

6 Chapters | 29 Topics



1500+
MCQs

With
Explanatory Notes
For

GENERAL SCIENCE

Useful for

UPSC-IAS, State-PCS, CDS, NDA, AFCAT, Banking, SSC, Railways & Others

- Physics • Chemistry • Biology • Healthcare System in India
- Everyday Science • Science & Tech./IT/Computer

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GENERAL SCIENCE

1
Chapter

Physics

Physical Quantities & Mechanics

1. The time period of a pendulum depends on
 - (a) the mass
 - (b) the length
 - (c) the time
 - (d) both (a) and (b)
2. Which of the following is the smallest unit of length?
 - (a) Micrometre
 - (b) Nanometre
 - (c) Angstrom
 - (d) Fermimetre
3. A man is standing on a boat in still water. If he walks towards the shore, the boat will
 - (a) move towards the shore
 - (b) move away from the shore
 - (c) remain stationary
 - (d) sink
4. One micron represents a length of
 - (a) 10^{-6} m
 - (b) 10^{-4} m
 - (c) 10^{-3} m
 - (d) 1 m
5. A body travelling with a speed of more than the velocity of sound in air is said to travel with
 - (a) supersonic speed
 - (b) hypersonic speed
 - (c) ultrasonic speed
 - (d) infrasonic speed
6. A passenger in a moving train tosses a coin. If the coin falls behind him, the train must be moving with
 - (a) an acceleration
 - (b) a deceleration
 - (c) a uniform speed
 - (d) any of the above
7. China wares are wrapped in straw or paper before packing. This is the application of concept of
 - (a) impulse
 - (b) momentum
 - (c) acceleration
 - (d) force
8. When a body is stationary, then
 - (a) there is no force acting on it
 - (b) the body is in vacuum
 - (c) the force acting on it is not in contact with it
 - (d) the net forces acting on it balances each other
9. What happens when a heavy object and a light object are allowed to fall from the certain height in the absence of air
 - (a) heavy object reaches the ground later than the lighter object
 - (b) lighter object reaches the ground later than the heavier object
 - (c) both heavy and light objects reach the ground simultaneously
 - (d) None of these

10. An artificial satellite orbiting the earth does not fall down because the earth's attraction
 - (a) is balanced by the attraction of the moon
 - (b) vanishes at such distances
 - (c) is balanced by the viscous drag produced by the atmosphere
 - (d) produces the necessary acceleration of its motion in a curved path
11. When a ship floats on water
 - (a) it displaces no water
 - (b) the mass of water displaced is equal to the mass of the ship
 - (c) the mass of water displaced is lesser than the mass of the ship
 - (d) the mass of water displaced is greater than the mass of the ship
12. A long jumper runs before jumping because he
 - (a) covers a greater distance
 - (b) maintains momentum conservation
 - (c) gains energy by running
 - (d) gains momentum
13. A body is thrown vertically upwards and then falls back on the ground. Its potential energy is maximum
 - (a) on the ground
 - (b) at the maximum height
 - (c) during the return journey
 - (d) both on the ground and at the maximum height
14. A jet engine works on the principle of conservation of
 - (a) linear momentum
 - (b) angular momentum
 - (c) energy
 - (d) mass
15. One feels heavier in a lift when the lift
 - (a) is going down steadily
 - (b) just begins to go up
 - (c) is moving up steadily
 - (d) descends freely
16. The lift of an air plane is based on
 - (a) Torricelli's theorem
 - (b) Bernoulli's theorem
 - (c) Law of gravitation
 - (d) Conservation of linear momentum

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17. The working principle of a washing machine is
 (a) centrifugation (b) dialysis
 (c) reverse osmosis (d) diffusion
18. Consider the following statements in respect of a jet engine and a rocket:
 1. A jet engine uses the surrounding air for its oxygen supply and so is unsuitable for motion in space.
 2. A rocket carries its own supply of oxygen in the gas form as a fuel.
- Which of the above statement(s) is/are correct?
 (a) 1 only (b) 2 only
 (c) Both 1 and 2 (d) Neither 1 nor 2
19. Match List-I with List-II and select the correct answer using the codes given below the lists:

List-I	List-II
A. Wavelength	1. Hertz
B. Energy	2. Angstrom
C. Intensity of sound	3. Joule
D. Frequency	4. Decibel

Codes:

A	B	C	D
(a) 2	3	4	1
(b) 1	2	3	4
(c) 2	3	1	4
(d) 2	1	3	4

20. Match List-I with List-II and select the correct answer with the help of codes given below:

List-I	List-II
A. Temperature	1. Kelvin
B. Power	2. Watt
C. Pressure	3. Pascal
D. Force	4. Newton

Codes:

A	B	C	D
(a) 2	1	3	4
(b) 1	2	4	3
(c) 1	2	3	4
(d) 2	1	4	3

21. Match List-I with List-II and select the correct answer from the codes given below:

List-I	List-II
A. Acceleration	1. Joule
B. Electric current	2. Newton second
C. Work done	3. Ampere
D. Impulse	4. Metre per sec ² .

Codes:

A	B	C	D
(a) 1	2	3	4
(b) 2	3	4	1
(c) 4	3	1	2
(d) 3	4	1	2

22. Match List-I with List-II and select the correct answer using the codes given below:

List-I	List-II
A. Joule	1. Henery–ampere/sec
B. Watt	2. Farad–volt
C. Volt	3. Coulomb–volt

- D. Coulomb 4. Orested–cm
 5. Amp–gauss 6. Amp²–ohm

Codes:

A	B	C	D
(a) I	6	5	4
(b) 3	6	1	2
(c) 3	6	1	5
(d) 2	6	1	3

23. A liquid drop tends to assume a spherical shape because of
 (a) surface tension (b) viscous force
 (c) gravitational force (d) centrifugal force

24. Consider the following statements. Work is not done, when:

1. a man is walking on a horizontal road.
2. a man is climbing up a hill.
3. a man with a load on his head is walking on a horizontal road.
4. moon is revolving round the earth.

Which of the statements given above are correct?

- (a) 1 and 3 only (b) 1 and 4 only
 (c) 2, 3 and 4 (d) 1, 3 and 4

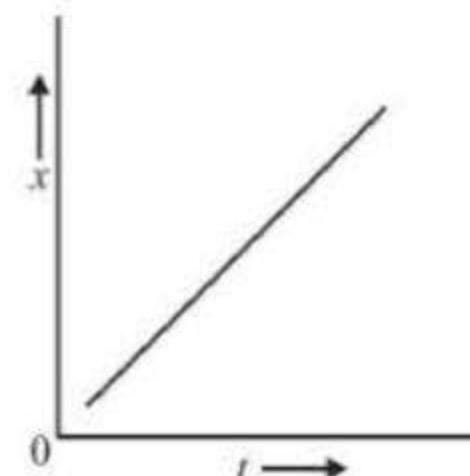
25. What is the correct sequence in which the lengths of the following units increase?

1. Angstrom
2. Micron
3. Nanometer

Select the correct answer using the codes given below:

- (a) 1, 2, 3 (b) 3, 1, 2
 (c) 1, 3, 2 (d) 2, 3, 1

26. The position– time ($x - t$) graph for motion of a body is given below:



Which one among the following is depicted by the above graph?

- (a) Positive acceleration
 (b) Negative acceleration
 (c) Zero acceleration
 (d) None of the above

27. A ball is dropped from a satellite revolving around the earth at a height of 120 km. The ball will

- (a) continue to move with same speed along a straight line tangentially to the satellite at that time
- (b) continue to move with the same speed along the original orbit of satellite
- (c) fall down to earth gradually
- (d) go far away in space

PHYSICS**F-3**

28. Consider the following statements :
 (1) A light and a heavy body, having equal momenta, have equal kinetic energies.
 (2) The total energy of a body in motion is equal to the work it can do in being brought to rest.
 (3) A body cannot have momentum when its energy is zero.
- Which of these statement(s) is/are correct ?
 (a) (1) and (2) (b) (2) and (3)
 (c) Only (2) (d) Only (3)
29. A car is moving on a circular path and takes a turn. If R_1 and R_2 be the reaction on the inner and outer wheels respectively, then
 (a) $R_1 = R_2$ (b) $R_1 < R_2$
 (c) $R_1 > R_2$ (d) $R_1 \geq R_2$
30. Meson was discovered by
 (a) Powell (b) Seaborg
 (c) Anderson (d) Yukawa
31. Natural radioactivity was discovered by
 (a) Rutherford (b) Becquerel
 (c) Curie (d) Schmidt
32. If an apple is released from an orbiting spaceship, it will
 [UP-PCS 2010]
 (a) fall towards the Earth
 (b) move at a lower speed
 (c) move along with the spaceship at the same speed
 (d) move at a higher speed
33. Which of the following is not scalar quantity?
 [UK-PSC 2015]
 (a) Time (b) Volume
 (c) Density (d) Momentum
34. Which of the following is a vector quantity?
 (a) Velocity (b) Speed
 (c) Temperature (d) Hours
35. Which of the following parameters does not characterize the thermodynamic state of matter?
 (a) Temperature (b) Pressure
 (c) Work (d) Volume
36. One Nanometer is equal to
 [UK-PSC 2016]
 (a) 10^{-9} m (b) 10^{-6} m
 (c) 10^{-10} m (d) 10^{-3} m
37. The rate of change of momentum of a body is equal of the resultant :
 [CDS 2016-II]
 (a) energy (b) power
 (c) force (d) impulse
38. The SI unit of mechanical power is :
 [CDS 2016-II]
 (a) Joule (b) Watt
 (c) Newton-Second (d) Joule-Second
39. Which one of the following physical quantities is the same for molecules of all gases at a given temperature?
 [CDS 2015-II]
 (a) Speed (b) Mass
 (c) Kinetic energy (d) Momentum
40. Newton's laws of motion do not hold good for objects
 [CDS 2015-II]
 (a) at rest
 (b) moving slowly
41. (c) moving with high velocity
 (d) moving with velocity comparable to velocity of light
41. Bar is a unit of which one of the following?
 [NDA/NA 2008 -II]
 (a) Force (b) Energy
 (c) Pressure (d) Frequency
42. On which one of the following conservative laws, does a rocket work?
 [NDA/NA 2008 -II]
 (a) Mass (b) Energy
 (c) Linear momentum (d) Angular momentum
43. If a small raindrop falls through air
 [NDA/NA 2009 -I]
 (a) its velocity goes on increasing
 (b) its velocity goes on decreasing
 (c) its velocity goes on increasing for sometime and then becomes constant
 (d) it falls with constant speed for sometime and then its velocity increases
44. A boy throws four stones of same shape, size and weight with equal speed at different initial angles with the horizontal line. If the angles are 15° , 30° , 45° and 60° , at which angle the stone will cover the maximum horizontally?
 [NDA/NA 2010-I]
 (a) 15° (b) 30°
 (c) 45° (d) 60°
45. An athlete diving off a high springboard can perform a variety of exercises in the air before entering the water below. Which one of the following parameters will remain constant during the fall?
 [NDA/NA 2010-II]
 (a) The athlete's linear momentum
 (b) The athlete's moment of inertia
 (c) The athlete's kinetic energy
 (d) The athlete's angular momentum
46. The force acting on a particle executing simple harmonic motion is
 [NDA/NA 2010 -II]
 (a) directly proportional to the displacement and is directed away from the mean position
 (b) inversely proportional to the displacement and is directed towards the mean position
 (c) directly proportional to the displacement and is directed towards the mean position
 (d) inversely proportional to the displacement and is directed away from the mean position
47. When a ball drops onto the floor it bounces. Why does it bounce?
 [NDA/NA 2011 -II]
 (a) Newton's third law implies that for every action (drop) there is a reaction (bounce)
 (b) The floor exerts a force on the ball during the impact
 (c) The floor is perfectly rigid
 (d) The floor heats up on impact
48. It is difficult to cut things with a blunt knife because
 [NDA/NA 2013 -II]
 (a) the pressure exerted by knife for a given force increases with increase in bluntness
 (b) a sharp edge decreases the pressure exerted by knife for a given force
 (c) a blunt knife decreases the pressure for a given force
 (d) a blunt knife decreases the area of intersection

F.4

49. Creation of something from nothing is against the law of
 (a) constant proportions
 (b) conservation of mass-energy
 (c) multiple proportions
 (d) conservation of momentum
50. A ball is thrown vertically upward from the ground with a speed of 25.2 m/s. The ball will reach the highest point of its journey in [NDA/NA 2016-II]
 (a) 5.14 s (b) 3.57 s
 (c) 2.57 s (d) 1.29 s
51. One kilowatt hour is equal to [NDA/NA 2016-II]
 (a) 36×10^3 joule (b) 36×10^5 joule
 (c) 10^3 joule (d) 10^5 joule
52. Pressure is a scalar quantity because [NDA/NA 2016-II]
 (a) it is the ratio of force to area and both force and area are vectors
 (b) it is the ratio of magnitude of force to area
 (c) it is the ratio of component of force (normal to area) to area
 (d) none of the above
53. The free fall acceleration g increases as one proceeds, at sea level, from the equator toward either pole. The reason is
 (a) Earth is a sphere with same density everywhere
 (b) Earth is a sphere with different density at the polar regions than in the equatorial regions
 (c) Earth is approximately an ellipsoid having its equatorial radius greater than its polar radius by 21 km
 (d) Earth is approximately an ellipsoid having its equatorial radius smaller than its polar by 21 km
54. Which one of the following statements is correct? [NDA/NA 2016-II]
 (a) The measurement of mass taken by a spring weighing balance is correct at the place where the spring balance is calibrated for
 (b) The measurement of mass taken by a spring weighing balance is correct at all places
 (c) The measurement of mass taken by a spring weighing balance is correct at the places where the acceleration due to gravity is same with the place where the spring balance is calibrated for
 (d) A spring balance cannot be used to measure mass at any place
55. Which one of the following is *not* a contact force? [NDA/NA 2016-II]
 (a) Push force (b) Gravitational force
 (c) Frictional force (d) Strain force
56. When a force of 1 newton acts on a mass of 1 kg which is able to move freely, the object moves in the direction of force with a/an [NDA/NA 2016-II]
 (a) speed of 1 km/s (b) acceleration of 1 m/s²
 (c) speed of 1 m/s (d) acceleration of 1 km/s²
57. Along a streamline flow of fluid [NDA/NA 2016-II]
 (a) the velocity of all fluid particles at a given instant is constant
 (b) the speed of fluid particle remains constant
 (c) the velocity of all fluid particles crossing a given position is constant
 (d) the velocity of a fluid particle remains constant
58. How is the kinetic energy of a moving object affected if the net work done on it is positive? [NDA/NA 2016-II]

GENERAL SCIENCE

- (a) Decrease (b) Increases
 (c) Remains constant (d) Becomes zero
59. If we plot a graph between volume V and inverse of pressure P (i.e. $\frac{1}{P}$) for an ideal gas at constant temperature T , the curve so obtained is [NDA/NA 2016-II]
 (a) straight line (b) circle
 (c) parabola (d) hyperbola
60. A particle executes linear simple harmonic motion with amplitude of 2 cm. when the particle is at 1 cm from the mean position, the magnitudes of the velocity and the acceleration are equal. Then its time period (in second) is [NDA/NA 2016-II]
 (a) $\frac{2\pi}{\sqrt{3}}$ (b) $\frac{\sqrt{3}}{2\pi}$
 (c) $\frac{\sqrt{3}}{\pi}$ (d) $\frac{1}{2\pi\sqrt{3}}$
61. Which one of the following statements is *not* correct? [NDA/NA 2016-II]
 (a) The SI unit charge is ampere-second
 (b) Debye is the unit of dipole moment
 (c) Resistivity of a wire of length l and area of cross-section a depends upon both l and a
 (d) The kinetic energy of an object of mass in kg and charge / coulomb when accelerated through a potential difference of V volt, is ev joule.
62. Two balls, A and B are thrown simultaneously, A vertically upward with a speed of 20 m/s from the ground and B vertically downward from a height of 40 m with the same speed and along the same line of motion. At what points do the two balls collide by taking acceleration due to gravity as 9.8 m/s²? [NDA/NA 2016-II]
 (a) The balls will collide after 3s at a height of 30.2 m from the ground
 (b) The balls will collide after 2s at a height of 20.1 m from the ground.
 (c) The balls will collide after 1s at a height of 15.1 m from the ground
 (d) The balls will collide after 5s at a height of 20m from the ground
63. A container is first filled with water and then the entire water is replaced by mercury. Mercury has a density of 13.6×10^3 kg/m³. If X is the weight of the water and Y is the weight of the mercury, then [NDA/NA 2016-I]
 (a) $X = Y$ (b) $X = 13.6 Y$
 (c) $Y = 13.6 X$ (d) None of the above
64. A body has a free fall from a height of 20 m. After falling through a distance of 5 m, the body would [NDA/NA 2016-I]
 (a) lose one-fourth of its total energy
 (b) lose one-fourth of its potential energy
 (c) gain one-fourth of its potential energy
 (d) gain three-fourth of its total energy
65. Two bodies A and B are moving with equal velocities. The mass of B is double that of A. In this context, which one of the following statements is correct? [NDA/NA 2016-I]
 (a) Momentum of B will be double that of A.
 (b) Momentum of A will be double that of B.
 (c) Momentum of B will be four times that of A.
 (d) Momenta of both A and B will be equal.

PHYSICS

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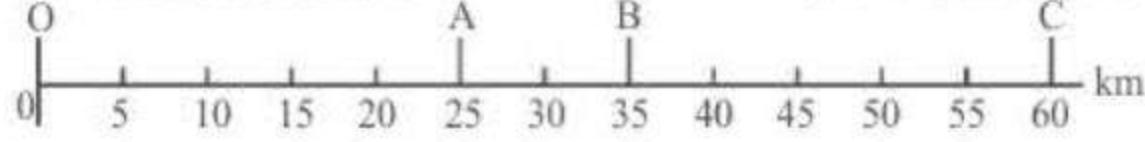
68. The impulse on a particle due to a force acting on it during a given time interval is equal to the change in its [NDA/NA 2016-I]

 - (a) force
 - (b) momentum
 - (c) work done
 - (d) energy

69. Which one of the following is *not* a form of stored energy?
[NDA/NA 2016-II]

- (a) Nuclear energy (b) Potential energy
(c) Electrical energy (d) Chemical energy

70. The motion of a car along a straight path is shown by the following figure: [NDA/NA 2016-II]



The car starts O and reaches at A, B and C at different instants of time. During its motion from O to C and back to B, the distance covered and the magnitude of the displacement are, respectively

- (a) 25 km and 60 km (b) 95 km and 35 km
(c) 60 km and 25 km (d) 85 km and 35 km

71. A brass ball is tied to a thin wire and swung so as to move uniformly in a horizontal circle. Which of the following statements in this regard is/are true? [NDA/NA 2015-III]

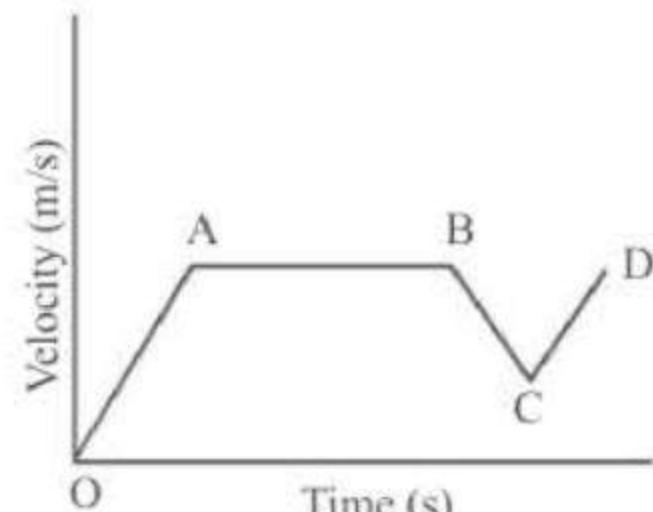
- 1. The ball moves with constant velocity
 - 2. The ball moves with constant speed
 - 3. The ball moves with constant acceleration
 - 4. The magnitude of the acceleration of the ball is constant

Select the correct answer using the code given below:

72. Which one of the following statements is **not** correct?
[NDA/NA 2015-II]

- (a) If the velocity and acceleration have opposite sign, the object is slowing down
 - (b) If the velocity is zero at an instant, the acceleration should also be zero at that instant
 - (c) If the velocity is zero for a time interval; the acceleration is zero at any instant within the time interval
 - (d) If the position and velocity have opposite sign, the object is moving towards the origin

73. The following figure represents the velocity-time graph of a moving car on a road: [NDA/NA 2015-III]



Which segment of the graph represents the retardation?

- (a) AB (b) BC
 (c) CD (d) None

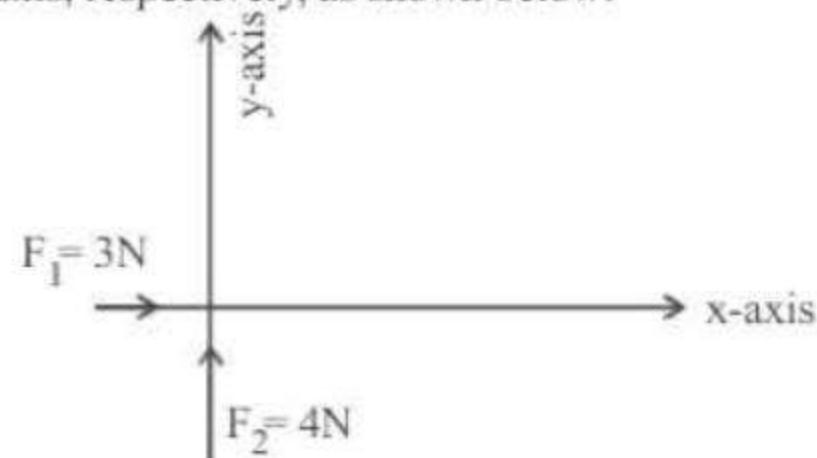
Which one of the following is the SI unit of the thermal conductivity of a material? [NDA/NA 2015-II]

(a) $\text{Wm}^{-1}\text{K}^{-1}$ (b) Wm/K
 (c) $\text{Wm}^{-1}/\text{K}^{-1}$ (d) $\text{Js}^{-1}\text{m}^{-1}\text{K}$

75. Conservation of momentum in a collision between particles can be understood on the basis of: [NDA/NA 2015-II]

 - (a) Newton's first law of motion
 - (b) Newton's second law of motion only
 - (c) Both Newton's second law of motion and Newton's third law of motion
 - (d) Conservation of energy

76. Two forces, one of 3 newton and another of 4 newton are applied on a standard 1 kg body, placed on a horizontal and frictionless surface, simultaneously along the x-axis and the y-axis, respectively, as shown below:



The magnitude of the resultant acceleration is:

78. The displacement-time graph of a particle acted upon by a constant force is [NDA/NA 2015-I]

 - a straight line
 - a circle
 - a parabola
 - any curve depending upon initial conditions

79. Which one among the following happens when a swing rises to a certain height from its rest position ?

[NDA/NA 2015-I]

 - (a) Its potential energy decreases while kinetic energy increases
 - (b) Its kinetic energy decreases while potential energy increases

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- (c) Both potential and kinetic energy decrease
 (d) Both potential and kinetic energy increase

80. Match List I with List II and select the correct answer using the code given below the Lists : **[INDA/NA 2015-II]**

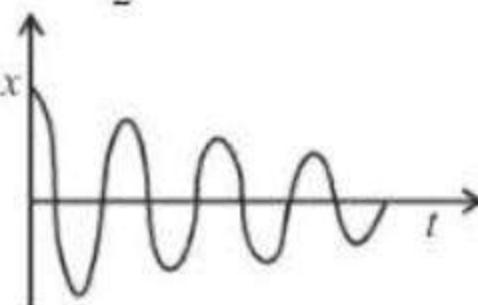
List I

(Physical quantity)

- A. Distance
 - B. Amount of material
 - C. Amount of electrical charge
 - D. energy

Code:

	A	B	C	D
(a)	3	1	2	4
(b)	3	2	1	4
(c)	4	2	1	3
(d)	4	1	2	3



The displacement (x)-time (t) graph given above approximately represents the motion of a [NDA/NA 2014-I]

- (a) simple pendulum placed in a vacuum
- (b) simple pendulum immersed in water
- (c) simple pendulum placed in outer space
- (d) point mass moving in air

83. How many cubic centimeters (cm^3) are in a cubic metre (m^3)? [NDA/NA 2014-II]

(a) 10^3 (b) 10^6
(c) 10^9 (d) 10^{12}

84. If the distance S covered by a moving car in rectilinear motion with a speed v in time t is given by $S = vt$, then the car undergoes [NDA/NA 2014-II]

(a) a uniform acceleration
(b) a non-uniform acceleration
(c) a uniform velocity
(d) a non-uniform velocity

DIRECTIONS: The following seven (7) items consists of two statements, Statement I and Statement II. You are to examine these two statements carefully and select the answers to these items using the code given below.

Codes

- (a) Both the statements are individually true and Statement II is the correct explanation of Statement I.

(b) Both the statements are individually true but Statement II is not the correct explanation of Statement I.

(c) Statement I is true but Statement II is false

(d) Statement I is false but Statement II is true.

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- 85. Statement I:** [NDA/NA2014-III]
A body moving in a circular path is acted upon by the centripetal force.

Statement II:
Centripetal force acting on the body is doing work to keep it rotating in the circular path.

86. If the motion of an object is represented by a straight line parallel to the time axis in a distance-time graph, then the object undergoes [NDA/NA2014-III]

 - an acceleration motion
 - a decelerated motion
 - a uniform non-zero velocity motion
 - a zero velocity motion

87. Two bodies A and B having masses m and $4m$ respectively are moving with equal linear momentum. The ratio of kinetic energies between A and B is [NDA/NA2014-III]

 - 1 : 4
 - 4 : 1
 - 1 : 1
 - 1 : 2

88. A force applied on a body is represented as $\vec{F} = 6\hat{i} - 8\hat{j} + 10\hat{k}$ [NDA/NA2014-III] and accelerates it at 1 m/s^2 . The mass of the body is

 - 10 kg
 - $10\sqrt{2}\text{kg}$
 - $2\sqrt{10}\text{kg}$
 - 8 kg

89. A particle is moving in a circular path of radius r at a constant speed v . Which one of the following graphs correctly represents its acceleration a ? [NDA/NA2014-III]

(a)

(b)

(c)

(d)

90. Two cars A and B have masses m_A and m_B respectively, with $m_A > m_B$. Both the cars are moving in the same direction with equal kinetic energy. If equal braking force is applied on both, then before coming to rest [NDA/NA2014-III]

 - A will cover a greater distance
 - B will cover a greater distance
 - both will cover the same distance
 - distance covered by them will depend on their respective velocities

91. If the length of the Equator is about 40000 km and the velocity of rotation is about 1700 km per hour, what would be the velocity of rotation at the Pole? [NDA/NA2014-III]

 - Zero
 - 850 km/hr
 - 1700 km/hr
 - 3400 km/hr

92. A bullet is fired vertically up from a 400 m tall tower with a speed 80 m/s. If g is taken as 10 m/s^2 , the time taken by the bullet to reach the ground will be [NDA/NA2014-III]

 - 8 s
 - 16 s
 - 20 s
 - 24 s

Matter & Its Properties

93. Scent sprayer is based on
 (a) Charles's law
 (b) Boyle's law
 (c) Archimedes' principle
 (d) Bernoulli's principle
94. Cooling is not done by
 (a) flow of water
 (b) release of compressed gas
 (c) burning cooking gas
 (d) melting the solid
95. When ice melts, then the
 (a) volume increases (b) volume decreases
 (c) mass increases (d) mass decreases
96. Which one of the following liquids is very good conductor of heat ?
 (a) Mercury (b) Water
 (c) Ether (d) Benzene
97. Air is filled in vehicle tyres because
 (a) it is non-conducting
 (b) it is cheap
 (c) it has low density
 (d) it is highly compressible
98. During the change of state of matter the temperature of the substance
 (a) increases (b) decreases
 (c) remains the same (d) may increase or decrease
99. An egg when placed in ordinary water sinks but floats when placed in brine. This is because
 (a) density of brine is less than that of ordinary water
 (b) density of brine is equal to that of ordinary water
 (c) density of brine is greater than that of ordinary water
 (d) None of these
100. A man is sitting in a boat which is floating in pond. If the man drinks some water from the pond, the level of water in the pond will
 (a) rise a little (b) fall a little
 (c) remain stationary (d) None of these
101. A block of ice is floating in a beaker containing liquid of specific gravity greater than one. When ice melts completely what happens to the level of liquid in the beaker?
 (a) It will remain the same as before
 (b) It will go down
 (c) It will rise up
 (d) It may or may not change depending upon size of beaker
102. Why do two ice blocks join to form one block when pressed together?
 (a) Melting point of ice is lowered with increase in pressure
 (b) Melting point of ice increases with increase in pressure
 (c) Melting point of ice remains unchanged with increase in pressure
 (d) Melting point of ice is 0°C
103. For which one of the following is capillarity not the reason?
 (a) Blotting of ink
 (b) Rising of underground water
 (c) Spread a water drop on a cotton cloth
 (d) Rising of water from the roots of a plant to its foliage
104. If a body is charged by rubbing it, its weight
 (a) remains precisely constant
 (b) increases slightly
 (c) decreases slightly
 (d) may increase slightly or may decrease slightly
105. If a rock is brought from the surface of the moon to the earth, then
 (a) its mass will change.
 (b) its weight will change but not its mass.
 (c) both mass and weight will change.
 (d) both mass and weight will remain the same.
106. An oil tanker is partially filled with oil and moves forward on a level road with uniform acceleration. The free surface of oil then
 (a) remains horizontal.
 (b) is inclined to the horizontal with smaller depth at the rear end.
 (c) is inclined to the horizontal with larger depth at the rear end.
 (d) assumes parabolic curves.
107. Consider the following statements :
 The fraction of a ball floating inside the liquid depends upon
 1. density of the liquid
 2. mass of the ball
 3. density of the ball
 Which of the statements given above are correct?
 (a) 1 and 2 only (b) 2 and 3 only
 (c) 1 and 3 only (d) 1, 2 and 3
108. Which one of the following particles has less than 0.002 mm diameter? [UP-RO 2016]
 (a) Clay (b) Silt
 (c) Fine sand (d) None of the above
109. Which one of the following statements is not correct? [CDS 2015-II]
 (a) Weight of a body is different on different planets.
 (b) Mass of a body on the earth, on the moon and in empty space is the same.
 (c) Weightlessness of a body occurs when the gravitational forces acting on it are counter-balanced.
 (d) Weight and mass of a body are equal at sea level on the surface of the earth.
110. Which one of the following is not result of surface tension? [NDA/NA 2009 -II]
 (a) Vapour formation above the liquid surface
 (b) Convex shape of liquid meniscus
 (c) Liquid rising in a capillary
 (d) Spherical shape of mercury fallen on the floor
111. Hair of a shaving brush cling together when the brush is removed from water due to [NDA/NA 2010 -I]

- (a) viscosity (b) surface tension
 (c) friction (d) elasticity

112. The apparent weight of a steel sphere immersed in various liquids is measured using a spring balance. The greatest reading is obtained for the liquid [NDA 2010 -III]
 (a) having the smallest density
 (b) having the largest density
 (c) in which the sphere was submerged deepest
 (d) having the greatest volume

113. Which one of the following statements is correct? [NDA 2010 -III]
 (a) The angle of contact of water with glass is acute while that of mercury with glass is obtuse
 (b) The angle of contact of water with glass is obtuse, while that of mercury with glass is acute
 (c) Both the angle of contact of water with glass and that of mercury with glass are acute
 (d) None of the above

114. In scuba-diving, while ascending towards the water surface, there is a danger of bursting the lungs. It is because of [NDA 2011 -II]
 (a) Archimedes' principle
 (b) Boyle's law
 (c) Gay-Lussac's law of combining volumes
 (d) Graham's law of diffusion

115. Which type/types of pen uses/use capillary action in addition to gravity for flow of ink? [NDA 2013 -III]
 (a) Fountain pen
 (b) Ballpoint pen
 (c) Gel pen
 (d) Both ballpoint and gel pens

116. Which one of the following petroleum refinery products has the lowest boiling point? [NDA 2009 -II]
 (a) Kerosene (b) Diesel
 (c) Gasoline (d) Lubricating oil

117. Water is a good coolant and is used to cool the engines of cars, buses, trucks etc. It is because water has a [NDA 2011 - II]
 (a) high specific heat (b) low surface tension
 (d) high boiling point (d) teflon

118. When a solid is heated, it turns directly into a gas. This process is called [NDA/NA 2016-II]
 (a) Condensation (b) Evaporation
 (c) Sublimation (d) Diffusion

119. Matter around us can exist in three different states, namely, solid, liquid and gas. The correct order of their compressibility is [NDA/NA 2016-II]
 (a) Liquid < Gas < Solid (b) Solid < Liquid < Gas
 (c) Gas < Liquid < Solid (d) Solid < Gas < Liquid

120. The temperature at which a solid melts to become a liquid at the atmospheric pressure is called its melting point. The melting point of a solid is an indication of [NDA/NA 2016-II]
 (a) strength of the intermolecular forces of attraction
 (b) strength of the intermolecular forces of repulsion
 (c) molecular mass
 (d) molecular size

Electromagnetic Waves & Optics/ Light

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134. The mirror used by a dentist to examine the teeth of patients is
 (a) Concave (b) Convex
 (c) Plane (d) Cylindrical
135. Sound above what level (in decibel) is considered hazardous noise pollution ?
 (a) 30 dB (b) 40 dB
 (c) 60 dB (d) 80 dB
136. The image of the object that we see forms on the retina of our eyes is
 (a) always erect
 (b) always inverted
 (c) erect or inverted depends upon the intensity of light
 (d) erect or inverted depends upon the age of the person
137. Sodium vapour lamp is usually used in street light, because
 (a) it is cheap
 (b) light from this is monochromatic and will not split through water droplets
 (c) it is pleasing to the eyes
 (d) it is brightly illuminating
138. In a three pin plug, the longest pin should be connected to
 (a) ground terminal (b) live terminal
 (c) neutral terminal (d) any terminal
139. A 100 watt electric bulb is used for 10 hours. What will be the cost of electricity consumed, if the consumption cost is ₹ 5 per unit ?
 (a) ₹ 5 (b) ₹ 10
 (c) ₹ 25 (d) ₹ 50
140. In television broadcast, the sound signals are transmitted by
 (a) amplitude modulation
 (b) frequency modulation
 (c) phase modulation
 (d) angle modulation
141. We cannot hear on the surface of the moon because
 (a) its surface absorbs sound
 (b) it has no atmosphere
 (c) it has very low gravitational force
 (d) None of these
142. Optical fibre works on the principle of
 (a) total internal reflection
 (b) refraction
 (c) scattering
 (d) interference
143. The least distance of distinct vision for human eye is
 (a) 25 cm (b) 5 cm
 (c) 75 cm (d) 100 cm
144. Red light is used as danger signal because it
 (a) is scattered least
 (b) is comfortable for eyes
 (c) produces least chemical reactions
 (d) absorbs least in air
145. A myopic eye can be corrected by using a
 (a) convex lens (b) concave lens
 (c) cylindrical lens (d) plano convex lens
146. Richter scale is used for measuring
 (a) velocity of sound
- (b) intensity of light
 (c) amplitude of seismic waves
 (d) intensity of sound
147. Which of the following is not an electromagnetic wave ?
 (a) γ -rays (b) cosmic rays
 (c) Microwave (d) Radio wave
148. CT scan is done by using
 (a) Infra-red rays (b) Ultrasonic waves
 (c) Visible lights (d) X-rays
149. When light passes from one medium to another medium, which one of the following does not change?
 (a) Intensity (b) Velocity
 (c) Wavelength (d) Frequency
150. Night vision cameras do not use
 (a) amplified light
 (b) infrared sensors
 (c) heat radiation from objects
 (d) X-ray radiation from objects
151. Among the following radiations, which has the highest energy ?
 (a) Visible (b) X-ray
 (c) Ultraviolet (d) Infrared
152. Wavelength range of visible light is
 (a) 200 – 900 nm (b) 600 – 780 nm
 (c) 300 – 800 nm (d) 390 – 780 nm
153. Technique for monitoring foetal growth is
 (a) Microwave technique
 (b) Ultrasonic
 (c) Ultra-violet rays
 (d) X-rays
154. Light from the sun reaches earth in about
 (a) 2 minutes (b) 4 minutes
 (c) 8 minutes (d) 16 minutes
155. Sound travels fastest in
 (a) vacuum (b) liquid
 (c) air (d) metal
156. To hear a clear echo, the minimum distance should be
 (a) 165 feet (b) 165 meter
 (c) 16.5 feet (d) 16.5 meter
157. A cut diamond sparkles because of its
 (a) hardness
 (b) high refractive index
 (c) emission of light by the diamond
 (d) absorption of light by the diamond
158. Finger prints on a piece of paper may be detected by sprinkling fluorescent powder on the paper and then looking it into
 (a) mercury light (b) sunlight
 (c) infrared light (d) ultraviolet light
159. A vibrating body
 (a) will always produce sound
 (b) may or may not produce sound if the amplitude of vibration is low
 (c) will produce sound which depends upon frequency
 (d) None of these
160. The special technique used in ships to calculate the depth of ocean beds is

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GENERAL SCIENCE

- (a) LASER (b) SONAR
 (c) sonic boom (d) reverberation
161. When the distance between the object and the plane mirror increases
 (a) the image remains same
 (b) the size of the image will become less than the size of the object
 (c) the distance between the image and the plane mirror increases
 (d) the distance between the image and the plane mirror decreases
162. Butter paper is an example of object.
 (a) a transparent (b) a translucent
 (c) an opaque (d) a luminous
163. The sun is seen before the actual sun rise because of
 (a) reflection (b) refraction
 (c) scattering of light (d) rectilinear propagation of light
164. Light year is
 (a) Light emitted by the sun in one year
 (b) Time taken by light to travel from sun to earth
 (c) The distance travelled by light in free space in one year
 (d) Time taken by earth to go once around the sun
165. The spread in colours in a rainbow on sky is primarily due to
 (a) dispersion of sunlight
 (b) reflection of sunlight
 (c) refraction of sunlight
 (d) total internal reflection of sunlight
166. The audible frequency range of a human ear is
 (a) 20 Hz to 200 Hz
 (b) 2 Hz to 20 Hz
 (c) 200 Hz to 2000 Hz
 (d) 20 Hz to 20000 Hz
167. Microwave oven consumes less power due to
 (a) small frequency of radiation
 (b) short wavelength of radiation
 (c) large frequency as well as wavelength of radiation
 (d) small frequency as well as wavelength of radiation
168. Bats can ascertain distance, directions, nature and size of the obstacles at night. This is possible by reflection of the emitted
 (a) ultrasonic waves from the bat
 (b) ultrasonic waves from the distant objects
 (c) supersonic waves from the bat
 (d) supersonic waves from the distant objects
169. If you are at open-air concert and someone's head gets between you and the orchestra, you can still hear the orchestra because
 (a) sound waves pass easily through a head
 (b) a head is not very large compared with the wavelength of the sound
 (c) the sound is reflected from the head
 (d) the wavelength of the sound is much smaller than the head
170. Sound cannot travel though
 (a) solids (b) liquids
 (c) gases (d) vacuum
171. Noise and music differ in their
 (a) quality (b) tone
 (c) note (d) pitch
172. Soap bubble looks coloured due to
 (a) dispersion (b) reflection
 (c) interference (d) Any one of these
173. Rainbow is formed due to
 (a) refraction, reflection and dispersion of light through a water droplet
 (b) reflection and dispersion of light through a water droplet
 (c) only refraction of light
 (d) only dispersion of light
174. A student finds the writing on the black board as blurred and unclear when sitting on the last desk in a classroom. However, he sees it clearly when sitting on the front desk. Student suffers from a vision defect known as
 (a) hypermetropia (b) myopia
 (c) presbyopia (d) astigmatism
175. A swimming pool looks shallower than it really is, when seen by a person standing outside near it, because of the phenomenon of
 (a) refraction of light (b) reflection of light
 (c) dispersion of light (d) None of these
176. When a CD (compact disc used in audio and video systems) is seen in sunlight, rainbow like colours are seen. This can be explained on the basis of the phenomenon of
 (a) reflection and diffraction
 (b) reflection and transmission
 (c) diffraction and transmission
 (d) refraction, diffraction and transmission
177. A child is standing in front of a magic mirror. She finds the image of her head bigger, the middle portion of her body of the same size and that of the legs smaller. The following is the order of combinations for the magic mirror from the top.
 (a) Plane, convex and concave
 (b) Convex, concave and plane
 (c) Concave, plane and convex
 (d) Convex, plane and concave
178. Given below are two statements:
Assertion (A): Universe is expanding.
Reason (R): The result is based on red shift of spectra of galaxies.
Codes:
 (a) Both A and R are true and R is the correct explanation of A.
 (b) Both A and R are true, but R is not the correct explanation of A.
 (c) A is true, but R is false.
 (d) A is false, but R is true.
179. Which one of the following statements is not true about cosmic rays?
 (a) They have very high frequency.

