to 3.3°C). Thus option (a) is correct.

389. (d); A periscope is an instrument for observation over, around or through an object, obstacle or condition that prevents direct line-of-sight observation from an observer's current position

390. (a); The trapped steam increases the atmospheric pressure inside the cooker by 15 pounds per square inch (psi), or 15 pounds above normal sea-level pressure. At that pressure, the boiling point of water is increased from 212°F to 250°F. This higher temperature cooks food faster.

391. (a); Sonography or ultrasonography is an important mean of clinical diagnosis. It is a diagnostic imaging technique based on the application of ultrasound. It is widely used in the field of medical science.

392. (d); Bats are a fascinating group animals. They are one of the few mammals that can use ultrasonic sound to navigate. As they fly, make an ultrasonic (shouting) sound. The returning echoes give the bats information about anything that is ahead of them, including the speed and size of an insect and which way it is going. This system of finding prey is called echolocation-locating things by their echoes.

393. (c); A jet engine is a machine for turning fuel into thrust. The thrust is produced by action and reaction also known as Newton's third law of motion. Those jet planes which are able to fly faster than the speed of sound are called supersonic jet planes. Jet engines are responsible for depletion of ozone. Flying at stratosphere height, they emits nitrogen oxide which has the potential to destroy significant quantities of ozone in the stratosphere.

394. (d); The electromagnetic spectrum consists of all the different wavelength of electromagnetic

radiations such as: Radiowaves > Microwave > Infrared > Visible > Ultraviolet > X-rays > Gamma rays. Thus it is clear that the radio-waves are having the maximum wavelength while the Gamma rays are having minimum wavelength.

395. (a); The atmosphere exerts enormous pressure on us but we do not feel it, because our blood exerts pressure slightly more than that of the atmosphere. We feel this pressure in water because the pressure underwater is greater than our normal blood pressure.

396. (d); The temperature dependence of liquid (Glycerin etc) viscosity is the phenomenon by which liquid viscosity tends to decrease as its temperature increases. The increase in temperature causes the kinetic or thermal energy to increase and the molecules become more movable.

397. (b); Food can be cooked faster in a pressure cooker since the boiling point of water increases with pressure. As the water boils, the steam produced cannot evaporate so the pressure inside the cooker increases. At higher elevations, atmospheric pressure is lower and therefore water boils at lower temperature.

398. (c); We know that the mass of liquid displaced by the floating ice equals to the mass of the object. That's why the ice caps float on water. Similarly, when an ice cube melts in a glass of water, the water level does not change as the melted water will occupy exactly the same amount of space as the ice under the water level previously occupied.

399. (b); Centripetal force is a real force that counteracts the centrifugal force and prevents the object from "flying out," keeping it moving instead with a uniform speed along a circular path.

400. (d); The escape velocity of earth is 11.2 km/sec.

401. (a); According to the law of gases
From formula = $V_1/V_2 = T_1/T_2$
$V_1 = V/2$ and $V_2 = V$[given]
$T_1 = 273+27 = 300K$
$T_2 = ?$
$(V/2)/V = 300/T_2 \Rightarrow T_2 = 600K$
$\therefore T_2 = 600-273 = 327°C$

402. (c); Electric motor is a device which converts electrical energy into mechanical energy. Electric motors involve rotating coils of wire which are driven by the magnetic force exerted by a magnetic field or an electric current.

403. (a); Electric motors operating at low voltage tend to burn out because they draw more current which is inversely proportional to the voltage.

404. (c); The lens used in CD player emit ultraviolet laser beams which produce sound after reflecting through the bright surface of C.D.

405. (d); Television signals cannot be received beyond a certain distance because the surface of the earth is curved, due to this the signals moves further without hitting the earth's surface.

406. (d); Human beings have stereoscopic vision (stereopsis) means having eyes at the front of their head. The two eyes are a few centimeters apart from each other. Due to this, two eyes see the same object from two slightly different angles and send two slightly different images to the brain. The brain combines these two images to build a three-dimensional picture of the object and we can judge the depth and distance of the object more accurately.

