RRB
Railway Recruitment Board

Junior Engineer

CBT 1 : 2024
Computer Based Test - Stage 1

- ## General Science
- ## General Awareness

Comprehensive Theory *with* Practice Questions

& Previous Years' Solved Questions

MADE EASY
PUBLICATIONS

RRB-Junior Engineer : General Science & General Awareness

First Edition : 2019

Second Edition: 2024

Preface

The post of Railway Recruitment Board-Junior Engineer has always been preferred by Engineers due to job stability. Indian Railways is one of the biggest Government employers in India. With the exam being just a few months away, it is time for the candidates planning to appear for the exam to pull up their socks and start their RRB-JE preparation.

B. Singh (Ex. IES)

The RRB-JE exam is conducted in two stages as shown in table given below.

Papers	Subjects	Maximum Marks	Duration
CBT-1 : Objective Type	(i) Mathematics	30 Marks	90 Minutes
	(ii) General Intelligence and Reasoning	25 Marks	
	(iii) General Awareness	15 Marks	
	(iv) General Science	30 Marks	
	Total	**100 Marks**	
CBT-2 : Objective Type	(i) General Awareness	15 Marks	120 Minutes
	(ii) Physics and Chemistry	15 Marks	
	(iii) Basics of Computers and Applications	10 Marks	
	(iv) Basics of Environment and Pollution Control	10 Marks	
	(v) Technical Abilities (viz, CE, ME, EE, EC, CS etc)	100 Marks	
	Total	**150 Marks**	

Note: There shall be negative marking for incorrect answers in CBTs. Each question carries 1 mark and 1/3rd of the marks alloted for each question shall be deducted for each wrong answer. Candidates shortlisted in Stage 1 will be called for Stage 2.

This book comprises both the General Science & General Awareness subjects. Besides, previous years' RRB-JE questions have been also included in a separate section. MADE EASY has taken due care to present detailed theory and MCQs without compromising the accuracy of answers.

Apart from Railway Recruitment Board-Junior Engineer Exam, this book is also useful for Public Sector Examinations and other competitive examinations for engineering graduates. I hope this book will prove as an important tool to succeed in RRB-JE and other competitive exams.

I have true desire to serve student community by providing good source of study materials and quality guidance. Any suggestion from the readers for improvement of this book is most welcome.

With Best Wishes

B. Singh (Ex. IES)

CMD, MADE EASY Group

Exam Syllabus
## (Computer Based Test 2024-First Stage)

Mathematics: Number systems, BODMAS, Decimals, Fractions, LCM and HCF, Ratio and Proportion, Percentages, Mensuration, Time and Work, Time and Distance, Simple and Compound Interest, Profit and Loss, Algebra, Geometry, Trigonometry, Elementary Statistics, Square Root, Age Calculations, Calendar & Clock, Pipes & Cistern.

General Intelligence and Reasoning: Analogies, Alphabetical and Number Series, Coding and Decoding, Mathematical operations, Relationships, Syllogism, Jumbling, Venn Diagram, Data Interpretation and Sufficiency, Conclusions and Decision Making, Similarities and Differences, Analytical reasoning, Classification, Directions, Statement – Arguments and Assumptions etc.

General Awareness: Knowledge of Current affairs, Indian geography, culture and history of India including freedom struggle, Indian Polity and constitution, Indian Economy, Environmental issues concerning India and the World, Sports, General scientific and technological developments etc.

General Science: Physics, Chemistry and Life Sciences (up to 10th Standard CBSE syllabus).

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General Science

Physics

Physics is a branch of science which is concerned with all aspects of nature on both the microscopic and macroscopic level. Its scope of study encompasses not only the behavior of objects under the action of forces but also the nature of gravitational, electromagnetic, nuclear forces among others.

The ultimate objective of physics is to formulate comprehensive principles that bring together and explain all such phenomena.

UNITS & MEASUREMENT

Unit & Measurement

- Unit is the chosen standard used for measuring a physical quantity.
- There are basically two types of unit:
    1. **Fundamental Unit:** These units are a set of measurements, defined arbitrarily and from which other units are derived. Examples: meter, kilogram, second, etc.
    The fundamental unit of some of the physical quantities are given below:

International System of Units (S.I.)		
Physical	**Fundamental**	**Symbol**
Mass	Kilogram	kg
Length	Metre	m
Time	Second	s
Temperature	Kelvin	K
Electric-current	Ampere	A
Luminous intensity	Candela	Cd
Quantity of matter	Mole	mol

Systems of units	Length	Mass	Time
C.G.S. System	Centimetre	Gram	Second
F.P.S. System	Foot	Pound	Second
M.K.S. System	Metre	Kilogram	Second

2. **Derived Unit:** All the units which are expressed in terms of fundamental units are known as derived units. Examples: Newton, Joule, etc.

- Internationally, there are four types of unit systems. These are:

1. **S.I. Units/System:** It is the modern form of the metric system, and is the most widely used system of measurement. It comprises a coherent system of units of measurement built on seven base units namely kilogram, meter, second, candela, ampere, kelvin and mol.

2. **CGS System:** The centimeter-gram-second (CGS) system of units is a variant of the metric system based on centimetre as the unit of length, gram as unit of mass, and the second as the unit of time.

3. **FPS System:** The foot-pound-second (FPS) system is a system of units built on three fundamental units: the foot for length, the pound for mass and the second for time.

4. **MKS System:** The MKS system of units is a physical system of units that expresses any given measurement using base units of the metre, kilogram, and second.

MOTIONS

Basics of Motion

A body is said to be in motion if it changes its position with respect to its surroundings as time goes on. A body is said to be at rest if it does not change its position with time, with respect to its surroundings.

Types of Motion

(i) When a particle or a body moves along a straight path, its motion is Rectilinear or translatory motion.

(ii) When a particle or a body moves in a circular path, its motion is circular motion. When a body spins about its own axis, it is said to be in rotational motion.

(iii) When a body moves to and fro or back and forth repeatedly about a fixed point in a definite interval of time, it is said to be in vibrational or oscillatory motion.

The path travelled by an object during its motion is called trajectory. The actual path length during the motion is called distance and, the straight distance between the initial and final position of the motion in a particular direction is called displacement.

Let a particle travel, starting from point A and go to point D along the path $ABCD$ in a given interval of time. The total path length ($= AB + BC + CD$) is the distance travelled and the shortest path length (AD) in the direction A to D is the displacement within the same time-interval.
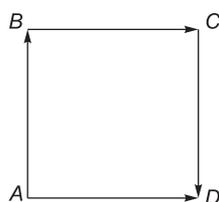
Speed

The time rate of change of position of an object in any direction i.e. the rate of change of distance of an object with respect to time is known as speed.

$$\text{Speed} = \frac{\text{displacement}}{\text{time taken}}$$

Velocity

The rate of change of displacement of an object with respect to time is known as velocity.

$$\text{Velocity} = \frac{\text{displacement}}{\text{time}}$$

Let a square $OPQR$ of side length 2 metre. A particle travels along its side starting from O to R via P and Q. It takes a total time of 2 seconds. The total distance travelled is $OP + PQ + QR = 2 + 2 + 2 = 6$ metres whereas the total displacement is OR = 2 metres. Hence
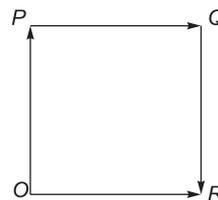
$$\text{Average Speed} = \frac{\text{distance}}{\text{time}} = \frac{6}{2} = 3 \text{ m/s}$$

$$\text{Average Velocity} = \frac{\text{displacement}}{\text{time}} = \frac{2}{2} = 1 \text{ m/s}$$

Acceleration

The rate of change of velocity with respect to time is called acceleration.

$$\text{Acceleration} = \frac{\text{Change in velocity}}{\text{time taken}}$$

When a body completes equal displacement in equal interval of time, its velocity is constant and hence, it does not have an acceleration. When a body shows equal change in velocity in equal interval of time its velocity is not constant but it has a constant acceleration.