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- (b) They have very high wavelength.
 (c) They are made of highly energetic charged particles.
 (d) They originate from the sun.
180. Which one of the following statements is not true for a person suffering from hypermetropia?
 (a) The person can see far objects distinctly.
 (b) The focal length of the lens is large.
 (c) The image of the close object is focussed behind the retina.
 (d) A concave lens is used to correct this defect.
181. The minimum height of a plane mirror to see the full size image of a person is equal to
 (a) the height of the person
 (b) half the height of the person
 (c) one-fourth the height of the person
 (d) double the height of the person
182. Magnetic resonance imaging is based on the phenomenon of
 (a) nuclear magnetic resonance
 (b) electron spin resonance
 (c) electron paramagnetic resonance
 (d) diamagnetism of human tissues
183. Consider the following statements and select the correct code.
Assertion (A): A diamond sparkles more than a glass imitation cut to the same shape.
Reason (R): The refractive index of diamond is less than that of glass.
Codes:
 (a) Both A and R are true, and R is correct explanation of A.
 (b) Both A and R are true, but R is not correct explanation of A.
 (c) A is true, but R is false.
 (d) A is false, but R is true.
184. Consider the following statements:
 1. Two persons on the surface of moon cannot talk to each other.
 2. Sound waves cannot travel through vacuum.
 3. Speed of sound is greater in solid medium than in liquid or gas medium.
 (a) 3 alone is correct
 (b) 1 and 2 are correct
 (c) 1 and 3 are correct
 (d) 1, 2 and 3 are correct
185. Consider the following statements:
 1. If a person looks at a coin which is in a bucket of water, the coin will appear to be closer than it really is.
 2. If a person under water looks at a coin above, the water surface, the coin will appear to be at a higher level than it really is.
 Which of the above statements is/are correct?
 (a) Both 1 and 2 (b) 1 alone
 (c) 2 alone (d) Neither 1 nor 2
186. Consider the following statements and select the correct code.

Assertion (A): A stick is dipped in water in a slanting position. If observed sideways, the stick appears short and bent at the surface of water.

Reason (R): The light coming from the stick undergoes scattering from water molecules giving the stick a short and bent appearance.

Codes:

- (a) Both A and R are true and R is the correct explanation of A.
 (b) Both A and R are true, but R is not the correct explanation of A.
 (c) A is true, but R is false.
 (d) A is false, but R is true.

187. Consider the following natural phenomena:

1. Terrestrial heating
2. Reflection of light
3. Refraction of light
4. Diffraction of light

Due to which of these phenomena is mirage formed?

- (a) 1 and 2 (b) 2, 3 and 4
 (c) 1 and 3 (d) 4 only

188. Consider the following statements:

1. Light of longer wavelength is scattered much more than the light of shorter wavelength.
2. The speed of visible light in water is 0.95 times the speed in vacuum.
3. Radio waves are produced by rapidly oscillating electrical currents.
4. To detect the overspeeding of vehicles, police use the Doppler effect to reflected short radio waves.

Which of these statements are correct?

- (a) 1 and 2 (b) 1 and 3
 (c) 2 and 4 (d) 3 and 4

189. Which one of the following statements is NOT correct?

- (a) The velocity of sound in air increases with the increase of temperature.
 (b) The velocity of sound in air is independent of pressure.
 (c) The velocity of sound in air decreases as the humidity increases.
 (d) The velocity of sound in air is not affected by the change in amplitude and frequency.

190. Consider the following statements:

1. If magenta and yellow-coloured circles intersect, the intersected area will have red colour.
2. If cyan and magenta coloured circles intersect, the intersected area will have blue colour.

Which of the statement(s) given above is/are correct?

- (a) 1 only (b) 2 only
 (c) Both 1 and 2 (d) Neither 1 nor 2

191. Consider the following statements:

1. A flute of smaller length produces waves of lower frequency.
2. Sound travels in rocks in the form of longitudinal elastic waves only.

Which of the statement(s) given above is/are correct?

- (a) 1 only (b) 2 only
 (c) Both 1 and 2 (d) Neither 1 nor 2

192. Ultrasonic waves are used for stirring liquid solutions because they
 (a) do not produce noise during the operation
 (b) are easy to produce
 (c) can produce perfectly homogeneous solution
 (d) do not produce chemical reactions in the solution

193. According to the modern theory of nature of light, the light has
 (a) wave nature only
 (b) particle nature only
 (c) both wave and particle (dual) nature
 (d) neither particle nature nor wave nature

194. According to Coulomb's law, the electrostatic force between two charges is
 (a) inversely proportional to the product of the charges
 (b) inversely proportional to the square of the distance between the charges
 (c) directly proportional to the cube of the distance between charges
 (d) none of these

195. What is the difference between a CFL and an LED lamp?
 1. To produce light, a CFL uses mercury vapour and phosphorus while an LED lamp uses semiconductor material.
 2. The average lifespan of a CFL is much longer than that of LED lamp.
 3. A CFL is less energy - efficient as compared to an LED lamp.

Which of the statement(s) given above is/are correct?
 (a) 1 only (b) 2 and 3
 (c) 1 and 3 (d) 1, 2 and 3

196. What does the term Dolby B or Dolby C printed on tape recorders and other sound systems refer to?
 (a) frequency modulated system
 (b) amplitude modulated system
 (c) noise reduction circuit
 (d) both DC and AC power can be used

197. Consider the following statements and select the correct code.
Assertion (A): The velocity of sound in air increased due to the presence of moisture in it.
Reason (R): The presence of moisture in air lowers the density of air.
Codes:
 (a) Both A and R are true and R is the correct explanation of A.
 (b) Both A and R are true, but R is not the correct explanation of A.
 (c) A is true, but R is false.
 (d) A is false, but R is true.

198. Which of the following properties is not possible in case of X-rays?
 (a) Interference
 (b) Diffraction
 (c) Polarisation
 (d) All of the above

199. If alpha, beta and gamma rays carry same momentum, which has the longest wavelength?
 (a) Alpha rays
 (b) Beta rays
 (c) Gamma rays
 (d) None, all have same wavelength

200. Consider the following statement:
 The principle of total internal reflection is applicable to explain the
 1. Formation of mirage in desert.
 2. Formation of image in microscope.
 3. Colour of evening sky.
 4. Operation of optical fibres.
 Which of the statement given above are correct?
 (a) 1 and 4 (b) 3 and 4
 (c) 2 and 3 (d) 1 and 2

201. Which of the following statements is/are true regarding a light wave travelling from air to glass?
 1. Its frequency remains unchanged.
 2. Its speed changes.
 Select the correct answer using the codes given below:
 (a) 1 only (b) 2 only
 (c) Both 1 and 2 (d) Neither 1 nor 2

202. Refractive index of an optical medium changes with
 1. the nature of the medium.
 2. the change in the angle of incidence of the ray.
 3. colour of the incident ray.
 Select the correct answer using the code given below:
 (a) 1 and 3 only (b) 2 and 3 only
 (c) 1 and 2 only (d) 1, 2 and 3

203. Consider the following statements :
 Hypermetropia is a defect of vision in which
 1. a person cannot see the distant objects clearly.
 2. a person cannot see the near objects clearly.
 3. the near point of the eye gets shifted away from the normal position.
 4. the far point of the eye gets shifted towards the eye.
 Which of the statements given above are correct?
 (a) 1 and 3 (b) 2 and 4
 (c) 1 and 4 (d) 2 and 3

204. During a thunderstorm, the thunder in the sky is produced by the
 1. meeting of cumulonimbus clouds in the sky
 2. lightning that separates the nimbus clouds
 3. violent upward movement of air and water particles
 Select the correct answer using the codes given below.
 (a) 1 only
 (b) 2 and 3
 (c) 1 and 3
 (d) None of the above produces the thunder

205. Choose the incorrect statement ?
 (a) Light from sun takes nearly eight minutes 20 seconds to come to earth.
 (b) For a convex lens, if the object is placed between the focus and optical centre then the image formed will be magnified
 (c) For a convex lens, if the object is placed between the focus and optical centre then the image formed will be diminished
 (d) Cinematography makes use of persistence of vision.

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206. Which of the following are true about speed of sound?
- Sound propagates through a medium at a finite speed.
 - The speed of sound decreases when we go from solid to gaseous state.
 - Speed of sound increases with increase in temp.
 - only (i) (i) & (iii)
 - (i), (ii) & (iii) (i) & (ii)
207. The sun is seen before the actual sunrise because of
- reflection
 - refraction
 - scattering of light
 - rectilinear propagation of light
208. A plane mirror is approaching you at a speed of 10 cm/s you can see your image in it. At what speed will your image approach you?
- 10 cm/s
 - 5 cm/s
 - 20 cm/s
 - 15 cm/s
209. A watch shows time as 3 : 25 when seen through a mirror, time appeared will be
- 8 : 35
 - 9 : 35
 - 7 : 35
 - 8 : 25
210. Consider the following statements and select the correct code.
- Assertion (A) :** Small glass beads fixed on traffic signals glow brightly when light falls upon them.
- Reason (R) :** Light is totally reflected when the angle of incidence exceeds a certain critical value and light travelling in a denser medium is reflected from a rarer medium.
- Codes :
- Both A and R are true and R is the correct explanation of A
 - Both A and R are true but R is not a correct explanation of A
 - A is true but R is false
 - A is false but R is true
211. Suppose a rocketship is receding from the earth at a speed of $\frac{2}{10}$ th the velocity of light. A light in the rocketship appears blue to the passengers on the ship. What colour would it appear to an observer on the earth?
- Blue
 - Orange
 - Yellow
 - Yellow-orange
212. Consider the following statements and select the correct code.
- Assertion (A) :** A jet aircraft moving at Mach Number equal to 1 travels faster at an altitude of 15 km than while moving at Mach Number equal to 1 near the sea level.
- Reason (R) :** The velocity of sound depends on the temperature of the surrounding medium.
- Both A and R are true and R is the correct explanation of A
 - Both A and R are true but R is not a correct explanation of A
 - A is true but R is false
 - A is false but R is true
213. Which of the following has highest frequency?
- Cosmic rays
 - X-rays
 - Radio waves
 - Micro waves
214. Which of the following electromagnetic wave has the longest wavelength ?
- Infra red rays
 - Gamma rays
 - Light rays
 - Ultra-violet rays
215. Gamma rays are
- high energy electrons
 - low energy electrons
 - high energy electromagnetic
 - high energy positrons waves
216. Consider the following parts of spectra:
- Visible
 - Infrared
 - Ultraviolet
 - Microwave
- Which of the following is the correct sequence in which the wavelengths increase?
- 4, 3, 1, 2
 - 4, 1, 2, 3
 - 3, 2, 1, 4
 - 3, 1, 2, 4
217. The blue colour of water in the sea. What is the reason behind the phenomenon?
- Refraction of the blue light by the impurities in sea water.
 - Scattering of blue light by water molecules.
 - Refraction of blue sky by sea water.
 - Absorption of other colours except the blue colour by water molecules.
218. Which one of the particles, claimed to have been discovered, can put Albert Einstein's theory of Relativity to the risk of being proved wrong? [IUP-PCS 2009]
- Microwave photons
 - Neutrinos
 - Liquid crystal
 - Light emitting diodes
219. A fluorescent tube is preferred to an electric bulb because [IUP-PCS 2009]
- it has a larger light emitting surface.
 - voltage fluctuations do not affect it.
 - in a tube electrical energy is almost fully converted into light.
 - None of the above.
220. Which one of the following statements is NOT true for a person suffering from hypermetropia? [IUP-PCS 2010]
- The person can see far objects distinctly.
 - The focal length of the lens is large.
 - The image of the close objects is focussed behind the retina.
 - A concave lens is used to correct this defeat.
221. What type of electromagnetic radiation is used in the remote control of a television? [IUP-PCS 2010]
- Infrared
 - Ultraviolet
 - Visible
 - None of these
222. Which mirror is used as a rear view mirror in the vehicles? [IUP-PCS 2011]
- Plane
 - Convex
 - Concave
 - Inverted
223. The reason of mirage is [IUP-PCS 2012]
- interference of light
 - diffraction of light

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- (c) polarisation of light
(d) total internal reflection of light
224. The colour of light is determined by its [UP-PCS 2012]
(a) amplitude (b) wavelength
(c) intensity (d) velocity
225. Ultrasonics are sound waves of frequency [UP-PCS 2012]
(a) greater than 20,000 Hz
(b) less than 10,000 Hz
(c) equal to 1000 Hz
(d) none of these
226. The mirror used by a dentist to examine the teeth of patients is [UP-PCS 2013]
(a) Concave (b) Convex
(c) Plane (d) Cylindrical
227. To look total image of a person, the minimum height of a plane mirror is [UP-PCS 2014]
(a) Equal to the height of a person.
(b) Half of the height of a person.
(c) One fourth of the height of a person.
(d) Two times the height of a person.
228. Sound Waves do not travel in [UP-PCS 2014]
(a) Solids (b) Liquids
(c) Gases (d) Vacuum
229. Which one of the following types of mirror is used to see the traffic behind the car? [UP-PCS 2015]
(a) Convex mirror (b) Concave mirror
(c) Plane mirror (d) Spherical mirror
230. How many images will be formed if a point light source is placed between two parallel plane mirrors? [UP-PCS 2015]
(a) Two (b) Four
(c) Eight (d) Infinite
231. A coil and a bulb are connected in series with a 5V d.c. source. When a soft iron core is inserted in the coil, the light emerging from the bulb –
(a) Increases (b) Decreases
(c) Remains the same (d) Become off
232. A number of images of a flame are seen in a thick mirror, silvered at the back. The brightest image is –
(a) First image
(b) Second image
(c) Third image
(d) All image are equally bright
233. The critical angle for light passing from glass into air is minimum for –
(a) Red light (b) Yellow light
(c) Green light (d) Violet light
234. When the length of the tube of a microscope is increased, its magnifying power –
(a) Decreases (b) Increases
(c) Remains constant (d) None of the above
235. The objective in a reflecting telescope is –
(a) Concave mirror
(b) Convex mirror
(c) Prism
(d) Concavo – Convex lens

GENERAL SCIENCE

236. A beam of electrons is used in Young's double-slit experiment. If the speed of electrons is increased, the fringe - width will –
(a) Increase (b) Decrease
(c) Remain same (d) Fringe will not be seen
237. Both light and sound have wave character, yet diffraction is much harder to observe in light, because –
(a) Light can travel in vacuum
(b) Light waves are transverse
(c) Speed of light is very high
(d) Wave length of light is rather small
238. Equation $E = p.c.$ is valid for –
(a) Both electron and Photon
(b) Electron only
(c) Photon only
(d) Neither electron nor photon
239. When beams of red, blue and green lights fall on the same spot, the colour of the light becomes – [Bihar J. Service 2016]
(a) violet (b) red
(c) yellow (d) white
240. In fiber-optics, the signal source is – [UK-PSC 2015]
(a) Light waves (b) Sound waves
(c) α -rays (d) Cosmic rays
241. Sound waves travel fastest in – [IMP-PSC 2017]
(a) solids (b) liquids
(c) gases (d) vacuum
242. The power of a lens is measured in – [IMP-PSC 2017]
(a) dioptre (b) aeon
(c) lumen (d) candela
243. Doppler Effect is associated with –
(a) Electric Current (b) Light
(c) Heat (d) Sound
244. Laws of electromagnetic induction have been used in the manufacturing of a –
(a) Galvanometer (b) Voltmeter
(c) Ammeter (d) Generator
245. When a wave is intercepted by an article, the rays bend round the obstacle particle. The phenomenon is known as –
(a) Interference
(b) Diffraction
(c) Polarisation
(d) Total internal reflection
246. Which of the following is a mechanical wave? [UK-PSC 2016]
(a) Radio - waves (b) X-rays
(c) Light waves (d) Sound waves
247. Which of the following colours of white light is least deviated by the prism?
(a) Green (b) Violet
(c) Indigo (d) Yellow
248. Which one of the following statements is correct? The velocity of sound : [CDS 2016-I]
(a) Does not depend upon the nature of media
(b) is maximum in gases and minimum in liquids
(c) is maximum in solids and minimum in liquids
(d) is maximum in solids and minimum in gases

PHYSICS

F-15

249. Which one of the following statements is not correct ? [CDS 2016-I]

 - Sounds wave in gases are longitudinal in nature
 - Sounds wave having frequency below 20 Hz are known as ultrasonic waves
 - Sounds waves having higher amplitudes are louder
 - Sound waves with high audible frequencies are sharp

250. A person rings a metallic bell near a strong concrete wall. He hears the echo after 0.3 s. if the sound moves with a speed of 340 m/s, how far is the wall from him? [CDS 2016-I]

 - 102 m
 - 11 m
 - 51 m
 - 30 m

251. X-rays are [CDS 2015-II]

 - deflected by an electric field but not by a magnetic field
 - deflected by a magnetic field but not by an electric field
 - deflected by both a magnetic field and an electric field
 - not deflected by an electric field or a magnetic field

252. The outside rearview mirror of modern automobiles is marked with warning "objects in mirror are closer than they appear". Such mirrors are [CDS 2015-II]

 - plane mirrors
 - concave mirrors with very large focal lengths
 - concave mirrors with very small focal lengths
 - convex mirrors

253. The phenomenon of mirage occurs due to which one of the following? [NDA/NA 2008 -II]

 - Polarisation of light
 - Dispersion of light
 - Diffraction of light
 - Total internal reflection of light

254. Television signal cannot be received generally beyond a particular distance due to [NDA/NA 2009 -I]

 - curvature of the Earth
 - weakness of antenna
 - weakness of signal
 - absorption of signal in air

255. Consider the following statements [NDA/NA 2009 -I]
X-rays

 - can pass through aluminum.
 - can be deflected by magnetic field.
 - move with a velocity less than the velocity of ultraviolet ray in vacuum.

Which of the statements given above is/are correct?

 - 1,2 and 3
 - Only 1
 - 2 and 3
 - 1 and 2

256. Consider the following statements [NDA/NA 2010 -I]

 - Clear sky appears blue due to poor scattering of blue wavelength of visible light.
 - Red part of light shows more scattering than blue light in the atmosphere.
 - In the absence of atmosphere, there would be no scattering of light and sky will look black.

Which of the statements given above is/are correct?

 - Only 1
 - 1 and 2
 - Only 3
 - All of these

257. The most familiar form of radiant energy in sunlight that causes tanning and sunburning of human skin, is called [NDA/NA 2010 -I]

 - ultraviolet radiation
 - visible radiation
 - infrared radiation
 - microwave radiation

258. A diffraction pattern is obtained using a beam of red light. Which one among the following will be the outcome, if the red light is replaced by blue light? [NDA/NA 2010 -II]

 - Bands disappear
 - Diffraction pattern becomes broader and further apart
 - Diffraction pattern becomes narrower and crowded together
 - No change

259. As the sunlight passes through the atmosphere, the rays are scattered by tiny particles of dust, pollen, soot and other minute particulate matters present there. However, when we look up, the sky appears blue during mid-day because [NDA/NA 2010 -II]

 - blue light is scattered most
 - blue light is absorbed most
 - blue light is reflected most
 - ultraviolet and yellow component of sunlight combine

260. The blackboard seems black because it [NDA/NA 2011 -I]

 - reflects every colour
 - does not reflect any colour
 - absorbs black colour
 - reflects black colour

261. Which one among the following colours has the highest wavelength? [NDA/NA 2013 -II]

 - Violet
 - Green
 - Yellow
 - Red

262. Dispersion process forms spectrum due to white light falling on a prism. The light wave with shortest wavelength [NDA/NA 2013 -II]

 - refracts the most
 - does not change the path
 - refracts the least
 - is reflected by the side of the prism

263. A ray of white light strikes the surface of an object. If all the colours are reflected the surface would appear [NDA/NA 2013 -II]

 - black
 - white
 - grey
 - opaque

264. No matter how far you stand from a mirror, your image appears erect. The mirror is likely to be [NDA/NA 2014 - I]

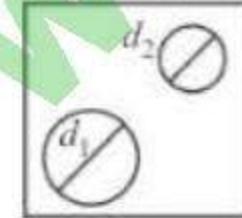
 - either plane or convex
 - plane only
 - concave
 - convex only

265. The position, relative size and nature of the image formed by a concave lens for an object placed at infinity are respectively [NDA/NA 2014 - I]

 - at focus, diminished and virtual
 - at focus, diminished and real
 - between focus and optical centre, diminished and virtual
 - between focus and optical centre, magnified and real

GENERAL SCIENCE

PHYSICS**F-17**

285. If a liquid is heated in space under no gravity, the transfer of heat will take place by process of
 (a) conduction
 (b) convection
 (c) radiation
 (d) can not be heated in the absence of gravity
286. Which zone of a candle flame is the hottest ?
 (a) Dark innermost zone
 (b) Outermost zone
 (c) Middle luminous zone
 (d) Central zone
287. Evening Sun is not as hot as the mid day sun. What is the reason?
 (a) In the evening, radiation travel slowly
 (b) In the evening, the temperature of the sun decreases
 (c) Ozone in atmosphere absorbs more light in the evening
 (d) In the evening, radiations travels larger distance through atmosphere
288. A fan produces a feeling of comfort during hot weather, because
 (a) our body radiates more heat in air
 (b) fan supplies cool air
 (c) conductivity of air increases
 (d) our perspiration evaporates rapidly
289. A man with a dark skin, in comparison with a man with a white skin, will experience
 (a) less heat and less cold
 (b) less heat and more cold
 (c) more heat and less cold
 (d) more heat and more cold
290. A bucket full of water is kept in a room and it cools from 75°C to 70°C in time T_1 minutes, from 70°C to 65°C in time T_2 minutes, and from 65°C to 60°C in time T_3 minutes, then
 (a) $T_1 = T_2 = T_3$ (b) $T_1 < T_2 < T_3$
 (c) $T_1 > T_2 > T_3$ (d) $T_1 < T_3 < T_2$
291. Two holes of unequal diameters d_1 and d_2 ($d_1 > d_2$) are cut in a metal sheet. If the sheet is heated,
- 
- (a) both d_1 and d_2 will decrease
 (b) both d_1 and d_2 will increase
 (c) d_1 will increase, d_2 will decrease
 (d) d_1 will decrease, d_2 will increase
292. Compared to burn due to air at 100°C , a burn due to steam at 100°C is
 (a) less dangerous (b) more dangerous
 (c) equally dangerous (d) None of these
293. Pendulum clocks become slow in summer because
 (a) days in summer are large.
 (b) of the friction in the coil.
 (c) the length of the pendulum increases.
 (d) the weight of the pendulum changes.

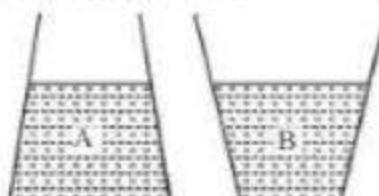
294. Consider the following statements and select the correct code:
Assertion (A): A piece of ice added to the drink cools it.
Reason (R): Ice takes latent heat from the drink for melting resulting in the cooling of the drink.
Codes:
 (a) Both A and R are true, and R is the correct explanation of A.
 (b) Both A and R are true, but R is not the correct explanation of A.
 (c) A is true, but R is false.
 (d) A is false, but R is true.
295. Consider the following statements and select the correct answer using the codes given below:
Assertion (A): If ice collects on the freezer, the cooling in the refrigerator is affected adversely.
Reason (R): Ice is a poor conductor.
Codes:
 (a) Both A and R are true, and R is the correct explanation of A.
 (b) Both A and R are true, but R is not the correct explanation of A.
 (c) A is true, but R is false.
 (d) A is false, but R is true.
296. A piece of ice is floating in a beaker containing water. When whole of the ice melts
 (a) the level of water will come down.
 (b) the level of water will come up.
 (c) the level of water will first rise and then fall.
 (d) the level of water will remain the same.
297. Consider the following statements and select the correct code.
Assertion (A): A piece of copper and a piece of glass are heated to the same temperature. When touched, thereafter, the copper piece appears hotter than the glass piece.
Reason (R): The density of copper is more than that of glass.
Codes:
 (a) Both A and R are true and R is the correct explanation of A.
 (b) Both A and R are true, but R is not the correct explanation of A.
 (c) A is true, but R is false.
 (d) A is false, but R is true.
298. Which of the following statements are true regarding heat?
 1. Heat is a form of energy.
 2. Heat can be reflected by mirror.
 3. Heat is an electromagnetic radiation.
 4. Heat cannot pass through a vacuum.
 Select the correct answer from the codes given:
 (a) 1, 2 and 3 (b) 2, 3 and 4
 (c) 1, 2 and 4 (d) 1, 3 and 4
299. Heavy water is used as a moderator in a nuclear reactor. The function of the moderator is
 (a) to control the energy released in the reactor.
 (b) to absorb neutrons and stop the chain reaction.
 (c) to cool the reactor.
 (d) to slow down the neutrons.

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300. The freezer in a refrigerator is located at the top section so that

- (a) the entire chamber of the refrigerator is cooled quickly due to convection.
- (b) the motor is not heated
- (c) the heat gained from the environment is high
- (d) the heat gained from the environment is low

301. Two vessels A and B of cross-sections as shown in figure contain a liquid up to the same height. As the temperature rises, the liquid pressure at the bottom (neglecting expansion of the vessels) will



- (a) increase in A, decrease in B
- (b) increase in B, decrease in A
- (c) increase in both A and B
- (d) decrease in both A and B

302. A : At high altitude regions the cooking of food becomes difficult.

- B : Water boils at lower temperature when the pressure is low.

- (a) Both A and B are wrong
- (b) A and B are correct and B is not the correct explanation of A
- (c) A and B are correct and B is the correct explanation of A
- (d) A is correct but B is wrong.

303. Two spheres of same size are made of the same metal but one is hollow and the other is solid. They are heated to same temperature, then

- (a) both spheres will expand equally
- (b) hollow sphere will expand more than the solid one
- (c) solid sphere will expand more than the hollow one
- (d) none of the above

304. If a liquid is heated in space under no gravity, the transfer of heat will take place by process of

- (a) conduction
- (b) convection
- (c) radiation
- (d) cannot be heated in the absence of gravity

305. Rheostat is a device used to vary –

- (a) Voltage
- (b) Current
- (c) Resistance
- (d) Power

306. Density of water is the highest at the temperature of –

[Bihar J. Service 2016]

- (a) 0°C
- (b) 4°C
- (c) 50°C
- (d) 100°C

307. Which of the following laws was formulated by Nernst ?

- (a) First Law of Thermodynamics
- (b) Second Law of Thermodynamics
- (c) Third Law of Thermodynamics
- (d) None of the above

308. Transfer of heat by convection can take place in –

[MP-PSC 2017]

GENERAL SCIENCE

- (a) solids and liquids
- (b) solids and vacuum

- (c) gases and liquids
- (d) vacuum and gases

309. Radiation is the process in which heat is transmitted from one place to another –

- (a) The substance without the actual motion of the particle

- (b) By the actual movement of the vibrating particles

- (c) Directly without the necessity of any intervening medium

- (d) Through the movement of atoms

310. On what factors does the resistance of a conductor depend?

- (a) Length of the conductor

- (b) Thickness of the conductor

- (c) Temperature of the conductor

- (d) All of the above

311. A piece of ice, 100 g in mass is kept at 0°C . The amount of heat required to melt it at 0°C is (take latent heat of melting of ice to be 333.6 J/g) :

- (a) 750.6 J
- (b) 83.4 J

- (c) 33360 J
- (d) 3.336 J

312. The handle of pressure cookers is made of plastic because it should be made non-conductor of heat. The plastic used there is the first man-made plastic, which is :

[CDS 2016-I]

- (a) Polythene
- (b) Terylene

- (c) Nylon
- (d) Bakelite

313. Two systems are said to be in thermal equilibrium if and only if :

[CDS 2016-I]

- (a) there can be a heat flow between them even if they are at different temperatures

- (b) there cannot be a heat flow between them even if they are at different temperatures

- (c) there is no heat flow between them

- (d) their temperatures are slightly different

314. Assertion (A): Steam is more harmful for human body than the boiling water in case of burn. **[NDA/NA 2008 -III]**

Reason (R) : Boiling water contains more heat than steam.

- (a) Both A and R are true and R is the correct explanation of A

- (b) Both A and R are true, but R is not the correct explanation of A

- (c) A is true, but R is false

- (d) A is false, but R is true

315. A perfect black body has the unique characteristic feature as

[NDA/NA 2009 -III]

- (a) a good absorber only

- (b) a good radiator only

- (c) a good absorber and a good radiator

- (d) neither a radiator nor an absorber

316. Which one of the following statement is true?

[NDA/NA 2010 -II]

- (a) Temperatures differing 25° on the Fahrenheit (F) scale must differ by 45° on the Celsius (C) scale

- (b) 0°F corresponds to -32°C

- (c) Temperatures which differ by 10° on the Celsius scale must differ by 18° on the Fahrenheit scale

- (d) Water at 90°C is warmer than water at 202°F

PHYSICS**F-19**

317. Which one of the following statements with regard to expansion of materials due to heating is **not** correct?

[NDA/NA 2016-I]

- (a) As ice melts, it expands uniformly up to 4°C .
- (b) Mercury thermometer works using the principle of expansion due to heating.
- (c) Small gap is kept between two rails to allow for expansion due to heating.
- (d) The length of metallic wire increases when its temperature is increased.

318. Which one of the following statements is **not** correct?

[NDA/NA 2015-II]

- (a) Conduction can occur easily in solids, less easily in liquids but hardly at all in gases
- (b) Heat energy is carried by moving particles in a convection current
- (c) Heat energy is carried by electromagnetic waves in radiation
- (d) The temperature at which a solid changes into a liquid is called the boiling point

319. Thermal conductivity of aluminium, copper and stainless steel increases in the order [NDA/NA 2015-I]

- (a) Copper < Aluminium < Stainless Steel
- (b) Stainless Steel < Aluminium < Copper
- (c) Aluymium < Copper < Stainless Steel
- (d) Copper < Stainless Steel < Aluminium

320. Heat given to a body which raises its temperature by 1°C is known as [NDA/NA 2014-II]

- (a) water equivalent
- (b) thermal capacity
- (c) specific heat
- (d) temperature gradient

321. A thermodynamic process where no heat is exchanged with the surroundings is [NDA/NA 2014-II]

- (a) isothermal
- (b) adiabatic
- (c) isobaric
- (d) isotropic

322. Fahrenheit and Celsius are the two scales used for measuring temperature. If the numerical value of a temperature recorded in both the scales is found to be same, what is the temperature? [NDA/NA 2014-II]

- (a) -40°
- (b) $+40^{\circ}$
- (c) $+72^{\circ}$
- (d) -72°

323. The working of a microwave oven involves

[NDA/NA 2014-II]

- (a) absorption of microwaves by matter
- (b) reception of microwaves by optical fibre
- (c) microwave amplification by stimulated emission of radiation
- (d) transmission of microwaves through a metal

Electricity & Magnetism

324. The magnetic needle always points in _____ direction.

- (a) East – West
- (b) West – South
- (c) North – South
- (d) North – East

325. What is the source of electrical energy in an artificial satellite?

- (a) Solar cell
- (b) Mini nuclear reactor
- (c) Dynamo
- (d) Thermopile

336. The weight of any body is

- (a) same at every place on earth's surface
- (b) maximum at poles
- (c) more on equator
- (d) more on mountains than in planes

327. Transformer is used

- (a) for converting AC into DC
- (b) for converting DC into AC
- (c) to step up DC voltages
- (d) to step up or step down AC voltages

328. When a body is taken from the earth to the moon

- (a) its weight increases
- (b) its weight decreases
- (c) its weight remains unchanged
- (d) it becomes completely weightless

329. An iron ball weighing 10 kg on the earth will weigh in space

- (a) less than 10 kg
- (b) more than 10 kg
- (c) exactly 10 kg
- (d) zero

330. Which of the following is the best conductor of electricity?

- (a) Aluminium
- (b) Copper
- (c) Silver
- (d) Gold

331. Astronauts in space can't stand at one place, because

- (a) there is no gravity
- (b) viscous forces of the atmosphere are very strong
- (c) solar wind exert an upward force
- (d) atmospheric pressure is very low

332. What should be the characteristic of fuse wire?

- (a) High melting point, high specific resistance
- (b) Low melting point, low specific resistance
- (c) High melting point, low specific resistance
- (d) Low melting point, high specific resistance

333. The heating element of an electric heater should be made with a material, which should have

- (a) high specific resistance and high melting point
- (b) high specific resistance and low melting point
- (c) low specific resistance and low melting point
- (d) low specific resistance and high melting point

334. Of the two bulbs in a house, one glows brighter than the other. Which of the two has a large resistance?

- (a) The bright bulb
- (b) The dim bulb
- (c) Both have the same resistance
- (d) The brightness does not depend upon the resistance

335. The magnet is strongest near the

- (a) poles of the magnet
- (b) only south pole of the magnet
- (c) centre of magnet
- (d) on equator point from the poles of the magnet

336. A book is kept on the surface of a table. If the gravitational pull of the earth on the book is the force of action, then the force of reaction is exerted by

- (a) the book on the table
- (b) the book on the earth
- (c) the table on the book
- (d) the table on the earth

337. Which one of the following is correct?

Lightning is formed, when

- (a) similar charges of electricity rush towards each other and then get repelled
- (b) clouds strike against impurities in air and the friction burns up these impurities
- (c) strong opposite charges in different clouds break down the resistance offered by intervening air
- (d) water vapour produces electricity in the clouds

338. Which one among the following is the correct order of power consumption for light of equal intensity?

- (a) CFL tube < Fluorescent tube < Incandescent bulb < Light emitting diode
- (b) Light emitting diode < CFL tube < Fluorescent tube < Incandescent bulb
- (c) CFL tube < Fluorescent tube < Light emitting diode < Incandescent bulb
- (d) Incandescent bulb < Light emitting diode < Fluorescent tube < CFL tube

339. When an electrical safety fuse is rated (marked) as 16 A, it means it

- (a) will not work if current is less than 16 A
- (b) has a resistance of 16 W
- (c) will work if the temperature is more than 16°C
- (d) will be blown (break) if current exceeds 16 A

340. At the time of short circuit, the current in the circuit

- (a) vary continuously
- (b) increases heavily
- (c) decreases substantially
- (d) does not change

341. The frequency of A.C. mains in India is

- (a) 30 c/s
- (b) 50 c/s
- (c) 60 c/s
- (d) 120 c/s

342. Electric iron uses wires of alloy as

- (a) they do not oxidise at high temperatures
- (b) they do not burn at high temperatures
- (c) both (a) and (b)
- (d) neither (a) nor (b)

343. Parameters of electricity supply in India are

- (a) Potential Difference of 220 V, Frequency of 50 hertz and Current Rating of 5A/15A
- (b) Potential Difference of 150 V, Frequency of 40 hertz and Current Rating of 10 A
- (c) Potential Difference of 220 V, Frequency of 60 hertz and Current Rating of 15A
- (d) Potential Difference of 220 V, Frequency of 40 hertz and Current Rating of 5 A

344. The earth's magnetic field always has a vertical component except at the

- (a) magnetic equator
- (b) magnetic poles
- (c) geographic north pole
- (d) latitude 45°

345. Domestic electrical wiring is basically a

- (a) series connection

- (b) parallel connection

- (c) combination of series and parallel connections
- (d) series connection within each room and parallel connection elsewhere

346. Of the two bulbs in a house, one glows brighter than the other. Which of the following statements is correct?

- (a) The brightness does not depend on resistance.
- (b) Both the bulbs have the same resistance.
- (c) The brighter bulb has larger resistance.
- (d) The dimmer bulb has larger resistance.

347. The leaning tower of Pisa does not fall because

- (a) it is tapered at the top.
- (b) it covers a large base area.
- (c) its centre of gravity remains at the lowest position.
- (d) the vertical line through the centre of gravity of the tower falls within the base.

348. Consider the following statements and select the correct code.

Assertion (A): The temperature of a metal wire rises when an electric current is passed through it.

Reason (R): Collision of metal atoms with each other releases heat energy.

Codes:

- (a) Both A and R are true and R is the correct explanation of A.
- (b) Both A and R are true, but R is not the correct explanation of A.
- (c) A is true, but R is false.
- (d) A is false, but R is true.

349. Consider the following statements and select the correct code.

Assertion (A): In our houses, the current in A.C. electricity line changes direction 60 times per second.

Reason (R): The frequency of alternating voltage supplied is 50 Hz.

Codes:

- (a) Both A and R are correct and R is the correct explanation of A.
- (b) Both A and R are correct, but R is not the correct explanation of A.
- (c) A is true, but R is false.
- (d) A is false, but R is true.

350. A man inside an artificial satellite feels weightlessness because the force of attraction due to earth is

- (a) zero
- (b) balanced by the force of attraction due to moon
- (c) equal to centripetal force
- (d) non-effective due to particular design of the satellite

351. Consider the following statements:

A body weighs less at the equator than at the poles because:

1. earth rotates about its axis.
2. the ice cap at the poles increases gravitational pull.
3. equatorial diameter is greater than the polar diameter.
4. of some unknown facts.

Which of the statements given above is/are incorrect?

- (a) 1 and 2
- (b) 3 only
- (c) 1 and 3
- (d) 4 only

PHYSICS**F-21**

352. Consider the following statements :

1. The magnetic pole in the northern hemisphere is the north magnetic pole.
 2. At all points on a magnet, an iron bar gets attracted.
- Which one of the following statements given above is/are correct ?
- (a) 1 only (b) 2 only
 (c) Both 1 and 2 (d) Neither 1 nor 2

353. Consider the following statements:

Heat produced in a conductor carrying current is independent of

1. Current passing through it.
2. Thermal conductivity.
3. Specific resistance.

Which of the statement given above is/are correct?

- (a) 1 and 3 (b) 2 only
 (c) 1 and 2 (d) 2 and 3

354. Match List I with List II and select the correct answer using the code given below:

List I (Magnet)	List II (Property)
A. Artificial magnet	1. Long lived
B. Permanent magnet	2. Last for infinitely long period
C. Temporary magnet	3. Short lived
D. Earth as a magnet	4. Induced magnet

Codes:

A	B	C	D
(a) 3	1	4	2
(b) 3	4	1	2
(c) 2	1	4	3
(d) 2	4	1	3

355. Consider the following statements :

1. If a piece of bar magnet is broken into two equally long pieces, the pieces will not lose the magnetic properties.
2. Magnetic properties of a substance lie in the atomic level.

Which of the statements given above is/are correct ?

- (a) 1 only (b) 2 only
 (c) Both 1 and 2 (d) Neither 1 nor 2

356. Consider the following statements:

1. The gravitational force exerted by the sun on the moon is greater than the gravitational force exerted by the earth on the moon.
2. A heavy body falls at a faster rate than a light body in vacuum.

Which of the following statements given above is/are correct ?

- (a) 1 only (b) 2 only
 (c) Both 1 and 2 (d) Neither 1 nor 2

357. Choose the incorrect option ?

- (a) A bulb in an electric circuits glows due to heating effect of current.
- (b) Tin cans, used for storing food are made by electroplating tin on to iron

- (c) When the cells are connected in series, the resultant voltage is equal to sum of the individual voltage of the cells

- (d) None of these

358. Consider the following statements :

- (1) For a spherically symmetric earth, the acceleration due to gravity should be about the same at the equator and at the poles.
- (2) If earth suddenly stops rotating about its axis, then the value of g will be same at all the places.

Which of these statement(s) is/are correct ?

- (a) (1) only (b) (2) only
 (c) Both (1) and (2) (d) Neither (1) nor (2)

359. What is the reason to pivot the compass needle on a sharp pin?

- (a) To minimise the magnetic effect on the pin
 (b) To maximize the magnetic effect on the pin
 (c) To minimize the friction between the pin and the compass needle
 (d) To ensure that the compass needle will not drop from the pivoted point

360. Ratio of the gravitational and the electrostatic forces between two electrons at some distance apart is –

- (a) 10^{43} (b) 10^{39}
 (c) 10^{-39} (d) 10^{-43}

361. An electron and a proton are located in a uniform electric field. They will experience –

- (a) Equal forces in the same direction
 (b) Forces equal in magnitude
 (c) Equal acceleration in opposite directions
 (d) Acceleration equal in magnitude

362. A dipole, placed in a uniform electric field experiences –

- (a) Only a net force
 (b) Only a torque
 (c) Both a net force and a torque
 (d) Neither a net force nor a torque

363. A closed surface has 'n' electric dipole located inside it. The net electric flux emerging out of the surface –

- (a) ne/ϵ_0 (b) $2e/\epsilon_0$
 (c) $2ne/\epsilon_0$ (d) zero

364. In electromagnetic induction, the induced charge does not depend on –

- (a) Change in flux
 (b) Time of change of magnetic flux
 (c) Resistance of Coil
 (d) None of the above

365. Lenz's law is a consequence of the law of conservation of –

- (a) Charge (b) Momentum
 (c) Energy (d) Mass

366. A magnetic field can be produced by –

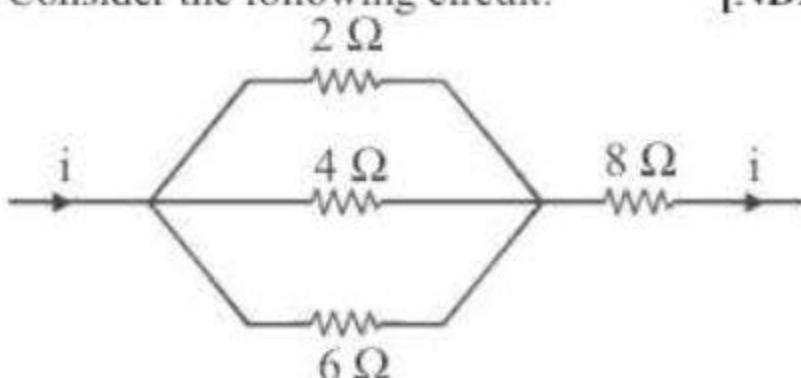
- (a) A moving charge only
 (b) A changing electric field only
 (c) Both of these
 (d) None of the above

367. The unit of electrical resistance of a conductor is –

[Bihar J. Service 2016]

PHYSICS**F-23**

388. Consider the following circuit:



[NDA/NA 2016-II]

The equivalent resistance of the circuit will be

- (a) 12Ω (b) $8\frac{11}{12} \Omega$
 (c) $9\frac{1}{11} \Omega$ (d) $\frac{24}{25} \Omega$
389. A man weighing 70 kg is coming down in a lift. If the cable of the lift breaks suddenly, the weight of the man would become [NDA/NA 2016-II]
 (a) 70 kg (b) 35 kg
 (c) 140 kg (d) zero
390. A given conductor carrying a current of 1 A produces an amount of heat equal to 2000 J. If the current through the conductor is doubled, the amount of heat produced will be [NDA/NA 2016-II]
 (a) 2000 J (b) 4000 J
 (c) 8000 J (d) 1000 J
391. Two long wires each carrying a d.c. current in the same direction are placed close to each other. Which one of the following statements is correct? [NDA/NA 2015-III]
 (a) The wires will attract each other
 (b) The wires will repel each other
 (c) There will be no force between the wires
 (d) There will be a force between the wires only at the moment when the current is switched ON or OFF
392. Three equal resistances when combined in series are equivalent to 90 ohm. Their equivalent resistance when combined in parallel will be: [NDA/NA 2015-III]
 (a) 10 ohm (b) 30 ohm
 (c) 270 ohm (d) 810 ohm
393. The resistance of a wire of length l and area of cross-section a is x ohm. If the wire is stretched to double its length, its resistance would become: [NDA/NA 2015-III]
 (a) $2x$ ohm (b) $0.5x$ ohm
 (c) $4x$ ohm (d) $6x$ ohm
394. The acceleration due to gravity 'g' for objects on or near the surface of earth is related to the universal gravitational constant 'G' as ('M' is the mass of the earth and 'R' is its radius): [NDA/NA 2015-III]
 (a) $G = g \frac{M}{R^2}$ (b) $g = G \frac{M}{R^2}$
 (c) $M = \frac{gG}{R^2}$ (d) $R = \frac{gG}{M^2}$

DIRECTIONS : The following 8 (Eight) items consist of two statements, Statement I and Statement II. You are to examine these two statements carefully and select the answers to these items using the code given below : [NDA/NA 2015-II]

Code :

- (a) Both the statements are individually true and Statement II is the correct explanation of Statement I
 (b) Both the statements are individually true but Statement II is *not* the correct explanation of Statement I
 (c) Statement I is true but Statement II is false
 (d) Statement I is true but Statement II is true

Modern Physics: Electronics, Nano Technology, etc.