407. (c); The only time that the sun can be viewed with the naked eye is during a total eclipse when the moon completely covers the disk of the sun. But it is never safe to look at a partial or annular eclipse or the partial phases of a total solar eclipse without proper equipment and techniques. Failure to use proper observing method may result in permanent eye damage or severe visual loss caused by the ultraviolet (UV) radiations of a higher wavelength.

408. (a); The Sun and the moon appear elliptical near the horizon because of refraction.

409. (c); The bacteria which are found at 400-8000 ft into the deep sea, for example green Sulphur bacteria, uses infrared radiations for photosynthesis to produce energy.

410. (a); The red light signal is used as a danger signal because it has the highest wavelength and scattered least.

411. (b); The correct order of colors of the rainbow is Red, Orange, Yellow, Green, Blue, Indigo and Violet. Thus it is clear that 'Green' Color is seen in the middle of Rainbow (VIBGYOR).

412. (d); A rainbow is located opposite to the sun; this explains why rainbow is not seen at 12 noon with the sun overhead.

413. (b); The cathode ray tube (CRT), which is used in colour television uses three different phosphors which emit red, green and blue light respectively. They are packed together in stripes or clusters called "triads".

414. (a); There are lots of reasons for using alcohol than mercury as thermometric liquids. Some alcohol has a very low freezing point of about-112°C and therefore is suitable to record very low temperature.

415. (b); Water freezes at 32 degrees Fahrenheit, 0 degrees Celsius, 273.15 Kelvin.

416. (d); CT scan or computed tomography are special x-rays tests that produce cross-sectional images of the body using x-rays and a computer.

417. (a); As per the WHO the safe noise level for a city is 45 decibel (db).

418. (d); Infrared waves are used to transmit radio and TV signals but some of them are using radio waves. Infrared is an electromagnetic radiation.

419. (a); The working principle of a washing machine is based on centrifugation force. The term centrifugal force is used to refer to an inertial force or fictitious force, particular to a particle moving on a circular path that has the same magnitude and dimensions as the force that keeps the particle on its circular path but the point in the opposite direction.

420. (c); Momentum is a vector quantity that is the product of Mass and the Velocity of an object or particle.
Momentum = Mass × Velocity
So, Mass = (Momentum)/Velocity

421. (b); The kinetic energy is the energy in moving objects or mass. The kinetic energy of the wind (wind energy) can be converted into electrical or mechanical energy.

422. (a); The conversion of light energy into electrical energy is based on the phenomenon called photovoltaic effect. Silicon is most widely used semiconductor material for construction photovoltaic cell.

423. (a); As we know v = u + at or at = v – u
∴ a=(v-u)/t
Where, v = ultimate velocity of the particle
u = initial velocity of the particle
a = Acceleration, t = time

424. (a); The shape of a drop of rain is constrained by the surface tension, which tries to give it the shape for which the surface area is minimum for the given volume. The spherical shape has the minimum surface area. That's why rain drops acquire spherical shape.

425. (c); The speed of light in vacuum is maximum (c = 3 × 108 ms–1). The speed of light decreases gradually in optically denser mediums like water or glass. It is least in diamond.

426. (c); The smaller units of measuring mass are Milligram, Microgram, Pikogram and Femtogram.
1 Pikogram = 10^{-12} gram

427. (c); Luxmeter is used to measure the intensity of light, while colorimeter is a device used to measure the intensity of colour.

428. (d); Law of Conservation of Energy means Energy can neither be created nor be destroyed, rather it can only be transformed from one form to another.

429. (a); It is clear that when the elevator is going upwards a person actually feels a little heavier than his usual weight and on the other hand when elevator accelerates downward then a person feels a little reduction than his usual weight.