Equation of Motion

For a body moving with a uniform velocity

If a body completes a displacement 'S' in time 't' with a uniform velocity 'V', then,

$$\text{Displacement} = \text{velocity} \times \text{time}$$

or $\qquad\qquad S = vt \qquad\qquad\qquad …(i)$

For a body moving with a uniform acceleration

If a body starting with an initial velocity 'u' moves with a uniform acceleration 'a' for a time 't' and attains a final velocity 'v' after travelling a displacement 's' then,

$$S = ut + \frac{1}{2}at^2 \qquad\qquad ….(iii)$$

$$v^2 = u^2 + 2as \qquad\qquad …(iv)$$

When the velocity of a body increases, it has a positive acceleration and when the velocity decreases, it has a negative acceleration.

This negative acceleration is called deceleration or retardation. When a body is released from a height, its velocity increases by 9.8 m/s in every second and when a body is thrown above the earth's surface, its velocity decreases by 9.8 m/s in every second. This change in velocity every second is called acceleration due to gravity which is denoted by 'g'. Its average value at the earth's surface is 9.8 m/s^2. It is always directed towards the centre of the earth because of the gravitational pull. For a freely falling body, its acceleration is 9.8 m/s^2.

Position (Displacement)-Time Graphs

For a body moving with a uniform velocity

This graph comes as a straight line because in a uniform velocity the particle completes equal displacement in an equal interval of time.
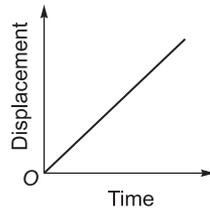
For the motion of a body thrown vertically upwards

When the body moves up, its velocity continuously decreases due to gravity and finally becomes zero at the maximum height. Then, the body falls with an increasing velocity.
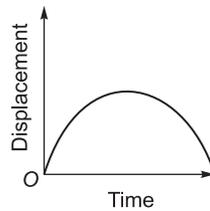
The slope of the position time graph is equal to the uniform velocity.

$$\text{Slope} = \frac{\text{Displacement}}{\text{Time}}$$

or $V = \dfrac{x}{t}$
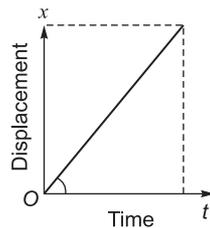
Velocity-time Graph

For a uniformly accelerated motion the velocity-time graph is a straight line. The area under the velocity-time graph is equal to displacement.

∴   Displacement = Area under velocity time graph

= Area of $\Delta OAB = \dfrac{1}{2} \times AB \times OB$

Where $\dfrac{AB}{2}$ = Average velocity (Var.)

$$= \frac{\text{Initial velocity+Final velocity}}{2}$$

or $V_{av} = \dfrac{u+v}{2}$ and OB = time (t)

∴ $S = \left(\dfrac{u+v}{2}\right)t$

∴ $V = u + at$

The slope of the velocity time graph is equal to acceleration.

In the figure, Slope = $\dfrac{AB}{OB}$ = acceleration

and OB = time (t)

∴ $a = \dfrac{v-u}{t}$

or, $V = u + at$
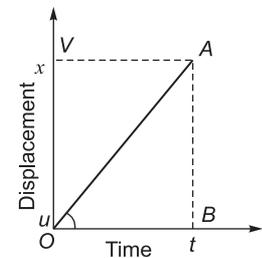
Physical Quantities

Vectors

They have a definite magnitude and a definite direction, e.g. displacement, velocity, acceleration, force etc.

Scalars

They have definite magnitudes only and not direction. e.g. distance, speed, work, energy, power, electric charge etc.

Tensors

They have different magnitudes in different directions, e.g. Moment of interia, stress etc.

In a motion, a body can have a constant speed but variable velocity like the motion of a body along a circular path. A particle may have zero displacement and zero velocity but non-zero distance and speed. When a body completes one revolution along a circular path in a given time period, the net displacement and velocity of the body will be zero but the distance and speed of the body must be non-zero.

The velocity and acceleration of a body may not necessarily be in the same direction and may not be zero simultaneously. The body in equilibrium may be at rest or may move with a constant velocity.

When a body is thrown upwards, it will go vertically until its vertical velocity becomes zero and it will return to the ground with the same velocity with which it was thrown.

When a body is thrown horizontally from a height or dropped from the same height in both cases it will be reaching to the ground simultaneously because in both the cases the body will be acted upon by the same vertically downward acceleration due to gravity (g).

A physical quantity having direction may or may not be a vector e.g. time, pressure, current-electricity, surface-tension etc. They have direction but are not vectors.

Linear-Momentum

It is the quantity of motion which a body possesses and is measured as the product of the mass and velocity of the body.

Linear momentum = mass × velocity

Impulse

The total change in momentum is called the impulse. If a very large force acts for a very small time, the product of force and the time is equal to the impulse.

Inertia

The inability of a body to change by itself its state of rest or state of uniform motion along a straight line is called inertia of the body.

The inertia of a body is measured by its mass. Heavier the body, greater is the force required to change its state and hence greater is its inertia. Inertia of a body may be inertia of rest, inertia of motion or inertia of direction.

Newton's Laws of Motion

First Law of Motion

Every body continues to be in a state of rest or uniform motion in a straight line, except in so far as it may be compelled by force to change that state.'
Newton's first law of motion defines inertia.

1. **Inertia of Rest :** The inability of a body to change by itself its state of rest.
   - When a branch of a fruit tree is shaken, the fruits fall down. This is because the branch comes in motion and the fruits tend to remain at rest. Hence, they get detached.
   - The dirt particles in a durree fall off if it is stricken by a stick. This is because the striking sets the durree in motion whereas the dirt-particles tend to remain at rest and hence fall.
   - When a train starts suddenly, the passenger sitting inside tends to fall backwards. This is so because the lower part of the passenger's body starts moving with the train but the upper part tends to remain at rest.
   - If a smooth paper having a coin on it placed on a table is suddenly drawn, the coin remains at the same place on the table due to inertia of rest.
   - When a horse starts suddenly, the rider tends to fall backwards due to inertia of rest

2. **Intertia of Motion :** The inability of a body to change by itself its state of uniform motion.
   - When a horse at full gallop stops suddenly, the rider on it falls forward because of inertia of motion of the upper part of the rider's body.
   - When an athelete takes a long jump, he runs first for a certain distance before the jump. This is because his feet come to rest on touching the ground and the remaining body continues to move owing to inertia of motion.
   - When train stops suddenly, a passenger sitting inside tends to fall forward. It happens because the lower part of the passenger's body comes to rest with the train but the upper part tends to continue its motion due to inertia of motion.
   - A person jumping out of a speeding train may fall forward due to inertia of motion of his body. Hence, he should run a few steps on the platform in the direction of motion of train.