395. Electronic motors operating at low voltages tend to burn out because

- (a) they draw more current which is inversely proportional to the voltage.
 (b) they draw more current which is inversely proportional to the square root of the voltage.
 (c) they draw heat proportional to V^2 .
 (d) low voltage sets in electrical discharge.

396. 'God Particle' is [BPSC 2017]

- (a) Neutrino (b) Higgs Boson
 (c) Meson (d) Positron
 (e) None of the above / More than one of the above

397. What is the purpose of 'evolved Laser Interferometer Space Antenna (eLISA)' project?

- (a) To detect neutrinos
 (b) To detect gravitational waves
 (c) To detect the effectiveness of missile defence system
 (d) To study the effect of solar flares on our communication systems

398. The terms 'Event Horizon', 'Singularity', 'String Theory' and 'Standard Model' are sometimes seen in the news in the context of

- (a) Observation and understanding of the Universe
 (b) Study of the solar and the lunar eclipses
 (c) Placing satellites in the orbit of the Earth
 (d) Origin and evolution of living organisms on the Earth

Discovery/Inventions & Scientific Instruments

399. Who was the inventor of Radar ?

- (a) Robert Watson (b) Fleming
 (c) Bush Wall (d) Austin

400. Which of the following instruments measures blood pressure?

- (a) Spherometer
 (b) Stethoscope
 (c) Sphygmomanometer
 (d) Ammeter

401. Refrigeration helps in food preservation by

- (a) killing the germs
 (b) reducing the rate of biochemical reactions
 (c) destroying enzyme action
 (d) sealing the food with a layer of ice

402. Wilhelm Rontgen invented

- (a) radio (b) X-ray machine
 (c) electric bulb (d) electric motor

F-24**GENERAL SCIENCE**

403. The safest temperature for keeping food fresh in a refrigerator is
 (a) 4°C (b) 8°C
 (c) 0°C (d) 10°C
404. In automatic wrist watches energy is provided by
 (a) manual binding
 (b) battery
 (c) liquid crystal
 (d) different movements of our hand
405. Dynamo is a machine which is used for conversion of
 (a) high voltage to low voltage
 (b) low voltage to high voltage
 (c) electrical energy to mechanical energy
 (d) mechanical energy to electrical energy
406. A dynamo which is said to generate electricity actually acts as a
 (a) Source of ions
 (b) Source of electric charge
 (c) Converter of energy
 (d) Source of electrons
407. Photoelectric effect was discovered by
 (a) Hertz (b) Einstein
 (c) Plank (d) Bohr
408. Pyrometer is used to measure
 (a) air pressure
 (b) humidity
 (c) high temperature
 (d) intensity of earthquake
409. The apparatus used to measure the intensity of light is known as
 (a) Anemometer (b) Calorimeter
 (c) Lux meter (d) Altimeter
410. Einstein got noble prize for
 (a) Photoelectric effect
 (b) Compton effect
 (c) Theory of relativity
 (d) None of these
411. The instrument used to measure the temperature of the source from its thermal radiation is
 (a) hydrometer (b) barometer
 (c) thermopile (d) pyrometer
412. Match List-I with List-II and select the correct answer using the codes given below the lists:
- | List-I | List-II |
|--------------------|-----------------|
| A. Revolver | 1. Alfred Nobel |
| B. Dynamite | 2. Pascal |
| C. Law of cooling | 3. Colt |
| D. Law of pressure | 4. Newton |
- Codes:**
- | A | B | C | D |
|-------|---|---|---|
| (a) 1 | 3 | 2 | 4 |
| (b) 1 | 3 | 4 | 2 |
| (c) 3 | 1 | 2 | 4 |
| (d) 3 | 1 | 4 | 2 |
413. An endoscope is used by a physician to view the internal parts of a body organ. It is based on the principle of
 (a) refraction of light
 (b) reflection of light
 (c) total internal reflection of light
 (d) dispersion of light
414. Which of the following is not correctly matched?
 (a) Voltmeter — Potential difference
 (b) Ammeter — Electric current
 (c) Potentiometer — E.M.F.
 (d) Galvanometer — Electric resistance
415. Which of the following describes the energy changes takes place when a steam engine drives a generator which lights a lamp?
 (a) Heat \rightarrow Kinetic \rightarrow Electricity \rightarrow Heat and light
 (b) Heat \rightarrow Sound \rightarrow Kinetic \rightarrow Electricity
 (c) Heat \rightarrow Light \rightarrow Sound \rightarrow Kinetic
 (d) Kinetic \rightarrow Light \rightarrow Heat \rightarrow Electricity
416. Which of the following laser types is used in a laser printer?
 (a) Dye laser (b) Semiconductor laser
 (c) Excimer laser (d) Gas laser
417. A device used for the measurement of radioactivity is
 (a) Mass spectrometer
 (b) Cyclotron
 (c) Nuclear reactor
 (d) G.M. counter
418. The device to measure transpiration in plants is
 (a) Hygrometer (b) Crescometer
 (c) Potometer (d) Clinometer
419. The device to measure the rate of stem growth is
 (a) Hydrometer (b) Hygrometer
 (c) Auxanometer (d) Potometer
420. Radar is used mainly for [UP-PCS 2008]
 (a) detecting objects by using light waves
 (b) reflecting sound waves to detect objects
 (c) determining the presence and location of objects with radio waves
 (d) tracking rain bearing clouds
421. The thermometer suitable to measure 2000°C is [UP-PCS 2008]
 (a) gas thermometer
 (b) mercury thermometer
 (c) total radiation pyrometer
 (d) vapour pressure thermometer
422. Wireless communication is reflected to earth's surface by [UP-PCS 2013]
 (a) Troposphere (b) Stratosphere
 (c) Ionosphere (d) Exosphere
423. The most commonly used material for making transistors is [UP-PCS 2015]
 (a) Aluminium (b) Silicon
 (c) Copper (d) Silver
424. The device used for producing electric current is called a—
 (a) Generator (b) Galvanometer
 (c) Motor (d) Ammeter

PHYSICS**F-25**

425. Which one of the following is an important component of a transistor? [UP-RO 2016]
 (a) Arsenic (b) Germanium
 (c) Osmium (d) Radium
426. Which of the following is correctly matched? [UP-RO 2016]
 (a) Thermoresistor — Electronic Thermometer
 (b) Capacitor — Thermometer
 (c) Bipolar Junction Transistor — Rectifier
 (d) Junction Diode — Amplifier
427. Laser is a device to produce [NDA/NA 2009 -II]
 (a) a beam of white light (b) coherent light
 (c) microwaves (d) X-rays
428. Why are inner lining of hot water geysers made up of copper? [NDA/NA 2010 -II]
 (a) Copper has low heat capacity
 (b) Copper has high electrical conductivity
 (c) Copper does not react with steam
429. Transformer is a kind of appliance that can [NDA/NA 2011 -II]
 1. increase power
 2. increase voltage
 3. decrease voltage
 4. measure current and voltage
 Select the correct answer using the codes given below
 (a) Only 4 (b) 1 and 4
 (c) 2 and 3 (d) 2, 3 and 4
 (d) Copper is good conductor of both heat and electricity
430. In SONAR, we use [NDA/NA 2013 -II]
 (a) ultrasonic waves (b) infrasonic waves
 (c) radio waves (d) audible sound waves
431. A device, which is used in our TV set, computer, radio set for storing the electric charge, is [NDA/NA 2013 -II]
 (a) resistor (b) inductor
 (c) capacitor (d) conductor
432. The gas used in a refrigerator is [NDA/NA 2013 -II]
 (a) cooled down on flowing
 (b) heated up on flowing
 (c) cooled down when compressed
 (d) cooled down when expanded
433. Light Emitting Diode (LED) converts [NDA/NA 2013 -II]
 (a) light energy into electrical energy
 (b) electrical energy into light energy
 (c) thermal energy into light energy
 (d) mechanical energy into electrical energy
434. Dual Energy X-ray Absorptiometry (DEXA) is used to measure [NDA/NA 2013 -II]
 (a) spread of solid tumour
 (b) bone density
 (c) ulcerous growth in stomach
 (d) extent of brain haemorrhage
435. An oscilloscope is an instrument which allows us to see waves produced by [NDA/NA 2014-II]
 (a) Visible light (b) X-rays
 (c) Sound (d) Gamma rays
436. In which categories did Marie Curie win her two different Nobel prizes? [NDA/NA 2007 -II]
 (a) Physics and Chemistry
 (b) Chemistry and Medicine
 (c) Physics and Medicine
 (d) Chemistry and Peace
437. Which one of the following is the secondary source of light in a fluorescent lamp? [NDA/NA 2008 -II]
 (a) Neon gas
 (b) Argon gas
 (c) Mercury vapour
 (d) Fluorescent coating
438. Which of the following statements about the commonly used automobile battery are true? [NDA/NA 2009 -II]
 I. It is usually a lead-acid battery.
 II. It has six cells with a potential of 2 V each.
 III. Its cells work as galvanic cells while discharging power.
 IV. Its cells work as electrolytic cells while recharging.
 Select the correct answer using the codes given below
 (a) I, II, III and IV
 (b) I, II and III
 (c) II and IV
 (d) III and IV
439. What does sphygmomanometer measure? [NDA/NA 2007 - II]
 (a) Blood pressure
 (b) Velocity of fluids
 (c) Temperature
 (d) Curvature of spherical surfaces
440. Who among the following invented the powerloom that revolutionized the cotton textile industry? [NDA/NA 2016-II]
 (a) Edmund Cartwright
 (b) Samuel Crompton
 (c) Richard Arkwright
 (d) James Hargreaves

Hints & Solutions

1. (b) Time period $T = 2\pi \sqrt{\frac{\ell}{g}}$. The time period of a pendulum depends on its length ℓ and acceleration due to gravity g .
2. (d) 1 micron = 10^{-6} m
1 nanometer = 10^{-9} m
1 angstrom = 10^{-10} m
1 fermi = 10^{-15} m
3. (b) According to Newton's third law of motion, every action has an equal and opposite reaction. This implies that force always occurs in pairs where if object A exerts a force "F" on object B, then object B exerts an equal and opposite force "-F" on object A. Thus, if a man standing on a boat in still water begins to walk towards the shore then in response to this, the boat will start moving away from the shore.
4. (a) One micron represents a length of 10^{-6} m. While milli represents 10^{-3} m.
5. (a) Supersonic speed is a rate of travel of an object that exceeds the speed of sound. For objects travelling in dry air of a temperature of 20°C at sea level, this speed is approximately 343 m/s.
6. (a) If the train were moving with uniform velocity, the coin would fall back to the passenger's hand. While, if the train is accelerated, the horizontal velocity of the train would be more than that of the coin by the time the coin returns. Therefore, the train travels a greater horizontal distance than the coin and coin falls behind the passenger.
7. (a) As a certain impulse applied for a short time will give a large force so the chinaware breaks into pieces. Therefore, chinaware is wrapped in straw or paper while packing so that the event of fall (impact) will take a longer time to reach the chinaware through straw or paper and hence the average force exerted on the chinaware is small and chances of its breaking reduce.
8. (d) For both stationary and moving objects with unchanging speed and direction, all the forces acting on the objects are in balance with each other, i.e. they all cancel each other.
9. (c) If no air resistance is present, the rate of descent depends only on how far the object has fallen, no matter how heavy the object is. This means that two objects will reach the ground at the same time if they are dropped simultaneously from the same height. This statement follows from the law of conservation of energy. However, if air resistance is present, then the shape of the object becomes important.
10. (d) An artificial satellite orbiting around the Earth does not fall down. This is so because the attraction of earth provides the necessary acceleration for its motion. This acceleration is "constant" in magnitude but "changing in direction". By the launch rocket, immediately before the satellite is established in the predetermined orbit, the speed given to it is 30,000 km/hr. The speed must be great enough so gravity brings the satellite back to Earth but not so great that the satellite escapes gravity out into space.
11. (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.
12. (b) A long jumper runs before jumping to maintain momentum. This helps in jumping higher and longer because of inertia of motion gained due to the motion.
13. (b) We know that
Potential energy = mgh
Hence potential energy is maximum at the maximum height.
14. (a) A jet engine works on the principle of conservation of linear momentum. In jet engines, a large volume of gases produced by the combustion of fuel is allowed to escape through a jet in the backward direction. Due to the very high speed or velocity, the backward rushing gases have a very large momentum.
15. (b) One feels heavier in a lift when the lift just begins to go up because our body gains inertia from the position of rest and pushes up against the gravity so here the weight becomes zero and our mass makes us feel heavier.
16. (b) Bernoulli's theorem
17. (a) Washing machine works on the principle of centrifugation. Centrifugation is a process that involves the use of the centrifugal force for the separation of mixtures with a centrifuge, used in industry and in laboratory settings. More-dense components of the mixture migrate away from the axis of the centrifuge, while less-dense components of the mixture migrate towards the axis.
18. (c) In respect of a jet engine and a rocket, both the given statements are correct.
19. (a) Wavelength is the distance between two consecutive crests or troughs and 1 angstrom = 10^{-10} m, joule is the unit of energy. Intensity of sound is measured in decibel. Frequency is measured in hertz (Hz).
20. (c) The unit of temperature is kelvin, power is measured in watt, pressure in pascal and force in newton.
21. (c) The unit of acceleration is metre per sec². The unit of electric current is ampere. The unit of work done is joule. The unit of impulse is newton second.

PHYSICS**F-27**

22. (b) Joule denoted by coulomb-volt. Watt denoted by amp²-ohm. Volt denoted by henry-amp/sec. Coulomb denoted by farad-volt.
23. (a) The liquid surface always acquires minimum surface area due to surface tension so, the small droplet of any liquid is always spherical.
24. (d) Work done is given by, $w = F s \cos \theta$ where θ is the angle between the directions of force applied and displacement.
In cases 1 and 3,
 \therefore work done = 0
In case 2, $w = f s \cos 0^\circ = mgh$, h being height covered.
In case 4, force is always perpendicular to motion i.e., $\theta = 90^\circ$, hence $w = 0$
25. (c) The multiplier for the given units are as follows:
 1 Angstrom = 10^{-10} m
 2 Micron = 10^{-6} m
 3 Nanometer = 10^{-9} m
 Hence, the order in which the lengths of the given units increase is given by Angstrom, Nanometer, Micron
 Therefore, the correct sequence is 1, 3, 2.
26. (c) From the given ($x - t$) graph it is clear that velocity is constant. Therefore, acceleration is zero.
 i.e. $v = \frac{dx}{dt} = \text{constant}$
 Now acceleration $\frac{dv}{dt} = 0$.
27. (b)
28. (d) Because they have equal momenta, hence equal mv , the heavy body will move very slowly and the light body will move very quickly. As Kinetic energy is $\frac{1}{2}mv^2$. Thus the speed of the light body will be high giving a higher kinetic energy to it in comparison to the kinetic energy of heavy body.
29. (b) It has been calculated in the theory of the chapter i.e., $R_1 = \frac{mg}{2} \left(1 - \frac{v^2 h}{rga} \right)$, and $R_2 = \frac{mg}{2} \left(1 + \frac{v^2 h}{rga} \right)$, so $R_1 < R_2$.
30. (a) Meson are sub-atomic particles composed of a quark and an antiquark. Its existence was theoretically predicted by Japanese physicist Yukawa Hideki, but it was first discovered by English physicist civil Frank Powell in 1947 in cosmic-ray particle interactions. All mesons are unstable having lifetimes ranging from 10^{-8} to less than 10^{-22} second.
31. (b) Natural radioactivity was discovered by Henri Becquerel in 1896 by using naturally fluorescent minerals to study properties of X-rays.
32. (c) Due to the lack of gravitational force the apple so released will move by the same speed as the spaceship.
33. (d) Momentum is a vector quantity. A vector quantity possesses both a magnitude and direction.
34. (a) A vector quantity is one which has both magnitude and direction. Velocity has both magnitude and direction so it is a vector quantity.
35. (c) The thermodynamic state of a system is defined by specifying values of a set of measurable properties sufficient to determine all other properties. The thermodynamic variables in case of a gas are pressure, temperature, and volume in addition to number of moles.
36. (a) One nanometre is 1×10^{-9} m. It is also defined as equal to 10 \AA° .
37. (c) Newton's 2nd Law - The rate of Change of momentum always acts in the direction of resultant force acting on a body $\Rightarrow (F = ma)$ (where m = mass; a = acceleration)
38. (b) Watt is the SI unit of mechanical power.
39. (c) Kinetic energy is the same for molecules of all gases at a given temperature.
40. (d) Newton's laws of motion do not hold good for objects moving with velocity comparable to velocity of light because it does not follow it on this level.
41. (c) 1 Bar = 10^5 Pa. Both bar and Pa are the unit of pressure.
42. (c) Rocket works on the principle of conservation of linear momentum.
43. (e) Velocity of raindrop increases until it reaches the terminal velocity.
44. (c) Horizontal range $R = \frac{u \sin 2\theta}{g}$
 For maximum horizontal range θ should be 45°
 $R_{\max} = \frac{u^2}{g} [\because \sin 2\theta = \sin 90^\circ = 1]$
45. (d) When a athlete jumps from the spring board, he curls his body by rolling his arms and legs in. By doing so, he decreases moment of inertia of his body and hence angular speed increases to conserve the angular momentum, as $I_1 w_1 = I_2 w_2 = \text{constant}$.
46. (c) The restoring force acting on the particle is always proportional to the displacement of the particle from the equilibrium position and is always directed towards the equilibrium position.
47. (b) When a ball drops on to the floor then floor exerts a force for small time which is equal to change in momentum of the ball.
48. (c) Pressure = $\frac{\text{force}}{\text{area}}$
 Bluntness of knife increases area, hence decreases the pressure for a given force.
49. (b) Creation of something from nothing is against the law of conservation of mass energy.
50. (c)
51. (b) One kilowatt hour is 3600000 joules.
52. (c) Pressure is magnitude of force normal to the area.
53. (c)
54. (d)
55. (b) Gravitational force is an imaginary force pulling everything towards the earth surface without any contact to the object.

F-28**GENERAL SCIENCE**

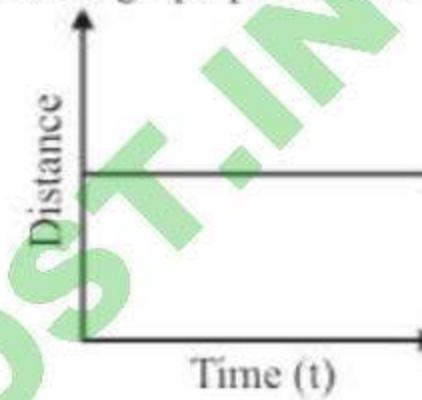
56. (b) Force (F) = Mass (m) \times acceleration (a)
 acceleration (a) = Force (F)/Mass (m)
 $= 1 \text{ newton}/1 \text{ kg} = 1 \text{ m/s}^2$
57. (c) 58. (b) 59. (a)
60. (a) 61. (c) 62. (c)
63. (c)
64. (b) According to law of conservation of energy total energy remains conserved.
 $P.E. = mgh = 20 \text{ mg}$
 Loss in potential energy is observed, as
 $(P.E.)^1 = mgh = 5\text{mg}$
 $(P.E.)^1/(P.E.) = 5\text{mg}/20\text{mg} = 1/4$
 $(P.E.)^1 = 1/4 \text{ P.E}$
65. (a) As we know
 Momentum $P = mv$
 Since, $V_A = V_B = V$, and $m_0 = 2m_A$
 for A, $P_A = m_A v_A$
 for B $P_B = (2m_A) v_A$
 $P_B = 2P_A$
66. (b) The SI unit of acceleration is the metre per second squared (m s^{-2}).
67. (a) $a = v/t = 50/25 = 2\text{m/s}^2$
 $S = Ut + 1/2at^2$
 $= 0 + 1/2 \times 2 \times 25 \times 25$
 $= 625 \text{ m}$
68. (b) The impulse-momentum theorem states that the change in momentum of an object equals the impulse applied to it.
69. (c) Nuclear potential and chemical energies implies the stored form of energy. But electrical energy is not a form of stored energy.
70. (d) Distance covered by the car = OA + AB + BC + CB
 $= 25 + 10 + 25 + 25 = 85 \text{ Km}$
 Displacement by the car = OB = 35 Km
71. (d) Velocity is the vector quantity so it get changed as the direction changes. The ball will move with constant speed and magnitude of acceleration of the ball will also be constant.
72. (b)
73. (b) BC
74. (a) In SI units, thermal conductivity is measured in watts per meter kelvin ($\text{W}/(\text{m. K})$).
75. (c) Conservation of momentum in a collision between particles is dependent on both Newton's second law of motion and Newton's third law of motion.
76. (c) Final force will be along the Z axis.
 $F = \sqrt{(3)^2 + (4)^2}$
 $= \sqrt{9 + 16} = \sqrt{25} = 5$
 Acceleration(a) = $F/m = 5/1 = 5\text{m/s}^2$
77. (b) SI unit of force Kg.m/s^2
78. (c) Constant force means constant acceleration.
 Now $s = ut + 1/2 at^2$.
 It represents a parabola.
79. (b) As the swing rises, its kinetic energy changes to potential energy; as with height potential energy $P.E. = mgh$ increases. And according to law of conservation of energy total energy $E = \text{K.E} + \text{P.E}$ constant.

80. (a) Large distance is measured in light year. Amount of a material is measured by mole. Amount of electrical charge is measured in coulomb. Energy is measured in watt hour.

81. (d) Pressure, $P = F/A$; $P' = F/A/2 = 2F/A$; $P'' = 2P$
 When a simple pendulum immersed in water then its oscillations are damped and its wave is cosine wave.

83. (b) 84. (c)
 As the body moves with a constant speed v along a straight line or rectilinear path hence body undergoes a uniform velocity. Here direction of the moving body is unchanged.

85. (c) 86. (d) Distance time graph parallel to the time axis.



It is clear from the graph that the position of the object is not changing with the change in time, hence the object is at rest or in other words we can say that it is a zero velocity motion.

The relation between linear momentum (P) and kinetic energy (K) is $K = \frac{P^2}{2m}$
 $K_A = \frac{P_A^2}{2m}$ and $K_B = \frac{P_B^2}{2(4m)}$

$$\frac{K_A}{K_B} = \frac{P_A^2}{2m} \times \frac{8m}{P_B^2} \quad [P_A = P_B, \text{ given}]$$

$$\frac{K_A}{K_B} = \frac{4}{1} = 4 : 1$$

87. (b) $\vec{F} = 6\hat{i} - 8\hat{j} + 10\hat{k}$

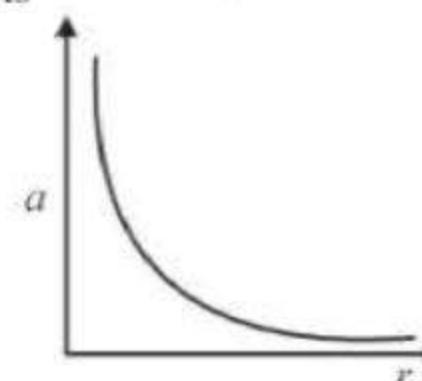
$$|\vec{F}| = \sqrt{(6)^2 + (-8)^2 + (10)^2} \\ = \sqrt{36 + 64 + 100} = 10\sqrt{2} \text{ N}$$

$$|\vec{a}| = 1 \text{ m/s}^2$$

using $F = ma$
 $\Rightarrow 10\sqrt{2} = m \times 1$

$$m = 10\sqrt{2} \text{ kg}$$

89. (d) The given situation is uniform circular motion. In this case, the centripetal acceleration $a_c = \frac{v^2}{r}$ as $|\vec{v}|$ is constant $\Rightarrow a \propto \frac{1}{r}$. Hence, the graph between 'a' and 'r' is



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90. (b) Using, $KE = \frac{P^2}{2m}$

$$\frac{P_A^2}{2m_A} = \frac{P_B^2}{2m_B} \quad [KE_A = KE_B \text{ given}]$$

$$P_A < P_B \quad [\text{as, } m_A > m_B]$$

Now from Newton's second law

$$F_{ext} = \frac{\Delta P}{\Delta t} \Rightarrow \Delta P = F_{ext} \Delta t$$

$$\Rightarrow \Delta P_A < \Delta P_B \Rightarrow F_{ext} \Delta t_A < F_{ext} \Delta t_B$$

$\Rightarrow \Delta t_A < \Delta t_B$ [equal braking force is hence on comparing time Δt_A and Δt_B] we can say that car B will cover a greater distance.

91. (a) Using $V_c = R_c W$

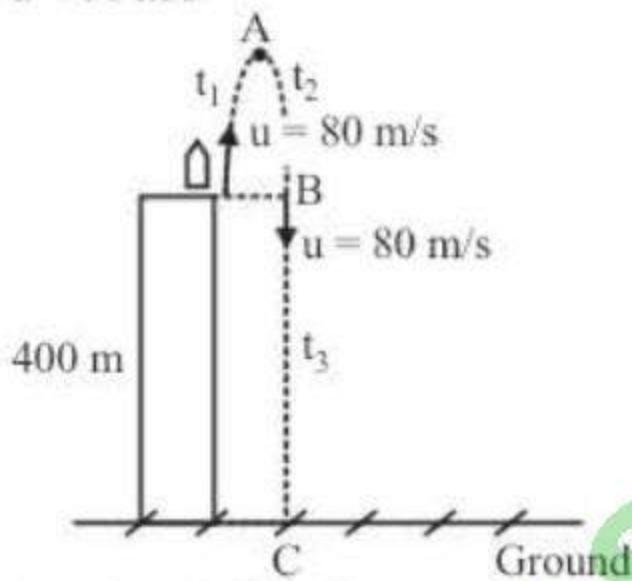
$$1700 \text{ km/h} = 20000 \times W$$

$$W = \frac{1700}{20000} = \frac{17}{200} \text{ rotation/hour}$$

Velocity of rotation of pole,

$$V_p = R_p \\ R_p = 0 \Rightarrow V_p = 0$$

92. (c) Total time taken to reach the ground $T = t_1 + t_2 + t_3$
 $u = 80 \text{ m/s}$



Velocity of the bullet at point A,

$$V_A = 0 \text{ m/s.}$$

$$a = -10 \text{ m/s}^2$$

$$V = u + at$$

$$0 = 80 - 10 t_1$$

$$t_1 = 8 \text{ s}$$

$$t_2 = t_1 \quad (\text{as there is no air resistance})$$

Calculation for t_3

Velocity of the bullet at point B,

$$V_B = u = 80 \text{ m/s}$$

$$h = 400 \text{ m}$$

$$\text{Using } s = ut + \frac{1}{2}at^2$$

$$\Rightarrow 400 = 80 \times t_3 + \frac{1}{2} \times 10 \times t_3^2$$

$$\Rightarrow 5t_3^2 + 80t_3 - 400 = 0$$

$$\Rightarrow t_3^2 + 16t_3 - 80 = 0$$

$$\Rightarrow t_3(t_3 + 20) - 4(t_3 + 20) = 0$$

$$t_3 = -20 \text{ s or } t_3 = 4 \text{ s}$$

Time cannot be negative hence neglecting $t_3 = -20 \text{ s}$

$$\text{Total time } T = 8 + 8 + 4 = 20 \text{ s}$$

93. (d) Bernoulli's principle states that an increase in the velocity of the fluid during the flow results in simultaneous decrease in the pressure of fluid. The converse is also true, when pressed, low pressure is created in scent bottles. Due to this, liquid rises up the tube following Bernoulli's principle and is pushed out through nozzle in the form of spray.

Whereas, Charles' law states that the volume of an ideal gas at constant pressure is directly proportional to the absolute temperature.

On the other hand, according to Boyle's law. Pressure of a given mass of an ideal gas is inversely proportional to its volume at a constant temperature. While, Archimedes principle states that the upward buoyant force that is exerted on a body immersed in a fluid, whether fully or partially submerged, is equal to the weight of the fluid that the body displaces and acts in the upward direction at the centre of mass of the displaced fluid.

94. (c) Cooling is not done by burning cooking gas. While, flow of water, release of compressed gas and melting solids results in cooling by absorbing heat from the surroundings, thus, lowering the temperature.

95. (b) When ice melts, density increases so volume decreases. That is why, ice floats on water.

$$\text{Mass} = \text{volume} \times \text{density}$$

96. (a) Mercury is very good conductor of heat as it is the only liquid metal. It is used in thermometer also.

97. (d) Air is filled in vehicle tyres because it is highly compressible.

98. (c) Heat given/taken by the substance is equal to the latent heat of fusion or vaporization of the substance. That is why the temperature of the substance remains the same during the change of state.

99. (c) An egg when placed in ordinary water sinks to the bottom as the density of egg is higher than the density of ordinary water. Density is the mass of a material per unit volume, thus, adding salt to water (brine) increases the density of solution because salt increases the mass without changing the volume. That is why, an egg when placed in brine would float.

100. (c) The level of water in the pond remains unchanged.

101. (c) The specific gravity of liquid is greater than one and as the specific gravity of water is 1 hence the level of liquid in the beaker will rise up.

102. (a) When two ice blocks are pressed together, little heat is generated due to pressure and of friction, which just melts the outer layer. When that melts, friction decreases and due to the low temperature of both the ice cubes, the water just refreezes.

103. (b) Capillary action, or capillarity, is a phenomenon where liquid spontaneously rises in a narrow space such as a thin tube, or in porous materials such as paper or in some non-porous materials such as liquefied carbon fibre. This effect can cause liquids to

- flow against the force of gravity or the magnetic field induction. In blotting of ink, spread of water drop on a cotton cloth and the rising of water from the roots of a plant to its foliage.
104. (d) 105. (b) If a rock is brought from the surface of the moon to the earth, its weight will change but not its mass. Mass is a invariant physical quantity whereas weight of a body ($w = mg$) is variable as the value of acceleration due to gravity (g) changes.
106. (c) The two points in the same horizontal line do not have equal pressure if the liquid is accelerated horizontally. The free surface of oil is inclined to the horizontal with larger depth at the rear end as the oil tanker is moving forward with uniform acceleration.
107. (c) The fraction of a ball floating inside the liquid depends only upon density of the liquid and the ball. If the ball floats then $V_d = V_p$
- $$\text{or } \frac{d}{p} = \frac{V'}{V}$$
- given the fraction of volume inside the liquid in which the body floats.
Which d is density of ball and p is density of liquid.
108. (a) Clay particles are smaller than 0.002 mm in diameter, slit particles are from 0.002 to 0.05 mm in diameter and sand ranges from 0.05 to 2.0 mm. Particles larger than 0.2 mm are called gravel or stones.
109. (d) Mass is the quantity of matter contained by the object. Weight is the force of gravity acting on a body. Mass is constant anywhere in the universe but weight depends upon the quantity of gravity in a particular place.
110. (c) Liquid rises in capillary tube due to capillary action.
111. (b) When brush is taken out, the water film is formed between the hairs and they contract due to surface tension.
112. (c) When a body immersed in a liquid, then the apparent weight of the body depends upon the densities of the liquids and volume of the portion of the solid immersed in liquid. So, the apparent weight of a steel sphere will be greatest for the liquid in which the sphere was submerged deepest.
113. (a) For ordinary water and glass it is about 8° (acute angle) and for mercury and glass it is about 135° (obtuse angle).
114. (b) As scuba diver ascends towards the water surface, water pressure decreases, so according to Boyle's law air in his lungs expands to occupy a greater volume. Which increase the chances of bursting the lungs.
115. (a) Fountain pen uses capillary action in addition to gravity for flow of ink.
116. (c)
- | Product | Boiling Point (°C) |
|---------------------|--------------------|
| (a) Kerosene | 200-300° |
| (b) Diesel | above 300° |
| (c) Gasoline | 70-200° |
| (d) Lubricating oil | Unvaporised liquid |
117. (a) Water has a high specific heat.
118. (c) Sublimation is the transition of a substance directly from the solid to the gas phase without passing through the intermediate liquid phase.
119. (b) The atoms and molecules in gases are much more spread out than in solids or liquids. They vibrate and move freely at high speeds. A gas will fill any container, but if the container is not sealed, the gas will escape. Gas can be compressed much more easily than a liquid or solid.
120. (a) The melting point is an important physical property of a compound. The melting point can be used to identify a substance and as an indication of its purity. The melting point of solid is defined as the temperature at which the solid exists in equilibrium with its liquid under an external pressure of one atmosphere.
Melting point also depends upon the intermolecular force of attraction between the molecule.
121. (a) The speed of light and its components vary inversely with the refractive index of the medium. Refraction is the deviation in the path of light when it travels from one optical medium to the other. Different wavelengths experience different degree of deviation. As a result, white light splits into 7 colours (VIBGYOR) on passing through the prism.
122. (a) Retina of the eye is comparable to the film of a traditional camera. Retina is a film of nerve fibres. Image of the object is formed at retina just like camera film is used to see the images.
123. (d) Filament of bulb is made of tungsten because of its high melting point (3422°C), lowest vapour pressure and great tensile strength. Hence, when current passes, it gets heated to emit light but does not melt or expand.
124. (b) Convex mirror is a diverging mirror used as a rear view mirror in the vehicles as it covers wide range of vehicles coming behind.
125. (d) Mirage is an optical illusion. The reason of mirage is total internal reflection of light. In summer air near the ground is hotter and hence rarer than the air above which is responsible for TIR, hence, mirage is formed.
126. (b) Wavelength is the distances between two points of the wave in the same phase. It is related to frequency and energy of the radiations. It helps in determining colour of light waves. The wavelength of light visible to eye falls between 400nm to 800nm.
127. (a) Ultrasonics are sound waves of frequency greater than 20,000Hz. The frequency range 20Hz to 20,000Hz is human audible range of frequency.
128. (d) Laser (Light Amplification by Stimulated Emission of Radiation) is a device for producing stimulated radiation. In stimulated radiation, an incoming photon of a specific frequency can interact with an excited atomic electron causing creation of a new

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- photon identical in all respect to the incident photon. As a result, two similar waves (original incident wave and the newly formed one) constructively interfere, leading to a more intense wave.
129. (a) Infrared is used in the remote control of a television. It has wavelength greater than visible light ($> 800\text{nm}$) which is invisible to human eye but can be felt as heat.
130. (d) One unit of electrical energy
 $= 1 \text{kwh}$.
 $= 1 \text{kilo watt hour}$
 $= \frac{100}{1000} \text{kilo watt} \times 4 \text{ hour}$
 $= 0.4 \text{ unit}$
131. (d) Tube light is filled with mercuric oxide and argon gas where mercuric oxide is used to emit UV light while argon gas is used to provide an inert atmosphere within the tube.
132. (b) The colour of the star is an indication of its temperature according to Wein's displacement law
 $\lambda \times T = b$
 where λ = Wavelength
 T = Temperature and
 b = Constant whose value is
 $2892 \times 10^{-6} \text{ mK}$
133. (b) Sound travels in the form of longitudinal waves. These waves travel in the form of compressions and rarefactions.
134. (a) The mirror by a dentists to examine the teeth of patients is concave as concave mirror gives upright and magnified image of the object. While, image formed by a convex mirror is upright but diminished. On the other hand, image formed by plane mirror is of the same size as the object.
135. (d) A sound's loudness is measured in decibels (dB). Normal conversation is 60dB, a lawn mower is about 90dB are harmful, depending on how long and how often one is exposed to them.
136. (b) The image of the object formed on the retina of our eyes is always inverted, however, optic nerve that carries information to the brain makes the image erect so that we see only erect image.
137. (b) Sodium vapour lamps fall under the gas discharge category, also known as high-intensity discharge (HID). The lamping compartment of these luminaries have sodium vapor in them, when electricity is passed through, it excites the vapour which in turn produces a yellow glow. Thus, light from these lamps is monochromatic, that is, single colour light that will not split through water droplets, making them efficient to be used in street lights.
138. (a) In a three pin plug longest pin should be connected to ground terminal. Ground pin is the largest to supply the additional voltage that can give electric shock. And being the longest it can touch before live and neutral terminal.
139. (a) The cost of electricity will be ₹ 5.
 1 unit of electricity
 $= 1 \text{kwh}$ (1 kilowatt hour)
 $= \frac{100}{1000}$ kilowatt $\times 10$ hour
 $= 1$ unit hence electricity bill
 $= 1 \times 5 = ₹ 5$
140. (b) In television broadcast, the video signal transmitter employs an AM transmitter as amplitude-modulation is used for video signals whereas audio signal transmitter employs FM modulator as frequency modulation is used for sound information.
141. (b) Sound waves require material medium to travel. Moon has no such material medium.
142. (a) Optical fibre works on the principle of total internal reflection. Each fibre consists of core and cladding. Refractive index of core is greater than cladding.
143. (a) The least distance of distinct vision is of 25 cm. It is the minimum distance that eye can accommodate to see the object.
144. (a) Red light is used as danger signal because it is scattered least.
 $\text{Scattering} \propto \frac{1}{\lambda^4}$
 And among three primary colours red, green and blue, red has maximum wavelength.
145. (b) Nearsightedness or myopia is the inability of the eye to focus on distant objects. The nearsighted eye has no difficulty viewing nearby objects. This condition results if the light from distant objects is refracted more than is necessary. The cure for nearsighted eye is to equip it with a diverging or concave lens. Since the nature of the problem of nearsightedness is that the light before it reaches the eye. This light will then be converged by the cornea and lens to produce an image on the retina.
146. (c) The Richter magnitude scale is the most common standard of measurement for earthquakes. It was invented in 1935 by Charles F. Richter as a mathematical device to compare the size of earthquakes. It is used to rate the magnitude of an earthquake, that is the amount of energy released during an earthquake.
147. (b) Cosmic rays are high energy radiations mainly originating outside the solar system. These are not electromagnetic waves while γ -rays, microwave and radio wave are examples of electromagnetic waves.
148. (d) A computerized tomography (CT) scan combines a series of x-rays used for the purpose of examining the internal structures of the body. It provides more detailed information than plain x-rays. It is used for examining people who have internal injuries as well as for detecting other conditions like cancer, heart disease, etc.
149. (d) When light passes from one medium to another medium frequency does not change.

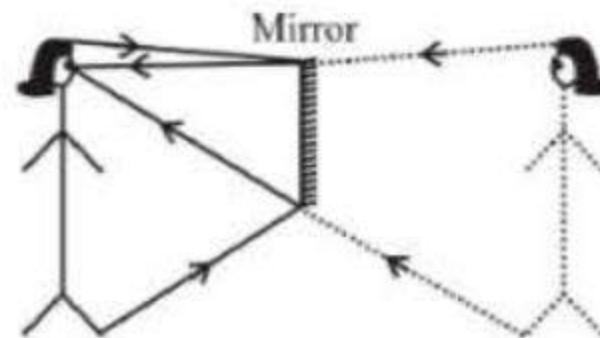
150. (d) Night vision cameras have three important features namely amplified light, infrared sensors as well as heat radiation from objects. While, x-rays radiations from objects are not used by these cameras.
151. (b) X-ray has the highest energy. Among the given four radiations X-ray has the highest frequency. And Energy $E = hv$.
Where $h = \text{Plank's constant}$ and $v = \text{frequency}$.
152. (d) Wavelength range of visible light is 390 – 780 nm.
153. (b) Ultrasonic or ultrasound scan is usually carried at about 32 weeks of pregnancy for monitoring foetal growth. It does so by measurement of the size of foetal head, abdomen and thigh bone and calculation of an estimate of foetal weight, examination of the movements of foetus, evaluation of placental position and appearance, measurement of amount of amniotic fluid.
154. (c) In about 8 minutes light from the sun reaches the earth.
 $\text{Time} = \frac{\text{Distance}}{\text{Speed}}$
Speed of light in air/vacuum = $3 \times 10^8 \text{ ms}^{-1}$
Distance of the earth from the sun = $1.44 \times 10^{11} \text{ m}$
155. (d) Sound travels fastest in metal. Increasing order of speed of sound in different mediums.
 $V_{\text{gas}} < V_{\text{liquid}} < V_{\text{solid}}$
Sound waves cannot travel through vacuum.
156. (d) To hear a clear echo, the minimum distance should be 16.5 metre.
To hear an echo, time = $\frac{1}{10} \text{ s}$
Velocity of sound (in air) = 330 ms^{-1}
 $\text{Time} = \frac{2d}{\text{Velocity of sound in air}}$
 $\Rightarrow \frac{1}{10} = \frac{2d}{330}$
 $\therefore d = 16.5 \text{ metre}$
157. (b) Diamonds have a very high refractive index (about 2.42 compared to about 1.5 for glass). The amount of light reflected at an air/other material interface is related to the refractive index change at the interface and the bigger the refractive index change, the more light is reflected. Thus, diamond reflects large amount of light and therefore, sparkles more.
158. (d) The primary application of forensic light source is for enhancing the detection of fingerprints. The use of fluorescent enhancement processes that compliment a light source greatly increases the type of surfaces from which a fingerprint can be detected. Fingerprints on a piece of paper can be detected by sprinkling powder on the paper and then looking it into ultraviolet light.
159. (c) A vibrating body will produce sound which is dependent upon the frequency. Sounds of frequencies less than about 20 vibrations per second (20 Hz)

cannot be detected by the human ear. Such sounds are called inaudible. On the higher side, sounds of frequencies higher than about 20,000 vibrations per second (20 kHz) are also not audible to the human ear.