430. (c); The seperation of cream from milk by churning is due to centrifugal force.

431. (c); The speed of light in a vacuum is 3 × 108 m/s, while the speed of sound in vacuum is zero and in air is 343 m/sec.

432. (a); Blue light which has the least wavelength of all the visible radiations is scattered most. The blue appearance of the sky is due to scattered light which enters the eyes.

433. (a); People use a concave mirror for shaving because when a man standing between the principal focus and pole of a concave mirror, he sees as enlarged, the erect and virtual image of his face.

434. (b); A concave lens is used to remove the defect of myopia.

435. (d); Red, green and blue are referred to as the primary colours of light. If we add the pair of primary colours we obtain white colour.

436. (b); The distance between two successive crests or two successive troughs is the wavelength for a transverse wave.

437. (a); Energy Consumption of 100 watt electric bulb which is used for 10 hours = 100 × 10
= 1000 watt hour
= 1 kilo watt hour
= 1 unit.
According to question the cost of 1 unit of electricity = Rs. 5

438. (d); Tungsten metal is used as filament in lighting bulbs.

439. (b); The principle of atomic bomb is based on nuclear fission while fusion weapons are referred as thermonuclear bombs or hydrogen bomb.

440. (c); In the field of Physics watt is measurement of power, describing the rate at which electricity is being used at a specific moment.
The S.I. unit of power is watt, which is equal to joule per second.

441. (b); An anemometer is a device for measuring wind speed.

442. (b); Fathometer is an instrument used to determine the depth of water or a submerged object by means of ultrasound waves. The barometer is used to measure atmospheric pressure, Hygrometer is used to measure atmospheric moisture and Altimeter is used to measure altitude/height of an object above a fixed level.

443. (b); Force = Mass × Acceleration = m.a

444. (a); Radium is a chemical element discovered by Marie Curie and her husband Pierre Curie. Penicillin was discovered by Alexander Fleming. X-ray were discovered by William Roentgen. Edward Jenner is well known around the world for his innovative contribution to immunization and the ultimate eradication of smallpox.

445. (a); The fountain pen leak at high altitudes. It is because of low air pressure.

446. (a); When pure water changes into the ice at 4°C, the density of ice so formed is 1/9th of the density of water. Therefore, in pure water, 90% part of the ice must be below the surface of the water and remaining 10% part must be above the surface. Sea water has high density (salty) water but the ice formed by it is pure and not salty. Therefore option (a) is correct.

447. (b); Human body has different resistances, when dry, resistance is 100,000 ohms. When wet because of sweat or water, resistance is only 1,000 ohms.

448. (a); Energy $\propto \frac{1}{\text{wave length}}$
The energy of any of the colour is inversely proportional to its wavelength. According the VIBGYOR violet, Indigo and blue have the minimum wavelength, thus they have maximum energy level. So according to the options given in the question, blue has the maximum energy while red had the minimum energy.

449. (a); Colours could be separated by using a prism.

450. (d); The wet clothes will dry earliest at minimum humidity & maximum temperature. Thus according to options given in question, option (d) will dry the wet clothes earliest.

451. (a); Dew is not formed on the night of strong wind as due to strong wind the rate of evaporation is fast. Thus, the particles of the dew tend to evaporate.

452. (b); The water remains cold in an earthen pitcher because of a physical process is known as evaporation, when liquid changes to a gaseous (or vapour) state without boiling, it is known as evaporation.

453. (c); Velocity of sound in air is 330m/sec.

454. (c); The electric power line reaches our house through three wires namely a live wire, neutral wire, and earth wire. To avoid confusion we follow a colour code for insulating these wires. The red wire is a live wire, and the black wire is neutral. The earth wire is given green plastic insulation.

455. (a); Parameters of electricity supply are different in different countries. In India they are:
Potential Difference of 220 V, Frequency of 50 hertz and Current Rating of 5A/15A.

456. (b); Eye is most sensitive to yellow-green light that is light of wavelength 555nm.