3. **Inertia of Direction :** The inability of a body to change by itself its direction of motion.
   - The wheels of any moving vehicle throw out mud, if any, tangentially, due to the inertia of direction. The mud-guards over the wheels stop this mud, protecting the clothes, etc. of the person sitting on the bike.
   - Use of an umbrella to protect us from rain is based on the property of inertia of direction because the rain drops cannot change their direction of motion.
   - When a bus or a car rounds a curve suddenly, the person sitting inside is thrown outwards. It happens so because the person tries to maintain his direction of motion due to directional inertia while the vehicle turns.

- When a knife is sharpened by pressing it against a grinding stone, the sparks fly off tangentially because of the inertia of direction.
- When a stone tied to one end of a string is whirled and the string breaks suddenly, the stone spins off along the tangent of its circular path. It happens so because of the pull in the string was forcing the stone to move in a circle. As soon as the string breaks, the pull disappears. The stone becomes free and in a bid to move along the straight line flies off tangentially.

Second Law of Motion

The rate of change of linear momentum of a body is directly proportional to the external force applied on the body and this change takes place always in the direction of the applied force'.

The second law gives us a measure of force. When a force is applied on a body, its momentum and hence, velocity change. The change in velocity produces an acceleration in the body. The rate of change of linear momentum with time is equal to the product of the mass of the body and its acceleration which measures the magnitude of the applied force i.e.

$$\text{Force} = \frac{\text{Change in linear momentum}}{\text{time interval}}$$

$$= \text{mass} \times \text{acceleration}$$

or, $F = ma$

When a body is moving with a uniform velocity along a straight line, it neither experience nor require an external force. This is because, the acceleration is due to change in the velocity of the body and the velocity remains constant because the acceleration is due to change in the velocity of the body and the velocity remains constant for a body moving with a uniform velocity along a straight line.

When a body changes its velocity or direction of its motion, its velocity changes too. It results in an acceleration which is possible only by the action of an external applied force. Hence, an accelerated motion is always due to an external force.

Application of the change in linear momentum (impluse) and second law of motion :

- Bogies of a train are provided with the buffers. These buffers avoid severe jerks during shunting of the train. Since force = change in momentum/ time and the time of impact increases due to

presence of buffers. Hence, force during jerks decrease. It results in decrease in the chances of damage.

- Crockery items are wrapped in paper or straw pieces before packing because paper or straw acts as buffers. It changes the time of impact and hence, avoids the chances of damage during the jerks.
- An athlete should stop slowly, after finishing a fast race, so that the time of impact of his run increases at stop and hence, force experienced by him decreases.
- In cricket, a player lowers his hands while catching a cricket ball to avoid injury. In doing so, he increases the time of impact of the ball which in turn reduces the effect of the force on his hands.
- Shockers in the motor-vehicles reduce the effect of jerk/force by increasing the time of impact of the jerks given by an uneven road.
- In a head-on collision between two vehicles, change in linear momentum is equal to the sum of the linear momenta of the two vehicles. Since time impact is very small, hence an extra large force develops which results in maximum damage to the vehicles.
- When a person falls from a height on a concrete floor, the floor does not yield. The total change in linear-momentum is produced in a very small interval of time. Hene, the floor exerts a much larger force and the person receives more injury. But when a person falls on a heap of sand, the sand yields. The same change in linear momentum is produced in a much longer time. The average force exerted on the person by the heap of sand is, therefore, much smaller and hence the person is not hurt.

Third Law of Motion

''To every action, there is always, an equal and opposite reaction.''

Here, the action is the force exerted by one body on the other body while the reaction is the force exerted by the second body on the first.

Significance of Third Law

It signifies that forces in nature are always in pairs. A single isolated force is not possible. Force of action and reaction act always on different bodies.

They never cancel each other and each force produces its own effect. The forces of action and reaction may be due to actual physical contact of the two bodies or even from a distance. But they are always equal and opposite. This third law of motion is applicable whether the bodies are at rest or they are in motion. This law is applied to all types of forces e.g. gravitational, electric or magnetic forces, etc.

Example and application of the third law of motion

- A book placed on a table exerts a force as an action on the table. This action is equal to the weight of the book. The table exerts a force of reaction equal and opposite to the reaction to support the book.

- When a gun fires a bullet, it moves forward due to a force exerted by the gun. The bullet exerts a reaction due to which the gun recoils backward.

- We can walk on a ground easily if it is tough because the ground provides sufficient reaction against our push. But it is difficult to walk on sand or ice. This is because on pushing, sand gets displaced and reaction from sandy ground is very little. In case of ice, force of reaction is again small, because friction between our feet and ice is very little.

- When a rubber ball is struck against a wall or floor, it exerts a force as an action on the wall. The ball rebounds with an equal and opposite force as reaction exerted by the wall on the ball.

- A swimmer pushes the water with a force of action in backward direction while water pushes the swimmer with a force of reaction in the forward direction. Consequently, the swimmer is able to swim.

- When a jet-plane or rocket moves in the sky, the gases produced due to combustion of fuel escape through the nozzle in the backward direction due to the force of action exerted by the engine. The escaping gases exert a force of reaction on the jet-plane or rocket in the forward direction. Consequently, the jet-plane or rocket moves.

Principle of Conservation of Linear Momentum

The total sum of the linear momentum of all bodies in a system remains constant and is not affected due to their mutual action and reaction. It means in a system of the two bodies, the total momentum of the bodies before impact is equal to the total momentum of the two bodies after impact. The law of conservation of linear momentum is universal i.e. it applies to both, the microscopic as well as macroscopic system.

Some common applications of the principle of conservation of linear momentum:

- When a person is lying on a frictionless surface at rest, his momentum is zero. As soon as he blows air out of his mouth or throws an object, he moves in the opposite direction. The total sum of momentum of the person and air blown or object thrown remains zero due to opposite directions.

- When a man jumps out of a boat to the shore, the boat is pushed slightly away from the shore. The initial momentum of the man and boat remains equal to that of the final value.

- The gun must be held tightly to the shoulder when the gun is fired. It would save hurting the shoulder

- Motion of rocket and jet planes is based on the conservation of linear momentum. Out of the three laws of motions, the second law is the real law because it includes remaining both the first law and the third law.

Uniform Circular Motion

When a body moves along a circular path or a curve with a uniform circular speed, the body is acted upon by an inward acceleration. This acceleration acts towards the centre of a circular path or curve and is called as radial or centripetal acceleration which gives rise to the centripetal force. The centripetal force is an essential condition of the circular motion. Centripetal force (F_c) = mass of the body (m) × centripetal acceleration (a_c)

or $\qquad F_c = ma_c$

Centripetal acceleration

$$a_c = \frac{v^2}{r} = rw^2$$

where v = linear speed, w = angular speed or, r = radius of circular path or curve.

$$\therefore \qquad F_c = ma_c = \frac{mv^2}{r} = mvw = mrw^2$$

The centripetal force acting on a body is an action and an equal and opposite force called centrifugal force appears as a reaction.

Application of centripetal force

- When a bucket containing water is whirled in a horizontal or vertical direction water does not fall down on the ground.

- In a circus, a motor cyclist is able to perform the feat of driving the motor cycle along a vertical circle in a cage. The motor cyclist does not fall down even at the highest point.

- A pilot of an aircraft can successfully loop a vertical loop without falling at the top of the loop being without belt.

- Motion of vehicles on a curved road :

  (a) **Level Curved Road :** A level curved road is constructed where the speed of the vehicles is slow. Here, the force of friction between the road and tyre of the wheel of the vehicle provides the necessary centripetal force.