160. (b) SONAR or sound Navigation and Ranging is helpful for exploring and mapping the ocean because sound waves travel farther in the water than do radar and light waves. These also determine the time between the emission of sound pulse and its reception, the transducer can determine the range and orientation of the object.
- While, LASER is a device that emits light through a process of optical amplification based on the stimulated emission of electromagnetic radiation. Whereas, sonic boom is the sound associated with the shock waves created by an object travelling through the air faster than the speed of sound. On the other hand, reverberation is the prolongation of a sound.
- In plane mirror, the image distance always equals the object distance. Therefore, when the distance between the object and the plane mirror increases then the distance between the image and the plane mirror also increases.
161. (c) Butter paper is a translucent object as it allows light to pass through it partially, thus not providing clear vision. While, a transparent substance allows light to pass through it completely providing a clear vision. Whereas, an opaque substance is impenetrable to light. On the other hand, luminous objects emit their own light.
162. (b) When the light rays pass through the atmosphere having layers of different densities and refractive indices, then atmospheric refraction takes place. The actual sunrise takes place when the sun is above horizon. When the sun is just below the horizon, the light rays coming from it, on entering the Earth's atmosphere suffer atmospheric refraction from a rarer to a denser medium, thus, bending towards normal at each refraction. Due to continuous refraction of light rays at each layer, it follows a curved path and reaches the eye of the observer. As a result, we can see the sun 2 min before it rises above the horizon in the morning. It is also due to refraction that we can still see the sun for about 2 mins even after the sun has set below the horizon. As a result, the time from sunrise to sunset is increased by about 4 mins.
163. (b) $1 \text{ light year} = \text{speed of light in vacuum} \times \text{no. of seconds in one year} = (3 \times 10^8) \times (365 \times 24 \times 60 \times 60) = 9.467 \times 10^{15} \text{ m}$
164. (c) Rainbow (a band of seven colours – VIBGYOR) is a natural spectrum. It is caused by dispersion (i.e. splitting of white light into seven constituent colours VIBGYOR) of sunlight by tiny droplets of water present in the atmosphere.
165. (a) The audible frequency range of a human ear is 20 Hz to 20000Hz.

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167. (b) Microwave oven consumes less power due to short wavelength of radiation.
168. (a) Bat emitted ultrasonic sounds specifically to produce echoes. By comparing the outgoing pulse with the returning echoes the brain and auditory nervous system can produce detail image of surrounding.
169. (b)
170. (d)
171. (c)
172. (c) Interference at thin films causes colouring of soap bubble.
173. (a)
174. (b) Myopic eye can see near objects clearly but cannot see far objects clearly.
175. (a)
176. (d) The reason CDs reflect rainbow colors is because they have a clear plastic coating on top of a mirrorized surface. Light refracts (bends) when it moves from one medium (such as air) to another with a different optical density (such as the clear plastic surface of a CD). Different wavelengths of light (every color has a different wavelength) travel at different speeds, so that full spectrum appears when white light passes from the air through the plastic surface of a CD, separated light rays which are then reflected back to us by the mirrorized center surface of a CD. Here the diffraction and transmission also takes place because diffraction of light rays occur when it strikes the surface of CD and transmission is obvious when light enters from one medium to another. The thickness of the different optical media, angle of source light, and brightness of source light all affect which rainbow patterns are visible on a CD.
177. (c) The size of the image formed by plane mirror is equal to the size of the object. Convex mirror forms diminished image whereas concave mirror always form magnified image of the object.
178. (a) Redshift is a phenomenon which involves an increase of wavelength electromagnetic radiation from an object or shift towards the red end of the spectrum. The cosmological redshift due to the expansion of the universe explains distant light sources showing a redshift due to their increasing distance from the earth as redshift occurs whenever light sources move away from an observer.
179. (b) Cosmic rays have very high frequency $>10^{23}$ Hz and wavelength $<10^{-24}$ m.
180. (d) Hypermetropia is corrected by using a concave lens. Myopia is corrected by convex lens.
181. (b) The minimum height of a plane mirror to see the full size image of a person is equal to the half the height of the person.



182. (a) Magnetic resonance imaging is based on the phenomenon of nuclear magnetic resonance (NMR). Magnetic Resonance Imaging (MRI) is a scanning technique for creating detailed images of the human body. It is also known as nuclear magnetic field and radio waves to generate images of body parts.
183. (c) A diamond sparkles more than a glass imitation cut to the same shape is only the true statement. The refractive index of diamond $2.42 >$ glass 1.5 .
184. (d) Sound waves require material medium to travel. On the surface of the moon, there is no atmosphere. The speed of sound is maximum in solids and minimum in gas medium.
185. (a) If the observer and object are situated in different medium then the object appears to be displaced from its real position due to refraction. Here, the person and the coin are in two different medium. The coin is in a bucket of water. The light entering the water is refracted at the water surface thus, the coin appears to be closer and at lighter level than it really is as the water is a rarer medium than atmosphere, and in this case depth is less than apparent depth.
186. (c) When a stick is dipped in water, the ray of light that travels from the stick to the observer travels from a denser medium to a rarer medium and bends away from the normal. Thus, every point of the dipped stick produces vertical image which is slightly above the original position. Thus, the stick appears to be slightly bent and shorter.
187. (c) The phenomenon of mirage is formed by the terrestrial heating and refraction of light. Due to terrestrial heating, layers of air of different densities (different refractive indices) are formed. The ray of light strikes different layers/refracted and causes mirage—an optical illusion.
188. (d) Radio waves are produced by rapidly oscillating electrical currents. For detecting over speeding of vehicles, police use the Doppler effect to reflected short radio waves. Scattering of light is inversely proportional to its wavelength so, longer the wavelength, the less it is scattered, speed of visible light in matter is almost $\frac{3}{4}$ th the speed of light in vacuum.
189. (c) With increase in temperature, Velocity of sound in gas increases ($v \propto \sqrt{T}$). Change in pressure has no effect on velocity of sound in gas if temperature remains constant. And the speed of sound in air doesn't effect by phase, loudness, pitch, amplitude, or frequency.

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- The velocity of sound in air increases as the humidity increases.
190. (c) The intersected area of magenta and yellow-coloured circles will have red colour. The intersected area of cyan and magenta coloured circles will have blue colour.
 Magenta = Red + Blue
 Cyan = Blue + Green
191. (b) As frequency $\propto \frac{1}{\text{Length}}$, so flute will produce waves of higher frequency. Sound wave transmitted through gas, plasma and liquid as longitudinal waves but through solids it can be transmitted both longitudinal as well as transverse waves.
192. (c) Ultrasonic waves can produce perfectly homogeneous solution. It is used in homogenising milk constituents, etc.
193. (c) Most commonly phenomenon i.e. reflection, refraction, interference, diffraction, polarization can be explained by wave nature of light. But the photoelectric effect suggested a particle nature of light. Hence, light shows wave as well as particle (dual) nature.
 According to the modern theory of nature of light, the light has both wave and particle nature.
194. (b) Electrostatic force of attraction or repulsion between two charges (q_1 and q_2) at a distance (r) is directly proportional to the product of charges and inversely proportional to the square of distance between the charges i.e.
 According to coulomb's law, $F \propto \frac{1}{4\pi\epsilon_0} \frac{q_1 q_2}{r^2}$
 or $F = \frac{1}{4\pi\epsilon_0} \frac{q_1 q_2}{r^2}$
195. (c) To produce light, a CFL uses mercury vapour and phosphorus while an LED lamp uses semi-conductor material. LED light bulbs are the undisputed, heavy weight champion with lifespan of 25,000 hours while CFL bulbs which bring in a respectable 8,000 hours of average life expectancy.
196. (c) The term Dolby B or Dolby C printed on tape recorders and other sound systems refers to noise reduction circuit.
197. (a) The velocity of sound in air increases as the humidity increases. Water vapor is relatively light compared to the O_2 and N_2 . Thus, when water vapor increases, the amount of oxygen and Nitrogen decreases per unit volume and thus density decreases because mass is decreasing.
198. (d) Due to high penetrating power, the properties of interference, diffraction and polarization are not possible in X-ray.
199. (d) When alpha, beta and gamma rays carry same momentum, then all have same wavelength as
- $$\lambda = \frac{h}{P}$$

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- where λ = wavelength, P = momentum and h = Plank's constant ($= 6.62 \times 10^{-34}$ Js).
200. (a) The principle of total internal reflection is applicable to explain the formation of image in desert and operation of optical fibres. The formation of image in microscope and colour of evening sky are based on refraction of light.
201. (c) When a light wave passes from one medium to other, its frequency remains constant but its speed and wavelength change.
 Because refractive index (μ)

$$= \frac{\text{Velocity of light in vacuum}(c)}{\text{Velocity of light in vacuum}(v)}$$

 Refractive index is the relative property of two media and is independent of frequency of light wave.
202. (d) Refractive index of a medium depends on its nature. Refractive index (μ) is also given by

$$\mu = \frac{\sin i}{\sin r}$$

 where i = angle of incidence
 r = angle of refraction
 Thus, μ depends on the angle of incidence.
 Again, $\mu = \frac{C_0}{c}$ where C_0 is the velocity of light in vacuum and c is the velocity in a medium. We know that frequency remains constant when light passes from one medium to other, therefore,

$$\mu = \frac{\lambda_0}{\lambda}$$

 The colour of light depends on wavelength.
 Thus, μ depends on the colour of the incident ray.
203. (d) The medical term for long-sightedness is hypermetropia. Eyesight problems, such as hypermetropia, are also known as refractive errors. Long sight leads to problems with near vision, and the eyes may commonly become tired. Distance vision (long sight) is, in the beginning, often clear. Because the light from nearby object arriving the eye less may get converged at a point behind the retina. Long sight can be corrected by glasses or convex lens, or sometimes 'cured' with laser eye surgery.
204. (d) Thunderstorms result from the rapid upward movement of warm, moist air. They can occur inside warm, moist air masses and at fronts. As the warm, moist air moves upward, it cools, condenses, and forms cumulonimbus clouds that can reach heights of over 20 km (12.45 miles). The thunderstorms are associated with the cumulonimbus clouds. These clouds normally form on warm sunny days but they can also be found on cold front. The lightning generates between 100 million and 1 billion volts of electricity and can heat the air to around 50K°F. The rapid expansion causes the shock waves. Thunder happens because the lightning would heat the air at huge temperatures and the air expands so fast that it makes a loud clap of thunder.

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205. (c) – Light from sun takes nearly eight minutes 20 seconds to come to earth.
 – The image formed by a convex lens when the object is placed between the focus and the optical centre is virtual and magnified.
 – Cinematography makes use of persistence of vision. Persistence of vision is the ability of an eye to continue to see the image of an object for a very short duration even after the removal of the object.
206. (c)
 207. (b)
 208. (c) Velocity of object w.r.t mirror = 10 cm/s
 So velocity of image w.r.t you = $2 \times 10 = 20$ cm/s.
 209. (a)
 210. (a) Both of the statements are correct and statement 2 is also correct explanation for statement 1. Total internal reflection is an optical phenomenon that happens when a ray of light strikes a medium boundary at an angle larger than a particular critical angle with respect to the normal to the surface. If the refractive index is lower on the other side of the boundary, no light can pass through and all of the light is reflected. Thus because of this phenomena traffic light beads glow when light falls on them.
211. (d) The observer on the earth will detect a wavelength given by
- $$v = \pm \frac{\lambda - \lambda_0}{\lambda} c$$
- where λ = original wavelength
 λ_0 = apparent wavelength
 v = velocity of source
- Here, source is receding, therefore +ve sign will be taken
- $$\therefore \frac{2}{10} c = \frac{\lambda - \lambda_0}{\lambda} c$$
- $$\Rightarrow \frac{\lambda - \lambda_0}{\lambda} = \frac{2}{10} \Rightarrow 1 - \frac{\lambda_0}{\lambda} = \frac{2}{10}$$
- $$\Rightarrow \frac{\lambda_0}{\lambda} = 1 - \frac{2}{10} = \frac{8}{10} \Rightarrow \lambda = \frac{10}{8} \lambda_0 = 1.25 \lambda_0$$
- The wavelength of blue light varies from 450 nm to 475 nm. Therefore, the observed light will have wavelength ranging from 562.5 nm to 593.75 nm which will be yellow orange.
212. (d) Mach number, a useful quantity in aerodynamics, is the ratio of air speed to the local speed of sound. The speed of sound varies with temperature. Since temperature and sound velocity normally decrease with increasing altitude, sound is refracted upward. Mach number is a function of temperature at altitude. With decrease in sound velocity Mach number increases.
213. (a) the correct frequency order is radio waves < microwaves < x-rays < cosmic rays
214. (a) Higher the wavelength, lower is the energy of the electron magnetic wave.
 215. (c) Gamma radiation, also known as gamma rays, are electromagnetic radiation of extremely high frequency.
 216. (d) Ultra-violet rays (0.1 micrometres) < visible light (0.7 micrometres) < infrared radiation (0.01 mm) < microwaves (less than 10 cm)
 217. (b) The ocean looks blue because of the way it absorbs sunlight when sunlight hits the ocean, the water strongly absorbs long wavelength colours at the red end of the light spectrum. It also absorbs short wavelength of light including violet and ultraviolet. The remaining light that is mostly seen is made up of blue wavelengths. The intensity of blue colour of water depends on the amount of water available. For example water in a glass is clear as there is not enough water available to absorb the light.
 218. (a)
 219. (c) 220. (d) 221. (a)
 222. (b) Convex mirror is used as a rear view mirror in Motor vehicles.
 223. (d) Total internal reflection is a special type of refraction where the incident angle is greater than the critical angle, the incident rays gets reflected within the medium. Mirage is common phenomenon in hot deserts.
 224. (b) Light is made up of wavelengths of light, and each wavelength designates a particular colour. The colour of an object is the wavelengths of light that it reflects and colour we see is a result of which wavelengths are reflected back to our eyes.
 225. (a) Ultrasonic is defined as acoustic frequencies greater than 16-20 kHz up to 1 GHz and are not audible to the human ear.
 226. (a) Concave mirrors produce magnified and upright images when object is placed at a distance less than the focal length. This is the reason to use it by dentists to have a magnified image of tooth.
 227. (b)
 228. (d) Sound is a wave and it spreads through the vibration of particles in a medium. There is no medium in vacuum for the sound to travel hence it cannot travel in vacuum.
 229. (a) Convex mirrors are commonly used as rear-view mirrors to view the traffic behind the vehicle. It gives an erect and diminished image and provides a wider field of view.
 230. (d) When any object or point light source is placed between two parallel plane mirrors, infinite images will be formed as it undergoes multiple reflection to produce the infinite images.
 231. (c) The resistance offered by the coil due to DC current remain zero hence there be no effect on light emerging from bulb
 232. (b) Second Image will be the brightest image
 233. (d) Critical angle will be directly proportional to velocity

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- of particular color of light ($\sin C \propto v$), which is minimum in the case of violet color.
234. (b) Increasing the length of the tube will increase the magnifying power as Magnifying power \propto length of tube and given by the formula $M = L/F_0 (1 + D/f_e)$
235. (a) Concave mirrors are used as objective in reflecting telescopes.
236. (b) The fringe width will decrease. As $\lambda = h/mv$, if v will increase then accordingly λ will decrease. Now fringe width = $\lambda D/d$, hence it will also decrease.
237. (d) Due to very small wavelength of light, it is harder to observe diffraction of light in comparison to sound waves. $\sin \theta = \lambda/d$ hence λ is very less for light.
238. (c) The equation $E = p.c.$ is valid for particles with zero rest mass, which is valid for photons but not for electron
239. (d)
240. (a) Fibre optics is the science of transmitting data, voice, and images by the passage of light through thin, transparent fibres.
241. (a) Speed of sound varies from substance to substance. Sound travels most slowly in gases; it travel faster in liquids and faster still in solids. For example, sound travels at 343 m/s in air; it travels at 1484 m/s in water (4.3 times as fast as in air) and at 5120 m/s in iron.
242. (a) Power of lens is the ability of the lens to converge the rays of light falling on it. In other words, the power of a lens is the reciprocal of its focal length in metres. It is measured in dioptre. 1 dioptre is the power of lens whose focal length is 1 metre.
243. (d) The Doppler Effect is associated with the phenomenon of sound. It is defined as the change in wavelength and frequency caused by movement of an observer relative to the source. One of the most common ways we can experience the Doppler Effect in action is in the change of pitch that occurs due to a moving sound source.
244. (d) Electromagnetic induction. It is the fundamental operating principle of electric generators, transformers, solenoids electrical motors and inductors.
245. (b) Diffraction occurs when a wave encounters an obstacle or a slit. Diffraction is the bending of light as it passes around the edge of an object. The amount of bending depends on the relative size of the wavelength of light to the size of the opening/slit.
246. (d) Mechanical wave is a type of wave that is not capable of transmitting its energy through a vacuum. Mechanical waves require a medium in order to transport their energy from one location to another. Sound waves are type of mechanical waves and cannot spread through vacuum.
247. (d) When light falls on the prism, refraction takes place. Since the wavelength of different components of light is different and the frequency is constant, each component gets deviated by a different angle due to the difference in velocity in the glass medium

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- of prism. The red color having the maximum wavelength is least deviated whereas violet having the least wavelength deviated the most. In the given options yellow is the least deviated colour.
248. (d) The Sound propagation is facilitated by the collisions between the particles of medium. The inter-molecular distance in solids is very small whereas in gases it is very high. Therefore the velocity of sound is maximum in solids and minimum in gases.
249. (b) The sound waves having frequency below 20 Hz are unaidable. Ultrasonic waves are those waves which have the frequency of above 20,000 Hz.
250. (c) Let the distance is x metre.

$$\text{Distance} = \text{Velocity} \times \text{Time}$$

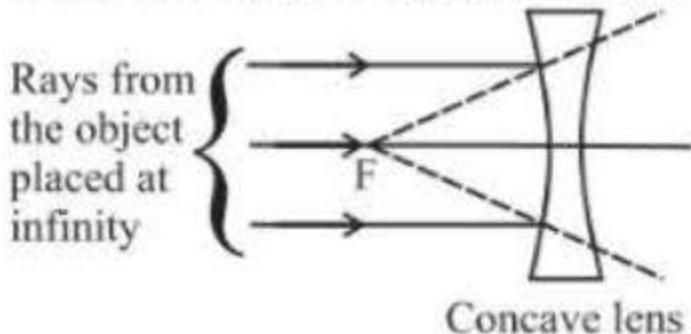
$$x = 340 \times 0.3 = 102 \text{ metre}$$
 (This is the total distance)

$$\therefore \text{The distance of wall is } \frac{102}{2} = 51 \text{ metre.}$$
251. (d) X-rays are electro magnetic radiations. It has penetrating ability, so it is used in radiography, airport railway security and CT scanning. It is not affected by electric and magnetic fields.
252. (d) In convex mirrors, the image is smaller than the object. This mirror provides a wider scope of view so it becomes easy for vehicles use.
253. (d) Total internal reflection is responsible for mirage formation in deserts.
254. (a) Curvature of the earth does not allow the television signals to be received beyond a particular distance.
255. (b) X-rays cannot be deflected by magnetic field as they consists of no charge.
256. (c) X-rays and UV rays are electromagnetic wave, so they move with same velocity in vacuum i.e. 3×10^8 m/s.
257. (a) The appearance of blue colour of sky is due to scattering of light which is not possible in absence of atmosphere.
258. (c) The tanning and sun burning of human skin is due to the harmful ultraviolet radiation from the sun.
259. (a) As, scattering $\propto \frac{1}{\lambda^4}$
- Since, wavelength of blue colour is least among three primary colours red, green and blue. The scattered light in the sky contains blue colour in plenty and therefore sky appears blue.
260. (b) Blackboard absorbs all the colours of light falling on it and does not reflect any colour due to which it appears black.
261. (d) Different colours in increasing order of their wavelength: violet, indigo, blue, green, yellow, orange and red.
262. (a) The light wave with shortest wavelength i.e. violet refracts the most.
263. (b) When an object reflects all the colours of a white light, then it would appear white. White light is the combination of all seven colours (VIBGYOR) of light.

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264. (a) Image formed by a plane and a convex mirror is always erect. Concave mirror forms image both erect and inverted depends on the position of the object from the mirror.

265. (a) From the ray diagram, it is very clear that the image of the object placed at infinity from a concave lens is virtual diminished and at the focus of the lens.



266. (a) The upper and lower portions in common type of bifocal lenses are concave and convex respectively.

267. (b)

268. (a) γ -rays are the most penetrating rays
 β -particles are moderately penetrating and
 α -particles are least penetrating.

269. (c) Contact lenses are made from lucite. It is a polymer of methyl methacrylate. The other names of lucite are plexiglass, acrylite and perspex.

270. (b) Green plants absorb red and blue colour maximally.

271. (a) All the three statements are not correct. Myopia refers long-sightedness, hypermetropia to short-sightedness and presbyopia is a disorder in which the eye shows a progressively diminished ability to focus on near object with the passage of age.

272. (a) The contraction of eyeball brings about in a long-sighted eye. To see the nearby objects, a convex lens is used.

273. (c) As the light enters from rarer medium to the denser medium the speed of light decreases but the frequency remains the same.

274. (d) Long sightedness or hypermetropia is eye related problem in which image is formed behind the retina. This may be due to short eye or cornea or crystalline lens does not refract the light enough.

275. (c) 276. (d)

277. (b) If the doors of a refrigerator are left open for a few hours, the room temperature will increase as heat is merely recycled from the room into the refrigerator and then back into the room. Thus, a net room temperature would increase from the heat of the motor that would be constantly running to move energy around in a circle.

278. (c) Thermostat is a device which automatically regulates the temperature of a system. As the word suggests. Thermostat = Thermo + stat i.e., keeping temperature (Thermo) Constant (static)

279. (a) Desert coolers are based on the simple principle of hot air replacement where unsaturated air comes in contact with water leading to evaporation of water. In the process, the moisture content of air increases, while its temperature decreases. The resulting cold

but moist air is used for providing cooling.

280. (b) When water is heated from 0°C to 4°C , its volume decreases. Density = $\frac{\text{Mass}}{\text{Volume}}$

Density of water is maximum at 4°C .

281. (d) Heat detectors in human skin are sensitive to wavelengths $< 400\text{ nm}$.

282. (a) The pressure cooker works on the principle of Gay-Lussac's Law which states that at constant volume, pressure is directly proportional to temperature. So when we heat the cooker, the inside temperature increases, thereby increasing the pressure and thus, cooking the food faster.

283. (a) A metal sheet with a circular hole when heated results in expansion of the hole. Assuming that the sheet is uniform and isotropic, the hole will expand in the same ratio as the metal according to thermal expansion equation.

$$dL = L \propto dT$$

This applies to all lengths associated with the metal including the circumference of the hole since the edge of the hole is made of metal. Thus, if the circumference of the hole expands, so does the diameter.

284. (d) When water is heated from 0°C to 10°C then the volume of water first decreases and then increases. This is because water contracts on heating from 0°C to 4°C while expands from 4°C onwards.

285. (c) Radiation is the heat transfer by electromagnetic waves or photons. It does not need a propagating medium. The heat radiated by the sun can be exchanged between the solar surface and the Earth's surface without heating the transitional space.

While, convection happens when a substance that can flow, like water or air is heated in the presence of gravity.

On the other hand, conduction is the flow of heat through solids and liquids by vibration and collision of molecules and free electrons.

286. (b) There are several zones within a non-luminous flame with each zone having a different temperature. The outer most zone of the flame is blue in colour and it is hottest part. This is due to complete combustion. The middle zone is moderately hot and yellow in colour as partial combustion occurs in this zone while the innermost zone is the least hot and black in colour due to presence of unburned wax vapours.

287. (d) In evening, the radiations from the sun travel larger distance through atmosphere that's why evening sun is not as hot as the mid day sun.

288. (d) A fan produces a feeling of comfort during hot weather because our perspiration evaporates rapidly.

289. (c) We know that reflected amount of radiation in light object is more than that of dark object. Therefore, this helps in keeping dark object warmer as compared to cold object.

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290. (b)
291. (b) When a body is heated, the distance between any two points on it increases. The increase is in the same ratio for any set of two points.
292. (b) It is due to the additional heat equal to latent heat possessed by steam.
293. (c) Pendulum clocks become slow in summer because the length of the pendulum increases.
Increase in length $\Delta l = l_0 \alpha \Delta T$
where l_0 = original length, α = coefficient of linear expansion and ΔT = change in temperature.
294. (a) Latent heat is the thermal energy released as released by a body or a thermodynamic system during a constant temperature process. A piece of ice added to the drink cool it because ice takes latent heat from the drink for melting resulting in the cooling of the drink.
295. (a) If ice collects on the freezer, the cooling in the refrigerator is affected adversely because ice is a poor conductor of heat.
296. (d) After the melting of ice, the level of water remains the same because the total volume of the melted ice is equal to the volume of floating ice.
297. (b) Because thermal conductivity of copper is greater than glass.
Copper has higher thermal conductivity as compared to glass.
298. (a) Heat is a form of energy flowing from one body of matter to another spontaneously due to their temperature difference.
Infrared rays are a form of heat that can be reflected by a mirror e.g. dielectric mirrors can be designed to reflect infrared. Light but transmit visible light.
Thermal (heat) radiation entails the emission of a spectrum of electromagnetic radiation due to an object's temperature.
No medium is required to travel for heat radiation.
299. (d) The function of moderator (Graphite, heavy water D_2O) is to slow down neutrons (or slow down the nuclear reaction).
300. (a) Because of the entire chamber of the refrigerator is cooled quickly due to convection.
301. (a) As temperature rises, the density decreases, height increases. In A, the top cross-section is smaller. Therefore $h_A > h_B$.
302. (c) 303. (a) 304. (c)
305. (c) A rheostat is a device with variable resistor used to control current. It can vary the resistance in a circuit without interrupting the current.
306. (b) The maximum density of Water is $1g/cm^3$ at $4^\circ C$.
307. (c) The Third Law of Thermodynamics was formulated by Walther Nernst. The third law of thermodynamics states that "The entropy of a perfect crystal at absolute zero temperature is exactly equal to zero."
308. (c) Convection is heat transfer by mass motion of a fluid such as air or water when the heated fluid is caused to move away from the source of heat, carrying energy

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with it. Convection takes place through advection, diffusion or both,

309. (c) Radiative heat transfer is the heat transfer process in which heat is transferred from one place to another without requiring a medium.
310. (d) Resistance of a conductor is directly proportional to the length of the conductor and inversely proportional with the cross section area of that conductor. It is also dependent upon temperature of the conductor.
311. (c) $q = m \Delta H_f$
Where, m = mass, q = heat energy
 ΔH_f = heat of fusion
 $q = (100g) \times 333.6 \text{ J/g} = 33360 \text{ J}$
312. (d) Bakelite was invented by Leo Baekeland in New York in 1907. It is the first man made plastic.
313. (c) Two systems are said to be in thermal equilibrium if there is no heat transfer takes place as both the systems have same temperature.
314. (c) Steam burns are more serious than burns from boiling water even though both are at $100^\circ C$ because when steam condenses it gives up very high heat energy i.e. additional 22.6×10^5 joule of heat (latent heat of vapourisation) compared to boiling water.
315. (c) A perfect black body emits and absorbs all colours of light. A good absorber is a good emitter.
316. (c) By the relation in different temperature scales

$$\frac{C - 0}{5} = \frac{F - 32}{9} = \frac{K - 273}{5} = \frac{R - 0}{4}$$
We can calculate that temperature which differ by 10° on the celsius scale must differ by 18° on the fahrenheit scale.
317. (a) Most solids expand when heated and contract when cooled. Water/ice is anomalous in that it expands when cooled, at least near its freezing point.
318. (d) The temperature at which a solid changes into a liquid is called the melting point.
319. (b) Among the three, aluminium, copper and stainless steel, copper is the best conductor of heat. Thermal conductivity (in W/m K) for copper, aluminium and stainless steel is 385, 205 and 50.2 respectively.
320. (c) Specific heat is the amount of heat needed to raise the temperature of a certain mass 1 degree Celsius.
321. (b) An adiabatic process is one that occurs without transfer of heat or matter between a system and its surroundings.
322. (a) Relation between Fahrenheit and Celsius scale is

$$C - 0^\circ = \frac{F - 32}{5} = \frac{9}{5}$$
Given that numerical value of a temperature recorded in both the scales are same.

$$\Rightarrow {}^\circ C = F = x$$

$$\Rightarrow \frac{x}{5} = \frac{x - 32}{9}$$

$$\Rightarrow 9x = 5x - 32 \times 5$$

$$\Rightarrow 4x = -32 \times 5$$

- $x = -\frac{32 \times 5}{4}$
 $x = -40^\circ$
323. (c) A microwave oven is based on maser.' Maser' is a device that produces coherent electromagnetic waves through amplification by stimulated emission.
324. (c) The magnetic needle always points North-South direction. Where magnetic north points towards geographic south and magnetic south towards geographic north pole.
325. (a) Most artificial satellites have solar cell to generate electricity. Batteries store some of this energy for times when the satellite is in the shadow of the earth.
326. (b) The weight of any body is maximum at poles.
Weight = mass \times acceleration due to gravity(g)
gmaximum at poles and
gminimum at equator hence weight is maximum at poles and minimum at equator.
327. (d) A transformer is an electrical device that transfers energy from one circuit to another by magnetic coupling with no moving parts. It comprises of two or more coupled windings, or a single topped winding, and a magnetic core to concentrate magnetic flux. These are used to convert between high and low voltages, to change impedance, and to provide electrical isolation between circuits.
328. (b) When a body is taken from the earth to the moon its weight decreases as the value of gravity on the surface of the moon is 1/6th as that of the earth's surface.
329. (d) An iron ball weighing 10 kg on the earth will weigh in space zero in space body experiences weightlessness as g = 0.
330. (c) Silver is the best conductor of electricity as compared to aluminium, copper and gold.
331. (a) Astronauts in space can't stand at one place because there is no gravity in space. The farther one gets from Earth, the less the gravitational force is which implies that gravity is absent in space as astronauts are very far from Earth.
332. (d) A fuse is a safety device consisting of a strip of wire that melts and breaks an electric circuit if the current exceeds the safe value. Characteristics of a fuse wire are that it should have low melting point, high specific resistance, low ohmic losses, should be economical and free from detraction.
333. (a) The working of heating elements is based on heating effect of electric current. When a current is passed through a resistance, it produces heat. The required properties in material used for heating elements is high melting point, high specific resistance, high tensile strength, low temperature coefficient of resistance, high ductility. Mostly nichrome wire is used as a heating element because it is very stable even at high temperatures.
334. (b) The bulbs will appear brighter only if the available current is not limited. Thus, the brighter bulb would be having less resistance or high voltage while the dim bulb would be having high resistance or less voltage.
335. (a) The magnetic field of a bar magnet is strongest at either pole of the magnet. It is equally strong at the north pole compared with the south pole. The force is weaker in the middle of the magnet and halfway between the pole and the center.
336. (c) According to Newton third Law of Motion, if the gravitational pull of the earth on the book is the force of action, then the force of reaction is exerted by the table on the book.
337. (c)
338. (b) Light emitting diode < CFL tube < fluorescent tube < incandescent bulb.
339. (d)
340. (b) In India the frequency of A.C. current is 50 Hz.
341. (b)
342. (c)
343. (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.
At magnetic equator, R = H; V = 0.
344. (a)
345. (b) In a parallel circuit, the voltage across each of the components is the same, and the total current is the sum of the currents through each component. The wiring for most homes is parallel .In parallel circuit each branch receives equal current. If one branch in the circuit is broken, electric current will still flow in other branches.
346. (d) The dimmer bulb has larger resistance than the brighter one. we know that $P = \frac{V^2}{R}$
i.e. Power of the bulb $\propto \frac{1}{\text{Resistance}}$
Resistance is the obstruction offer to the flow of current.
347. (d) The centre of gravity of an object is the point at which there is an even disperse of weight, and all the sides are equally balanced. In case of the leaning tower of pisa. The vertical line drawn from the centre of gravity passes through its base till today, and that is the reason that tower does not fall.
348. (a) The conduction of electric current through a metal wire involves moving electrons. These electrons collide into the atoms comprising the metal wire, and thus some account of energy is transferred from the moving electrons to the electrons of the wire which are at rest. Thus, these electrons heat up.
349. (d) In our houses, the frequency of alternating voltage supplied is 50 Hz, i.e. 50 times per second.
In America, frequency of A.C. line is 60 Hz.

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350. (a) A man inside an artificial satellite feels weightlessness because the force of attraction due to earth i.e. g (= acceleration due to gravity) is zero. i.e. $F = W = 0$
351. (b) For a given point on the surface of earth, g decreases as w increases. Hence, body weighs less at the equator than at the poles also equatorial diameter is greater than polar diameter, so according to $g = \frac{GM}{R^2}$, value of g decreases.
352. (d) The Earth's North Magnetic Pole is actually a magnetic south pole and the Earth's South magnetic pole is a magnetic north pole. No, an iron bar does' not get attracted at all points because in the middle of magnet magnetic field is zero.
353. (d) Heat produced in a current carrying conductor is given by $H = I^2Rt$ i.e. heat generated is directly proportional to the resistance of wire, current flowing in wire and time Heat produced in current carrying conductor is independent of thermal conductivity (k) and specific resistance.
354. (a) Properties of different types of magnets are; Artificial magnet- short lived, permanent magnet- long lived, Temporary magnet- induced magnet, earth as a magnet- last for infinitely long period.
355. (c) Broken pieces of magnet never lose their magnetic properties. Yes, magnetic properties of a substance lie in the atomic level It has to do with the way electrons fill in the valence shell of an atom. If all the electrons in the valence shell are paired up then the atom will not be magnetic, if these are not paired then it will be magnetic. The more unpaired electrons, the stronger magnet it is.
356. (a) The gravitational force F between two bodies is directly proportional to the product of masses of those bodies. Here, since the product m_1m_2 is greater for the sun and the moon than that of the earth and the moon (because mass of the sun is greater than that of earth), therefore F exerted by the sun on the moon is greater than the F exerted by the earth on the moon. In vacuum acceleration is which does not depend on mass of the falling body.
357. (d)
 - Due to the heating effect of current, the filament of the bulb gets heated to a high temp and it starts glowing.
 - Tin being less reactive than iron is used for Storage of food items.
 - When cells are connected in series, the resultant voltage is the sum of the individual voltage of the cells.
358. (b) There is difference in acceleration due to gravity at equator and poles. The gravity is more on the poles due 2 factors:-
(1) the effect due to the angular rotation of earth is minimum or zero at poles.
(2) the earth is flatish towards the poles so g is more at poles.

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359. (c)
360. (d) Gravitational forces (GF) between two electrons is represented by Gm_1m_2/r^2
Electrostatic force (EF) between two electrons is given by formula kq_1q_2/r^2 ,
Where m = the mass of an electron = 9.1×10^{-31} kg
 q = the electric charge on an electron = 1.6×10^{-19} C
 r = the distance between the two electrons
 G = Universal Gravitation Constant = 6.67×10^{-11} N m²/kg²
 $k = 8.9 \times 10^9$ N m²/C²
Now, the ratio of GF/EF = $6.67 \times 10^{-11} \times 9.1 \times 10^{-31}$ kg $\times 9.1 \times 10^{-31}$ kg / $8.9 \times 10^9 \times 1.6 \times 10^{-19}$ C $\times 1.6 \times 10^{-19}$ C = 10^{-43}
361. (b) The electron and proton carry opposite charges but equal in magnitude hence the forces acting on these particles in uniform electric field will be equal in magnitude but in opposite direction. Electron and proton differ in mass hence the acceleration will be different in these two particles.
362. (b) Since dipole is placed in uniform electric field the net force will be zero but the torque will produce since the dipole axis will form an angle with the electric field and will be given by product of force and distance between forces.
363. (d) The net flux will be zero as the electric field lines entering the negative end of the dipole will be exactly cancelled by the electric field lines leaving the positive end of the dipole.
364. (b) Induced charge does not depend upon time of change of magnetic flux, as Induced charge $Q = n\Delta\Phi/R$
365. (c) Lenz's law deduced by German physicist Heinrich Friedrich Lenz which gives the polarity of the induced EMF in a clear and concise fashion. The law is a consequence of law of conservation of energy.
366. (c) Magnetic field is produced both by a moving charge and change in electric field
367. (d) Ohm is the SI unit of electrical resistance. 1 ohm is define as the resistance of a conductor when a potential difference of 1 volt is applied to its ends when a current of 1 ampere flows through it
368. (b) Unit of electric energy is kilowatt hour (kW h), hence the unit consumed during usage of electric bulb will be $60W \times 5 \text{ hour} \times 30 \text{ days} = 9000 \text{ Wh} = 9 \text{ kWh} = 9 \text{ unit}$
369. (c) In case of semiconductors two kinds of electrical charge carriers are present. These charge carriers are electrons and holes.
370. (a) The magnetic field inside a long straight solenoid carrying current is uniform at all points.
371. (c) If any magnet is divided into two parts, every part will be a new magnet.
372. (d) Mechanical energy is the ability of an object to do work. This energy is equal to the sum of kinetic and potential energy, it is always constant.

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373. (b) Transformer is based on the principle of mutual induction.
374. (b) Pressure is normal force per unit area, therefore, for lesser value of area pressure is greatest.
375. (d) Mass of an object does not change when an objects location changes. It is the weight of the body ($w = mg$) which changes with value of 'g' at that place.
376. (a) As the plug is pulled out, the value of resistance in the circuit decreases and hence more current tries to flow through the circuit. Pulling out the plug breaks the circuit and to complete the circuit for the flow of electricity a spark is observed.
377. (a) In step-down transformer $N_p > N_s$, $E_p > E_s$, $I_p < I_s$
Here N, E and I used for no. of turns, emf and current respectively.
378. (a) A rectifier is used to convert AC voltage into DC voltage and inverter converts DC voltage into AC voltage.
379. (a) All of these forces doesn't need any physical contact to exist hence, non-contact forces.
380. (a) The coil in a heater is made up of nichrome because its melting point and resistivity are high.
381. (a) Electricity is produced through dry cell from chemical energy. The cells from which electric energy is derived by irreversible chemical action are called primary cells. The primary cell is capable of providing an EMF when its constituent's two electrodes and a suitable electrolyte are assembled together. The three main primary cells are the Daniel cell, the Leclanche cell, and the dry cell. None of these cells can be recharged electrically.
382. (d) Electric fuse in electric circuit is a device which is used to interrupt any type of accidental fire due to short circuit.
383. (c) 484. (c)
385. (c) According to the universal law of gravitation, everybody in the universe attract other body with a force which is directly proportional to the product of their masses and inversely proportional to the square of the distance between them. Therefore mass is doubled then the force acting between them F, will become $4F$.
386. (a) $i = V/R = 12/24 = 0.5A$
387. (a) $1/R = 1/R_1 + 1/R_2 + 1/R_3$
 $= 1/2 + 1/4 + 1/8$
 $= 7/8$
 $R = 8/7$, It is more than one and less than 2.
388. (c) $1/R = 1/R_1 + 1/R_2 + 1/R_3$
 $= 1/2 + 1/4 + 1/6$
 $= 11/12$
 $R = 12/11$
 $\text{Total resistance} = 12/11 + 8 = 9 \text{ } 1/11 \text{ ohm.}$
389. (d) If the cable of the lift breaks suddenly the weight of the man would become zero because the system would all begin to accelerate downward due to the force of gravity. All objects in the freefall accelerate downward with the same magnitude.
390. (c) Heat produced by the wire, $W = I^2R$
 $W_1/W_2 = (I_1)^2/(I_2)^2$
 $2000/W_2 = (1)^2/(2)^2$
 $W_2 = 2000 \times 4/1$
 $W_2 = 8000J$
391. (a) When wire carrying d.c. current in the same direction are placed close to each other, the wire will attract each other.
392. (a) Three equal resistance in series are 90 ohm. therefore resistance is 30 ohm.
Three resistance each with 30 ohm in parallel gives 10 ohm.
393. (c) Resistance is directly proportional to length(l)
 $r \propto l$, $r \propto 1/a$
wire is stretched to double its length the resistance will become
 $r \propto l$, $r \propto 1/a/2$ Combining these two $r \propto 4l/a$
 $g = GM/R^2$
394. (b)
395. (a) An electric motor is an electrical device that converts electrical energy into mechanical energy. Electric motors operating at low voltages tend to draw out more current; which is inversely proportional to the voltage. thus, more that $H = H = I^2Rt$, is generated as a result. Eventually this heat wears out the motors.
396. (b) The "God particle" is the name given to subatomic particle called the Higgs Boson. Different subatomic particles are responsible for giving matter different properties. Particles, like protons and neutrons, have mass. The Higgs Boson is believed to be the particle which gives mass to matter. It is named after scientists Peter Higgs and Satyendra Nath Bose.
- F7. Discovery/Inventions & Scientific Instruments
397. (b) eLISA aims to measure gravitational waves in the frequency range from 0.1 mHz to about 100 mHz.
398. (a) Nature is governed by four fundamental forces - electromagnetic, strong, weak and gravitational. Standard Model explains the first three forces. (TheHindu, 2017, April)
 - Event horizon is the imaginary boundary surrounding the black hole from beyond which light cannot escape and The singularity constitutes the centre of a black hole and is hidden by the object's "surface".
 - All these point to answer "A".
399. (a) Radar was invented by Robert Watson. It is an acronym derived from "Radio Detection and Ranging". It involves the technique of using radio waves to detect the presence of objects in the atmosphere.
400. (c) Sphygmomanometer is used for measuring blood pressure. It was invented by Basch and consists of a rubber bulb that was filled with water to restrict blood flow in the artery. The bulb is connected to a mercury column for measuring pressure required to completely stop blood movement in the pulse.
401. (b) Refrigeration is the process of removing heat from an enclosed space or from any substance for the

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- purpose of lowering the temperature. Refrigeration slows down bacterial action on food so that the food takes a longer time to get spoiled. While, freezing completely stops bacterial action as frozen bacteria are inactive.
402. (b) Willian Roentgen invented x-ray machine which is used to investigate the internal structures of living organisms.
While, radio was invented by Guglielmo Marconi. Whereas, electric bulb was invented by Edison. On the other hand, electric motor was invented by Willian Strugeon.
403. (a) The purpose of refrigerator is to slow down the growth of bacteria while the purpose of freezer is to stop bacteria completely. However, some foods change dramatically on being frozen. Thus, the preferred temperature in refrigerator to keep food fresh is between 3-4°C.
404. (d) An automatic wrist watch is a watch that continues to operate due to the regular motion of the wearer's wrist. These watches do not need winding if worn daily. The energy is stored by using a half-disc metal weight called a motor, which spins when the arm is moved. This energy is used to power the watch and keep the watch going at night or while the watch isn't being worn. Stored energy in an automatic wrist watch can keep an unworn watch running for 24 to 48 hours.
405. (d) Dynamo is a rotary electrical machine used for conversion of mechanical energy from the motor to electric energy in the form of direct electric current. It is a DC electric generator working on the principle of electromagnetic induction.
406. (c) A dynamo which is said to generate electricity actually acts as a converter of energy. It converts mechanical energy into electrical energy.
407. (b) The photoelectric effect is the emission of electrons or other free carriers when photon hits onto a metal surface. It was discovered by Einstein. While, hertz discovered radio waves. On the other hand, Max Planck discovered the energy quanta. Whereas, Bohr discovered the atomic model.
408. (c) Pyrometer is a device used for measuring high temperature such as those encountered in furnaces. Most pyrometers work by measuring radiation from the body whose temperature is to be measured.
409. (c) The apparatus used to measure the intensity of light is known as Lux meter.
410. (a) When light shines on a metal electrons can be ejected from the surface of the metal in the phenomenon known as photoelectric effect. Einstein received noble prize for discovery of the same.
While, compton effect, discovered by Arthur Holly Compton, is the inelastic scattering of a photon by a charged particle, usually an electron. It results in a decrease in energy of the photon called the Compton effect.