457. (d); Visible light is that part of electromagnetic radiation which can be seen by human eyes. A normal human eye can see the electromagnetic radiation between 390–780 nm of wavelength.

458. (a); Any of the object or material which has the highest refractive index has the minimum speed of light. The glass has the highest refractive index among other like, vacuum, water and air.

459. (c); As we know that the reflection in the plane mirror forms at the same distance at which the object is placed in front of the mirror. That is,
d_o = distance of the object from the mirror
d_i = distance of reflection from the mirror
and focus distance for a curved mirror or the relationship between r, d_o and d_i is 1/d_o +1/d_i =2/r (here r=radius of curvature)
But for the plane mirror
d_o=-d_i
Thus 2/r=0
Or, r=2/0(Undefined)
Or r = ∞
Thus, the radius of curvature of plane is considered as infinity.

460. (d); Electrical conductivity is a measure of the amount of electrical current under a material can carry. The most electrically conductive element is silver.

461. (d); The most common nuclear fuels are uranium – 235 (235U) and plutonium - 239(239Pu). Thorium is more abundant in nature than uranium. Thorium can be used as a nuclear fuel through breeding to uranium-233 (U-233). Lead is not used as a nuclear fuel.

462. (d); The neon gas is used in discharge lamps, tubes and in fluorescent bulbs.

463. (c); According to formula = > n = c/I
[wheren = frequency, c = speed of light; I=wavelength]
= (3× 〖10〗 ^8)/30=10× 〖10〗 ^6=10 MHz

464. (b); Xeric condition refers to low humidity. Xeric environment is place where water is meager

465. (c); Tungsten metal is used as filament in electric bulb. When electric current flows through it, its temperature goes up to 2500°C from 1500°C. Generally, electric bulbs convert only 5% to 10% of electric energy to light.

466. (a); In the three-pin plug, there are three ends namely live, neutral and earth. The earth pin on a plug is longer than the line and neutral pins. This means the earth pin is the first to connect and last to disconnect for safety of electrical device. It provides an alternative and easy path for leakage or fault current flow.

467. (d); According to Ohm's law, if there is a potential difference (V) across a resistor then there is a current (I) flowing through it. Current flows in a circuit as a result of difference in potential between two points in the circuit.

468. (a); potential of large drop = n^(2/3) V

469. (a); Direct Current is used to charging the batteries with the help of rectifier which converts AC to DC. Thus alternate current is not preferable for it.

470. (d); The materials [Germanium, Silicon] whose electrical conductivity varies between conductors and dielectric are called semiconductors. At absolute zero temperature, a semiconductor behaves like a perfect dielectric.

471. (c); In solid state electronics, either pure silicon or germanium may be used as the intrinsic semiconductor which forms the starting point for fabrication. Each has four valence electrons but germanium at a given temperature has more free electrons and higher conductivity. Silicon is by far the more widely used semiconductor for electronics because it can be used at much higher temperatures than germanium.

472. (b); Cyclotron is a machine used to accelerate charged particle such as alpha particles, deuteron, proton etc. up to a very high speed.

473. (c); Scintillation counter is an instrument for detecting ionizing radiation by using the excitation effect of incident radiation. Radiation on a scintillator material and detecting the resultant light pulses.

474. (d); In 1935 Meson particles were discovered by Japanese physicist Hideki Yukawa. Positron, the antiparticle of the antimatter counterpart of the electron was discovered by C.D. Anderson and U.F. Hess in 1932. In 1939, Hans Bethe described the nuclear reactions that power the sun and other

starts. In synthesis of transuranic elements, Glenn T. Scaborg played an important role instead of Enrico Fermi. The fact is that he attempted to prepare a transuranium element in 1934 in Rome but failed to do so.

475. (b); The density of water increases with temperature but volume decreases. At 4°C, the volume of water is low and density is maximum. Conversion of Celsius in Kelvin
K = C + 273
= 4 + 273 = 277
So, the density of water is maximum at 277 K.