  (b) **Banking of Roads :** At the highways where vehicles run fast, the frictional force is not a reliable source for providing the required centripetal force to the vehicle. Hence, at such curved roads, a safer course of action is to raise the outer edge of the curved road above the inner edge. It is known as banking of roads. The banking of roads provides the required centripetal force.

- A cyclist leans forward while going along a curve. By doing so, the ground provides him the centripetal force which he requires for turning. Hence, the cyclist leans inwards from his vertical position.

- In an atom, the required centripetal force for an electron in its circular orbit is provided by the electrostatic force of attraction between the electron and nucleus.

- The force of gravitation provides the essential centripetal force when a satellite revolves around a planet or a planet revolves around the sun.

Rotational Motion

Torque (Moment of Force)

The product of force acting on a body and perpendicular distance of line of action of the force from the axis of rotation is called moment of force or torque.

Torque = Force × Perpendicular distance from axis rotation

Applications of Torque

- Torque due to a force is maximum, the distance from the axis of rotation is maximum. We can open or close a door easily by applying force near the edge of the door i.e. at maximum distance from the hinges.

- Hence, a handle or knob is fitted near the free edge of the plank of the door. A wrench with a long arm is required to unscrew a nut fitted tightly to a bolt. Longer the arm of the wrench, smaller is the required force to give sufficient turning effect.

Angular Momentum

It is equal to the product of linear momentum of a body and the perpendicular distance from the axis of rotation. It follows the principle of conservation. It means the total angular moment of an isolated system remains always constant.

Applications of conservation of Angular Momentum:

(i) The angular velocity of revolution of a planet around the sun in an elliptical orbit increases, when the planet comes closer to the sun and vice-versa.

(ii) A circus acrobat performs feats involving spin by bringing his arms and legs closer to his body and viceversa. It is because in doing so the angular speed increases.

(iii) Consider a ballet dancer is rotating with her arms and legs stretched outwards. When she folds her arms and brings the stretched legs close to the other leg, her angular speed increases.

(iv) Due to the same reason, the angular speed of the inner layer of the tornado (whirlwind) is extremely high.

(v) All helicopters are provided with two propellers. If there was one single propeller, the helicopter would rotate itself in an opposite direction in accordance with the laws of conservation of angular momentum.

Friction

When a body moves (slides or rolls) or even tries to move over the surface of another body a tangential force comes into action between their surfaces in contact, against their relative motion. This opposing force is termed as the force of friction.

The force of friction depends upon the mass of the body on a surface and roughness of the surfaces in
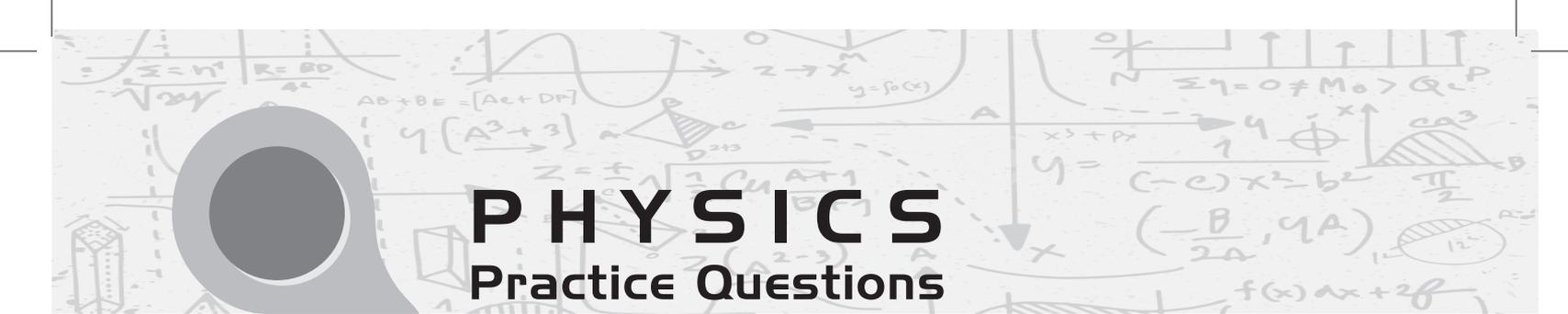
PHYSICS
Practice Questions

Q.1 A liquid is kept in a regular cylindrical vessel up to a certain height. If this vessel is replaced by another cylindrical vessel having half the area of cross-section of the bottom, the pressure on the bottom will
(a) Remain unaffected
(b) Be reduced to half the earlier pressure
(c) Be increase to twice the earlier pressure
(d) Be reduced to one-fourth the earlier pressure

Q.2 In SONAR, we use
(a) Ultrasonic waves
(b) Infrasonic waves
(c) Radio waves
(d) Audible sound waves

Q.3 Which one of the following reactions is the main cause of the energy radiation from the Sun?
(a) Fusion reaction
(b) Fission reaction
(c) Chemical reaction
(d) Diffusion reaction

Q.4 Two identical piano wires have same fundamental frequency when kept under the same tension. What will happen if tension of one of the wire is slightly increased and both the wire are made to vibrate simultaneously?
(a) Noise   (b) Beats
(c) Resonance   (d) Non-linear effects

Q.5 Which one among the following correctly defines a unit magnetic pole in SI units?
It is the pole which when placed in air at a distance of
(a) 1 foot from an equal and a similar pole repels it with a force of 1 pound
(b) 1 metre from an equal and similar pole repels it with a force of 1 newton
(c) 1 cm from an equal and a similar pole repels it with a force of 1 dyne
(d) 1 metre from an equal and a similar pole repels it with a force of 1 newton/m^2

Q.6 Which one of the following phenomena is associated with the fire flies giving cold light in night?

(a) Fluorescence
(b) Phosphorescence
(c) Chemiluminescence
(d) Effervescence

Q.7 When a ball drops onto the floor it bounces back. Why does it bounce?
(a) The floor is perfectly fluid
(b) The floor heats up on impact
(c) Newton's third law implies that for every action (drop), there is a reaction (bounce)
(d) The floor exerts a force on the ball during the impact

Q.8 When you pull out the plug connected to an electric appliance, you will often observe a spark. To which property of the appliance is this related?
(a) Resistance   (b) Inductance
(c) Capacitance   (d) Wattage

Q.9 In scuba diving, while ascending towards the water surface, there is a danger of bursting the lungs. It is because
(a) Graham's law of diffusion
(b) Archimedes' principle
(c) Boyle's law
(d) Henry's law

Q.10 The most familiar form of radiant energy in sunlight that cause tanning and has the potential for casing melanoma in humans is called
(a) Infra-red radiation
(b) Visible radiation
(c) Ultra-violet radiation
(d) Microwave radiation

Q.11 An athlete diving off high springboard can perform a variety of exercise in the air before entering the water body. Which one of the following parameters will remain constant during the fall?
(a) The athlete's linear momentum
(b) The athlete's angular momentum
(c) The athlete's kinetic energy
(d) The athlete's moment of inertia

Q.97 What Is the wavelength of visible spectrum ?
(a) 1300A°-3000A°
(b) 3900 A° - 7600 A°
(c) 7800 A° - 8000 A°
(d) 8500 A° - 9800 A°

Q.98 The sky appears blue because of
(a) Atmospheric water vapour
(b) Scattering of light
(c) Reflection on sea water
(d) Emission of blue wavelength by the sun