GENERAL SCIENCE

- Theory of relativity determined that the laws of physics are the same for all non-accelerating observers.
411. (c) Thermopile is a combination of thermocouple which generates electrical energy when one end is kept at higher temperature with respect to the other end. It is helpful in measuring the temperature of a hot and radiating body.
412. (d) Revolver was discovered by Colt. Dynamite was discovered by Alfred Nobel. Law of cooling was discovered by Newton and law of pressure by Pascal.
413. (c) An endoscopic process is based on the principle of total internal reflection of light. The phenomenon of total internal reflection occurs when a propagating wave strikes a medium boundary, at end the wave cannot pass through and is reflected entirely because the refractive index is lower on the other side of the boundary and the incident angle is greater than the critical angle (the angle of incidence for which angle of refraction is 90°).
414. (d) Galvanometers are electrical devices used for the detection or measurement of the electric currents.
415. (a) A steam engine converts the heat energy produced by coal into kinetic energy and this produces electricity which further lights the lamp and converts electricity into heat and light.
416. (b) In laser printers, a semiconductor laser beam (an aluminium gallium arsenide-AlGaAs) is used to project an image of the page to be printed to a paper by direct contact. Then the paper is passed onto a finisher, which uses intense heat to instantly fuse toner/image onto the paper.
417. (d) G.M. counter or Geiger-Muller counter is used for the detection and measurement of all types of radiation-alpha, beta and gamma radiation. It consists of a pair of electrodes surrounded by gas. High voltage is applied across the electrodes.
Mass spectrometer: Mass and relative concentrations of atoms and molecules
Cyclotron : Particle accelerator
Nuclear reactor: Used at nuclear power plants to produce electricity and in propulsion of ships.
418. (c) The device which is used to measure transpiration in plants is known as Potometer also known as transpirometer. Hygrometer is an instrument used for measuring the moisture content in the atmosphere, Cresco meter or Cresco graph is used to measure the growth in plants, Clinometer is a device which is used to measure the height of tall things that one can't possibly reach.
419. (c) Auxanometer is the instrumental apparatus to measure the rate of growth of plants.
420. (c) 'RADAR' is the short form of 'Radio' detection and ranging which means Radio communication and supervision. It is based on 'Echo' Principle. It produces radio magnetic waves which go to the sky

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- and by knocking the object they come back and thus the position of the object e.g. aeroplane etc is known.
421. (c) The total radiation pyrometer is used to measure very high temperature. It is based on the Stiphen's rule. But the temperature below 800°C are not measured by it because No radian take place below this temperature.
422. (c) The High Frequency waves are reflected by the ionosphere, which is a layer in which the atmosphere is partially ionized by ultraviolet light from the Sun, giving rise to enough electrons and ions to reflect high frequency waves.
423. (b) Transistors are semiconductor devices used for amplify or switch electronic signals and electrical power. It is mainly made up of semiconductors like Germanium, Silicon, and Gallium arsenide.
424. (a) Generator or electric generator is the device that converts mechanical energy into electrical energy. Sources of mechanical energy may be in the form of steam turbines, gas turbines, water turbines, internal combustion engines
425. (b) Transistors are semiconductor devices used to amplify or switch electronic signals and electrical power. It is mainly made up of semiconductors like Germanium, Silicon, and Gallium arsenide.
426. (c)
427. (b) A laser is a device that emits coherent light through a process called stimulated emission.
428. (d) Copper is a good conductor of both heat and electricity due to this it is used in all such appliance where quick heat transfer is required.
429. (c) Transformer is an appliance that can increase or decrease voltage.
430. (a) Sonar (sound navigation and ranging) is a technique that uses sound propagation to navigate (usually under water, as in submarine navigation), communicate with or detect objects on or under the surface of the water, such as the vessels as ultrasonic waves which is used having very high frequency $> 20,000\text{ Hz}$.
431. (c) Capacitor (condenser) is used to store energy in an electric field. Capacitance of a capacitor C , defined as the ratio of charge $\pm Q$ on each conductor to the voltage V between them.
- $$C = \frac{Q}{V}$$
432. (d) In a refrigerator gas is allowed to expand suddenly (adiabatically) from high to low pressure. This cools it.
433. (b) Light Emitting Diode (LED) is semiconductor device – a forward bias p-n junction diode which converts electrical energy into light energy.
434. (b) Dual Energy X-ray Absorptiometry (DEXA) is used to measure the density or strength of bones.
435. (c) Oscilloscope is an instrument which allows us to see waves produced by sound. The microphone can then pick up the sound and convert it to an electrical signal which can be displayed on the oscilloscope.
436. (a) Marie Curie won her two different Nobel prizes in two different categories i.e., Physics and Chemistry.
437. (d) Fluorescent coating on the glass is the secondary source of light in a fluorescent lamp.
438. (a) Automobile batteries are usually lead-acid type, and are made of six galvanic cells in series to provide a 12-volt system. Each cell provides 2.1 volts for a total of 12.6 volts at full charge.
Lead-acid batteries are made up of plates of lead and separate plates of lead dioxide, which are submerged into an electrolyte solution of about 38% sulfuric acid and 62% water. This causes a chemical reaction that releases electrons, allowing them to flow through conductors to produce electricity. As the battery discharges, the acid of the electrolyte reacts with the materials of the plates, changing their surface to lead sulfate. When the battery is recharged, the chemical reaction is reversed: the lead sulfate reforms into lead dioxide and lead. With the plates restored to their original condition, the process may now be repeated.
439. (a) Sphygmomanometer is an instrument to measure the blood pressure. It is made up of an inflatable cuff to restrict the blood flow and a mercury or manometer to measure pressure.
440. (a) A power loom is a mechanised loom powered by a line shaft, and was one of the key developments in the Industrial Revolution. Edmund Cartwright invented the power loom which revolutionised the textile industry.

2

Chapter

Chemistry

Nature/ State of Matter: Solid, Liquid & Gas/Pure, Mixture & Compound

1. Solder is an alloy of
 - (a) tin and lead
 - (b) tin and copper
 - (c) tin, copper and zinc
 - (d) tin, lead and zinc
2. Indane gas is a mixture of
 - (a) butane and hydrogen
 - (b) butane and oxygen
 - (c) butane and propane
 - (d) methane and oxygen
3. The gas which emits from rice field is
 - (a) ethane
 - (b) methane
 - (c) nitrogen
 - (d) All of the above
4. Minerals are
 - (a) liquids
 - (b) inorganic solid
 - (c) gases
 - (d) all of the above
5. Milk is a
 - (a) mixture
 - (b) element
 - (c) metal
 - (d) None of these
6. A detergent is a
 - (a) cleansing agent
 - (b) drug
 - (c) catalyst
 - (d) soap
7. An ideal gas is one which obeys
 - (a) Gas laws
 - (b) Boyle's laws
 - (c) Charle's law
 - (d) Avogadro's law
8. Scattering of light takes place in
 - (a) electroplating
 - (b) electrolysis
 - (c) solution of electrolyte
 - (d) colloidal solution
9. The gas is commonly used in anaesthesia
 - (a) methane
 - (b) nitrous oxide
 - (c) nitrogen
 - (d) hydrogen peroxide
10. The inert gas abundantly found in atmosphere is
 - (a) Xe
 - (b) Kr
 - (c) He
 - (d) Ar
11. Which gas is used in filling electric bulbs?
 - (a) Neon
 - (b) Argon
 - (c) Radon
 - (d) Krypton
12. Kerosene is a mixture of
 - (a) aromatic hydrocarbons
 - (b) aliphatic hydrocarbons
 - (c) saturated hydrocarbons
 - (d) alicyclic hydrocarbons
13. Candles contains a mixture of
 - (a) Bees wax and paraffin wax
 - (b) Bees wax and stearic acid
 - (c) Paraffin wax and stearic acid
 - (d) Higher fatty acid

14. Which one of the following noble gases is not found in the atmosphere?
 - (a) Argon
 - (b) Krypton
 - (c) Radon
 - (d) Xenon
15. Which gas is responsible for the swelling of bread?
 - (a) Oxygen
 - (b) Carbon monoxide
 - (c) Carbon dioxide
 - (d) Ammonia
16. Which one among the following is *not* a mixture?
 - (a) Graphite
 - (b) Glass
 - (c) Brass
 - (d) Steel
17. Which one among the following is used as a moderator in nuclear reactors?
 - (a) Ozone
 - (b) Heavy hydrogen
 - (c) Heavy water
 - (d) Hydrogen peroxide
18. Which of the following is used as a preservative to protect processed food?
 - (a) Sodium sulphate
 - (b) Saccharin
 - (c) BHT
 - (d) Sodium metabisulphite
19. Which one is a sublime substance?
 - (a) Table salt
 - (b) Sugar
 - (c) Iodine
 - (d) Potassium Iodide
20. Carborundum is a compound of
 - (a) Ca
 - (b) Ge
 - (c) Si
 - (d) S
21. LPG is a mixture of
 - (a) $C_6H_{12} + C_6H_6$
 - (b) $C_4H_{10} + C_3H_8$
 - (c) $C_2H_2 + C_2H_4$
 - (d) $CH_4 + C_2H_4$
22. Which of the following could act as a propellant for rockets ?
 - (a) Liquid oxygen + Liquid argon
 - (b) Liquid hydrogen + Liquid oxygen
 - (c) Liquid nitrogen + Liquid oxygen
 - (d) Liquid hydrogen + Liquid nitrogen
23. Calcium carbonate is naturally available as limestone and can also be synthesized from quick lime. It is seen that the compositions of the elements in both the natural and synthetic calcium carbonate are same. The validity of which one among the following laws is confirmed by this observation?
 - (a) Law of conservation of mass
 - (b) Law of definite proportion
 - (c) Law of multiple proportion
 - (d) Avogadro's law

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24. Which one of the following mixtures is homogeneous?

 - (a) Starch and sugar
 - (b) Methanol and water
 - (c) Graphite and charcoal
 - (d) Calcium carbonate and calcium bicarbonate

25. H_2O is liquid and H_2S is a gas because

 - (a) oxygen forms stronger hydrogen level than sulphur.
 - (b) oxygen is less electronegative than sulphur.
 - (c) atomic radius of oxygen is less than that of sulphur.
 - (d) atomic radius of oxygen is greater than that of sulphur.

26. Helium is preferred to hydrogen in air balloons because it

 - (a) is cheaper
 - (b) is less dense
 - (c) has greater lifting power
 - (d) does not form an explosive mixture with air

27. Match List-I with List-II and select the correct answer from the codes given below:

List-I	List-II
A. Silicon carbide	1. Photosynthesis
B. Carbon fibre	2. Refrigerant
C. Carbon dioxide	3. Artificial diamond
D. Dichloro-difluoromethane	4. Aircraft

Codes:

	A	B	C	D
(a)	4	3	1	2
(b)	3	4	1	2
(c)	2	3	1	4
(d)	3	2	1	4

28. Match List-I with List-II and select the correct answer from the codes given below:

List-I	List-II
A. Bleaching powder	1. Calcium oxychloride
B. Gypsum	2. Calcium sulphate
C. Marble	3. Calcium carbonate

Codes:

	A	B	C
(a)	1	2	3
(b)	2	3	1
(c)	1	3	2
(d)	2	1	3

29. Match List-I with List-II and select the correct answer from the codes given below:

List-I	List-II
A. Limestone	1. Cement
B. Copper	2. Electrical goods
C. Bauxite	3. Manufacture of aeroplanes
D. Manganese	4. Steel

Codes:

	A	B	C	D
(a)	1	2	3	4
(b)	2	3	1	4
(c)	4	3	2	1
(d)	3	4	1	2

30. Which one of the following pairs is not correctly matched?

- (a) Dry ice : Solid carbon dioxide
- (b) Mustard gas : Poisonous liquid used in chemical warfare

- (c) Teflon : Polymer containing fluorine
 (d) Fullerene : Organic compounds containing fluorine

31. Match List-I with List-II and select the correct answer from the codes given below:

List-I	List-II
A. Diamond	1. Calcium
B. Marble	2. Silicon
C. Sand	3. Aluminium
D. Ruby	4. Carbon

Codes:

	A	B	C	D
(a)	1	2	3	4
(b)	4	1	2	3
(c)	3	1	2	4
(d)	4	2	1	3

32. Which one among the following statements regarding the properties of mixtures and compounds is not correct?

 - (a) A mixture shows the properties of its constituents but the properties of a compound are entirely different from its constituents
 - (b) A mixture may be homogeneous or heterogeneous but a compound is a homogeneous substance
 - (c) The constituents of a mixture can be separated by physical methods but those of a compound cannot be separated by physical methods
 - (d) Energy is either absorbed or evolved during the preparation of a mixture but not in the preparation of a compound

33. Following statements are made in connection with carbon dioxide (CO_2)

 1. CO_2 is a poisonous gas.
 2. CO_2 is an acidic oxide.
 3. CO_2 turns limewater milky.

Which of the statements given above is/are correct?

34. Which of the statements given above is/are correct?

(a) 1 and 2 (b) 2 and 3
 (c) 3 only (d) 1 and 3

34. Match List-I with List-II and select the correct answer using the codes given below:

List-I (Compound)	List-II (Use)
A. Cellulose nitrate	1. Soft soap
B. Potassium sulphate	2. Gun powder
C. Potassium salt of fatty acids	3. Fertilizer
D. Calcium oxide	4. Glass

Codes:

	A	B	C	D
(a)	2	3	1	4
(b)	3	2	1	4
(c)	4	1	2	3
(d)	3	1	2	4

36. Which of the following is/are not correctly matched?
 (I) Absolute alcohol – 100% ethanol
 (II) Power alcohol – 90–95% ethanol
 (III) Rectified spirit – 5% ethanol
 (a) I only (b) II only
 (c) III only (d) II and III
37. In a sample of ethyl ethanoate ($\text{CH}_3\text{COOC}_2\text{H}_5$) the two oxygen atoms have the same number of electrons but different number of neutrons. Which of the following is the correct reason for it?
 (a) One of the oxygen atoms has gained electrons
 (b) One of the oxygen atoms has gained two neutrons
 (c) The two oxygen atoms are isotopes
 (d) The two oxygen atoms are isobars.
38. Hydrogen gas can be conveniently used as a fuel for running vehicles if it is absorbed at very low temperature by a substance only to be released at the temperature generated by the exhaust. What is that substance found in India?
 [UP-PCS 2008]
 (a) Hydrites (b) Coals
 (c) Soap stone (d) Resins
39. Which one of the following forms an irreversible complex with haemoglobin of the blood?
 [UP-PCS 2008]
 (a) Carbon dioxide
 (b) Pure Nitrogen gas
 (c) Carbonmonoxide
 (d) a mixture of carbon dioxide and helium
40. The hypo solution used in photography is the aqueous solution of
 [UP-PCS 2010]
 (a) sodium thiosulphate (b) sodium tetrathionate
 (c) sodium sulphate (d) ammonium per sulphate
41. Which one of the following compounds is used as a sedative?
 [UP-PCS 2010]
 (a) Potassium bromide
 (b) Calcium chloride
 (c) Ethyl alcohol
 (d) Phosphorus trichloride
42. Indane gas is a mixture of
 [UP-PCS 2011]
 (a) butane and hydrogen
 (b) butane and oxygen
 (c) butane and propane
 (d) methane and oxygen
43. Which one of the following is not an explosive matter?
 [UP-PCS 2014]
 (a) Trinitro toluene
 (b) Dinitro glycerine
 (c) Cyclo Trimethylene trinitramine
 (d) Nitrochloroform
44. Which one of the following polymers is used for making bullet proof windows?
 [UP-PCS 2015]
 (a) Polycarbonates (b) Polyurethanes
 (c) Polystyrene (d) Polyamides
45. Which of the following statements is correct?
 (a) Most of food preparations are colloidal in nature
 (b) Most drugs, which are insoluble in water, are administered as colloidal dispersions
 (c) Latex is colloidal solution of negatively charged colloidal rubber particles
 (d) All of the above
46. Brass is an alloy of –
 (a) copper and iron
 (b) zinc and iron
 (c) copper and zinc
 (d) iron and nickel
47. Baking soda is –
 [Bihar J. Service 2016]
 (a) sodium carbohydrate (b) sodium bicarbonate
 (c) sodium sulphate (d) sodium hydroxide
48. Which of the following is not an property of crystalline solid?
 (a) The atoms and molecules are arranged in a definite order
 (b) It does not have a sharp melting point
 (c) Crystalline solids are bounded by flat surfaces
 (d) They posses uniform chemical composition
49. Teflon is a polymer of which of the following monomers?
 [BPSC 2017]
 (a) Tetrafluoroethylene
 (b) Vinyl chloride
 (c) Chloroprene
 (d) Acetylene dichloride
 (e) None of the above / More than one of the above
50. Match List – I with List – II and select and correct answer using the codes given below the lists –
 [BPSC 2017]
- | List – I
(Substances) | List – II
(Applications) |
|--------------------------|-----------------------------|
| (A) Aspartame | 1. Synthetic rubber |
| (B) Freon | 2. Anti – histamine |
| (C) Neoprene | 3. Artificial Sweetener |
| (D) Benadryl | 4. Refrigerant |
- Codes**
- | (A) | (B) | (C) | (D) |
|-------|-----|-----|-----|
| (a) 1 | 3 | 4 | 2 |
| (b) 2 | 4 | 1 | 3 |
| (c) 3 | 4 | 1 | 2 |
| (d) 3 | 1 | 2 | 4 |
- (e) None of the above / More than one of the above
51. The gas used in the manufacture of Vanaspati Ghee from Vanaspati Oil is –
 [BPSC 2017]
- | | |
|--------------|--------------------|
| (a) Hydrogen | (b) Oxygen |
| (c) Nitrogen | (D) Carbon dioxide |
- (e) None of the above / More than one of the above
52. LPG used as domestic fuel chiefly contains –
 [BPSC 2017]
- | | |
|--------------|-------------|
| (a) Methane | (b) Propane |
| (c) Ethylene | (d) Butane |
- (e) None of the above / More than one of the above
53. Avogadro's law states that equal volumes of all gases under similar conditions of temperature and pressure contain equal number of –
 (a) Molecules (b) Atoms
 (c) Valency (d) Isotopes
54. With the rise of temperature, the viscosity of liquid –
 [UK-PSC 2016]
- | |
|--|
| (a) Increases |
| (b) Decreases |
| (c) Remains unchanged |
| (d) May increase or decrease depending on nature of liquid |

CHEMISTRY**F-47**

55. Which pair of following is of Copper alloys?
[UK-PSC 2016]
 (a) Brass and invar (b) Bronze and Nichrome
 (c) Brass and Bronze (d) None of the above
56. Which is main component of natural gas?
[Chhatis-PSC 2016]
 (a) Methane (b) Ethane
 (c) Propane (d) Benzene
 (e) None of the above
57. Water gas is –
[Chhatis-PSC 2016]
 (a) $\text{CO} + \text{H}_2$ (b) $\text{CO} + \text{H}_2\text{O}$
 (c) $\text{CO}_2 + \text{H}_2$ (d) $\text{CO}_2 + \text{H}_2\text{O}$
 (e) None of the above
58. Baking Soda is –
[Chhatis-PSC 2016]
 (a) Sodium Hydrogen Carbonate
 (b) Sodium Dihydrogen Carbonate
 (c) Disodium Hydrogen Carbonate
 (d) Sodium Carbonate
 (e) None of the above
59. Methyl Isocyanate gas, which was involved in the disaster in Bhopal in December 1984, was used in the Union Carbide factory for production of :
[CDS 2016-II]
 (a) Dyes (b) Detergents
 (c) Explosives (d) Pesticides
60. Which one of the following statement is not correct?
[CDS 2015-II]
 (a) Water starts boiling when its vapour pressure becomes equal to atmospheric pressure.
 (b) Water is known as universal solvent.
 (c) Permanent hardness of water is due to presence of MgCl_2 , CaCl_2 , MgSO_4 and CaSO_4 .
 (d) Density of ice is greater than that of water.
61. The flavour of apple is mainly due to which one of the following?
[INDA/NA 2007-II]
 (a) Formalin (b) Benzene
 (c) Ethanol (d) Benzaldehyde
62. Nail varnish remover generally contains which one of the following?
[INDA/NA 2007 -II]
 (a) Vinegar (b) Benzene
 (c) Methyl alcohol (d) Acetone
63. 'Freon' used as refrigerants is chemically known as
[INDA/NA 2007 -II]
 (a) chlorinated hydrocarbon
 (b) fluorinated hydrocarbon
 (c) chlorofluoro hydrocarbon
 (d) fluorinated aromatic compound
64. German silver is an alloy of
[INDA/NA 2007 -II]
 (a) gold and silver (b) copper and silver
 (c) copper, zinc and silver (d) copper, zinc and nickel
65. What is the pH value of pure water? **[INDA/NA 2008 -I]**
 (a) 1 (b) 6
 (c) 7 (d) 10
66. Which one of the following is used as a mordant in dyeing and tanning industry?
[INDA/NA 2009 -I]
 (a) Magnesium oxide (b) Magnesium carbonate
 (c) Magnesium chloride (d) Magnesium sulphate
67. Which one among the following nontoxic gases helps in formation of enzymes which ripen fruit?
[INDA/NA 2012 - I]
 (a) Acetylene (b) Ethane
 (c) Methane (d) Carbon dioxide
68. The pH of fresh ground water slightly decreases upon exposure to air because **[INDA/NA 2012 - I]**
 (a) carbon dioxide from air is dissolved in the water
 (b) oxygen from air is dissolved in the water
 (c) the dissolved carbon dioxide of the ground water escapes into air
 (d) the dissolved oxygen of the ground water escapes into air
69. Why hard water does not give lather with soap?
[INDA/NA 2013 - I]
 (a) Hard water contains calcium and magnesium ions which form precipitate with soap
 (b) Hard water contains sulphate and chloride ions which form precipitate
 (c) pH of hard water is high
 (d) pH of hard water is less
70. Which of the following are the two main constituents of granite?
[INDA/NA 2014 - II]
 (a) Iron and silica (b) Iron and silver
 (c) Silica and aluminium (d) Iron oxide and potassium
71. When hard water is evaporated completely, the white solid remains in the container. It may be due to the presence of
[INDA/NA 2015-I]
 1. Carbonates of Ca and Mg
 2. Sulphates of Ca and Mg
 3. Chlorides of Ca and Mg
 Select the correct answer using the code given below :
 (a) 1 and 2 only (b) 1, 2 and 3
 (c) 3 only (d) 1 and 3 only
72. What does water gas comprise of? **[INDA/NA 2007 - II]**
 (a) Carbon monoxide and hydrogen
 (b) Carbon dioxide and hydrogen
 (c) Carbon monoxide and methane
 (d) Carbon dioxide and methane
73. Combination of one volume of nitrogen with three volumes of hydrogen produces
[INDA/NA 2016-III]
 (a) one volume of ammonia
 (b) two volumes of ammonia
 (c) three volumes of ammonia
 (d) one and a half volumes of ammonia
74. Emulsion is known as a
[INDA/NA 2016-III]
 (a) colloidal solution of substances having different physical states
 (b) true solution
 (c) distillation mixture for making alcohols
 (d) colloidal solution of two liquids
75. Which one of the following carbon compounds will *not* give a sooty flame?
[INDA/NA 2016-I]
 (a) Benzene (b) Hexane
 (c) Naphthalene (d) Anthracene
76. Ammonia (NH_3) obtained from different sources always has same proportion of Nitrogen and Hydrogen. It proves the validity of law of:
[INDA/NA 2015-III]
 (a) Reciprocal proportion
 (b) Constant proportion
 (c) Multiple proportions
 (d) None of the above

Atomic Structure: Laws, Number, Mass, & Particles (e, p, n)

List-I	List-II
A. Electron	1. Goldstein
B. Proton	2. J.J. Thomson
C. Neutron	3. Chadwick
D. Positron	4. Anderson

Codes:

	A	B	C	D
(a)	2	1	3	4
(b)	4	3	1	2
(c)	2	1	4	3
(d)	4	3	2	1

86. Match List-I with List-II

List-I	List-II
A. Thomson model	1. Dual nature of electron
B. Rutherford model	2. Nuclear theory
C. Bohr's model	3. Plum pudding model
D. de-Broglie theory	4. Concept of quantization of energy

Codes:

	A	B	C	D
(a)	3	4	2	1
(b)	2	4	1	2
(c)	2	1	3	4
(d)	3	2	4	1

87. Match List-I with List-II and select the correct answer from the codes given below

List-I	List-II
A. Zero mass	1. Positron
B. Fractional charge	2. Neutrino
C. Fractional spin	3. Quark
D. Integral spin	4. Photon

Codes:

	A	B	C	D
(a)	4	3	1	2
(b)	3	2	4	1
(c)	2	3	4	1
(d)	3	2	1	4

88. Which of the following pairs is/are correctly matched?

 1. **Isotopes** : Atoms with same atomic number but different atomic mass.
 2. **Isobars** : Atoms with same number of neutrons but different atomic number.
 3. **Isotones** : Atoms with same mass number but different atomic number.

Select the correct answer using the codes given below :

- Consider the following statement
 In $^{90}_{38}\text{Sr}^{2+}$:
 (i) atomic number is 36
 (ii) number of electrons is 38
 (iii) number of neutrons is 52
 (iv) number of protons is 38

(iv) number of protons is 3.

90. Consider the following statements

 - (a) A molecule of sulphur contains 4 sulphur atoms.
 - (b) Metals placed below hydrogen in activity series lose electrons to H^+ ions of acids.
 - (c) Silver acquires a blackish tinge when exposed to air for a long time.

Which of these statement(s) is/are correct?

91. Match column-I with column-II and choose the correct code given below the columns.

Column I

(A) Electron (p) 1.00867 a.m.u
 (B) Proton (q) 9.1×10^{-31} kg
 (C) Neutron (r) 1.00728 a.m.u

(a) A - (q); B - (r); C - (p)
 (b) A - (p); B - (q); C - (r)
 (c) A - (r); B - (q); C - (p)
 (d) A - (q); B - (p); C - (r)

92. The atoms, in which the number of protons is same but the number of neutrons is different, are known as

[UP-PCS 2009]

CHEMISTRY**F-49**

93. The atomic nucleus was discovered by –
[Bihar J. Service 2016]
 (a) Rutherford (b) Dalton
 (c) Einstein (d) Thompson
94. Which one of the following statements is not correct ?
[CDS 2016-I]
 (a) Atoms of different elements may have same mass numbers
 (b) Atoms of an element may have different mass numbers
 (c) All the atoms of an element have same number of protons
 (d) All the atoms of an element will always have same number of neutrons.
95. The atomic theory of matter was first proposed by
[CDS 2015-II]
 (a) John Dalton (b) Rutherford
 (c) J. J. Thomson (d) Niels Bohr
96. A body is charged negatively. It implies that
[INDA/NA 2011 - I]
 (a) it has lost some of its protons
 (b) it has acquired some electrons from outside
 (c) it has lost some of its electrons
 (d) None of the above
97. There are six electrons, six protons and six neutrons in an atom of an element. What is the atomic number of the element?
[INDA/NA 2016-II]
 (a) 6 (b) 12
 (c) 18 (d) 24
98. Which one of the following has different number of molecules? (All are kept at normal temperature and pressure)
[INDA/NA 2016-II]
 (a) 3 gram of Hydrogen (b) 48 gram of Oxygen
 (c) 42 gram of Nitrogen (d) 2 gram of Carbon
99. How many moles of hydrogen atom are present in one mole of Aluminium hydroxide?
[INDA/NA 2016-II]
 (a) one mole (b) Two moles
 (c) Three moles (d) Four moles
100. An atom of carbon has 6 protons. Its mass number is 12. How many neutrons are present in an atom of carbon?
[INDA/NA 2016-I]
 (a) 12 (b) 6
 (c) 10 (d) 14
101. What is the number of mole(s) of $H_2(g)$ required to saturate one mole benzene?
[INDA/NA 2016-I]
 (a) 1 (b) 2
 (c) 3 (d) 4
102. Which of the following are the properties of an electron?
[INDA/NA 2015-II]
 1. Electron is a constituent of cathode ray
 2. Electron is a negatively charged particle
 3. The mass of the electron is equal to the mass of the proton
 4. Electron is deflected by the electric field but not by magnetic field
 Select the correct answer using the code given below:
 (a) 1 and 2 only (b) 1, 2 and 3
 (c) 3 and 4 (d) 1 and 4

103. Which one of the following statements is correct?
[INDA/NA 2015-II]
 (a) Rutherford's alpha-particle scattering experiment led to the discovery of electron
 (b) J J Thomson suggested that the nucleus of an atom contains protons
 (c) The atomic number of an element is the same as the number of protons in the nucleus of its atom
 (d) The mass number of an atom is equal to the number of electrons in its shells

Radioactivity: α , β , γ rays & Nuclear Fission & Fusion

104. Solar energy is produced by the following reaction
 (a) Fission reaction (b) Fusion reaction
 (c) Chemical reaction (d) None of these
105. **Column I**
 (A) Radioactivity (p) Emission of electrons from metals
 (B) Photoelectric effect (q) Atom bomb
 (C) Nuclear fusion (r) Spontaneous emission of radiations
 (D) Nuclear fission (s) Hydrogen bomb
 (a) A - (p); B - (r); C - (q); D - (s)
 (b) A - (q); B - (p); C - (r); D - (s)
 (c) A - (s); B - (r); C - (q); D - (p)
 (d) A - (r); B - (p); C - (s); D - (q)
106. A radioactive substance emits
 (a) alpha particle (b) beta particle
 (c) gamma particle (d) all of the three
107. 'Yellow Cake' an item of smuggling across border is
 (a) a crude form of heroin
 (b) a crude form of cocaine
 (c) uranium oxide
 (d) unreformed gold
108. A radioactive substance has a half life of four months. Three-fourth of the substance would decay in
 (a) 3 months (b) 4 months
 (c) 8 months (d) 12 months
109. The difference between a nuclear reactor and atomic bomb is that
 (a) no chain reaction takes place in nuclear reactor while in the atomic bomb there is a chain reaction.
 (b) the chain reaction in nuclear reactor is controlled.
 (c) the chain reaction in nuclear reactor is not controlled.
 (d) no chain reaction takes place in atomic bomb while it takes place in nuclear reactor.
110. The inexhaustible source of energy of the stars is due to
 (a) conversion of hydrogen to helium
 (b) conversion of helium to hydrogen
 (c) decay of radioactive elements
 (d) excess of oxygen that helps burning and release of energy
111. If by mistake some radioactive substance gets into human body, than from the point of view of radiation damage, the most harmful will be one that emits -
 (a) α - rays (b) Neutrons
 (c) β - rays (d) γ - rays

Chemical Formula/ Change/ Equations/ Reactions/ Bonding

119. When iron is rusted, it is
(a) Oxidised (b) Reduced
(c) Evaporated (d) Decomposed

120. In which one of the following situations a chemical reaction does not occur?
(a) Common salt is exposed to air
(b) Coal is burnt in air
(c) Sodium is placed in water
(d) Iron is kept in moist air

121. Oils are purified by
(a) Fractional distillation (b) Steam distillation
(c) Crystallisation (d) Vacuum distillation

122. Which one among the following equations is correctly balanced ?
(a) $\text{NaOH} + \text{Al} + \text{H}_2\text{O} \rightarrow 2\text{H}_2 + \text{NaAlO}_2$
(b) $2\text{NaOH} + 2\text{Al} + 2\text{H}_2\text{O} \rightarrow 3\text{H}_2 + 2\text{NaAlO}_2$

CHEMISTRY

GENERAL SCIENCE

149. Match List I with List II and select the correct answer using the code given below the Lists: [NDA/NA 2016-III]

	List I (Process)	List II (Type of Change)
A.	Heating Camphor	1. Chemical
B.	Cooling of water vapour up to room temperature	2. Evaporation
C.	Cooking an egg	3. Condensation
D.	Formation of water vapour at room temperature	4. Sublimation

Code :

(a) A B C D
 (b) 4 1 3 2
 (c) 2 1 3 4
 (d) 2 3 1 4

150. Which one of the following species is not capable of showing disproportionation reaction? [NDA/NA 2016-III]

 - (a) ClO^-
 - (b) ClO_2
 - (c) ClO_3^1
 - (d) ClO_4^1

151. Which one of the following statements is correct ?
[NDA/NA 2016-III]

 - (a) Covalent bonds are directional
 - (b) Ionic bonds are directional
 - (c) Both covalent and ionic bonds are directional
 - (d) Both covalent and ionic bonds are non-directional

152. Which one of the following is ***not*** a chemical change?
[NDA/NA 2016-II]

(a) Ripening of fruits (b) Curdling of milk
(c) Freezing of water (d) Digestion of food

153. Which one of the following is a reduction reaction? [NDA/NA 2016-II]

 - (a) $2 \text{Mg(s)} + \text{O}_2(\text{g}) \longrightarrow 2 \text{MgO(s)}$
 - (b) $\text{S(s)} + \text{O}_2(\text{g}) \longrightarrow \text{SO}_2(\text{g})$
 - (c) $2 \text{HgO(s)} \xrightarrow{\text{heat}} 2 \text{Hg(l)} + \text{O}_2(\text{g})$

- (d) $\text{Mg(s)} + \text{S(s)} \longrightarrow \text{MgS(s)}$

154. Which one of the following is the chemical name for baking soda? [NDA/NA 2016-II]

 - (a) Sodium bicarbonate (Sodium hydrogen carbonate)
 - (b) Sodium carbonate
 - (c) Potassium bicarbonate (Potassium hydrogen carbonate)
 - (d) Potassium carbonate

155. Suppose you have four test tubes labelled as 'A', 'B', 'C', and 'D'. 'A' contains plain water, 'B' contains solution of an alkali, 'C' contains solution of an acid, and 'D' contains solution of sodium chloride. Which one of these solutions will turn phenolphthalein solution pink?

- [NDA/NA 2016-II]

156. Which one of the following oxides dissolves in water? [NDA/NA 2016-II]

 - (a) CuO
 - (b) Al₂O₃
 - (c) Fe₂O₃
 - (d) Na₂O

158. Consider the following reaction: [NDA/NA 2015-II]
 $\text{CH}_4(\text{g}) + \text{H}_2\text{O}(\text{g}) \xrightarrow{1270\text{K}} \text{CO}(\text{g}) + 3\text{H}_2(\text{g})$
 In the reaction given above, the mixture of CO and H₂ is:
 (a) natural gas (b) water gas
 (c) producer gas (d) industrial gas

Elements' Classification/Periodic Table/Law

CHEMISTRY**F-53**

173. Which one of the following is the correct sequence of the given elements in the increasing order of their reactivity ?
 (a) Iodine-Bromine-Chlorine-Fluorine
 (b) Bromine-Iodine-Chlorine-Fluorine
 (c) Bromine-Iodine-Fluorine-Chlorine
 (d) Iodine-Bromine-Fluorine-Chlorine

174. Match List-I with List-II and select the correct answer from the codes given below:

List-I	List-II
A. Moderator	1. Uranium
B. Control rod	2. Graphite
C. Fuel rods	3. Boron
D. Coolant	4. Lead
	5. Sodium

Codes:

A	B	C	D
(a) 2	1	3	5
(b) 2	3	1	5
(c) 3	2	1	5
(d) 3	4	1	2

175. Which one of the following sets of elements was primarily responsible for the origin of life on the Earth?
 (a) Hydrogen, oxygen, sodium
 (b) Carbon, hydrogen, nitrogen
 (c) Oxygen, calcium, phosphorus
 (d) Carbon, hydrogen, potassium

176. What are the elements which are liquids at room temperature and standard pressure?

1. Helium	2. Mercury
3. Chlorine	4. Bromine

Select the correct answer using the codes given below:

- (a) 2 and 3 only (b) 2, 3 and 4
 (c) 2 and 4 only (d) 1 and 3 only

177. Match List - I (oxidation number) with List - II (The element) and select the correct answer using the code given below the list :

List - I (Oxidation number)	List - II (The element)
A. 2	1. Oxidation number of Mn in MnO_2
B. 3	2. Oxidation number of S in $H_2S_2O_7$
C. 4	3. Oxidation number of Ca in CaO
D. 6	4. Oxidation number of Al in $NaAlH_4$

Code :

A	B	C	D
(a) 3	4	1	2
(b) 4	3	1	2
(c) 3	4	2	1
(d) 4	3	2	1

178. Consider the following statements and select the correct code.

Assertion (A) : In the periodic table of chemical elements, electron affinity is always found to increase from top to bottom in a group

Reason (R) : In a group, the atomic radii generally increase from top to bottom.

- (a) Both A and R are individually true and R is correct explanation of A

- (b) Both A and R are individually true and R is not the correct explanation of A

- (c) A is true but R is false

- (d) A is false but R is true

179. Enriched uranium are [UP-PCS 2009]

- (a) Uranium rods kept under special shield

- (b) Natural Uranium in which the component of radioactive isotope U^{235} is artificially increased

- (c) Natural Uranium mixed with Thorium

- (d) Uranium rods coated with Chromium

180. Match List-I with List-II and select the correct answer using the code given below the lists : [UP-PCS 2010]

List-I (Naturally occurring substance)	List-II (Elements present)
--	--------------------------------------

A. Diamond	1. Calcium
B. Marble	2. Silicon
C. Sand	3. Aluminium
D. Ruby	4. Carbon

Code :

A	B	C	D
(a) 3	1	2	4
(b) 4	2	1	3
(c) 2	1	3	4
(d) 4	1	2	3

181. Which one of the following is used as a moderator in the nuclear reactor? [UP-PCS 2011]

- (a) Thorium (b) Graphite

- (c) Radium (d) Ordinary water

182. Certain new elements have been added to periodic table :

- I. Nihonium – Nh II. Moscovium – Mc

- III. Tennessine – Ts IV. Oganesson – Og

The correct code is –

- (a) Only I and II are correct
 (b) Only II and III are correct
 (c) Only I and IV are correct
 (d) I, II, III and IV are correct

183. Which of the following is / are correct statements with respect to Copper (Cu), Silver (Ag) and Gold (Au)?

1. All of them can be found naturally in their elemental state.
 2. All of them belong to same group in the periodic table.

Select the correct option from the codes given below :

- (a) Only 1 (b) Only 2
 (c) Both 1 and 2 (d) Neither 1 nor 2

184. Which one of the following statements is not correct? [CDS 2016-I]

- (a) Hydrogen is an element

- (b) Hydrogen is the highest element

- (c) Hydrogen has no isotopes

- (d) Hydrogen and oxygen form an explosive mixture

185. Which one of the following is not true for diamond? [CDS 2015-II]

- (a) Each carbon atom is linked to four other carbon atoms

- (b) Three-dimensional network structure of carbon atoms is formed

- (c) It is used as an abrasive for sharpening hard tools

- (d) It can be used as a lubricant.