476. (d); Holography is a technique of producing a three-dimensional image of an object.

477. (b); A convex mirror gives a much wider field of view of the traffic at your back than a plain mirror of the same size. It always forms an erect and diminished image and they also have a wider field of view as they are curved outwards.

478. (b); The minimum height of plane mirror to enable a person to see full image is ½ of his height.

479. (a); The conversion of light energy into electrical energy is based on the phenomenon called photovoltaic effect. Silicon is most widely used semiconductor material for constructing photovoltaic cell.

480. (a); Edward Teller, one of the most famous scientists of 20th century was known as "father of hydrogen bomb".

481. (b); Indian Institute of Remote Sensing is situated in Dehradun.

482. (b); The group of 8 bits is called one byte and at least two bits are combined together to form a binary word. MB is used as an abbreviation for Mega byte.

483. (a); X-ray was invented by W.C. Rontgen.

484. (a); The trapped steam increased the atmospheric pressure inside the cooker. At that pressure boiling point of water is increased.

485. (a); Light year is a unit of astronomical distance equivalent to the distance that light travels in one year, which is 9.46 × 1015 meters.

486. (c); Horse power is a unit of measurement of power (the rate at which work is done).
1 Watt = 1 Joule/second
1 Horse power = 746 watt.

487. (c); A Pyrometer is a type of remote-sensing thermometer which is used to measure high temperature. It is based on Stefan-Boltzmann law, which describes that the total radiation emitted by a black body is proportional to the fourth power of its absolute temperature ($E \propto T^4$). It is also used to measure the temperature of distant objects such as sun.

488. (a); The working principle of a washing machine is based on centrifugation force. The term centrifugal force is used to refer to an inertial force or fictitious force, particular to a particle moving on a circular path that has the same magnitude and dimensions as the force the keeps the particle on its circular path but the point in the opposite direction.

489. (b); The time period of a pendulum depends on its length. As we know that $T = 2\pi\sqrt{\frac{l}{g}}$, thus the result is that the one variable that affects the period of the pendulum is the length of the string. Increases in the length lead to increases in the period.

490. (c); The rain drop spherical due to surface tension.

491. (a); The optical fibre is a very thin strand of glass or plastic cable for transmitting light from one point to another. They work on the principle of total internal reflection. There is no loss of signal through an optical fibre.

492. (d); The temperature when both the Centigrade and Fahrenheit scales are same is -40 degrees.

493. (b); According to Archimede's principle when a body is immersed fully or partially in a liquid, it experiences an upward force that is equal to the weight of the fluid displaced by it therefore the mass of water displaced is equal to the mass of the ship.

494. (c); Most remote controls of a television receiver send signals using Infra-red radiation.

495. (b); Option (b) is not correct. It is because the breaking apart of nucleus of an atom is called fission not fusion. Fission is a radioactive decay process in which the nucleus of an atom splits into smaller parts.

496. (b); The correct order of the following different categories of radiations are -x-rays > ultraviolet > visible light > infrared. The electromagnetic spectrum of radio waves has the lowest energy while Gama rays consist of highest energy.

497. (b); The Sun produces energy by the nuclear fusion of hydrogen into helium in its core. Since there is a huge amount of hydrogen in the core, these atoms stick together and fuse into a helium atom. This energy is then radiated out from the core and moves across the solar system. This is the main source of energy for the sun and stars. Besides that the gravitational contraction in stars is also the source of their energy.

498. (a); Solar (or photovoltaic) cells convert the sun's energy into electrical energy through photoelectric effect. Photoelectric effect is the ability of matter to emit electrons when a light shines upon it.

499. (a); A vast collection of stars held together by mutual gravitation is called a Galaxy.

500. (d); The stars which appear in the form of closed groups and form recognizable shapes and patterns are known as Constellations