Q.99 Oil rises up the wick in a lamp because
(a) Oil is very light
(b) Of the diffusion of oil through the wick
(c) Of the surface tension phenomenon
(d) Of the capillary action phenomenon

Q.100 The hydraulic brakes used in automobiles is a direct application of:
(a) Archimedes principle
(b) Toricellian law
(c) Bernoulli's theorem
(d) Pascal's law

Q.101 For a body moving with non-uniform velocity and uniform acceleration
(a) Displacement - Time graph is linear
(b) Displacement - Time graph is non-linear
(c) Velocity - Time graph is nonlinear
(d) Velocity - Time graph is linear

Q.102 Lamberts law is related to
(a) Reflection (b) Refraction
(c) Interference (d) Illumination

103. Decibel is the unit used for
(a) Speed of light
(b) Intensity of heat
(c) Intensity of sound
(d) Radio wave frequency

104. The atmospheric layer reflecting 'radio waves is called
(a) Ozonosphere (b) Ionosphere
(c) Stratosphere (d) Mesosphere

105. The mass-energy relation is the outcome of
(a) quantum theory
(b) general theory of relativity
(c) field theory of energy
(d) special theory of relativity

106. Danger signals are generally red as red light
(a) is least bright
(b) undergoes least deviation
(c) has lowest velocity
(d) gives comfort to eye

107. Heat from the sun reaches earth by the process of
(a) Conduction (b) Convection
(c) Radiation (d) All of the above

108. The instrument for measuring intensity of earthquakes is called
(a) Ediograph
(b) Pantagraph
(c) Ergograph
(d) Seismograph

Answer Key   General Science | Chapter 1 • Physics

1. (c)	2. (a)	3. (a)	4. (b)	5. (b)	6. (c)	7. (d)	8. (a)	9. (c)
10. (c)	11. (b)	12. (d)	13. (d)	14. (d)	15. (d)	16. (b)	17. (c)	18. (b)
19. (b)	20. (c)	21. (b)	22. (c)	23. (b)	24. (c)	25. (b)	26. (b)	27. (a)
28. (b)	29. (d)	30. (b)	31. (a)	32. (a)	33. (a)	34. (b)	35. (a)	36. (a)
37. (c)	38. (b)	39. (c)	40. (c)	41. (b)	42. (a)	43. (b)	44. (d)	45. (c)
46. (b)	47. (c)	48. (c)	49. (c)	50. (d)	51. (b)	52. (d)	53. (c)	54. (a)
55. (c)	56. (b)	57. (b)	58. (d)	59. (a)	60. (b)	61. (b)	62. (a)	63. (d)
64. (c)	65. (c)	66. (d)	67. (a)	68. (c)	69. (d)	70. (a)	71. (b)	72. (b)
73. (d)	74. (a)	75. (b)	76. (c)	77. (a)	78. (b)	79. (b)	80. (d)	81. (a)
82. (c)	83. (c)	84. (a)	85. (b)	86. (b)	87. (c)	88. (b)	89. (c)	90. (b)
91. (c)	92. (c)	93. (b)	94. (b)	95. (c)	96. (a)	97. (b)	98. (b)	99. (d)
100. (d)	101. (b)	102. (d)	103. (c)	104. (b)	105. (d)	106. (b)	107. (c)	108. (d)

General Awareness

History and Culture of India

1 Chapter

ANCIENT INDIA

PREHISTORIC PERIOD

- The early prehistoric period was observed before the 8th millennium BCE.
- The period of the prehistoric agriculturalists and pastoralists was during approximately the 8th to the mid-fourth millennium BCE.
- The Early Indus or Early Harappan period witnessed the emergence of the first cities in the Indus River System (3500-2600 BCE).

Period/ Age	Remarks
Paleolithic Age	• People in Paleolithic age were dependent on hunting for their livelihood and used to travel from one place to another depending on the availability of natural resources for survival. • They developed sharp weapons of stone for hunting purpose.
Mesolithic Age	• During Mesolithic age, people were still hunter-gatherers, but were possibly starting to stay in one place. • Domestication of animals can be seen in this age.
Neolithic Age	• During Neolithic age, stone tools and weapons were also further modified and were sharpened by fine shedding of the stones. • It also contributed greatly in the field of transportation by an important invention of the wheel.
Chalcolithic Age	• The people of Chalcolithic age practiced agriculture. They used tools made up of copper and stone. • Painted pottery was the most distinguishing feature of all Chalcolithic cultures.

INDUS VALLEY CIVILIZATION

- Indus Valley Civilization is one of the oldest civilizations of the world. It flourished around the Indus river and its tributaries. The area consists of modern Pakistan and Northwestern India. Mohenjodaro is the largest site of the Civilization.
- Indus valley civilization is also called as Harappan civilization because Harappa was the first site to be excavated in 1921 under the supervision of **Daya Ram Sahni**.
- The known extent of this civilization in the west is upto Sutkagendor in Baluchistan; Alamgirpur (UP) in the east; Daimabad (Maharashtra) in South; and Manda (J and K) in the north.
- This civilization belongs to Bronge Age/ Chalcolithic Age. Hence, it is also called Bronze Age civilization.
- Contemporary civilizations of Harappan civilization are Mesopotamian or Sumerian civilization, Egyptian civilization and Chinese civilization.
- John Marshall was the first scholar to use the term "Indus Valley Civilization".

Important Sites of Harappan Civilization

1. **Harappa**
   - People of Harappa knew the process of making tarcoal.
   - Main gate for the entry in the houses of Harappa was in the north direction.
   - R-37 cemetry have been found here.
   - Terracotta figurine of Mother Goddess have been found here.

2. **Mohenjo-daro**
   - Mohenjo-daro was discovered in 1922 under the supervision of **R.D. Bannerji**.

- The literal meaning of Mohenjo-daro in Sindhi language is **mound of the dead.**
- The Great Bath, a granary, big halls, a bronze statue of a dancing girl, idol of a yogi and numerous seals have been found here.
- Seven layers of Mohenjo-daro city directs that the city was destroyed and rebuilt seven times.

3. Lothal
- In 1954, Lothal was discovered by S.R. Rao in Gulf of Cambay in Gujarat.
- Red & black clay pots, copper tools, brick built tank like structure, a bead making factory and a seal from Iran have been found at Lothal.
- Linear scale of bronze have been found here.
- A dockyard has been found at Lothal.

4. Kalibangan
- Kalibangan was discovered in 1953. It is located in upper Rajasthan.
- It did not have a drainage system.
- A number of firepits *agnikundas* (firepits) have been found here.

- It saw two cultural phases viz. pre-Harappan and Harappan.
- A ploughed field have been found here.

5. Dholavira
- Dholavira in Gujarat was discovered in 1992 by **J.P. Joshi**.
- Dholavira shows all the three phases of Harappan civilization.
- A script consists of big alphabets has been found on a gate in Dholavira.