Electrochemistry & Thermochemistry

186. While performing cathode ray experiments, it was observed that there was no passage of electric current under normal conditions. Which of the following can account for this observation?
- Dust particles are present in air
 - Carbon dioxide is present in air
 - Air is a poor conductor of electricity under normal conditions
 - None of the above

Acids, Bases & Salts

187. The end product of alcoholic fermentation is
- pyruvic acid
 - acetaldehyde
 - ethyl alcohol
 - formic acid
188. Uric acid is present in
- Soda water
 - Rancid butter
 - Sour milk
 - Urine of mammals
189. Source of Vitamin C is
- Nitric acid
 - Ascorbic acid
 - Oxalic acid
 - Maleic acid
190. Which one of the following is responsible for blue baby syndrome?
- Fluoride
 - Nitrate
 - Arsenic
 - Lead
191. The acid in gastric juice is
- acetic acid
 - nitric acid
 - hydrochloric acid
 - sulphuric acid
192. Which one of the following acids is used for etching glass?
- H_2SO_4
 - HNO_3
 - HF
 - HCl
193. Human stomach produces acid 'X' which helps in digestion of food. Acid 'X' is
- acetic acid
 - methanoic acid
 - hydrochloric acid
 - citric acid
194. Sometimes, indigestion is caused by the secretion of too much hydrochloric acid in the stomach. To ease the pain caused, a tablet can be taken that reacts to reduce the amount of acid present. Which one among the following would be inappropriate for a manufacturer to include as a major reactant in the tablet?
- $CaCO_3$
 - $MgCO_3$
 - $NaOH$
 - $Mg(OH)_2$
195. To protect tooth decay we are advised to brush our teeth regularly. The nature of the tooth paste commonly used is
- acidic
 - neutral
 - basic
 - corrosive
196. Which one among the following is the equivalent weight of sulphuric acid?
- (Atomic weight : H = 1, S = 32, O = 16)
- 98
 - 60
 - 100
 - 49
197. Hydrofluoric acid is not kept in glass bottles because it reacts with
- visible light
 - sodium oxide of glass
 - aluminium oxide of glass
 - silicon dioxide of glass

198. Match List-I with List-II and select the correct answer from the codes given below:

List-I	List-II
A. Sour milk	1. Malic acid
B. Vinegar and pickle	2. Carbonic acid
C. Soda water	3. Acetic acid
D. Apple	4. Lactic acid

Codes:

A	B	C	D
(a) 1	2	3	4
(b) 4	3	1	2
(c) 4	3	2	1
(d) 3	4	2	1

199. Match column-I (acid) with column-II (use) and select the correct answer using the code given below the columns :

Column I (Acid)	Column II (Use)
A. Oxalic acid	(p) As an eye-wash, antiseptic and grain preservation
B. Nitric acid	(q) For making explosives
C. Boric acid	(r) In food preservation
D. Benzoic acid	(s) As a constituent of ink stain remover

- A - (s), B - (q), C - (r), D - (p)
- A - (q), B - (s), C - (p), D - (r)
- A - (r), B - (q), C - (p), D - (s)
- A - (s), B - (q), C - (p), D - (r)

200. Sodium stearate is a salt and is used
- in gunpowder
 - in paint
 - to make soap
 - to make fertilizer

201. Match List-I with List-II and select the correct answer using the code given below the lists-

List-I	List-II
(A) Formic acid	1. Tamarind
(B) Tartaric acid	2. Orange
(C) Oxalic acid	3. Spinach
(D) Citric acid	4. Ant's sting

Codes:

	(A)	(B)	(C)	(D)
(a)	2	3	1	4
(b)	2	1	3	4
(c)	4	3	1	2
(d)	4	1	3	2

202. Vinegar is an aqueous solution of [IUP-PCS 2009]

- Oxalic acid
- Citric acid
- Hydrochloric acid
- Acetic acid

203. Which of the following acids does not contain oxygen? [Bihar J. Service 2016]

- Nitric acid
- Sulphuric acid
- Hydrochloric acid
- All of the above

204. Iodised salt contains - [BPSC 2017]

- Free iodine
- Calcium iodine
- Magnesium iodine
- Potassium Iodine
- None of the above / More than one of the above

CHEMISTRY**F-55**

205. Antacids are – [Chhatis-PSC 2016]

- (a) Base (b) Acid
 (c) Salt (d) Buffer
 (e) None of the above

206. Match List – I with List – II and select the correct answer using the code given below the lists : [UP-RO 2016]

List – I

- (A) Compound present in Bones
 (B) Acid present in vinegar
 (C) Souring of milk
 (D) Ripening of fruits

List – II

1. Lactic acid
 2. Ethylene
 3. Acetic acid
 4. Calcium phosphate

Codes :

	(A)	(B)	(C)	(D)
(a)	1	2	3	4
(b)	2	1	4	3
(c)	3	4	2	1
(d)	4	3	1	2

207. The tracking of people by trained dogs is based on the recognition of which of the following compounds in the sweat from feet? [NDA/NA 2007 -II]

- (a) Carboxylic acids (b) Uric acid
 (c) Sugar (d) Salt

208. Consider the following statements [NDA/NA 2007 -II]

1. Nitric acid is used in the production of fertilizers.
 2. Sulphuric acid is used in the production of explosives.
 Which of the statements given above is/are correct?
 (a) Only 1 (b) Only 2
 (c) Both 1 and 2 (d) Neither 1 nor 2

209. Statement I : Addition of water to an aqueous solution of HCl decreases the pH. [NDA/NA 2008 -II]

Statement II : Addition of water suppresses the ionisation of HCl.

- (a) Both the statements are individually true and Statement II is the correct explanation of Statement I
 (b) Both the statements are individually true but Statement II is not the correct explanation of Statement I
 (c) Statement I is true, but Statement II is false
 (d) Statement I is false, but Statement II is true

210. Match List I with List II and select the correct answer using the codes given below the lists. [NDA/NA 2011-II]

	List I		List II
	(Acid)		(Source)
A.	Lactic acid	1	Tamarind
B.	Tartaric acid	2	Orange
C.	Oxalic acid	3	Tomato
D.	Citric acid	4	Sour curd

Codes

	A	B	C	D
(a)	2	3	1	4
(b)	2	1	3	4
(c)	4	3	1	2
(d)	4	1	3	2

Metals & Non-metal

211. The important metal used with iron to produce stainless steel is

- (a) carbon (b) tin
 (c) chromium (d) aluminium

212. The first metal used by man was

- (a) gold (b) silver
 (c) copper (d) iron

213. Which one is not metal?

- (a) Sulphur (b) Sugar
 (c) Nitrogen (d) All of these

214. In which type of coal percentage of carbon is the highest?

- (a) Peat (b) Lignite
 (c) Bituminous (d) Anthracite

215. At 30°C, which 3 metals are all liquids ?

- (a) Hg, Fe, Zn (b) Hg, Sn, Pb
 (c) Zn, Pb, Sn (d) Hg, Ga, Cs

216. Stainless steel contains

- (a) Fe + Cr + Ni (b) Fe + Ni + Cu
 (c) Fe + Cr + Cu (d) Fe + C + Ni

217. Which one of the following metals occurs in nature in free state?

- (a) Gold (b) Sodium
 (c) Aluminium (d) Copper

218. In surgery, metal pins are used for joining together broken bones. These metal pins remain uncorroded in the body. What is the material of these pins?

- (a) Copper (b) Iron
 (c) Aluminium (d) Titanium

219. Cinnabar is an ore of

- (a) Hg (b) Cu
 (c) Pb (d) Zn

220. Consider the following statements :

1. An alloy is a mixture of two or more metals.
 2. An alloy is a mixture of a metal or metals with a non-metal.

Which of the statements given above is/are correct ?

- (a) 1 only (b) 2 only
 (c) Both 1 and 2 (d) Neither 1 nor 2

221. Consider the following about non-metals

1. Non-metals are malleable
 2. Non-metals are ductile
 3. Non-metals are brittle

The correct answer is

- (a) 1 and 2 are correct
 (b) 1 and 3 are correct
 (c) 2 and 3 are correct
 (d) Only 3 is correct

222. Consider the following statements

1. Most of the metal oxides are insoluble in water.
 2. Sodium oxide and potassium oxide are metal oxides and hence insoluble in water.

The correct answer is

- (a) Only 1 is true
 (b) Only 2 is true
 (c) 1 and 2 both are true
 (d) Neither of the two is true

223. From which mineral is radium obtained -
 (a) Limestone (b) Haematitic
 (c) Pitchblende (d) Rutile
224. Which of the following copper alloys is used for the manufacture of springs and suspension filaments in electrical instruments?
 (a) Bronze (b) Aluminium bronze
 (c) German silver (d) Phosphor bronze
225. Which of the following is correctly matched?
 (a) Aluminium-Haematite
 (b) Lead-Galena
 (c) Iron-Bauxite
 (d) Magnesium-Malachite
226. Until the nineteenth Century, aluminium was almost as expensive as gold. The invention of an inexpensive way to extract this metal by a 22-year-old American made this metal inexpensive subsequently. The inventor was
 (a) Goldschmidt
 (b) Mond
 (c) Charles-Martin Hall
 (d) Parkes
227. Why is tungsten used exclusively for making filaments of electric bulbs?
 (a) Tungsten has very high melting point
 (b) Tungsten has very flexibility
 (c) Tungsten has low rate of evaporation at high temperature
 (d) all of the above
228. German silver is used to make decorative articles, coinage metal, ornaments, The name is given because :
 [CDS 2016-I]
 (a) it is an alloy of copper and contains silver as one of its components
 (b) Germans were the first to use silver
 (c) Its appearance is like silver
 (d) It is an alloy of silver
229. Tungsten is used for the construction of filament in electric bulb because of its
 [INDA/NA 2014-II]
 (a) high specific resistance
 (b) low specific resistance
 (c) high light emitting power
 (d) high melting point
230. Which one of the following metals is less reactive than hydrogen?
 [INDA/NA 2007 -II]
 (a) Barium (b) Copper
 (c) Lead (d) Magnesium
231. 'Misch metal' is widely used in the manufacture of which of the following?
 [INDA/NA 2008 -I]
 (a) Material of car brake (b) Smoke detectors
 (c) Cigarette lighters (d) Emergency lights
232. Which one of the following is the softest?
 [INDA/NA 2008 -II]
 (a) Sodium (b) Aluminium
 (c) Iron (d) Copper
233. Graphite is a much better conductor of heat and electricity than diamond. This is due to the fact that each carbon atom in graphite:
 [INDA/NA 2015-II]
 (a) undergoes sp^2 hybridization and forms three sigma bonds with three neighbouring carbon atoms
 (b) undergoes sp^3 hybridization

- (c) is tetrahedrally bonded
 (d) is free from van der Waals force
234. The alkali metals have relatively low melting point. Which one of the following alkali metals is expected to have the highest melting point? [INDA/NA 2015-II]
 (a) Li (b) Na
 (c) K (d) Rb

DIRECTIONS : The following 8 (Eight) items consist of two statements, Statement I and Statement II. You are to examine these two statements carefully and select the answers to these items using the code given below : [INDA/NA 2015-I]

Code :

- (a) Both the statements are individually true and Statement II is the correct explanation of Statement I
 (b) Both the statements are individually true but Statement II is *not* the correct explanation of Statement I
 (c) Statement I is true but Statement II is false
 (d) Statement I is true but Statement II is true
235. **Statement I :** Diamond is very bright. [INDA/NA 2015-I]
Statement II : Diamond has very low refractive index.
236. Metalloids are
 (a) alloys of alkali metals with other metals.
 (b) colloids of metals.
 (c) elements having some properties of both metals and non-metals.
 (d) metals heavier than lead.

Organic Chemistry: Hydrocarbons, Biomolecules...

237. CNG used in automobiles to check pollution, mainly consists of
 (a) CH_4 (b) CO_2
 (c) N_2 (d) H_2
238. Pyrethrins used in mosquito coil is obtained from
 (a) a seed plant (b) an insect
 (c) a bacterium (d) a fungus
239. Bio-gas mainly consists of
 (a) carbon dioxide and hydrogen
 (b) hydrogen and methane
 (c) carbon dioxide and methane
 (d) hydrogen and oxygen
240. Which of the following is not a nitrogenous fertilizer?
 (a) $Ca(CN)_2$ (b) $CaCN_2$
 (c) NH_4NO_3 (d) Urea
241. The metal compound commonly found in Sindoor or Kumkum is based on
 (a) Tin (b) Lead
 (c) Copper (d) Zinc
242. In chemical terms, what are alums used for purifying water for drinking purposes ?
 (a) Hydrated chlorides (b) Double nitrate
 (c) Double sulphates (d) Nitrates of aluminium
243. What is iodised table salt?
 (a) An element
 (b) A compound
 (c) A heterogeneous mixture
 (d) A homogeneous mixture

CHEMISTRY

List-I

A. Morphine	1.	Antiseptic
B. Sodium	2.	Alloy
C. Boric acid	3.	Analgesic
D. German silver	4.	Kerosene oil

B. Codes:

	A	B	C	D
(a)	4	3	1	2
(b)	2	4	3	1
(c)	3	1	4	2
(d)	3	4	1	2

255. The order of appearance of the following with increasing temperature during the refining of crude oil is _____

 - (a) Kerosene, gasoline, diesel
 - (b) Diesel, gasoline, kerosene
 - (c) Gasoline, kerosene, diesel
 - (d) Gasoline, diesel, kerosene

256. What is " Kiss of death" ?

 - (a) A flower whose smell was the basis of a discovery on smell that led to award of 2004 Nobel Prize in Medicine.
 - (b) A protein degradation mechanism whose discovery ultimately won the scientists the 2004 Nobel Prize in Chemistry.
 - (c) A good wine flavour working on which scientist won the 2004 Nobel Prize in Chemistry.
 - (d) A network in brain associated with smell whose discovery led the scientists win the 2004 Nobel Prize in Physiology and Medicine.

257. Match List-I with List-II and select the correct answer from the codes given below:

List-I

A. Potassium bromide	1. Fertiliser
B. Potassium nitrate	2. Photography
C. Potassium sulphate	3. Bakery
D. Monopotassium tartarate	4. Gunpowder

Codes*

	A	B	C	D
(a)	2	4	1	3
(b)	2	4	3	1
(c)	4	2	3	1
(d)	4	2	1	3

258. Match List-I with List-II and select the correct answer from the codes given below:

List-I

A. German silver	1. Tin
B. Solder	2. Nickel
C. Bleaching powder	3. Sodium
D. Hypo	4. Chlorine

Codes:

	A	B	C	D
(a)	1	2	4	3
(b)	2	1	3	4
(c)	1	2	3	4
(d)	2	1	4	3

259. Consider the following statements and select the correct code.

Assertion (A): The main constituent of the liquefied petroleum gas is methane.

Reason (R): Methane can be used directly for burning in homes and factories where it can be supplied through pipelines.

Codes:

- (a) Both A and R are true, and R is the correct explanation of A.
 - (b) Both A and R are true, but R is not the correct explanation of A.
 - (c) A is true, but R is false.
 - (d) A is false, but R is true.

260. Consider the following:

Crude oil is a direct source of

- | | |
|----------------|-----------------|
| 1. Asphalt | 2. Paraffin wax |
| 3. Fatty acids | 4. Gas oil |

Which of the above are correct?

- | | |
|------------------|----------------|
| (a) 1 and 2 only | (b) 2 and 3 |
| (c) 1 and 4 only | (d) 1, 2 and 4 |

261. The correct order of these fuels in terms of their calorific value in increasing order is

- | | |
|-----------------|-----------------|
| 1. Hydrogen gas | 2. Kerosine oil |
| 3. Charcoal | 4. Wood |
| (a) 4, 3, 2, 1 | (b) 4, 2, 3, 1 |
| (c) 1, 2, 3, 4 | (d) 1, 3, 2, 4 |

262. Consider the following statements : The purpose of adding sodium sulphate and sodium silicate to washing powder is—

1. To keep washing powder dry
 2. To maintain the alkalinity of the powder which of these statements is/are correct ?
- | | |
|------------------|---------------------|
| (a) Only 1 | (b) Only 2 |
| (c) Both 1 and 2 | (d) Neither 1 nor 2 |

263. Match column-I with column-II and select the correct answer using the code given below the columns.

Column I		Column II	
A. Fertilizer	(p) King of chemicals		
B. Sulphuric acid	(q) Basic		
C. Lime water	(r) Magnesium hydroxide		
D. Milk of magnesia	(s) Potassium nitrate		
(a) A – (s), B – (p), C – (q), D – (r)			
(b) A – (r), B – (p), C – (q), D – (s)			
(c) A – (s), B – (q), C – (p), D – (r)			
(d) A – (s), B – (p), C – (r), D – (q)			

264. Which of the following do not contain nitrogen element?

- | | |
|---------------------------|-------------|
| 1. Superphosphate of lime | |
| 2. Urea | |
| 3. Indian saltpeter | |
| 4. Chille saltpeter | |
| (a) 1, 3 and 4 | (b) 1 and 3 |
| (c) 1 only | (d) 3 only |

265. The following question consist of two statements, one labelled as the Assertion (A) and the other as 'Reason (R). You are to examine these two statements carefully and select the answers to these items using the codes given below:

Assertion (A) : Though carbohydrates are covalent compounds, they are soluble in water.

Reason (R) : Compounds which form hydrogen bond with water are generally soluble in water.

- | | |
|--|--|
| (a) Both A and R are individually true and R is the correct explanation of A | |
| (b) Both A and R are individually true but R is NOT the correct explanation of A | |
| (c) A is true but R is false | |
| (d) A is false but R is true | |

266. Match List-I with List-II and select the correct answer by using the codes given below the lists : [UP-PCS 2011]

List-I		List-II	
A. Morphine	1. Antiseptic		
B. Sodium	2. Alloy		
C. Boric Acid	3. Analgesic		
D. German Silver	4. Kerosene oil		

Code :

	A	B	C	D
(a)	4	3	1	2
(b)	2	4	3	1
(c)	3	1	4	2
(d)	3	4	1	2

267. Which of the following statements with regard to Portland Cement are Correct? [CDS 2015-II]

1. Silica imparts strength to cement.
2. Alumina makes the cement quick setting
3. Excess of lime increases the strength of cement.
4. Calcium sulphate decreases the initial setting time of cement

Select the correct answer using the code

- | | |
|------------------|------------------|
| (a) 2 and 4 only | (b) 1 and 3 |
| (c) 1, 2 and 4 | (d) 1 and 2 only |

268. Red phosphorus is used in the manufacture of safety matches. This is due to the fact that [CDS 2015-II]

- (a) it shows phosphorescence
- (b) at ordinary temperature, it is less reactive than other varieties of phosphorus
- (c) it cannot be converted to white phosphorus on heating
- (d) it does not react with halogen on heating

269. Match List-I with List-II and select the correct answer using the code given below the Lists : [CDS 2015-II]

List-I		List-II	
(Exponent)		(Law)	
A. John Dalton		1. Law of definite proportion by volume	
B. Joseph Proust		2. Law of multiple proportion	
C. Antoine Lavoisier		3. Law of definite proportion by weight	
D. Joseph Louis Gay-Lussac		4. Law of conservation of mass	

Code :

	A	B	C	D
(a)	2	3	4	1
(b)	2	4	3	1
(c)	1	4	3	2
(d)	1	3	4	2

270. Which one of the following substances is made from natural raw materials? [NDA/NA 2007 -III]

- | | |
|---------------|-----------------|
| (a) Rayon | (b) Nylon |
| (c) Polyester | (d) Polystyrene |

271. Which one of the following substances is used in the manufacture of safety matches? [NDA/NA 2008 -II]

- | | |
|--------------------------------|--|
| (a) Red phosphorus | |
| (b) White phosphorus | |
| (c) Phosphorus trioxide (P2O3) | |
| (d) Black phosphorus | |

272. Which one of the following is used in the preparation of antiseptic solution? [NDA/NA 2008 -II]

- | | |
|-----------------------|------------------------|
| (a) Potassium nitrate | (b) Iodine |
| (c) Iodine chloride | (d) Potassium chloride |

273. Which one of the following polymeric materials is used for making bullet proof jacket? [NDA/NA 2009 -II]

- | | |
|----------------|------------|
| (a) Nylon-6, 6 | (b) Rayon |
| (c) Kevlar | (d) Dacron |

Discovery/Inventions

274. Who of the following is known as the Father of Biology?
(a) Darwin (b) Lamarck
(c) Aristotle (d) Theophrastus

275. Who of the following is known as the Father of Botany?
(a) Darwin (b) Lamarck
(c) Carolus Linnaeus (d) Theophrastus

276. Which of the following is known as the Father of Indian Botany?
(a) Birbal Shahni (b) K.C. Mehta
(c) William Roxburgh (d) T. Sadashivam

277. Who is called the Father of Taxonomy?
(a) Aristotle (b) Carolus Linnaeus
(c) Theophrastus (d) Lamarck

278. Gregor Johann Mendel worked on
(a) Edible pea (b) Wild pea
(c) Garden pea (d) Pigeon pea

279. Who described of a non-bacterial pathogen or virus for the first time?
(a) Stockman (b) Ivanovsky
(c) Stanley (d) Smith

280. The virus is
(a) protein and lipid (b) nucleic acid and protein
(c) lipid and carbohydrate (d) carbohydrate

281. The theory of mutation was propounded by
(a) De-vries (b) Malpighi
(c) Robert Hooke (d) Pasteur

282. The word gene was firstly used by
(a) Waldare (b) Watson
(c) Crick (d) Johannsen

283. Who discovered genetic material ?
(a) Crick and Watson
(b) Avery Mclood
(c) Friedrich Miescher
(d) Federik Meischer

284. Who propounded the theory of Jumping-gene ?
(a) G.J. Mendel (b) Thomas Hunt
(c) Mc Clintock (d) Heinrich Hertz

285. The scientist who firstly explained about the blood circulation
(a) A. Leeuwenhoek (b) William Harvey
(c) J.G. Mendel (d) Ronald Ros

286. The first heart transplantation was performed by
(a) Dr. W. Harbe (b) Sir F.G. Hafkin
(c) Dr. Louis Pasteur (d) Dr. C. Barnard

287. The structure of double helix of DNA was described by
(a) Dr. M. Soha (b) Dr. S. Hawking
(c) Watson and Crick (d) Dr. A. Fleming

288. Who was the discoverer of human blood groups?
(a) Landsteiner (b) Livine
(c) Vinear (d) Leeuwenhoek

289. Which one of the following scientists first time saw bacteria through a microscope made by himself ?
(a) Anton Van Leeuwenhoek (b) Louis Pasteur
(c) Robert Hooke (d) Robert Virchow

290. Who of the following invented the cotton gin that separates the seeds from cotton three hundred times faster than by hand?

 - Eli Whitney
 - George Stephenson
 - McAdam
 - James Watt

291. A species inhabiting different geographical areas is known as

 - allopatric species
 - sympatric species
 - bio species
 - sibling species

292. Match List-I with List-II and select the correct answer from the codes given below:

List-I	List-II			
A. Arber and Smith	1. Developed transgenic plants with <i>Agrobacterium</i> T-DNA			
B. Feldman	2. Discovered endonucleases			
C. Mullis	3. Discovered reverse transcriptase			
D. Temin and Baltimore	4. Discovered polymerase chain reaction			
A B C D				
(a) 2 1 4 3				
(b) 1 2 4 3				
(c) 2 1 3 4				
(d) 1 2 3 4				

293. Match List-I with List-II and select the correct answer from the codes given below:

List-I	List-II			
A. Discovery of transduction and conjugation in bacteria	1. Khorana			
B. Establishing the sex-linked inheritance	2. Kornberg			
C. Isolation of DNA polymerase from <i>E. coli</i>	3. Lederberg			
D. Establishing the complete genetic code	4. Morgan			
5. Ochoa				
A B C D				
(a) 4 3 2 1				
(b) 3 4 1 5				
(c) 4 3 1 5				
(d) 3 4 2 1				

294. Consider the following statements and the correct ones.

 - Fish that eradicates the mosquito larva is *Gambusia*.
 - The instrument used to measure blood pressure is Autoanalyser.
 - CT scanning was developed by Godfrey Hounsfield.
 - Only 1
 - Only 2
 - Only 1 and 3
 - All are correct

295. Consider the following statements:

 - Carolus Linnaeus is the father of binomial nomenclature of organisms.
 - The word taxonomy was coined by Augustin de Candolle.

Which of the above statements is/are correct?

 - 1 only
 - 2 only
 - Both 1 and 2
 - Neither 1 nor 2

296. Consider the following statements:

 - The cell was discovered by Robert Hooke.
 - Nucleus was described by Robert Brown.
 - Plant cells generally have lysosomes.

F-60

GENERAL SCIENCE

Which of the above statements is/are correct?

- (a) 1 only (b) 1 and 2 only
 (c) 2 and 3 only (d) 1, 2 and 3

297. Match List-I with List-II and select the correct answer by using the codes given below:

List-I				List-II			
A. Theory of mutation	1.	Beadle and Tatum					
B. Theory of evolution	2.	Jacob and Monod					
C. One gene one enzyme hypothesis	3.	Darwin					
D. Concept of operon	4.	De Vries					
A B C D							

- (a) 3 4 1 2
 (b) 3 4 2 1
 (c) 4 3 1 2
 (d) 4 3 2 1

298. Match List-I with List-II and select the correct answer from the codes given below the lists:

List-I				List-II			
A. Anthrax	1.	A disease due to a defective gene					
B. Thalassaemia	2.	Womb-renting					
C. Surrogacy	3.	Science of altering genes					
D. Transgenics	4.	A toxin used by biowarfare					
A B C D							

- (a) 4 1 2 3
 (b) 2 3 4 1
 (c) 3 2 1 4
 (d) 1 2 3 4

299. Consider the following statements and select the correct answer from the codes given below:

Assertion (A): Mendel worked on garden pea.

Reason (R): Garden pea belongs to the family Malvaceae.

- (a) Both A and R are true and R is the correct explanation of A.
 (b) Both A and R are true, but R is not the correct explanation of A.
 (c) A is true, but R is false.
 (d) A is false, but R is true.

300. Match List-I with List-II and select the correct answer from the codes given below:

List-I				List-II			
A. Father of circulatory system	1.	Stephen Hales					
B. Father of plant physiology	2.	William Harvey					
C. Coined the term 'Genera'	3.	Karl Landsteiner					
D. Discovered various blood groups	4.	John Ray					
A B C D							

- (a) 1 4 3 2
 (b) 2 3 1 4
 (c) 2 1 4 3
 (d) 4 3 1 2

301. Consider the following statements:

1. The virus was discovered by Ivanovskiy.
 2. The bacteria were discovered by Rudolf Virchow.
 3. The cell theory was proposed by Schleiden and Schwann.

Which of the statements given above is/are correct?

- (a) 1 and 2 (b) 2 and 3
 (c) 1 and 3 (d) 1, 2 and 3

302. Consider the following statements and choose the correct ones.

1. Loose smut of wheat is caused by *Puccinia graminis*.
 2. Father of Indian mycology and plant pathology is E.J. Butler.
 (a) 1 only (b) 2 only
 (c) Both 1 and 2 (d) Neither 1 or 2

303. Match List-I with List-II and select the correct answer from the codes given below:

List-I				List-II			
A. Testosterone	1.	Sedative drug					
B. Codeine	2.	Indian rubber					
C. Caoutchouc	3.	Aromatic oil of clove					
D. Eugenol	4.	Hormone					
A B C D							

- (a) 4 1 2 3
 (b) 1 2 3 4
 (c) 4 3 2 1
 (d) 2 3 4 1

304. Which one of the following is the bioethically non controversial source of stem cells as an alternative to the highly controversial embryonic stem cells?

[UP-PCS 2008]

- (a) Bone marrow - derived stem cells
 (b) Amniotic fluid derived stem cells
 (c) Blood of foetus
 (d) Blood of babies

305. To study meiosis in plants, the best part would be –

[IMP-PSC 2017]

- (a) shoot apex (b) root apex
 (c) anthers (d) leaf cells

306. The major constituent of connective tissue is –

- (a) Lipid (b) Carbohydrate
 (c) Cholesterol (d) Collagen

307. From which human stem cells, were first functional pacemaker cells developed?

- (a) Embryonic stem cells
 (b) Somatic stem cells
 (c) Pluripotent stem cells
 (d) None of the above

308. Which of the following is/are fluid connective tissue?

- (a) Blood (b) Lymph
 (c) Both (a) and (b) (d) Neither (a) and (b)

309. Cellulose and starch both are made up of –

[UK-PSC 2016]

- (a) (+)-glucose
 (b) (-)-fructose
 (c) Both (a) and (b) given above
 (d) (+)-galactose

310. Which of the following acts as an insulator against heat, cold and as a shocks absorber in the body?

- (a) Dermis (b) Epidermis
 (c) Subcutaneous (d) All of the above

311. Who among the following is considered as the father of genetic engineering?

- (a) Philip Drinker (b) Paul Berg
 (c) Thomas Addison (d) Alpheus Packard Jr.

Hints & Solutions

1. (a) Solders are typically made from tin or lead or a combination of both in the ratio of 63:37 respectively.
2. (c) Indane gas is a mixture of butane and propane. It is liquefied petroleum Gas (LPG) used for cooking in house-holds.
3. (b) Rice farming is a big source of atmospheric methane, possibly the biggest of man-made methane sources.
4. (b) Minerals are naturally occurring compounds metals these are inorganic solid. for example, Fe_2O_3 (Hematite) is mineral Fe and Al_2O_3 (alumina) is a mineral of Al. These mineral from which metals are extracted are known as ores.
5. (a) Milk is a mixture composed of water, along with fat and sugar. Chief among these protein is called caseins which make up about 80% of the proteins in milk.
6. (a) A detergent is a cleansing agent. Both detergents and soap can clean, but they are different chemically. A soap is the metal salt of long-chain fatty acid. The metal may be an alkali metal such as sodium (Na) or potassium (K).
7. (a) A gas, when kept at a constant temperature, would obey the gas laws exactly. The gas laws are Charle's law, Boyle's law and Gay-Lussac's law.
8. (d) Scattering of light takes place in colloidal solution. This phenomenon is called Tyndall effect. The path of the light beam illuminates by scattering of light.
9. (b) Nitrous oxide (N_2O) is commonly used in anaesthesia.
10. (d) Argon (Ar) makes up 0.9 percent of the atmosphere.
11. (b) Electric bulbs are generally filled with argon gas because this gas is able to burn very intensely and produce bright light.
12. (b) Kerosene is a mixture of aliphatic-hydrocarbons.
13. (c) Candles contain a mixture of paraffin wax and stearic acid.
14. (c) All noble gases are present in Earth's atmosphere except for helium and radon. Noble gases are group of highly unreactive elements placed in the Gr-18 (VIIIB) in the periodic table.
15. (c) Carbon dioxide is responsible for swelling of bread.
16. (a) Graphite is an allotrope of carbon. Hence this is an element not mixture. Graphite is an allotropic form of element carbon. Glass is a mixture made up mostly of silica (SiO_2) and other additives. Brass is an alloy obtained by mixing metals copper (Cu) and (Zn). Steel is also an alloy obtained by using iron (Fe) and other elements like carbon (C), Manganese (Mn), chromium (Cr), etc.
17. (c) In nuclear reactor heavy water (D_2O) used to slow down the speed of neutrons i.e., act as moderator.
18. (d) Sodium metabisulphite ($\text{Na}_2\text{S}_2\text{O}_5$) inhibits growth of bacteria and fungi including mold. It is an artificial food additive.
19. (c) Sublimation is the process in which a substance directly goes into vapour state without passing through the liquid state. Iodine is a substance which can sublime. Some other examples are camphor, naphthalene, etc..
20. (c) Carborundum is silicon carbide (SiC).
21. (b) LPG is a mixture of C_4H_{10} (Butane), C_3H_8 (propane) and C_2H_6 (ethane). Main constituent is butane (C_4H_{10}).
22. (b) Liquid hydrogen and liquid oxygen are used as excellent fuel for rockets. $\text{H}_2(l)$ has low mass and high enthalpy of combustion whereas oxygen is a strong supporter of combustion.
23. (b) According to law of definite proportion, a chemical compound is always found to be made up of the same element combined together in the same fixed proportion by mass.
24. (b) Homogeneous mixture have the same composition throughout. A mixture of methanol (a liquid) and water (a liquid) is homogeneous.
25. (a) Physical state of any compound depends on the strength of interaction between its molecules. H_2O and H_2S both undergo intermolecular hydrogen bonding. O atom is more electronegative than S atom. Hence, the strength of hydrogen bonding between H_2O molecules is much greater than the strength of hydrogen bonding between H_2S molecules. As a result H_2O is liquid while H_2S is gas.
26. (d) Hydrogen combines with oxygen with explosive force in the presence of a spark. Helium is an inert gas that will not burn or explode, so is much safer to use in balloons instead of hydrogen.
27. (b) As a gemstone used in jewellery, silicon carbide is called "synthetic moissanite" or just "moissanite". Moissanite is similar to diamond in several important respects it is transparent and hard. Moissanite has become popular as a diamond substitute, and may be misidentified as diamond, since its thermal conductivity is close to that of diamond, more than any other diamond substitute.
The properties of carbon fibres, such as high stiffness, high tensile strength, low weight, high chemical resistance, high temperature tolerance and low thermal expansion, make them very popular in aerospace, civil engineering, military, and motor sports.
Dichlorodifluoromethane (R-12) is a colourless gas, and usually sold under the brand name Freon-12, is a chlorofluorocarbon halo-methane (CFC), used as a refrigerant and aerosol spray propellant.
28. (a) In photosynthesis, solar energy is converted to chemical energy. The chemical energy is stored in the form of glucose (sugar). Carbon dioxide, water, and sunlight are used to produce glucose, oxygen, and water.
Bleaching powder or calcium hypochlorite is a chemical compound with formula $\text{Ca}(\text{ClO})_2$. The chemical formula for marble is CaCO_3 . It is calcium carbonate.
Gypsum is a very soft sulphate mineral composed of calcium sulphate dihydrate, with the chemical formula $\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$. It can be used as a fertilizer, is the main constituent in many forms of plaster and is widely used.

29. (a) Manganese is essential for iron and steel production. At present, steel making accounts for 85 to 90% of the total demand, most of the total demand. Manganese is a key component of low-cost stainless steel formulations and certain widely used aluminium alloys.
Limestone can be used in constructing buildings. It can be used for making cement and mortar. Limestone is used to make glass and even used to make roads. Bauxite is the mineral ore of aluminium which is used in the manufacture of cans, airplanes, sporting and electronic equipment and home appliances. Copper is used extensively as an electrical conductor, for the making of electrical wire.
30. (d) Fullerene is a pure carbon molecule composed of at least 60 atoms of carbon.
Fullerenes are class of allotropes of carbon and are made of balls, cage or tubes of carbon atoms. Buckminster fullerene is one type of fullerene. Its molecule has 60 carbon atoms arranged in a hollow sphere.
31. (b) Diamond is a metastable allotrope of carbon, where the carbon atoms are arranged in a variation of the face-centred cubic crystal structure called a diamond lattice.
The most common constituent of sand is silica (silicon dioxide, or SiO_2), usually in the form of quartz. Because of its chemical inertness and considerable hardness, it is the most common mineral resistant to weathering.
Marble is composed of recrystallized carbonate minerals, most commonly calcite or dolomite. Calcite is a carbonate mineral and the most stable polymorph of calcium carbonate (CaCO_3).
A ruby is a pink to blood-red-coloured gemstone, a variety of the mineral corundum (aluminium oxide).
32. (d) The compound is always formed by absorption or evolution of energy but no energy is released or absorbed during the formation of mixture.
33. (b) (i) CO_2 is an acidic oxide. It dissolves in water forming unstable carbonic acid.

$$\text{H}_2\text{O} + \text{CO}_2 \rightleftharpoons \text{H}_2\text{CO}_3$$
(ii) Limewater $\text{Ca}(\text{OH})_2$ is turned milky on passing CO_2

$$\text{Ca}(\text{OH})_2 + \text{CO}_2 \xrightarrow{\text{insoluble}} \text{CaCO}_3 + \text{H}_2\text{O}$$
34. (a) These compounds are used in the manufacture of the following products. Cellulose nitrate- Gun powder, Potassium Sulphate- Fertiliser, Potassium salts of fatty acids- Soft soap, Calcium oxide- Glass.
35. (a) n-heptane has octane number of 0.0
2-methyl heptane \rightarrow 21.7
Iso-octane \rightarrow 100.00
2, 2-dimethyl hexane \rightarrow 72.5
36. (d) Rectified spirit is a mixture with composition of 95% ethanol and 5% water. Absolute alcohol is 100% concentrated ethanol. Power alcohol is a mixture of 75-80% petrol, 20-25% ethanol and minute amounts of aromatic compounds.
37. (c) Isotopes have same atomic number (number of protons) but different mass number (number of neutron + number of protons).
38. (d)
39. (c) Carbon monoxide gas forms an irreversible complex with the haemoglobin of the blood.
40. (a) Chemical formula of sodium thiosulphate is $\text{Na}_2\text{S}_2\text{O}_3 \cdot 5\text{H}_2\text{O}$. It is also called as Hypo. It is used for fixing negative in photography. It leads to the removable of silver bromide.
41. (a) Potassium bromide is used as sedative.
42. (c) L.P.G. is a mixture of Propane and Butane and Iso butane of hydrocarbons. It is used for Cooking in Houses. These Gases are in liquid form at a Very high temperature. This mixture of liquid hydrocarbons is called as L.P.G.
43. (d) Nitrochloroform is a broad-spectrum antimicrobial which is used as a fungicide, herbicide, insecticide and nematicide. It is also known as Chloropicrin.
44. (a) Bullet-proof windows are constructed using several layers of polycarbonate and/or laminated glass
45. (d) Colloids are a mixture in which one substance is divided into minute particles (called colloidal particles) and dispersed throughout a second substance. The substances are present as larger particles than those found in solution, but are too small to be seen with a microscope.
46. (c) Brass is an alloy of copper and zinc. The proportions of zinc and copper can vary between different types of brass alloys having different mechanical and electrical properties.
47. (b) Baking soda is sodium bicarbonate with chemical formula NaHCO_3 . It is primarily used in baking industries as a leavening agent.
48. (b) The solids in which the constituent particles of matter are arranged and organized in a specific manner are called Crystalline Solids. These solids contain crystals in their structure and each crystal has definite geometry. The sharp freezing point is found in crystalline solids. This is because the distance between same atoms/molecules or ions is same and remains constant, unlikely from amorphous solids
49. (a) Teflon or Polytetrafluoroethylene is a strong and nonflammable synthetic resin produced by the polymerization of tetrafluoroethylene.
50. (c)
51. (a) Vanaspati ghee is manufactured from vegetable oil by a process called 'hydrogenation'. By passing hydrogen gas. Vegetable Oil contains unsaturated fatty acids; upon hydrogenation it is converted into saturated fatty acids to form vanaspati ghee.
52. (e) Liquefied Petroleum Gas or LPG consists mainly of propane, propylene, butane, and butylene in various combinations. It is produced as a by-product of natural gas processing and petroleum refining.
53. (a)
54. (b) The viscosity of the liquid tends to decrease with the increase in temperature. The temperature effect on viscosity is different for liquid and gases.
55. (c) Brass and Bronze are metal alloys of copper. Brass is a metal alloy of copper and zinc, while Bronze is an alloy of copper and tin.
56. (a) Natural gas is a mixture of gases which are rich in hydrocarbons. The main composition of it is methane, other gases present are nitrogen, carbon dioxide etc. Natural gas reserves are deep inside the earth near other solid & liquid hydrocarbons beds like coal and crude oil

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57. (a) Water gas used as a fuel gas. It is composed mainly of carbon monoxide and hydrogen. Water gas is produced by passing steam over incandescent coke.
58. (a) Baking soda is sodium bicarbonate with chemical formula NaHCO_3 . It is primarily used in baking industries as a leavening agent.
59. (d) Methyl Isocyanate gas (MIC) is used in preparation of agricultural product pesticide, a poisonous substance.
60. (d) Ice is less dense in comparison to liquid water. Actually when water freezes, water (H_2O) molecules form a crystalline structure by Hydrogen bonds. These bonds cause molecules to push apart lowering the density of water (H_2O).
61. (c) The flavour of apples is mainly due to the ethanol ($\text{C}_2\text{H}_5\text{OH}$).
62. (d) Nail varnish remover generally contains acetone (CH_3COCH_3).
63. (c) Chlorofluoro carbon (CF_2Cl_2) is also known as freon. It is used as refrigerants in refrigerators and air conditions. It is also used as propellant in aerosols and foams.
64. (d) German silver is an alloy of copper (25-50%), zinc (25-35%) and nickel (10-35%). It is used in utensils and resistance wire.
65. (c) Pure water is neutral in nature hence, the pH value of pure water is 7.
66. (d) Magnesium sulphate (MgSO_4) is used as a mordant in dyeing and tanning industry.
67. (a) Acetylene is the nontoxic gases that help in formation of enzymes which ripen fruit. Ripening is a process in fruits causes them to become more palatable.
68. (a) The pH of fresh ground water slightly decreases upon exposure to air because when it comes to air, it absorbs the carbon dioxide (CO_2), and forms carbonic acid (H_2CO_3) which is a weak acid i.e. less pH.
69. (a) The main cause of hardness of water is presence of Ca or Mg ions. When hard water containing these ions is treated with soap solution it reacts to form white cruddy ppt known as scum.
70. (c) Silica and aluminium are the two main constituents of granite. Granite contains 70-77% of silica and 11-13% of aluminium in the form of (Al_2O_3).
71. (b) The white solid remains in the container when hard water is evaporated completely is mainly due to the presence of carbonates of Ca and Mg and also due to presence of traces of chloride and sulphates of Ca and Mg.
72. (a) Water gas is a synthetic gas, having CO and H_2 . The gas is produced by passing steam over a red hot hydrocarbon fuel as coke.
73. (b)
74. (d)
75. (b) Hexane do not give sooty flame as it is alkane and saturated compound whereas Benzene, Naphthalene and Anthracene are aromatic and unsaturated so they give sooty flame.
76. (b) Ammonia (NH_3) obtained from different sources always has same proportion of Nitrogen and Hydrogen and it proves the validity of law of constant proportion.
77. (b) The force between protons and neutrons in the nucleus is short range strong interaction.
78. (b) Rutherford determined that the particles that made up the gold foil must consist mostly of empty space since most of the alpha particles passed through. However, some regions of the gold must have been too dense to allow the alpha particles through, and this heavy part of the atom was what Rutherford called the nucleus. He concluded that it was the nucleus that held most of the atom's mass.
79. (d) An orbital is the area around an atom where the electron (or electrons) are most likely to be. (90-95% probability)
80. (b) Isotopes have same atomic number (A) but different atomic mass (Z). Hence the value of neutrons (Z-A) will be different.
81. (c) Species containing same number of electrons are called Isoelectronic. Isobars have same atomic mass but different atomic number. Isobars are elements having the same numbers of neutrons.
82. (d) In case of a neutral atom
Number of protons = Number of electrons
Anion is formed by gain of electron (s) by a neutral atom. Thus in case of anion.
Number of electrons > Number of protons
83. (c) Nitrogen (Z = 7) has the electronic configuration $1s^2 2s^2 2p_x^1 2p_y^1 2p_z^1$ (i.e. ns² np³)
84. (a) The charged carbon atom in a carbocation is a "sextet", i.e. it has only six electrons in its outer valence shell instead of the eight valence electrons that ensures maximum stability (octet rule). Therefore carbocations are often reactive, seeking to fill the octet of valence electrons as well as regain a neutral charge.
85. (a) The electron was discovered in 1896, by the British physicist J. J. Thomson, using cathode rays while doing discharge tube experiments.
In 1886, Eugen Goldstein discovered the existence of a new type of rays in discharge tube and named them as anode rays or canal rays. Canal or anode rays travel in straight line and are deflected by electric field towards cathode which proves that they are composed of positively charged particles. These lightest positively charged particles were named and characterised as protons by Ernest Rutherford in 1919 who proposed Rutherford model for atom to explain the atomic structure.
Anti-electron or in other words the positron was discovered in 1932 by Anderson, a physicist and he found that the bombardment of boron with an alpha particle resulted in the emission of this particle.
In 1932, James Chadwick, an English physicist who had worked with Rutherford, detected neutrons.
86. (d) The "plum pudding model" was put forward by J.J. Thomson in 1904. In this model, the atom is made up of negative electrons that float in a "soup" of positive charge, much like plums in a pudding or raisins in a fruit cake. In 1906, Thomson was awarded the Nobel Prize for his work in this field.
Louise de Broglie suggested that electron exhibits a dual nature. Broglie also got Physics Nobel Prize for his theory.
In 1913, Bohr proposed his quantized shell model of the atom to explain how electrons can have stable orbits around the nucleus.

- Ernest Rutherford published his atomic theory describing the atom as having a central positive nucleus surrounded by negative orbiting electrons. This model suggested that most of the mass of the atom was contained in the small nucleus, and that the rest of the atom was mostly empty space.
87. (a) Quarks have fractional electric charge values—either $\frac{1}{3}$ or $\frac{2}{3}$ times the elementary charge.
The positron has an electric charge of $+1e$, a spin of $\frac{1}{2}$, and has the same mass as an electron.
A neutrino is an electrically neutral, weakly interacting elementary subatomic particle with half-integer spin. All evidence suggest that neutrinos have mass but that their mass is tiny even by the standards of subatomic particles. Their mass has never been measured accurately.
Photon has zero mass and rest energy.
88. (b) Isotopes are variants of a particular chemical element: while all isotopes of a given element share the same number of protons and electrons, each isotope differs from the others in its number of neutrons. For example, carbon-12, carbon-13 and carbon-14 are three isotopes of the element carbon with mass numbers 12, 13 and 14 respectively. The atomic number of carbon is 6, which means that every carbon atom has 6 protons, so that the neutron numbers of these isotopes are 6, 7 and 8 respectively.
89. (c) In ${}_{38}^{90}\text{Sr}^{2+}$,
Atomic number = no. of protons = 38
Since it has lost $2e^-$ so no. of electrons = $38 - 2 = 36$
Atomic mass = no. of protons + no. of neutrons
 $90 = 38 + \text{no. of neutrons}$
 $90 - 38 = \text{no. of neutrons}$
 $52 = \text{no. of neutrons}$
Hence, no. of neutrons = 52, no. of protons = 38.
90. (d) Silver forms a black thin layer of silver sulphide on reaction with hydrogen sulphide which is present in trace amount in the atmosphere.
91. (a) Electron $- 9.1 \times 10^{-31} \text{ kg}$
Proton $- 1.00728 \text{ a.m.u.}$
Neutron $- 1.00867 \text{ a.m.u.}$
92. (a) In isotopes electrons and protons are found in equal Number while the number of Neutron is different.
93. (a) Ernest Rutherford discovered the nucleus of the atom.
94. (d) Atoms of the same element always have the same number of protons (if it had a different number of protons it would be a different element.)
95. (a) John Dalton (1766-1844), an English chemist is known for the work in the development of modern atomic theory. He was awarded the Royal medal for this.
96. (b) Atoms are neutral. When an atom loses electron, it becomes positively charged and when an atom gains electron, it becomes negatively charged. Hence, a body is charged negatively when it has acquired some electrons from outside.
97. (a) Atomic number of any element is same as electron number or proton number.
98. (b) $48 \text{ gram of O}_2 \times (1 \text{ mole of O}_2 \div 32 \text{ gm of O}_2) \times (6.022 \times 10^{23} \text{ molecules O}_2 \div 1 \text{ mole of O}_2) = 9.033 \times 10^{23} \text{ molecules of O}_2$
99. (c)
100. (b) Mass number = number of proton + number of neutron
 $12 = 6 + \text{number of neutron}$
 $12 - 6 = \text{number of neutron}$
number of neutron = 6
101. (c)
102. (a) Cathode rays are composed of negatively charged particle electron.
In any atom atomic number represent the number of electrons which is equal to the number of proton.
104. (b) A fusion reaction typically happens at high temperatures. In this reaction, various isotopes of hydrogen are fused together to form a single nucleus of Helium and a neutron of high energy. This formation of helium and highly energetic neutron is accompanied by release of large amount of energy which is solar energy.
105. (d)
106. (d) A radioactive substance emits alpha, beta and gamma particles. These differ in their velocities, the way they are effected by magnetic field and their abilities to penetrate or pass through matter.
107. (c) Yellow cake is a solid form of mixed uranium oxide U_3O_8 which is produced from uranium ore in the uranium recovery (milling) process.
108. (c) Given half life ($t_{1/2}$) = 4 months
Hence the amount of a radioactive substance remains half after 4 months. Hence, $\frac{3}{4}$ th of a substance would decay in two half lives i.e., 8 months.
109. (b) There are two main fundamental differences between the design of an atomic bomb, and the design of a nuclear reactor. One difference is the way the fission reactions are controlled and the second difference stems from the enrichment of the fuel.
110. (a) The energy released from the collapse of the gas into a star causes the centre of the star to become extremely hot. When the core is hot enough, nuclear fusion commences. Fusion is the process where two hydrogen atoms combine to form a helium atom, releasing energy.
The fusion reaction is a very efficient process, releasing a huge amount of energy. This is because a single helium atom contains less mass than two hydrogen atoms. The excess mass is released as energy.
111. (d) γ -rays has highest frequency range and hence highest penetrating power. These are able to travel many feet in air and many inches in human tissue. These readily penetrate most materials and are sometimes called "penetrating" radiation.
112. (b) The credit of construction of first nuclear reactor goes to Fermi. On December 2, 1942 Fermi reported having produced the first self sustaining chain reaction.
113. (a) Atomic bomb is a nuclear bomb that involves nuclear fission reactions. The most common isotopes and for fissile reactions are uranium (U - 235) and plutonium (P - 239). So in the event of an atomic bomb explosion, the most likely element that would enter the food chain is U - 235, among the options.

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114. (a) Radioactive dating is a technique which can be used to measure the age of rocks etc. In this process the half age of radio active is measured and on the basis of the quantity remaining after half the age of the rock, wood etc. is measured.
115. (b) Hydrogen bomb was discovered by the American scientist in 1952. It is based on the reaction of nuclear fusion. It is based on uncontrolled chain reaction.
116. (b)
117. (c) Nuclear fusion reactors work on the principle of fusion of smaller nuclei. They usually have Tokamak design. They operate at a very high temperature. Hydrogen bomb is based on this principle.
118. (c) Moderators like carbon and Graphite are used for slowing down the neutrons in a nuclear reactor. Neutrons from fission have very high speeds and must be slowed greatly by "moderation" to maintain the chain reaction.
119. (a) Rusting is a chemical process that results in corrosion or oxidation when oxygen metal comes in contact with a metal. It is a process in which iron turns into red iron oxide.
120. (a) Exposure of common salt to air is a physical change. In chemical sections, reactants produce substances which are different form the reactants No chemical realize taken plot when common salt (NaCl) is exposed to air as no new substances are produced.
121. (b) Oils are purified by steam distillation. In steam distillation process steam is bubbled through a heated mixture of raw material. Some of the target components will vaporize which are coded and condensed yielding a layer of oil and a layer of water.
122. (b) As per the law of conservation of mass, of reactant atom on the right side of a chemical equation must be equal to the no of elements on the left side such an equation is called balanced chemical equation.
123. (c) Zinc is much more reactive as compared to tin and may react with natural acids and bases in food materials.
124. (a) Carbon and Silicon both belongs to group IV and carbon have maximum valency of 4.
 $\text{C} : 2, 4$
 $\text{Si} : 2, 8, 4$
 But Si have vacant d-orbitals and can be used to accommodate more electrons. Thus, the maximum covalency of Si can be 6.
125. (c) When air reaches the dew point at a particular pressure, the water vapour in the air is in equilibrium with liquid water which means that water vapour is condensing at the same rate at which liquid water is evaporating. Below dew point, liquid water will begin to condense.
126. (a) The rates of most reactions increase with a rise in temperature. Raising the temperature increases the fraction of molecules having very high kinetic energies. These are the ones most likely to react when they collide. The higher the temperature, the larger the fraction of molecules that can provide the activation energy needed for reaction.
127. (b) Except option (2), all are applications of capillary action. One would not be able to consume soft drink, if there is no atmospheric pressure, i.e., in vacuum.
128. (d) Ammonium chloride decomposes into ammonia and hydrogen chloride gas.
 $\text{NH}_4\text{Cl} \rightarrow \text{NH}_3 + \text{HCl}$
 It produces fumes of ammonia and hydrochloric acid.
129. (c) The zinc serves as a sacrificial anode, so that it cathodically protects exposed steel.
130. (b) $\text{CaO} + \text{H}_2\text{O} \longrightarrow \text{Ca}(\text{OH})_2 + \text{heat}$
 $\text{Ca}(\text{OH})_2$ formed will be basic thus $\text{pH} > 7$.
131. (a) The inexhaustive source of energy of stars is the conversion of Hydrogen in Helium. The major part of sun is made up of Hydrogen and Helium and it's inner temperature is 107° K . In such a high temperature in the fusion of hydrogen Nucleas take place which results in the releases of huge energy.
132. (c) Zinc Phosphide is used as rat poison for killing rat and Zinc Sulphide is also called as Philosopher's wool white silver chloride is known as horn silver. It is used in artificial rain while Silver Nitrate is used in making ink for the purpose of voting.
133. (c) Soda water obtained by passing CO_2 gas in water produces a low concentration of carbonic acid which is slightly acidic in nature.
134. (b) Soaps are sodium or other salts of fats and oils. Fats and oils can easily be broken down into simple molecules like fatty acids and glycerol by microbes and hence soaps are biodegradable while lab detergents/detergents are synthetic compounds generally ammonium or sulfate salts with long chain which cannot be degraded by bacteria present in the sewage.
135. (c) Nitrification is the process whereby reduced forms of inorganic and organic nitrogen like ammonia or ammonium are oxidized to nitrite or nitrate.
136. (c)
137. (b) Bakelite is the trade name of resin produced by combination of phenol-formaldehyde. It is a hard, infusible, and chemically resistant plastic type.
138. (c)
139. (b) Soap removes grease by Emulsification.
140. (d) The reactivity series is a series of metals, in order of reactivity from highest to lowest. It is used to determine the products of single displacement reactions, whereby a metal placed higher in the activity series can displace the metal that occupies a lower position from the aqueous solution of its salt.
141. (a) Corrosion is the deterioration of a metal as a result of chemical reactions between it and the surrounding environment. Black coating on silver is due to formation of silver sulphide. It is formed by reaction of silver with hydrogen sulphide in the atmosphere. Copper metal when exposed to air turns green in colour due to corrosion. It is a mixture of copper carbonate and copper hydroxide. Iron reacts with atmospheric oxygen and moisture to form ferrous oxide which is brown in color and is formed due to corrosion.
142. (a) Burning of paper is a chemical change because it is irreversible.
143. (c) Reverse osmosis method is used to obtain pure water from water containing a salt or for desalination of sea water.
144. (c) A chemical change a new substance is formed. During crystallisation of table salt from sea water no new substance is formed hence, it is not a chemical change.

144. (c)
145. (b) The rusting of iron nail takes place in the presence of air (oxygen) and water (moisture). It increases the weight of iron nail due to the formation of rust.

$$4\text{Fe} + 3\text{O}_2 + x\text{H}_2\text{O} \rightarrow 2\text{Fe}_2\text{O}_3 \cdot x\text{H}_2\text{O}$$

 Rust
146. (d) On adding water, quicklime (CaO) gives a hissing sound and forms calcium hydroxide commonly known as slaked lime.

$$\text{CaO} + \text{H}_2\text{O} \rightarrow \text{Ca}(\text{OH})_2 + 15000 \text{ calories}$$
147. (a) Vulcanisation is a process in which natural rubber is treated with 3-5% sulphur. It introduces sulphur bridges between polymer chains thereby increasing its tensile strength, elasticity and resistance to abrasion.
148. (a) Lime water is actually $\text{Ca}(\text{OH})_2$. When it reacts with CO_2 , insoluble CaCO_3 is formed which turns solution milky. When excess CO_2 is added, CaCO_3 reacts with water and CO_2 to form Calcium bicarbonate which is soluble. That is why the solution clears out.
149. (a) Heating Camphor-Sublimation
 Cooling of water vapor up to room temperature-condensation
 Cooking an egg-Chemical change
 Formation of water vapor at room temperature-Evaporation
150. (d) In ClO_4^- , Cl is in its maximum oxidation state that is +7 so it cannot go disproportionation reaction because it cannot further oxidised.
151. (a) Covalent bonds being directional is that atoms bonded covalently prefer specific orientations in space relative to one another. As a result, molecules in which atoms are bonded covalently have definite shapes.
152. (c) Freezing of water is not a chemical change as ice when melt changes back to water showing physical change.
153. (c) Mercuric oxides got reduced to mercury and its oxidation number changes from +2 to 0. Whereas in other reaction are showing oxidation reaction.
154. (a) Sodium bicarbonate is a chemical compound with the formula NaHCO_3 .
155. (b)
156. (d) Oxides of Sodium readily dissolved in water as it has ionic bond which breaks in water easily other oxides have covalent bond which do not break easily.
157. (a)
158. (b) Water gas is a fuel gas consisting mainly of carbon monoxide and hydrogen, made by passing steam over incandescent coke.
159. (a) The most abundant element in the universe is hydrogen, which makes up about 3/4 of all matter. Helium makes up most of the remaining 25%. Oxygen is the third most abundant element in the universe. All of the other elements are relatively rare.
160. (b) Graphite is an allotropic form of the element carbon. Graphite can act as moderator because it can slow down the speed of the neutrons so that nuclear fission reaction can be carried out in controlled manner in nuclear reactors.

161. (a) The sun generates its energy by nuclear fusion of hydrogen nuclei into helium. Coming together of smaller nuclei and formation of heavy nucleus is known as nuclear fusion process huge amount of energy is released in nuclear fusion process.
162. (b) The coated end of a match, known as the match "head", contains red phosphorus as the active ingredient and gelatin as a binder.
163. (b) Compounds of bromine have been used as sedatives, hypnotics, and analgesics.
164. (c) As (Arsenic) is a metalloid. In this group both As and Sb are metalloids.
165. (d) The most rare naturally occurring element is known as astatine. An estimated 30 grams of Astatine (At) is available in Earth's crust. It is radioactive and longest half-life of any of its isotope is 8 hours. It is a halogen and placed in the Gr-17 (VIIA) of the periodic table.
166. (c) Fluoride, which is obtained from the element fluorine, slows down the process of decaying of enamel of tooth. It stops the loss of calcium and phosphate of enamel when exposed to acid following ingestion of food and drinks which contain sugars.
167. (b) Tetra ethyl lead $(\text{C}_2\text{H}_5)_4\text{Pb}$ is used as an antiknock compound. It is mixed with petrol to improve its quality. Therefore automobile exhausts lead, which pollutes city.
168. (c) Graphite is an allotrope of carbon. Alumina (Al_2O_3) and silica (SiO_2) are oxides and Brass is an alloy of Cu and Zn.
169. (a) Mercury exists in liquid state at room temperature. Bromine (Br) also exists as liquid at room temperature however it is a non-metal. Some other metals like caesium, gallium and rubidium exists as liquid slightly above room temperature.
170. (d) Chlorophyll is a green pigment in which at the centre of the ring is a magnesium ion. It also bears a long phytol chain.
171. (c) Unstable allotropes of nitrogen consisting of more than two nitrogen atoms have been produced in the laboratory, like N_3 and N_4 . Under extremely high pressures (1.1 million atm) and high temperatures (2000 K), as produced under diamond anvil conditions, nitrogen polymerizes into the single bonded diamond crystal structure, an allotrope nicknamed "nitrogen diamond".
172. (d) Silicon is a semiconductor which means that unlike metal its electrical conductivity increases with temperature. As a semiconductor, silicon (Si) is used to make transistor which amplify or switch electrical currents.
173. (a) Reactivity of halogens decreases as we move down the group. i.e. fluorine is most reactive and iodine is least reactive, since there is successive increase in size, decrease in electronegativity and decrease in dissociation energy of X-X bonds.
174. (b) A nuclear reactor coolant — usually water but sometimes a gas or a liquid metal (like liquid sodium) or molten salt — is circulated past the reactor core to absorb the heat that it generates. The heat is carried away from the reactor and is then used to generate steam.
- Control rods that are made of a neutron poison are used to absorb neutrons. Absorbing more neutrons

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in a control rod means that there are fewer neutrons available to cause fission, so pushing the control rod deeper into the reactor will reduce its power output, and extracting the control rod will increase it. A neutron moderator is a medium that reduces the speed of fast neutrons, thereby turning them into thermal neutrons capable of sustaining a nuclear chain reaction involving uranium-235. Commonly used moderators include regular (light) water (roughly 75% of the world's reactors), solid graphite (20% of reactors) and heavy water (5% of reactors). Nuclear fuel is a material that can be 'burned' by nuclear fission or fusion to derive nuclear energy. Nuclear fuel can refer to the fuel itself, or to physical objects (for example, bundles composed of fuel rods) composed of the fuel material, mixed with structural, neutron moderating, or neutron reflecting materials. The most common nuclear fuels are uranium-235 (^{235}U) and plutonium-239 (^{239}Pu).

175. (b) Carbon, hydrogen and nitrogen were primarily responsible for the origin of life on the earth. It is believed that organic molecules could be formed by inorganic process under primitive earth conditions. The gases present on the earth like Carbon, Hydrogen and Nitrogen might have combined in favourable conditions provided by the primitive earth to produce amino acids and other organic molecules like sugars, nucleic acids bases and lipids. These molecules are called building blocks of life.
176. (c) Mercury and bromine are liquids of room temperature and standard pressure.

177. (a)
 (i) MnO_2
 Oxidation of Mn in MnO_2 :

$$x + 2(-2) = 0$$

$$x = 4$$

- (ii) $\text{H}_2\text{S}_2\text{O}_7$
 $2(+1) + 2(x) + 7(-2) = 0$
 $2 + 2x - 14 = 0$

$$x = 6$$

- (iii) CaO
 $x + 1(-2) = 0$
 $x = 2$
- (iv) NaAlH_4
 $1(+1) + x + 4(-1) = 0$
 (H is hydride in this compound)
 $1 + x - 4 = 0$
 $x = 3$

178. (d) Electron affinity generally decreases from top to bottom in a group. Atomic radii increases from top to bottom as energy levels increases because as we move down a group number of electrons increases.
179. (b) Enriched uranium are the uranium in which the component of Ratio active isotopes U^{235} are artificially increased. It is used in atomic reactors.

180. (d) **List I**
(Naturally occurring substance)
- A. Diamond
 - B. Marble
 - C. Sand
 - D. Ruby
- List II**
(Elements present)
- 4. Carbon
 - 1. Calcium
 - 2. Silicon
 - 3. Aluminium

181. (b) Graphite is used as moderator in nuclear reactors. Nuclear reactor provide us Nuclear energy for structural works. Heavy water is also used as moderator in Nuclear reactors.

182. (d) New elements added to the periodic table are, Nihonium (Nh) with atomic number 113, Moscovium (Mc) with atomic number 115, Tennessine (Ts) with atomic number 117 and Oganesson (Og) with atomic number 118.

183. (c) Gold, Silver, copper along with platinum are the metals which occur in nature in native forms. These are called native metals as these are found in its metallic form in pure form. Gold, Silver and copper belong to group 11 in the periodic table.

184. (c) Hydrogen has three naturally occurring isotopes denoted by ^1H , ^2H and ^3H .

The structure of diamond.

In diamond each carbon (C) atom shares electrons (e⁻) with four other carbon atoms forming four single bond. shape of structure appears three dimensional network structure. It is very hard structure being used in cutting and sharpening tools. It cannot be used as lubricant.

186. (c) Alcoholic fermentation, is a biological process in which sugars such as glucose, fructose, and sucrose are converted into cellular energy and thereby produce ethanol and carbon dioxide as metabolic waste products.

187. (c) Uric acid is present in the urine of mammals. High blood concentrations of uric acid can lead to gout which is a form of painful arthritis.

188. (d) Vitamin C is also known as ascorbic acid and L-ascorbic acid. As a supplement it is used to treat and prevent scurvy. Vitamin C is water soluble vitamin and hence the body does not store it. It is available in citrus fruits, broccoli and tomatoes.

189. (b) Blue Baby Syndrome is an illness that begins when large amounts of nitrates in water are ingested by an infant and converted to nitrite by the digestive system. The nitrite then reacts with oxyhemoglobin to form methemoglobin, which cannot carry oxygen. If a large amount of methemoglobin is formed in the blood, body tissues may be deprived of oxygen, causing the infant to develop a blue coloration of their mucous membranes and possibly digestive and respiratory problems. This condition is also known as methemoglobinemia.

190. (b) The acid present in gastric juice is hydrochloric acid (HCl). The role of HCl in stomach is to break down foods and cause release of enzymes that further aid digestion.

191. (c) Hydrofluoric acid (HF) is used in the etching of glass. Hydrochloric acid secreted by oxyntic cell activates proenzyme pepsinogen to pepsin and also provides the acidic pH optimal for pepsins.

194. (c) Calcium carbonate, magnesium carbonate and magnesium hydroxide are important chemicals used in the making of antacids to reduce indigestion. NaOH is not used in antacid tablets as it is highly caustic.
195. (c) The nature of tooth paste is basic the food that we consume produces acid in our tooth. The acid produced damages enamel of our tooth. Hence basic toothpaste is used to the acid produced.
196. (d) Equivalent weight is defined as the weight of a substance that combines with 1.008 gm of hydrogen or 8 grams of oxygen. For acids it can be obtained by dividing the molecular weight by the basicity of the acid.
- Equivalent Wt. =
$$\frac{\text{Molecular weight}}{\text{basicity}}$$
$$\frac{98}{2} = 49.$$
197. (d) Hydrofluoric acid is one of the most dangerous acids known. It needs to be treated differently than even strong acids like sulphuric and hydrochloric. HF reacts with many materials, therefore, should be avoided from coming in contact with glass, concrete, metals, water, other acids, oxidizers, reducers, alkalis, combustibles, organics and ceramics. Hydrofluoric acid slowly dissolves silicon dioxide (SiO_2) which is a major component of most of the types of glass. It forms water soluble Hexafluorosilicic acid (H_2SiF_6) and gaseous silicon tetrafluoride (SiF_4). This particular property of the acid is used to etch glass for removing particularly stubborn stains.
198. (c) Milk contains lactic acid which is a hydrogen or proton donor. Soda water is a plain water in which CO_2 gas is dissolved making it carbonic acid. Malic acid in apple, which is a dicarboxylic acid, found in wine, rhubarb and grapes too.
199. (d) Oxalic acid can be used for many household uses as a cleansing agent and for bleaching. So it is used as a constituent for removal of ink stains. Nitric acid is a chemical that is extensively used in the manufacture of explosives such as TNT. Boric acid is a weak acid derived from minerals with mild antiseptic and antifungal properties. It is used as an antiseptic in minor cuts or burns and as very dilute solutions to treat eye or ear infections. Benzoic acid is the most stable type of food preservative for juices and drinks that are naturally in acidic pH range.
200. (c) Sodium stearate is a typical example of detergent or soap. It contains a long hydrocarbon tail and a carboxylic acid head group.
201. (d) Formic acid – Ant's sting
Tartaric acid – Tamarind
Oxalic acid – Spinach
Citric acid – Orange
202. (d) Acids are those substances in which Hydrogen is found and they produce Hydrogen ion in aqueous solution. We use many natural acids in our usual life. In lemon, Orange and grapes citric acid is found while malic acids is found in raw apples and in milk lactic Acid is found while in Vinegar Acetic Acid (CH_3COOH) is found.

203. (c) Chemical formula of Hydrochloric acid is HCl. It consists of one atom of Hydrogen and one atom of Chlorine connected with a covalent single bond.
204. (d) Generally, iodized salt contains Iodine either as potassium Iodide or potassium Iodate.
205. (a) Antacids help in neutralizing excess acid environment in the stomach cause due to indigestion and other factors. These generally contain alkaline ions or basic salts that chemically neutralize stomach gastric acid. Magnesium hydroxide is an alkaline salt works as a common antacid
206. (d) Compound Present in Bones — Calcium Phosphate
Acid Present in Vinegar — Acetic Acid
Souring of milk — Lactic acid
Ripening of fruits — Ethylene
207. (a) The tracking of people by trained dogs is based on the recognition of carboxylic acid in sweat from feet.
208. (c) Nitric acid is used in the production of fertilizers. The principal chemical produced from nitric acids ammonium nitrate, sulphuric acid is used in the production of explosives like TNT, nitroglycerine, gun cotton, etc.
209. (c) Addition of water to an aqueous solution of HCl decreases the pH because on dilution the number of H^+ ions (from water) increases. Now since $[\text{H}^+] = 10^{-\text{pH}}$ As $[\text{H}^+]$ increases pH decreases.
210. (d) Lactic acid occurs in sour curd.
Tartaric acid occurs in tamarind.
Oxalic acid occurs in tomato.
Citric acid occurs in all citrus fruits like orange, lemon etc.
211. (c) Stainless steel contains sufficient chromium to form a passive film of chromium oxide, which prevents further surface corrosion by blocking oxygen diffusion to the steel surface and blocks corrosion from spreading into the metal's internal structure.
212. (c) Probably copper which can be found as a naturally occurring native metal which is sometimes found in large lumps on the ground. People learned to make this into copper tools and other things, although, for a metal, it is quite soft. When it was melted over fire, people learned how to make an alloy called bronze, which is much harder and stronger than copper.
213. (d) Sulphur and nitrogen are non-metals and sugar is a compound made of different elements like carbon, hydrogen and oxygen.
214. (d) The kind of coal in increasing order of metamorphism due to heat and pressure with passage of time or alteration is given below:
Peat → Lignite → sub-bituminous → Bituminous Anthracite
So anthracite coal has reached highest maturation stage of coal and it is shiny and hard. Its carbon content (95%) is also very high and hence has high calorific value.
215. (d) At room temperature (30°C), Hg, Ga, Cs metals are liquids.
216. (a) Chemically, stainless steels are 75 – 90% iron. They are alloyed with varying amounts of chromium, nickel, and/or molybdenum.
217. (a) Gold is a stable noble metal and resists the action of the atmosphere and occurs in free state.

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218. (d) Titanium (Ti) metal is important for its strength, low density and corrosion resistance. It has better corrosion resistance and less reactivity than aluminium. Hence, Titanium pins remains uncorroded in the body.
219. (a) Cinnabar is HgS .
220. A homogeneous mixture of two or more metals is known an Alloys.
221. (d) Non-metals are very brittle. They are not malleable (pounded into sheets) or ductile (i.e drawn into wires).
222. (a) Only 1 is true. Sodium and potassium oxides are soluble in water.
223. (c) Radium was discovered in 1898 by Madame Curie from pitchblende a material that contains uranium.
224. (d) Phosphor bronze is used for manufacture of springs and suspension filaments in electrical instruments.
225. (b) Haematite – Iron (Fe_2O_3)
Galena – Lead (PbS)
Bauxite – Aluminium (Al(OH)_3)
Malachite – Copper ($\text{Cu}_2\text{CO}_3(\text{OH})_2$)
226. (c) Charles Martin Hall was an American inventor, businessman and chemist. He is best known for his invention in 1886 of an inexpensive method for producing aluminium which became the first metal to attain wide spread use since the prehistoric discovery of iron.
227. (d)
228. (c) German silver is a mixture of copper, zinc and nickel. It is an alloy metal. It is used to make pots and toys due to hardness toughness and resistance to corrosion.
229. (d) Tungsten has the highest melting point and lowest vapour pressure of all metals.

K	Potassium
Na	Sodium
Ca	Calcium
Mg	Magnesium
Al	Aluminium
C	Carbon
Zn	Zinc
Fe	Iron
Sn	Tin
Pb	Lead
H	Hydrogen
Cu	Copper
Ag	Silver
Au	Gold
Pt	Platinum

↑
Most reactive
↓
Least reactive

C H added for comparison

Reactivity Series of Metals

In the reactivity series of metals, copper is placed below the hydrogen. Hence, it is less reactive than hydrogen. On the other hand barium, lead and magnesium are placed above the hydrogen hence, these are more reactive than hydrogen.

231. (c) ‘Misch metal’ alloyed with iron is used in the cigarettes lighters. Misch metal is an alloy of cerium (50%), lanthanum (25%), neodymium (18%), praseodymium (5%) and other rare metals.

232. (a) Alkali metals such as lithium, sodium and potassium are soft metals. These can be easily cut with a knife.
233. (a) Undergoes sp^2 hybridization and forms three sigma bonds with three neighbouring carbon atoms.
234. (a)
235. (c)
236. (c) A metalloid is a chemical element with properties in between, or that are a mixture of, those of metals and non-metals. There is no standard definition of a metalloid, nor is there complete agreement as to which elements are appropriately classified as such. The six commonly recognised metalloids are boron, silicon, germanium, arsenic, antimony and tellurium. Elements less commonly recognised as metalloids include carbon, aluminium, selenium, polonium, and astatine.
237. (a) Natural gas is 95 percent Methane (CH_4) and have four other hydrocarbons:
 $\text{Ethane (C}_2\text{H}_6\text{)} - 2.5\%$, $\text{Propane (C}_3\text{H}_8\text{)} - 0.2\%$, $\text{Butane (C}_4\text{H}_{10}\text{)} - 0.06\%$, $\text{Pentanes Plus Decane (C}_5\text{H}_{12} + \text{C}_{10}\text{H}_{22}\text{)} - 0.02\%$. It also contains small amounts of: Nitrogen (N_2) – 1.6%, Carbon Dioxide (CO_2) – 0.7%, Hydrogen Sulphide (H_2S) – trace, Water (H_2O) – trace
238. (a) Pyrethrin is a natural plant derived substance that comes from the flowers of Chrysanthemum cineraria folium.
239. (c) Biogas is primarily a mixture of methane (CH_4) and inert carbon dioxide gas (CO_2). The gas is produced by the anaerobic digestion or fermentation of organic matter like manure, sewage sludge, municipal solid waste, biodegradable waste, etc. It is a clean and renewable fuel.
240. (a) Except $\text{Ca}(\text{CN})_2$ all are nitrogenous fertilizers.
241. (b) Pb_3O_4 commonly known as red lead is used as sindhoor.
242. (c) Alum is double sulphates having the composition $\text{M}_2\text{SO}_4 \cdot \text{M}_2(\text{SO}_4)_3 \cdot 24\text{H}_2\text{O}$. Where M stands for monovalent basic radicals. Alums used in purification of water.
243. (d)
244. (c) Gypsum is added in calculated quantity in order to adjust the rate of setting of cement. Alum is not present in cement.
245. (a) Aluminium sulphate is used in ‘foam’ fire extinguishers, which contains Sodium bicarbonate and aluminium sulphate in separate receptacles on being mixed they form the foam in the form of bubbles of CO_2 .
246. (d)
247. (c) Reinforced glass is used in bullet proof covers. $\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$ (Gypsum) is added to cement clinker to retard setting action of cement.
248. (d) Gun powder is a powdered explosive containing potassium nitrate, powdered charcoal and sulphur.
249. (d) Alum is used to purify water, as it has the property to coagulate mud particles.
250. (a) C11-L-methyl-methionine is used in positron emission tomography (PET) to locate and differentiate primary brain tumor and also to monitor the therapeutic effect of tumour irradiation.
251. (c) Its main constituent is butane which burns giving off a lot of heat. Butane is easily liquefied under high pressure.

252. (d) *Pseudomonas putida* is the new strain of bacteria produced by biotechnology in alcohol industry.
253. (d) Soap helps to lower the surface tension of solution, thus soap gets stick to the dust particles and grease and these are removed by action of water.
254. (d) Morphine is an analgesic drug that is used to relieve severe pain.
Boric acid, also called orthoboric acid, is a weak acid of boron often used as an antiseptic or insecticide.
Nickel silver, also known as German silver, is a copper alloy with nickel and often zinc.
Sodium is an extremely reactive metal and a powerful reducing agent. When exposed to air, it very quickly oxidizes. It also reacts violently to water. We store sodium under kerosene because kerosene is already highly reduced and won't react with sodium metal.
255. (c) Petroleum products are usually grouped into three categories: light distillates (LPG, gasoline, naphtha), middle distillates (kerosene, diesel), heavy distillates and residuum (heavy fuel oil, lubricating oils, wax, asphalt). Hence, the correct option would be: Gasoline, kerosene, diesel.
256. (b) Aaron Ciechanover, Avram Hershko and Irwin Rose have been awarded the Nobel Prize in Chemistry 2004 for "...helping to understand how the human body gives the 'kiss of death' to rogue proteins to defend itself from diseases like cancer"
257. (a) Potassium bromide is a salt used to make photographic papers and plates and for process engraving.
Gunpowder, also known as black powder, is a mixture of sulphur, charcoal, and potassium nitrate (saltpeter)—with the sulphur and charcoal acting as fuels, while the saltpeter works as an oxidizer.
The principal use of potassium sulphate is as a fertilizer.
 $KHC_4H_4O_6$, is used in baking powder, in the tinning of metals, and as a component of laxatives.
258. (d) Nickel silver, also known as German silver, is a copper alloy with nickel and often zinc.
Solders are typically made from tin or lead or a combination of both in the ratio of 63:37 respectively. Calcium hypochlorite, also known as bleaching powder, is a chemical compound with formula $Ca(ClO)_2$. It is widely used for water treatment and as a bleaching agent. This chemical is considered to be relatively stable and has greater available chlorine than sodium hypochlorite (liquid bleach).
Hypo solution is the abbreviation for sodium thiosulphate or sodium hyposulphite, a chemical used to fix the image on photographic film after it has been developed.
259. (d) The main constituent of LPG (Liquefied petroleum gas) is butane and propane.
Methane is supplied to homes and factories as PNG (Piped Natural Gas) through pipelines for burning. CNG, PNG, LNG are same fuel. Natural gas (NG) in different forms for the purpose of storage and transportation.
LPG is different than NG. It consists mainly of butane and propane.
260. (d) Asphalt, paraffin wax and Gas oil (Diesel) are obtained from fractional distillation of crude oil as different fractions in the refining of oil.

261. (a) The calorific value of a fuel is the quantity of heat produced by its combustion at constant pressure and under normal (standard) conditions (i.e to 0°C and under a pressure of 1 atmosphere)
From above – fuels in terms of decreasing calorific values are as follows : 1 > 2 > 3 > 4
262. (a) Sodium sulphate and sodium silicate are added to keep the washing powder dry. Sodium triphosphate or sodium carbonate is added to washing powder to maintain the alkalinity.
263. (a) Potassium nitrate upon dissociation serves as a soluble source for two major plant nutrients, nitrate and potassium. It is thus serve as a fertilizer for high value crops. Sulphuric acid has either a direct or indirect application in the manufacture of various chemicals including fertilizers. Sulphuric acid production has also been used to estimate the economy of a country and thus is called the king of chemicals. Lime water is calcium hydroxide which is basic in nature, magnesium hydroxide is also called milk of magnesia for its laxative and antacid properties.
264. (c) Superphosphate of lime – $Ca(H_2PO_4)_2$
Urea – $CO(NH_2)_2$
Indian saltpeter – KNO_3
Chile saltpeter – $NaNO_3$
265. (a) Carbohydrates such as sugars (simple) are covalent compounds, yet they are soluble in water due to their low molecular weight and because they are able to form hydrogen bonds with water.
Correct matching will be as following :
- | List – I | List – II |
|------------------|-----------------|
| A. Morphine | 3. Analgesic |
| B. Sodium | 4. Kerosene oil |
| C. Boric Acid | 1. Antiseptic |
| D. German Silver | 2. Alloy |
266. (d) Portland Cement is a building material, its main constituents are - Silica, Alumina and Calcium sulphate. Alumina causes the cement fast setting, Silica provides strength and Calcium sulphate ($CaSO_4$) minimises the setting time.
267. (c) Phosphorus is of the two types - White and red. White phosphorus is highly reactive and catches fire at normal room temperature but red phosphorus does not show such nature.
268. (b) Exponent - Law
 John Dalton - Law of multiple proportion
 Joseph Proust - Law of definite proportion by weight
 Antoine Lavoisier - Law of Conservation of mass
 Joseph Louis Gay Lussac - Law of definite proportion by volume.
269. (a) Rayon is made from naturally occurring cellulose. Rayon is also called artificial silk.
270. (a) Red phosphorus is mostly used in the manufacture of safety matches and in making smoke bombs.
271. (a) Iodine is a powerful antiseptic. It is used as a tincture of iodine which is 2-3% iodine solution in alcohol-water.
272. (b) Kevlar, a polymeric material is used for making bullet proof jacket.