THE INDUS VALLEY
◉ Cities
● Towns and villages
○ Other prehistoric sites
■ Modern cities

Major Harappan Sites and their Excavators					
Site	River	District	Province/ State	Country	Excavators
Harappa	Ravi	Sahiwal	Punjab	Pakistan	Daya Ram Sahni (1921), Madho Swaroop Vatsa (1926), Wheeler (1946)
Mohenjodaro	Indus	Larkana	Sindh	Pakistan	Rakhal Das Bannerji (1922), Mackay (1927), Wheeler (1930)
Chanhudaro	Indus	Shaheed Benazirabad	Sindh	Pakistan	Mackay (1925), N.G. Mazumdar (1931)
Lothal	Sabarmati & Bhogva	Ahmedabad	Gujarat	India	S.R. Rao (1954)
Kalibangan (i.e., the bangles of black colour)	Ghaggar	Hanuman-garh	Rajasthan	India	Amalanand Ghosh (1951), B.B. Lai & B.K. Thapar (1961)
Banawali	Saraswati	Fatehabad	Haryana	India	R.S. Bist (1973)
Dholavira	Luni	Kutchh	Gujarat	India	J.P. Joshi (1967-68)

Major Harappan Sites and Archeological Findings	
Site	**Archaeological Findings**
Harappa	6 Granaries in row, Working floors, Workmen's quarters, Virgin-Goddess (seal), Cemetery (R-37, H), Stone symbols of Lingam (male sex organ) & Yoni (female sex organ), Painted pottery, Clay figures of Mother Goddess, Wheat & Barley in wooden mortar, Copper scale, Crucible for bronze, Copper-made mirror, Vanity box, Dice.
Mohenjodaro	Great Bath, Great Granary (the largest building of civilization), Assembly hall, Shell strips, Pashupati Mahadeva/Proto-Shiva (seal), Bronze Image of a nude woman dancer, Steatite image of bearded man, Human skeletons huddled together, Painted seal (Demi-God), Clay figures of Mother Goddess, A fragment of woven cotton, Brick Kilns, 2 Mesopotamian seals, 1398 seals (57% to total seals of civilization),Dice.
Chanhudaro	City without a citadel, Inkpot, Lipstick; Metal-workers', shell-ornament makers' and bead-makers' shops; Imprint of dog's paw on a brick, Terracotta model of a bullock cart, Bronze toy cart.
Kalibangan	Ploughed field surface (Pre-Harappan), 7 Fire altars, Decorated bricks, Wheels of a toy cart, Mesopotamian cylindrical seal.
Lothal	Dockyard, Rice husk; Metal-workers', shell-ornament makers' & bead-makers' shops; Fire altars, Terracotta figurine of a horse, Double burial (burying a male and a female in a single grave), Terracotta model of a ship, Dying vat, Persian/ Iranian seal, Baharainean seal, Painted jar (bird & fox).
Surkotada	Bones of horse, Oval grave, Pot burials.
Banawali	Lack of chess-board or gridiron pattern town planning, Lack of systematic drainage system, Toy plough, Clay figures of Mother Goddess.
Daimabad	Bronze images (Charioteer with chariot, ox, elephant & rhinoceros)
Dholavira	A unique water harnessing system and its storm water drainage system, a large well and a bath (giant water reservoirs), Only site to be divided into 3 parts, Largest Harappan inscription used for civic purposes, A stadium.

Important Features of Indus Valley Civilization

- **Town planning** was the most distinguishable feature of the Harappan civilization. Hence, this civilization is also called first urbanisation.
- Towns were divided into parts viz. citadel and lower town. Citadels were occupied by members of ruling class and lower town was inhabited by the common people.
- Harappan cities were developed in **Block Pattern/Chess Board Pattern** because roads of these cities used to cut each other at right angles.
- Most peculiar feature of town planning was their **drainage system.** Drains were built of burnt bricks and covered by stone lids and manholes for cleaning.
- Complete burial was the most common method of the disposal of the dead.
- They grew wheat and barley on a large scale. The other crops grown were pulses, cereals, cotton, dates, melons, pea, sesamum and mustard.
- No clear evidence of rice has been found, except from Rangpur and Lothal where some grains of rice were found, but they may be of later period.
- Harappan people were mostly peasants and thus the Harappan civilization was an agro-commercial civilization.
- Evidences of hoe and plough have been found in kalibangan and Banawali.

- Harappans domesticated sheep, goat, buffalo and pig. They also knew about tiger, camel, elephant, tortoise, deer, various birds, etc. However, they didnot know about **lion.**
- **Humpless bull** or unicorn was the most important animal.
- They did not know about the horse, except a jaw bone of horse which has been recovered from Surkotada in Gujarat in upper layers of excavation.
- The Harappans were the earliest people to produce cotton because cotton was first produced in this area. The Greeks called it **sindon,** which is derived from sindh.
- The Harappan culture belongs to the Bronze Age, as the people were very well acquainted with the manufacture and use of bronze.
- Leather was also known to them but no evidence of **silk** has been found.
- Harappans used to make seals, stone statues, terracotta figurines, etc.
- Harappans did not know about iron.
- Seals are made of **steatite** and they are square in shape.
- Land and sea trade was in vogue.
- Most important trading partner was Mesopotamia. It is evident from the inscriptions of Mesopotamia. Other trading partners were Afghanistan, Persia, central Asia and various parts of India.
- The Mesopotamian inscriptions refer to trade relations with **Meluha** which was the ancient name given to Indus region.
- The mode of trade was barter system.
- Pashupati seal has been found from Mohenjo-daro in which a Yogi figure has been depicted. The Yogi on the seal is surrounded by buffalo, tiger, elephant, rhinoceros and deer. Hence, the Yogi is said to be proto-Shiva.
- Signs of phallic worship have been found.
- Harappans worshipped Mother Goddess. It is evident from the terracotta figurine recovered from Harappa.
- Harappans worshipped *pipal* tree.
- No evidences of temples have been found in this civilization.
- The Harappan script is not alphabetical but mainly pictographic.

- The Harappan script has not been deciphered so far.
- Script was consisted of about 400 symbols, out of which 75 were original and remaining were their variants.

Major Imports Items	
Material	**Source place**
Gold	Kolar (Karnataka), Afghanistan, Persia (Iran)
Silver	Afghanistan, Persia
Copper	Khetri (Rajasthan), Baluchistan, Saudi Arabia
Lead	Rajasthan, South India, Afghanistan, Iran
Tin	Afghanistan, Central Asia
Agates	Western India
Lapis Lazuri and Sapphire	Afghanistan
Turquoise	Central Asia, Iran
Amethyst	Maharashtra

VEDIC PERIOD

- Aryans are said to be propounders of Vedic civilization.
- They spoke a language called *arya* which was similar to later days Sanskrit. Hence, they are called Aryans.
- Central Asian theory of Max Muller is widely accepted theory of the origin of Aryans.

Views on Original Home of Aryans	
Europe	Sir W. Jones
Central Asia	Max Muller
Arctic Region	Bal Gangadhar Tilak
Tibet Region	Dayanand Saraswati

- The source of knowledge about the Aryans is the Vedic literature, of which Vedas are the most important. **Veda** means knowledge.

- The Vedas are not an individual religious work. The Vedic literature had grown in the course of many centuries and was handed down from generation to generation by word of mouth. Hence, they are called *shruti.*
- The Vedas are also called *apaurusheya* which means man did not compose them; and *nitya* which means they were existing in all eternity.

Vedic Literature

- Vedic literature consists of four classes of literary creations, viz. Vedas, Brahmanas, Aranyakas and Upanishads.
- The Vedas are collection of hymns, prayers, charms, litanies and sacrificial formulae. These are four in number.

Vedic Literatures	
Vedas	**Details**
Rigveda	• It was compiled around 1500–1000 BC. • The literal meaning of the word *rig* is 'to praise'. • It is a collection of hymns in praise of gods. • It has been divided into ten volumes called Mandals. • Mandal II to VII are the oldest books. They are also called family books because these are attributed to families of *rishis.* • Mandal VIII and IX belong to middle time. • Mandal I and X are the last to be compiled. • Mandal III contains the **Gayatri Mantra** which was compiled in the praise of sun god **Savitri.** • Mandal IX is dedicated only to **Soma** god, the Lord of Plants. • Mandal X contains a hymn called **Purusha Sukta** in which origin of varna system is discussed. • Those rishis who were experts in Rigveda were called *hotra* or *hotri*. • The Rigveda has many things in common with **Avesta,** which is the oldest text in Iranian language.
Samaveda	• It is a collection of songs mostly taken from the hymns of Rigveda and set to tune. • It is a book of chants. • The experts in the knowledge of Samaveda were called *udgatri.* • Compilation of Samaveda is known to be the beginning of Indian music. • Samaveda consists of 1810 hymns.
Yajurveda	• It is a collection of sacrificial formulae. • It describes the rituals to be followed at the time of recitation of mantra. • The experts in the knowledge of Yajurveda were called **adhvaryu.** • It is found in both prose and poetry. • It consists of two parts, viz. **Krishna Yajurveda** and **Shukla Yajurveda.**
Atharvaveda	• It is a collection of charms and spells. • It contains magical hymns to get relief from diseases. • Indian medicinal science called **Ayurveda** has its origin from Atharvaveda.

Other Vedic Literatures	
Name	**Details**
The Brahmanas	• These are prose texts which contain details about the meanings of Vedic hymns, their applications, stories of their origins, etc. • The Aitareya or Kaushitaki Brahmanas are assigned to the Rigveda; Tandya and Jaiminiya Brahmanas to Samaveda; Taittireya and Shatpatha Brahmanas to the Yajurveda; and Gopath Brahmans to the Atharvaveda. • **Tandya Brahmana** is the oldest of all the Brahmanas. • **Shatapatha Brahmana** is the most voluminous among all the Brahmanas.
The Aranyakas	• These are the concluding portions of the Brahmanas. • These were called Aranyakas because the mystical and philosophical character of their content required that they should be studied in the solitude of *aranya* (forest). • They initiated a changeover from materialistic religion to spiritual religion. Thus, they formed a tradition that culminates in the Upanishads. • Aranyakas are like a bridge between Vedas cum Brahmanas and Upanishads.
The Upanishads	• These are the last phase of Vedic literature. • Upanishads deal with metaphysics i.e. philosophy. • These are also called **Vedanta** because these were the last books to be compiled in the series of Vedic literature. • These contain subject matter about soul, **brahman,** rebirth, theory of karma, etc. • Upanishads emphasized the path of knowledge. • The literal meaning of Upanishad is 'to sit near the feet of'. • The most important Upanishads are Chhandogya Upanishad and Brahadaranyaka Upanishad. • The other important Upanishads are Katha Upanishad, Isha Upanishad, Prasna Upanishad, Mundaka Upanishad, etc. • The conversation of Yama and Nachiketa is the subject matter or Katha Upanishad. • The word *satyameva jayate* in the National Emblem is taken from Mundaka Upanishad.

Ancient Rivers

Rigvedic Names	Modern Names
Sindhu	Indus
Vitasta	Jhelum
Askin	Chenab
Parushni	Ravi
Vipasa	Beas
Satudri	Sutlej
Drishadvati	Ghaggar
Krumu	Kurram
Gomal	Gomati

Important Features of Vedic Period

Early Vedic Aryans

• The early Aryans lived in the geographical area covered by eastern Afghanistan, North-West Frontier Province, Punjab and western Uttar Pradesh.
• As per the Rigveda, the whole region in which the Aryans first settled in the Indian subcontinent is called *saptasindhava* region or the **Land of the Seven Rivers.**
• Rigveda also mentions about The Himalayas, Mujavant mountains and *Samudra* (ocean).
• Rigveda mentions Saraswati and Sindhu falling in the ocean. Saraswati was the most revered river in the Rigveda.

Painting

The history of Indian paintings is just about as old as the history of the people of India. The most primitive instances of paintings in India can be traced back to cave paintings.

Types of Painting	Remarks
Mughal painting	Mughal painting is a style of Indian painting, generally confined to illustrations on the book and done in miniatures, and which emerged, developed and took shape during the period of the Mughal Empire between the 16th and 19th centuries.
Rajput painting	Rajput painting, a style of Indian painting, evolved and flourished, during the 18th century, in the royal courts of Rajputana.
Mysore painting	Mysore painting is an important form of classical South Indian painting that originated in the town of Mysore in Karnataka. These paintings are known for their elegance, muted colours and attention to detail. The themes for most of these paintings are Hindu Gods and Goddesses and scenes from Hindu mythology.
Tanjore painting	Tanjore painting is an important form of classical South Indian painting native to the town of Tanjore in Tamil Nadu. The art form dates back to the early 9th century, a period dominated by the Chola rulers, who encouraged art and literature.
Madhubani painting	Madhubani painting is a style of painting, practiced in the Mithila region of Bihar state. Themes revolve around Hindu Gods and mythology, along with scenes from the royal court and social events like weddings.
Pahari painting	The Pahari painting developed and flourished during 17th to 19th centuries stretching from Jammu to Almora and Garhwal, in the sub-Himalayan India, through Himachal Pradesh.

PRACTICE QUESTIONS

Q.1 Where is "Pushkar Fair" held?
(a) Jodhpur   (b) Ajmer
(c) Jaipur   (d) Udaipur

Q.2 Who among the following occupied the supreme position in the Later Vedic pantheon?
(a) Indra   (b) Prajapati
(c) Agni   (d) Varuna

Q.3 'Rath Yatra' at Puri is celebrated in honour of
(a) Lord Rama   (b) Lord Shiva
(c) Lord Jagannath (d) Lord Vishnu

Q.4 Maithili is primarily spoken in which state?
(a) Bihar   (b) Assam
(c) West Bengal   (d) Meghalaya

Q.5 Bihu is a folk dance of which state?
(a) Assam   (b) Maharashtra
(c) Odisha   (d) Uttarakhand

Q.6 The famous "Ganga Sagar Mela", an annual fair is held in which state of India?
(a) Bihar
(b) Jharkhand
(c) Uttar Pradesh
(d) West Bengal

Q.7 Which among the following has inscribed Kumbh Mela on the Representative list of Intangible Cultural Heritage of Humanity?
(a) WHO
(b) UNCTAD
(c) ADB
(d) UNESCO

Q.8 Who amongst the following is renowned in the field of painting?

Q.1 Which of the following is a unit of momentum?
(a) 1 Nm
(b) $kgms^{-1}$
(c) $kgms^{-2}$
(d) $kgms^{-2}$

Q.2 A ball is thrown vertically upward with a velocity of 16 m/s. The maximum height it attains is (g = 9.8 m/s^2)
(a) 4.9 m
(b) 9.8 m
(c) 19.6 m
(d) 39.2 m

Q.3 A 10 kg box is placed at a height h above the ground. The potential energy of the box is 980 J. The value of h is ($g = 9.8$ m/s^2)
(a) 10 m
(b) 20m
(c) 98 m
(d) 49 m

Q.4 A source produces sound waves under water. Waves travel through water and some of it is transmitted into air. Which of the following statements about the frequency f and wavelength λ is correct as sound passes from water to air?

(a) f and λ remain unchanged
(b) f increases but λ decreases
(c) f remains unchanged but λ increases
(d) f remains unchanged but λ decreases

Q.5 A light ray from air enters and passes through a glass slab. Which of the following statements is true about its speed after it emerges from the block?
(a) Speed is same as that before it entered glass slab
(b) Speed is same as that in glass slab
(c) Speed is less than when in glass slab
(d) Speed is less than before it entered glass slab

Q.6 An object of mass m at rest is acted upon by a force. When the velocity-time graph of the object is plotted (with velocity on y-axis and time on x-axis), we get a straight line passing through origin and inclined to x-axis. If the force (on x-axis) versus time (on x-axis) graph is plotted, the graph is a straight line

(a) passing through origin and inclined to x-axis
(b) passing through origin and coinciding with x-axis
(c) parallel to x-axis
(d) parallel to y-axis

Q.7 The acceleration due to gravity, g is
(a) independent of the mass of the earth
(b) inversely proportional to the radius of the earth
(c) proportional to the mass of the earth and inversely proportional to the square of the radius of the earth
(d) same at the poles and the equator.

Q.8 Rohan (mass 40 kg) and Sohan (mass 60 kg) climb the stairs of their school building to reach the first floor in 40 s and 60 s, respectively. Let P_1 and P_2 be the power delivered in this task by Rohan and Sohan, respectively. Which one the following is correct?
(a) $P_1 = P_2$ (b) $P_2 > P_1$
(c) $P_1 < P_2$ (d) $P_1 = 2P_1$

Q.9 The loudness or softness of a sound is determined basically by its
(a) Amplitude
(b) frequency
(c) speed
(d) speed and frequency both

Q.10 A ray of light travelling in air is incident on a glass slab. Part of it is reflected and part is refracted. Let i, r and s be the angle of incidence, angle of reflection and angle of refraction. Which one of the following is correct?
(a) $i = r = s$ (b) $i \neq r \neq s$
(c) $i = r$ and $s < i$ (d) $i = r$ and $s > i$

Q.11 A conducting wire has length l and area of cross-section A. The resistivity of its material is ρ and its resistance is R. It is connected in series with another wire of the same dimensions but of a resistivity 2ρ. The net resistance of the combination is
(a) R (b) 2R
(c) 3R (d) 2R/3

Q.12 An object of mass m at rest is acted upon by a force. The velocity-time graph (velocity on y-axis and time on x-axis) is found be a straight line passing through origin and inclined to x-axis with a slope c. The force acting on the object is
(a) 0 (b) m/c
(c) mc (d) 2 mc

Q.13 The SI unit of gravitational constant G, is
(a) Nm^2kg^{-2} (b) $Nm–2kg–2$
(c) $N\,kg^2\,m^{-2}$ (d) $m^2\,kg^{-1}\,s^{-2}$

Q.14 A force acting on an object of mass m changes its velocity during its course of motion, which of the following cases, the work done by the force is maximum?
(a) When velocity of the object changes from 0 to v m/s
(b) When velocity of the object changes from v m/s to 2v m/s
(c) When velocity of the object changes from 2v m/s to 3v m/s
(d) When velocity of the object changes from 3v nr/s to 4v m/s

Q.15 In a longitudinal sound wave, the particles of the medium move
(a) about their position of rest in a direction parallel to the direction of propagation of disturbance
(b) about their position of rest in a direction perpendicular to the direction of propagation of disturbance
(c) from one place to another in a direction parallel to the direction of propagation of disturbance
(d) from one place to other in a direction perpendicular to the direction of propagation of disturbance

Q.16 Rays of light are evident on a concave mirror parallel to the principal axis. After reflection, they meet at
(a) Infinite
(b) The centre of curvature
(c) At focus
(d) At a point halfway to the focus

123. With reference to water pollution, BOD means
(a) Biochemical Oxygen Dilution
(b) Biochemical Oxygen Demand
(c) Bio Organic Dissolutes
(d) Basic Organic Dissolutes

124. Approx. percentage of oxygen in Earth's atmosphere is
(a) 17%　　　　(b) 21%
(c) 25%　　　　(d) 33%

125. In the context of Information Technology, OCR means
(a) Optical Character Recognition
(b) Octagonal Cyclic Recharge
(c) Octadecimal Cyclic Regeneration
(d) Optical Character Regeneration

126. Which state is known for its sandalwood carvings?
(a) Maharashtra　　(b) Madhya Pradesh
(c) Kerala　　　　(d) Karnataka

127. Section 66 A has been in media controversy recently. The section pertains to
(a) Communal Harmony
(b) Sexual Aggression
(c) Company's Act
(d) Information Technology

128. IPC stands for
(a) International Peace Code
(b) Indian Peace Code
(c) Indian Penal Code
(d) International Punishment Code

129. Who among the following can accept the deposits of money from the public, as a business in financial transactions?
(a) Individuals
(b) Firms
(c) Unincorporated Associations
(d) None of the above

130. NEFT and RTGS are the means for
(a) Money transfer
(b) Fiscal control policy
(c) Monitoring tax collection
(d) Implementing GST

131. In Sept. 2014 ISRO achieved success in which project?
(a) Launched Heavy payload vehicle
(b) Launched geo-stationery satellite
(c) Launched rocket to mars
(d) Mars orbiter successfully entered mars orbit

132. In October 2014 a cyclone hit Vishakhapatnam. The name of the cyclone was
(a) Katrina　　　(b) Hudhud
(c) Laila　　　　(d) Helen

133. SAARC countries are from which part of the world?
(a) South America　(b) South Asia
(c) South Africa　　(d) None of these

Answer Key　RRB JE | Questions Prior to 2019

1. (b)	2. (c)	3. (a)	4. (d)	5. (a)	6. (c)	7. (c)	8. (a)	9. (a)
10. (c)	11. (c)	12. (c)	13. (a)	14. (d)	15. (a)	16. (c)	17. (b)	18. (b)
19. (b)	20. (a)	21. (c)	22. (a)	23. (d)	24. (c)	25. (b)	26. (c)	27. (a)
28. (b)	29. (a)	30. (c)	31. (d)	32. (a)	33. (d)	34. (b)	35 (c)	36. (a)
37. (b)	38. (a)	39. (d)	40. (c)	41. (c)	42. (b)	43. (a)	44. (b)	45. (b)
46. (c)	47. (d)	48. (d)	49. (a)	50. (b)	51. (c)	52. (c)	53. (c)	54. (a)
55. (a)	56. (a)	57. (c)	58. (d)	59. (b)	60. (d)	61. (c)	62. (a)	63. (d)
64. (a)	65. (a)	66. (d)	67. (a)	68. (d)	69. (b)	70. (c)	71. (a)	72. (d)
73. (c)	74. (c)	75. (d)	76. (c)	77. (a)	78. (c)	79. (d)	80. (b)	81. (c)
82. (c)	83. (b)	84. (d)	85. (c)	86. (d)	87. (d)	88. (d)	89. (b)	90. (c)
91. (b)	92. (d)	93. (c)	94. (d)	95. (a)	96. (a)	97. (c)	98. (a)	99. (d)
100. (c)	101. (c)	102. (a)	103. (a)	104. (b)	105. (b)	106. (a)	107. (b)	108. (c)
109. (c)	110. (a)	111. (b)	112. (a)	113. (b)	114. (d)	115. (c)	116. (a)	117. (d)
118. (b)	119. (a)	120. (c)	121. (c)	122. (d)	123. (b)	124. (b)	125. (a)	126. (d)
127. (d)	128. (c)	129. (d)	130. (a)	131. (d)	132. (b)	133. (b)		