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274. (c) Aristotle is known as the Father of Biology and he was the student of Plato. Aristotle distinguished about 500 species of birds, mammals and fishes. Darwin published the theory of Evolution and theory of natural selection, Theophrastus, is known as Father of Botany and Lamarck gave the theory of Lamarckism stating that environment plays an important role in certain changes in animals.
275. (d) Theophrastus is considered to be the father of Botany. He created Historia Plantarum that means History of Plants which was a "treatise on plants". Carolus Linnaeus is known as Father of Modern Taxonomy.
276. (c) William Roxburgh, a Scottish botanist is considered to be the father of Indian Botany. For the period 1776-1793 he worked at Coromandel Coast. He was instrumental in introducing many plant species to India. Birbal Sahni was an Indian paleobotanist who studied the fossils of the Indian subcontinent, K.C.Mehra, was an Indian Plant Pathologist, T.Sadashivam was an Indian freedom fighter, writer and journalist.
277. (b) Carl Linnaeus or Carolus Linnaeus (in Latin) was a Swedish botanist, physician, as well as zoologist. He laid the foundations of binomial nomenclature for the modern biological naming scheme. He is known as the father of modern taxonomy, and is also considered one of the fathers of modern ecology. Aristotle was known as a Father of Biology, Theophrastus is known as Father of Botany and Lamarck gave the theory of Lamarckism.
278. (c) Gregor Mendel worked on garden pea. This plant has short life cycle and is a self pollinating crop, which made it a suitable choice for genetic studies by Mendel.
279. (b) In 1892 Dmitri Ivanovsky in his article described of a non-bacterial pathogen infecting tobacco plants. Later the tobacco mosaic virus got discovered (first virus to be discovered) by Martinus Beijerinck in 1898.
280. (b) The viral particles are made up of only nucleic acid as its genetic material and some also have capsid made up of proteins. It is not cellular.
281. (a) The theory of 'Mutation theory' was propounded by a Dutch scientist; De-Vries in 1901. He had observed an unusual occurrence in a plant called evening primrose. Robert Hooke gave the cell theory and coined the term "cell", Malpighi, is known as "Father of microscopically anatomy" and Pasteur gave the term, Pasteurization.
282. (d) Wilhelm Johannsen was a Danish botanist, plant physiologist, and geneticist. In his book he introduced the term gene. This term was coined in opposition to the then common pangene that stemmed from Darwin's theory of pangenesis. This book had become one of the founding texts of genetics. Watson and Crick gave the Double helix structure of DNA in the year of 1953.
283. (c) Friedrich Miescher, a Swiss physician and biologist was the first researcher to isolate and identify nucleic acid. He isolated various phosphate-rich chemicals, which he called nuclein then, from the nuclei of white blood cells in 1869. It is the first report of the discovery and isolation of the genetic material.
284. (c) Jumping gene was discovered by McC lntok, which is a phenomenon present in maize which is usually known as transposition and used to demonstrate that genes are responsible for turning physical characteristics on and off. While, Mendel proposed the principles of inheritance and Heinrich Hertz gave theory of electromagnetic waves and provided the unit of sound.
285. (b) William Harvey was the first scientist who described the systemic circulation of blood by experimenting on small animals and fishes. He also found out that it is the heart which pumps blood throughout the whole body. Antony von Leeuwenhoek gave the cell theory, while Mendel gave the principles of inheritance.
286. (d) Christiaan Neethling Barnard was a South African cardiac surgeon performed the world's first successful human-to-human heart transplant on 3 December 1967. He is also credited with the first successful kidney transplantation in 1953, in the United States.
287. (c) The knowledge that the structure of DNA is double helical was described by Francis Crick and James Watson in 1953. Their description was based on a single X-ray diffraction image taken by Rosalind Franklin and Raymond Gosling in May 1952, as well as the knowledge given by Erwin Chargaff about the specific rules of nucleotides pairing. Fleming discovered the drug Penicillin which is an antibiotic drug.
288. (a) Karl Landsteiner is credited for the discovery of human blood groups. He also won the 1930 Nobel Prize for Physiology or Medicine for the same. Antonie Philips van Leeuwenhoek is commonly known as "Father of Microbiology", and often considered to be the first acknowledged microscopist and microbiologist. The terms Livine and Vinar doesn't exist.
289. (a) Anton Van Leeuwenhoek for the first time saw bacteria through a microscope that he made himself. He took samples of plaque from his own teeth and mixed them with water. When he looked at the mixture through his microscope he saw what he called "many very little living animalcules." These were some of the first recorded observations of what today we would call bacteria. Leeuwenhoek found that these were killed when he drank hot coffee. Louis Pasteur coined the term "pasteurization", Robert Virchow gave the "cell theory" and Robert Hooke identified the "cells".
290. (a) Eli Whitney invented the cotton gin that separates the seeds from cotton three hundred times faster than by hand. American inventor, pioneer, mechanical engineer, and manufacturer Eli Whitney is best remembered as the inventor of the cotton gin.
291. (a) A species inhabiting different geographical areas is known as allopatric species.
292. (a) Werner Arber along with American researchers Hamilton Smith and Daniel Nathans, had won the 1978 Nobel Prize in Physiology or Medicine for the discovery of restriction endonucleases. For the first

- time, Feldmann and Marks had demonstrated the production of transgenic plants without *in vitro* step. They just grew the *Arabidopsis* seeds with the gene containing *Agrobacterium tumefaciens*. Kary Mullis is the inventor of the technique PCR for *in vitro* synthesis of DNA fragments. Reverse transcriptase was discovered by Howard Temin and independently isolated by David Baltimore in 1970.
293. (d) Transduction and conjugation were discovered by Joshua Lederberg. Morgan investigated about the sex-linked inheritance in *Drosophila*. In 1956, Arthur Kornberg and colleagues had discovered the enzyme DNA polymerase I, also known as Pol I, in *Escherichia coli*. Hargobind Khorana, Marshall W. Nirenberg and Robert W. Holley were given the Nobel Prize for their work on the discovery of the genetic code in 1968.
294. (c) The instrument used for measuring blood pressure is known as *Sphygmomanometer* or BP apparatus. Blood pressure is usually measured from left brachial artery. Autoanalyser is a computer controlled instrument for various biochemical tests on sample of blood, urine or other body fluids. CT scanning, was developed by Godfrey Hounsfield in 1968, (Nobel Prize in 1979). *Gambusia* is a larvivorous fish, used as a biocontrol agent for mosquitoes.
295. (c) Carolus Linnaeus is credited as the father of modern taxonomy. He had created the binomial nomenclature of the living organism as he introduced it in *Species Plantarum* in 1753. The term taxonomy was originally coined by Augustin Pyramus de Candolle in 1813.
296. (b) The cell was discovered by Robert Hooke in 1665. The nucleus was the first organelle to be discovered. The oldest description of the nucleus was given by Anton van Leeuwenhoek (1632–1723). But the nucleus was described in more detail for the first time in 1831 by Scottish botanist Robert Brown in a talk at the Linnean Society of London. Lysosomes are found in animal cells but their presence in yeasts and plant cells is disputed.
297. (c) Hugo de Vries introduced the term mutation and developed the mutation theory of evolution. Darwin had given the theory of evolution. One gene one enzyme hypothesis was an idea which said that one gene is responsible for producing one enzyme only. This was proposed by Beadle and Tatum in 1941. The concept of Operon was given by Jacob and Monod in 1961.
298. (a) The causative agent of Anthrax is used as a potent bioweapon in warfare. Thalassaemia is a disease caused by defective genes of haemoglobin. Surrogacy is an intermediate stage in artificial insemination for producing an offspring. The science of altering genes is a branch of biology known as *transgenics*.
299. (c) Mendel worked on garden pea as it was easy for genetic studies and easy to work with as it had short lifespan, self-pollinating crop, and had seven distinguishable contrasted features to compare between. Pea (*Pisum sativum*) is a leguminous crop which belongs to the family Fabaceae.
300. (c) Willian Harvey discovered the circulatory system of animals. Stephan Hales is considered to be the Father of Plant Physiology. John Ray coined the term 'genera' in around 17th century. Karl Landsteiner discovered the blood groups in humans.
301. (c) In 1892, Dmitri Ivanovsky for the first time had described a non-bacterial pathogen which infected tobacco plants. Then the actual discovery of tobacco mosaic virus was done by Martinus Beijerinck in 1898. Anton van Leeuwenhoek of 17th century is credited with the discovery of bacteria for the first time in a drop of pond water under a glass lens. Theodor Schwann, Matthias Jakob Schleiden, and Rudolf Virchow proposed the cell theory. In 1839, Schwann and Schleiden suggested that cells were the basic unit of life.
302. (b) Father of Indian mycology (study of fungus) and plant pathology is E.J. Butler. Loose smut of wheat is a fungal disease of wheat in which the ears of and grains of wheat are replaced by a mass of dark spores. It is caused by *Ustilago tritici*. Testosterone is a male sex hormone. Codeine is a sedative drug. Caoutchouc is an Indian rubber. Eugenol is an aromatic oil of clove.
303. (a) Stem cells are of two types— (i) Embryonic stem cells and (ii) Adult stem cell. Embryonic stem cells are obtained from embryo at the time of the earliest stage of the development of embryo. These embryos could be develop either in uterus or in test tubes. The embryonic stem cells are responsible for the development of the organs like brain, Heart, muscles etc. The adult stem cells are found in the bone marrow Muscles and brain where they replace the damaged cells and produce new cells.
304. (a) In plants, meiosis occurs in the reproductive cells like in anthers and Ovary. In anthers pollen grains are formed by meiosis and within the ovary to form ovules.
305. (c) Connective tissues are the most diverse and widely distributed tissues in the body. Bone, types of blood are well-known connective tissues which perform many different functions and constitute different properties. Collagen fibres, fibroblasts and other components form important constituent of connective tissues.
306. (d) Fluid connective tissue is a form of tissue in which the matrix is in a liquid state. Blood and lymph are type of fluid connective tissue.
307. (c) Cellulose consists of long polymer chains of glucose units connected by a beta acetal linkage. Starch consists of two types of molecules, amylose and amylopectin. Both amylose and amylopectin are polymers of glucose.
308. (c) The subcutaneous layer is the innermost layer of the skin. It consists of a network of fat and collagen cells and functions as both an insulator, conserving the body's heat, and as a shock-absorber, protecting the inner organs.
309. (a) Paul Berg (1926), an American biochemist is considered as the father of genetic engineering. He evolved a technique to join DNAs from two different organisms.

3

Chapter

Biology

Cell Biology/ Genetics/ Blood

1. Blood cells do not shrink in blood because blood is
 - (a) hypertonic
 - (b) isotonic
 - (c) equimolar
 - (d) hypotonic
2. Xylem tissue is mainly concerned with the
 - (a) Photosynthesis of plants
 - (b) Transport of water and mineral nutrients in plants
 - (c) Storage of prepared foods in plants
 - (d) Transport of enzymes in plants
3. Antigen is a substance which
 - (a) lowers body temperature
 - (b) destroys harmful bacteria
 - (c) triggers the immune system
 - (d) is used as an antidote to poison
4. Which organelle in the cell, other than nucleus contains DNA ?
 - (a) Centriole
 - (b) Golgi apparatus
 - (c) Lysosome
 - (d) Mitochondrion
5. When one gene controls two or more different characters simultaneously, the phenomenon is called
 - (a) Apomixis
 - (b) Pleiotropy
 - (c) Polyploidy
 - (d) Polyteny
6. Which of the following does not have any enzymes in its cells ?
 - (a) Algae
 - (b) Virus
 - (c) Lichen
 - (d) Bacteria
7. Which of the following has the largest number of chromosomes ?
 - (a) Human beings
 - (b) Pteridophytes
 - (c) Elephants
 - (d) Bryophytes
8. The phenomenon of genetic mutation can not occur in
 - (a) DNA
 - (b) RNA
 - (c) chromosome
 - (d) ribosome
9. The main function of the Golgi body is
 - (a) respiration
 - (b) to begin cell division
 - (c) to produce gastric juice
 - (d) secretion
10. Which of the following blood group is called universal donor ?
 - (a) A⁺
 - (b) B⁺
 - (c) O⁺
 - (d) AB⁺
11. In plants, which one of the following tissues is dead ?
 - (a) Parenchyma
 - (b) Collenchyma
 - (c) Sclerenchyma
 - (d) Phloem
12. Which one of the following is considered as a cell within a cell ?
 - (a) Ribosome
 - (b) Chloroplast
 - (c) Lysosome
 - (d) Golgi complex
13. Which of the following contain enzymes for cellular respiration?
 - (a) Dictyosomes
 - (b) Endoplasmic reticulum
 - (c) Lysosomes
 - (d) Mitochondria
14. Which one among the following cell organelles is semi-permeable?
 - (a) Cell membrane
 - (b) Plasma membrane
 - (c) Cell wall
 - (d) Nucleus
15. Which one among the following nutrients is a structural component of the cell wall of plants?
 - (a) Manganese
 - (b) Potassium
 - (c) Phosphorus
 - (d) Calcium
16. Certain parts of a plant can be bent easily without breaking. This flexibility in certain parts, like leaf and stem, can be attributed to the abundance of
 - (a) parenchyma
 - (b) collenchyma
 - (c) sclerenchyma
 - (d) xylem and phloem
17. In which one of the following antibody formations takes place?
 - (a) RBCs
 - (b) Blood Platelets
 - (c) Blood Plasma cells
 - (d) Donnan's membrane
18. An individual whose blood type is B may in an emergency, donate blood to a person whose blood type is
 - (a) B or A
 - (b) AB or A
 - (c) A or O
 - (d) AB or B
19. Carbohydrates are stored in plants and animals in the form of
 - (a) cellulose and glucose respectively
 - (b) starch and glycogen respectively
 - (c) starch and glucose respectively
 - (d) cellulose and glycogen respectively
20. Which of the following groups is present in animal cells?
 - (a) Mitochondria, Cell membrane, Cell wall, Cytoplasm
 - (b) Chloroplasts, Cytoplasm, Vacuole, Nucleus
 - (c) Nucleus, Cell membrane, Mitochondria, Cytoplasm
 - (d) Vacuole, Cell membrane, Nucleus, Mitochondria
21. Average life span of human R.B.C is
 - (a) 100 days
 - (b) 90 days
 - (c) 120 days
 - (d) None of these

22. Cells which takes part in secondary growth are named as
 (a) phloem (b) xylem
 (c) cambium (d) medullary ray

23. Blood and lymph are types of
 (a) muscular tissue (b) epithelial tissue
 (c) connective tissue (d) permanent tissue

24. Which one of the following is not a constituent of cell membrane?
 (a) Cholesterol (b) Glycolipids
 (c) Proline (d) Phospholipids

25. The replication of DNA is a pre-requisite for a eukaryotic cell to undergo division. During the cell cycle, the DNA replicates in
 (a) S-phase (b) G₁-phase
 (c) G₂-phase (d) M-phase

26. During which stage of mitosis does cytokinesis usually occur in animals?
 (a) Prophase (b) Metaphase
 (c) Anaphase (d) Telophase

27. Which of the following substances if introduced in the blood stream would cause coagulation at the site of its introduction?
 (a) Fibrinogen (b) Prothrombin
 (c) Heparin (d) Thromboplastin

28. Lysosome arises from
 (a) endoplasmic reticulum
 (b) golgi apparatus
 (c) nucleus
 (d) mitochondria

29. pH of human blood is
 (a) 7.4 (b) 6.2
 (c) 9.0 (d) 7.5 - 8.0

30. The double helix model of Watson and Crick is known as
 (a) C-DNA (b) B-DNA
 (c) Z-DNA (d) D-DNA

31. The correct sequence of cell cycle is
 (a) S, G₁, G₂, M (b) S, M, G₁, G₂
 (c) G₁, S, G₂, M (d) M, G₁, G₂, S

32. Biological membranes are composed of
 (a) 40% proteins and 60% lipids
 (b) 50% proteins and 50% lipids
 (c) 70% proteins and 30% lipids
 (d) 60% proteins and 40% lipids

33. F₁ particles / oxysome / elementary particles are present in
 (a) endoplasmic reticulum
 (b) chloroplast
 (c) mitochondria
 (d) golgi complex

34. Which of the following is related to glycosylation of protein?
 (a) Endoplasmic reticulum
 (b) Peroxisome
 (c) Lysosome
 (d) Mitochondria

35. The function of nucleolus is the synthesis of
 (a) DNA (b) m-RNA
 (c) r-RNA (d) t-RNA

36. The shape of chromosome is clearly visible at
 (a) prophase (b) anaphase
 (c) metaphase (d) telophase

37. Chromosome start separating at which stage of mitosis
 (a) early metaphase (b) late metaphase
 (c) early anaphase (d) early telophase

38. "Endomitosis" refers to
 (a) division of nucleus without chromosomal division
 (b) division of chromosome without nuclear division
 (c) division of cytoplasm
 (d) None of the above

39. The camel's hump is composed of a tissue. It is a type of
 (a) skeletal tissue (b) areolar tissue
 (c) adipose tissue (d) muscular tissue.

40. Peroxisomes are involved in the synthesis of
 (a) glucose (b) fatty acids
 (c) glycine and serine (d) nucleotides

41. The major constituent of connective tissue is
 (a) lipid (b) carbohydrate
 (c) cholesterol (d) collagen

42. Bone forming cells are
 (a) osteoclasts (b) osteoblasts
 (c) chondroblast (d) chondroclasts

43. When the concentration of water and solutes on either side of the cell membrane is same, the solution is said to be
 (a) hypertonic (b) isotonic
 (c) hypotonic (d) None of these

44. Smooth muscles are likely to be found in
 (a) muscles of legs (b) muscles of arms
 (c) stomach (d) heart

45. Bacteria are (were) considered more as plants than animals because of the presence of
 (a) small nucleus (b) plasma membrane
 (c) cell wall (d) spore formation

46. The kingdom Protista is primarily made up of organisms that are
 (a) eukaryotic and multicellular
 (b) prokaryotic and multicellular
 (c) prokaryotic and single-celled
 (d) eukaryotic and single-celled

47. Mesosome in a bacterial cell is
 (a) plasmid
 (b) connection between two cells
 (c) plasma membrane infolded for respiration
 (d) None of these

48. Collar cells occur in
 (a) sponges (b) hydra
 (c) sandworm (d) starfish

49. Consider the following statements:
 1. Human beings have 23 pairs of chromosomes.
 2. Sex chromosome in human male is named XX.
 3. Chromosomes are best seen in metaphase.
 Which of the statements given above are false about chromosomes?
 (a) 1 and 2 (b) 2 only
 (c) 1, 2 and 3 (d) None of these

50. Consider the following statements about gene
 1. Word 'Gene' was given by Johanssen.
 2. Genes are situated on chromosomes.
 3. Genes located at different locus and having different expression are multiple alleles.
 Which of the statements given above are true?
 (a) 1 and 2 (b) 2 and 3
 (c) 1 and 3 (d) 1, 2 and 3

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51. Consider the following statements:

Assertion (A): In humans, female sex is determined by XX-chromosomes.

Reason (R): Male sex is determined by YY-chromosomes.

Codes:

- (a) Both A and R are true and R is the correct explanation of A.
- (b) Both A and R are true, but R is not the correct explanation of A.
- (c) A is true, but R is false.
- (d) A is false, but R is true.

52. Consider the following statements:

Assertion (A): Scientists can cut apart and paste together DNA molecules at will, regardless of the source of the molecules.

Reason (R): DNA fragments can be manipulated from restriction endonucleases and DNA ligases.

Codes:

- (a) Both A and R are true and R is the correct explanation of A.
- (b) Both A and R are true, but R is not the correct explanation of A.
- (c) A is true, but R is false.
- (d) A is false, but R is true.

53. Consider the following statements:

Assertion (A): 'DNA fingerprinting' has become a powerful tool to establish paternity and identity of criminals in rape and assault cases.

Reason (R): Trace evidences, such as hairs, saliva and dried semen, are adequate for DNA analysis.

Codes:

- (a) Both A and R are true and R is the correct explanation of A.
- (b) Both A and R are true, but R is not the correct explanation of A.
- (c) A is true, but R is false.
- (d) A is false, but R is true.

54. Match the following columns:

Types of blood cells	Function
A. Neutrophils	1. Heparin and histamine secretion
B. Basophils	2. Antibodies formation
C. Acidophils	3. Scavenger
D. Monocytes	4. Phagocytes
E. Lymphocytes	5. Antiallergic and healing of wounds

Codes:

- | A | B | C | D | E |
|----------|----------|----------|----------|----------|
| (a) 3 | 1 | 5 | 4 | 2 |
| (b) 1 | 4 | 5 | 3 | 2 |
| (c) 3 | 2 | 1 | 4 | 5 |
| (d) 2 | 3 | 1 | 4 | 5 |

55. Consider the following statements and choose the correct code.

Assertion (A): A true nucleus is absent in *E. coli* and other prokaryotes.

Reason (R): An undifferentiated, unorganised fibrillar chromosome exists inside the prokaryotic cells.

Codes:

- (a) Both A and R are true and R is the correct explanation of A.
- (b) Both A and R are true, but R is not the correct explanation of A.
- (c) A is false, but R is true.
- (d) Both A and R are false.

56. Consider the following statements and choose the correct code.

Assertion (A): Regeneration in animals is one of the strategies to escape predation.

Reason (R): These strategies include the rearrangement of pre-existing tissue.

Codes:

- (a) Both A and R are true and R is the correct explanation of A.
- (b) Both A and R are true, but R is not the correct explanation of A.
- (c) A is false, but R is true.
- (d) Both A and R are false.

57. Match List-I with List-II and select the correct answer by using the codes given below:

List-I

- A. Ribosome
- B. Lysosome
- C. Mitochondria
- D. Nucleus

List-II

- 1. Suicidal bag of cells
- 2. Protein factory of cells
- 3. Controller of cell
- 4. Power house of cell

Codes:

- | | A | B | C | D |
|-----|----------|----------|----------|----------|
| (a) | 2 | 1 | 4 | 3 |
| (b) | 4 | 3 | 2 | 1 |
| (c) | 1 | 4 | 3 | 2 |
| (d) | 3 | 2 | 1 | 4 |

58. Which of the following is the correct sequence of the different phases of cell division?

- 1. Anaphase
- 2. Telophase
- 3. Prophase
- 4. Metaphase

Codes:

- (a) 1, 2, 3, 4
- (b) 1, 3, 2, 4
- (c) 3, 1, 4, 2
- (d) 3, 4, 1, 2

59. Match List-I with List-II and select the correct answer by using the codes given below:

List-I**(Physiological processes)**

- A. Photosynthesis
- B. Mineral uptake
- C. Respiration
- D. Protein synthesis

List-II**(Cell organelles)**

- 1. Plasma membrane
- 2. Chloroplast
- 3. Mitochondria
- 4. Ribosomes

Codes:

- | | A | B | C | D |
|-----|----------|----------|----------|----------|
| (a) | 1 | 2 | 3 | 4 |
| (b) | 1 | 2 | 4 | 3 |
| (c) | 2 | 1 | 3 | 4 |
| (d) | 2 | 1 | 4 | 3 |

60. Which of the following is not a true statement about chloroplasts and mitochondria?

- (a) Each contains a small amount of DNA
- (b) Neither are components of the endomembrane system
- (c) Both are membrane less organelles
- (d) Mitochondria do not synthesise all their proteins

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GENERAL SCIENCE

61. Match List-I with List-II and select the correct answer from the codes given below:

List-I (Blood group)	List-II (Antibody)
A.	1. anti-B
B.	2. anti-A
C. AB	3. None
D.	4. Both anti-A and anti-B

Codes:

A	B	C	D
(a) 1	2	3	4
(b) 4	3	2	1
(c) 4	2	3	1
(d) 3	4	2	1

62. Which of the following statements are correct about the functions of the blood?

1. Transportation of oxygen.
2. Transportation of hormones.
3. Control of body temperature.
4. Excessive bleeding.

Codes:

- | | |
|------------------|-------------------|
| (a) 1 and 2 only | (b) 3 and 4 only |
| (c) 1, 2 and 3 | (d) 1, 2, 3 and 4 |

63. Consider the following statements and select the correct answer from the codes given below:

1. In DNA, the base adenine, guanine, thymine and cytosine are found.
2. The nucleus contains all the DNAs of a cell.
3. In RNA, thymine is replaced with uracil.
4. RNA is mainly found to be in the cytoplasm.

Codes:

- | | |
|------------------|-------------------|
| (a) 1, 2 and 3 | (b) 2 and 3 only |
| (c) 1 and 4 only | (d) 1, 2, 3 and 4 |

64. Match List-I with List-II and select the correct answer from the codes given below:

List-I (Organisms)	List-II (Chromosomes in pairs)
A. Human	1. 6 (= 12)
B. Housefly	2. 23 (= 46)
C. Mosquito	3. 39 (= 78)
D. Dog	4. 3 (= 6)

Codes:

A	B	C	D
(a) 2	1	4	3
(b) 4	3	2	1
(c) 3	4	1	2
(d) 4	3	1	2

65. With reference to the animal cell, which of the following statements are correct?

1. There is no cell wall in animal cell but the cell is covered by plasma membrane.
2. Chlorophyll is not found in animal cells.
3. Lysosome occurs in plant cells.
4. Almost in all animal cells, centrioles exist.

Codes:

- | | |
|------------------|----------------------|
| (a) 2 and 3 only | (b) 1, 2 and 3 only |
| (c) 1, 2 and 4 | (d) All of the above |

DIRECTIONS (Qs. 66) : The following questions items consist of two statements, statement I and statement II. You are to

examine these two statements carefully and select the answers to these items using the code given below:

Code :

- (a) Both the statements are individually true and statement II is the correct explanation of statement I
- (b) Both the statements are individually true but statement II is not the correct explanation of statement I
- (c) Statement I is true but statement II is false
- (d) Statement I is false but statement II is true

66. **Statement I :** Red blood cells burst when placed in water.
Statement II : Due to the phenomenon of osmosis water enters into red blood cells.

67. Consider the following statements regarding osmosis in animal cells :

1. If the water potential of the solution surrounding the cell is too high, the cell shrinks.
2. If the water potential of the solution surrounding the cell is too low, the cell swells and bursts.
3. It is important to maintain a constant water potential inside the animal body.
4. In animal cells, water potential far exceeds the solute potential.

Which of the statements given above is/are correct?

- | | |
|-------------|-------------|
| (a) 1 and 2 | (b) 3 only |
| (c) 4 only | (d) 2 and 3 |

68. Consider the following respiratory pigments :

- | | |
|-------------------|---------------------|
| (1) Haemoglobin | (2) Haemocyanin |
| (3) Haemoerythrin | (3) Haemocynoglobin |

Iron is contained in :

- | | |
|-------------------|----------------|
| (a) 1, 2, 3 and 4 | (b) 1 and 3 |
| (c) 1 and 2 | (d) 1, 2 and 4 |

69. A drop of blood contains.

- | | |
|---------------------------|----------------------------|
| (a) about 10,000 cells | (b) about 100,000 cells |
| (c) several million cells | (d) less than 25,000 cells |

70. Human blood contains _____ plasma.

- | | |
|---------|---------|
| (a) 35% | (b) 40% |
| (c) 50% | (d) 55% |

71. Biologically, marriage should be avoided in between

- (a) Rh⁺ male and Rh⁺ female
- (b) Rh⁻ female and Rh⁻ male
- (c) Rh⁺ female and Rh⁻ male
- (d) Rh⁺ male and Rh⁻ female

72. A disorder which is linked to the Y chromosome in humans (holandric) will

- (a) only be expressed in males whose mothers were a carrier of the gene
- (b) never be passed from father to child
- (c) show a pattern of skipping generations in a family
- (d) be passed only from father to son

73. Normal adult human male has

- | |
|--|
| (a) 10 g of haemoglobin/100 g of blood |
| (b) 14 g of haemoglobin/100 g of blood |
| (c) 18 g of haemoglobin/100 g of blood |
| (d) 24 g of haemoglobin/100 g of blood |

74. New species may be formed if

- (i) DNA undergoes significant changes in germ cells
- (ii) chromosome number changes in the gamete
- (iii) there is no change in the genetic material
- (iv) mating does not take place

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75. Select the incorrect statement
 (a) Frequency of certain genes in a population change over several generations resulting in evolution
 (b) Reduction in weight of the organism due to starvation is genetically controlled
 (c) Low weight parents can have heavy weight progeny
 (d) Traits which are not inherited over generations do not cause evolution

76. Select the statements that describe characteristics of genes
 (i) genes are specific sequence of bases in a DNA molecule
 (ii) a gene does not code for proteins
 (iii) in individuals of a given species, a specific gene is located on a particular chromosome
 (iv) each chromosome has only one gene
 (a) (i) and (ii) (b) (i) and (iii)
 (c) (i) and (iv) (d) (ii) and (iv)

77. Which of the following fights infection in the body?
[Bihar J. Service 2016]
 (a) RBC (b) WBC
 (c) Blood plasma (d) Haemoglobin

78. The sex of a newborn baby is determined by the chromosome inherited from –
 (a) The mother (b) The father
 (c) Mother's father (d) Father's father

79. Which of the following is responsible for controlling hereditary characters of the living cells?
[BPSC 2017]
 (a) Enzyme (b) Hormone
 (c) RNA (d) DNA
 (e) None of the above / More than one of the above

80. Gene is –
[UK-PSC 2016]
 (a) A segment of DNA
 (b) A segment of DNA and histone
 (c) A segment of DNA, RNA and histone
 (d) All of the above

81. The living content of cell is called protoplasm. It is composed of :
[CDS 2016-I]
 (a) Cytoplasm only
 (b) Cytoplasm and nucleoplasm
 (c) Nucleoplasm only
 (d) Cytoplasm, nucleoplasm and other organelles

82. Genetic screening is
[CDS 2015-II]
 (a) analysis of DNA to check the presence of a particular gene in a person
 (b) analysis of gene in a population
 (c) pedigree analysis
 (d) screening of infertility in parents

83. Which of the following cause(s) variation in the genetic material of progeny?
[CDS 2015-III]
 1. Sexual reproduction 2. Asexual reproduction
 3. Mutations 4. Epigenetic changes
 Select the correct answer using the code given below.
 (a) 2 only (b) 1, 2 and 3
 (c) 1, 3 and 4 (d) 1 and 3 only

84. Neutrophils and lymphocytes originate from
[CDS 2015-II]
 (a) kidney tubule (b) spleen
 (c) bone marrow (d) lymph node

85. A mother of blood group O has a group O child. What could be the blood group of father of the child?
[NDA 2007 - II]
 (a) Only O (b) A or B or O
 (c) A or B (d) Only AB

86. Which of the following part of blood carry out the function of body defence?
 (a) Red blood cells (b) White blood cells
 (c) Platelets (d) Haemoglobins

87. **Assertion (A):** Red blood cells burst when placed in water.
Reason (R): Due to osmosis, water enters into red blood cells.
[NDA 2008 - III]
 (a) Both A and R are true and R is the correct explanation of A
 (b) Both A and R are true, but R is not the correct explanation of A
 (c) A is true, but R is false
 (d) A is false, but R is true

88. Between which one of the following sets of blood groups, is the blood transfusion possible?
[NDA 2008 - II]
 (a) A and O (b) B and A
 (c) A and AB (d) AB and O

89. White blood cells act
[NDA 2011 - I]
 (a) as a defence against infection
 (b) as source of energy
 (c) as a clotting agent
 (d) as a medium for oxygen transport from lungs to tissues

Plant Anatomy/ Physiology

98. Which of the following is the cellular respiratory centre?

 - Nucleus
 - Mitochondria
 - Ribosome
 - Golgi body

99. Which of the following is a plant hormone?

 - Adreneline
 - Insulin
 - Oxytocin
 - Auxin

100. The water and mineral salts are transported to the various organs by which of the following?

 - Xylem
 - Phloem
 - Cortex
 - Cambium

101. The food material prepared in the plants is transported to the various organs by which of the following?

 - Xylem
 - Phloem
 - Cortex
 - Cambium

102. The suitable conditions in which the rate of evaporation occurs more fastly are

 - Low speed of wind
 - High humidity
 - Low humidity and high temperature
 - Excess amount of water in the soil

103. Process by which plants prepare their food is

 - Carbohydrolysis
 - Metabolic synthesis
 - Photosynthesis
 - Photorespiration

104. In photosynthesis

 - Light energy is converted into chemical energy
 - Chemical energy is converted into light energy
 - Chemical energy is converted into electrical energy
 - Light energy is converted into mechanical energy

105. Which of the following organelles of a cell is involved in photosynthesis?

 - Chloroplast
 - Mitochondria
 - Golgi bodies
 - Endoplasmic reticulum

106. The ultimate cause of water movement in a plant stem against gravity is

 - Osmosis
 - Photosynthesis
 - Transpiration
 - Diffusion

107. A seed is ripened :

 - Ovary
 - Flower
 - Gynoecium
 - Ovule

108. Which of the following plants produce only seeds but no fruit?

 - Sugarcane
 - Peanut
 - Cycas
 - Almond

109. Photosynthesis using the invisible part of the sunlight is done by

 - Trees
 - Algae
 - Fungi
 - Bacteria

110. Which one of the following is not an essential micronutrient for plants?

 - Boron
 - Zinc
 - Sodium
 - Copper

111. Which of the following plant hormone is mainly responsible for fruit ripening?

 - Cytokinie
 - Abscissic acid
 - Ethylene
 - None of these

112. Pollination by snail is called

 - Zoophily
 - Entomophily
 - Chiropteriphily
 - Malacophily

113. The natural dye present in turmeric is known as

 - Cinnamon
 - Phenolphthalein
 - Methyl orange
 - Curcumin

114. The main function of the inner bark of a woody plant is to

 - transport minerals and water from the roots to the leaves
 - act as a membrane impermeable to water and gas
 - transport food from the leaves to the other parts of the plant
 - protect the plant from herbivorous animals

115. Which one of the following is modification of parenchyma?

 - Fibres found in phloem
 - Tracheids
 - Vessel
 - Chlorenchyma

116. Which of the following are absent in gymnosperms?

 - Xylem vessels
 - Xylem fibres
 - Tracheids and fibres
 - All of these

117. Consider the following statements:

 - Annual rings are distinct in plants which grow in temperate region.
 - One growing ring of plant consists of only spring wood.

Which of the statements given above is/are correct about annual ring?

 - 1 only
 - 2 only
 - 1 and 2
 - Neither 1 nor 2

118. Match List-I with List-II and select the correct answer by using the codes given below:

List-I	List-II
A. Dark reaction	1. Grana of chloroplast
B. Light reaction	2. Stroma of chloroplast
C. Glycolysis	3. Cytoplasm
D. Kreb's cycle	4. Mitochondrial matrix

A	B	C	D
(a) 2	1	3	4
(b) 3	4	2	1
(c) 1	3	4	2
(d) 4	2	1	3

119. Consider the following statements:

 - Food prepared by plant is transported to different parts of plant through phloem.
 - Water and minerals in plant is transported through phloem.
 - The cell wall of phloem cells is rich in lignin.

Which of the statements given above is/are correct?

 - 1 only
 - 2 and 3
 - 1 and 3
 - 1, 2 and 3

120. Match the following:

List-I	List-II
A. Chili pepper	1. Capsaicin
B. Coriander	2. Allicin
C. Garlic	3. Lycopene
D. Tomato	4. Geraniol

Codes:

A	B	C	D
(a) 1	4	2	3
(b) 3	1	2	4
(c) 4	3	1	2
(d) 2	1	3	4

121. Consider the following statements:

 - Carbon dioxide, chlorophyll and sunlight all are essential for photosynthesis.
 - Rate of photosynthesis is minimum in red light and maximum in green light.

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3. Increase in O_2 concentration decreases photosynthesis.

Which of the statements given above are correct about photosynthesis?

 - 1 and 2
 - 2 and 3
 - 1 and 3
 - 1, 2 and 3

122. Consider the following statements and choose the correct ones.

 - Anthesis is a phenomenon of ripening of fruits.
 - Fruits developed without fertilization are parthenocarpic.
 - Plants undergo single fertilization event.
 - 1 and 2 only
 - 1 only
 - 2 only
 - All are correct

123. Consider the following statements:

 - Photolysis of water involves breakdown of oxygen by light.
 - The specific function of light energy in the process of photosynthesis is to activate chlorophyll.
 - Byproduct of photosynthesis is carbon dioxide.

Which of the statements given above is/are correct?

 - 1 only
 - 2 only
 - 3 only
 - 1, 2 and 3

124. Vaseline was applied to both surfaces of the leaves of a plant. Which of the following process/processes would be affected?

 - Photosynthesis
 - Respiration
 - Transpiration

Select the correct answer using the codes given below:

 - 1 and 3 only
 - 2 only
 - 2 and 3 only
 - 1, 2 and 3

125. Which of the following is a correct statement about nitrogen fixation?

 - Plants convert atmospheric nitrogen to ammonia.
 - Ammonia is converted to N_2 , which is the form of nitrogen most easily absorbed by plants.
 - Mutant strains of Rhizobium are able to secrete excess protein into the soil.
 - The enzyme Nitrogenase reduces N_2 to form ammonia.

126. Consider the following facts about plants.

 - Carbon dioxide and water vapour in plants are produced as wastes during respiration.
 - Oxygen is produced as a waste during photosynthesis.
 - The gaseous wastes of respiration and photosynthesis in plants are removed through the xylem vessels.

The correct answer is:

 - 1 and 2
 - 2 and 3
 - 1 and 3
 - 1, 2 and 3

127. Consider the following statements:

 - Androecium and gynoecium are reproductive organs of flower.
 - Calyx and corolla are accessory female reproductive organs of a flower.

Which of the statements given above is/are correct?

 - 1 only
 - 2 only
 - Both 1 and 2
 - Neither 1 nor 2

128. Consider the following statements :

 - In algae, the reproductive organs are single-celled.
 - Fern plants lack true vascular system.

Which of the statements given above is/are correct ?

 - Only 1
 - Only 2
 - Both 1 and 2
 - Neither 1 nor 2

129. Which of the following statements about sexual reproduction in flowering plants are correct ?

 - Stamen is present in the centre of a flower.
 - Stamen produces pollen grains in the ovary.
 - The swollen bottom part of carpel is the ovary.
 - The fusion of germ cells gives rise to zygote.

Select the correct answer using the code given below.

 - 2, 3 and 4 only
 - 2 and 4 only
 - 1 and 3 only
 - 1, 2, 3 and 4 only

130. Vivipary in plants means

 - germination of seeds in the crevices of stem where some soil is deposited
 - development of pea nut fruits after the fertilization
 - organization of several shoots
 - germination of seeds inside the fruit while it is still on the plant parent tree

131. Choose the forms in which most plants absorb nitrogen

 - Proteins
 - Nitrates and Nitrites
 - Urea
 - Atmospheric nitrogen
 - (i) and (ii)
 - (ii) and (iii)
 - (iii) and (iv)
 - (i) and (iv)

132. Which of the following statement(s) is (are) correct ?

 - Pyruvate can be converted into ethanol and carbon dioxide by yeast
 - Fermentation takes place in aerobic bacteria
 - Fermentation takes place in mitochondria
 - Fermentation is a form of anaerobic respiration
 - (i) and (iii)
 - (ii) and (iv)
 - (i) and (iv)
 - (ii) and (iii)

133. Offspring formed by asexual method of reproduction have greater similarity among themselves because

 - asexual reproduction involves only one parent
 - asexual reproduction does not involve gametes
 - asexual reproduction occurs before sexual reproduction
 - asexual reproduction occurs after sexual reproduction
 - (i) and (ii)
 - (i) and (iii)
 - (ii) and (iv)
 - (iii) and (iv)

134. Factors responsible for the rapid spread of bread mould on slices of bread are

 - large number of spores
 - availability of moisture and nutrients in bread
 - presence of tubular branched hyphae
 - formation of round shaped sporangia
 - (i) and (iii)
 - (ii) and (iv)
 - (i) and (ii)
 - (iii) and (iv)

135. Which one of the following gases is essential for photosynthesis process?

136. Chlorophyll contains [UP-PCS 2012]
 (a) Iron (b) Copper
 (c) Magnesium (d) Manganese
137. Photosynthesis using the invisible part of the sunlight is done by some [UP-PCS 2013]
 (a) Trees (b) Algae
 (c) Bacteria (d) Fungi
138. Which of the following accounts for red colour of tomato? [UP-PCS 2016]
 (a) Capsaicin (b) Carotene
 (c) Anthocyanin (d) Lycopene
139. Consider the following statements : [UP-RO 2016]
Assertion (A) : Cuscuta (Amarbel) is an example of parasitic angiosperm.
Reason (R) : It gets its nutrition from the host plant.
 Choose your answer from the codes give below –
 (a) Both (A) and (R) are true and (R) is the correct explanation of (A)
 (b) Both (A) and (R) are true but (R) is not the correct explanation of (A)
 (c) (A) is false, but (R) is true
 (d) (A) is true, but (R) is false
- Animal/ Human Anatomy/ Physiology**
140. The enzymes are killed
 (a) at a very high temperature
 (b) during chemical reaction
 (c) at low temperature
 (d) under atmospheric pressure
141. Which has maximum calorific value?
 (a) Fat (b) Protein
 (c) Carbohydrate (d) Amino acid
142. pH of human body varies within the range of
 (a) 6.0 to 6.5 (b) 5.5 to 5.8
 (c) 7.0 to 7.8 (d) 7.0 to 11.0
143. Which of the following hormones contains Iodine?
 (a) Thyroxine (b) Testosterone
 (c) Insulin (d) Adrenaline
144. Arteries supplying blood to the heart are called
 (a) Carotid arteries (b) Hepatic arteries
 (c) Coronary arteries (d) Pulmonary arteries
145. The hormone insulin is a
 (a) glycolipid (b) fatty acid
 (c) peptide (d) sterol
146. In which organ of the human body are the lymphocytes formed?
 (a) Liver (b) Bone marrow
 (c) Pancreas (d) Spleen
147. In human body, which one of the following hormones regulates blood calcium and phosphate?
 (a) Glucagon (b) Growth hormone
 (c) Parathyroid hormone (d) Thyroxine
148. In the human beings, normally in which one of the following parts, does the sperm fertilize the ovum?
 (a) Cervix (b) Fallopian tube
 (c) Lower part of uterus (d) Upper part of uterus
149. Which one of the following parts of human brain is the regulating centre for swallowing and vomiting?
 (a) Cerebellum (b) Cerebrum
 (c) Medulla oblongata (d) Cortex
150. Production of which one of the following is associated with the function of the liver?
 (a) Lipase (b) Urea
 (c) Mucus (d) Hydrochloric acid
151. Which one of the following is not a digestive enzyme in the human system?
 (a) Trypsin (b) Gastrin
 (c) Ptyalin (d) Pepsin
152. In the human body, the appendix is attached to
 (a) the large intestine (b) the small intestine
 (c) the gall bladder (d) the stomach
153. Which of the following does not have a gall bladder?
 (a) Camel (b) Giraffe
 (c) Rat (d) Fish
154. Which of the following vitamins acts like hormone?
 (a) Vitamin A (b) Vitamin B
 (c) Vitamin C (d) Vitamin D
155. The study of bones is done under the branch of science called
 (a) Orology (b) Osteology
 (c) Seromology (d) Geology
156. In human the thickest skin is present in
 (a) palm (b) sole
 (c) neck (d) head
157. Which of the following is not the vestigial human organ?
 (a) Tailbone (b) Eardrum muscles
 (c) Frontal teeth (d) Appendix
158. Which of the following does not have blood but undergoes respiration?
 (a) Cockroach (b) Snail
 (c) Hydra (d) Kangaroo
159. The number of chambers found in mammals heart is:
 (a) 2 (b) 3
 (c) 4 (d) 5
160. The total number of bones found in newly born human body?
 (a) 212 (b) 206
 (c) 202 (d) 300
161. The bone of the which organ is the longest in the human body?
 (a) Spinal cord (b) Thigh
 (c) Rib cage (d) Ankle-bone
162. The hormone which stimulates the stomach for the production of digestive juice is
 (a) Gastrin (b) Trypsin
 (c) Secretin (d) Pepsin
163. The site of RBC formation in human body is
 (a) heart (b) spleen
 (c) liver (d) bone marrow
164. Which part of the human brain regulates sleep?
 (a) Medulla oblongata (b) Cerebellum
 (c) Pineal gland (d) Pituitary gland
165. The organ of the human body which stores the carbohydrates in the form of glycogen is
 (a) intestine (b) stomach
 (c) pancreas (d) liver
166. Which one of the following completes the given statement correctly?
 Cretinism is a human disorder which is due to the under secretion of

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- (a) Adrenaline hormone (b) Cortisone hormone
 (c) Glucagon hormone (d) Thyroxine hormone
167. A surge of which hormone stimulates ovulation in human females?
 (a) Luteinizing hormone
 (b) Estrogen
 (c) Follicle stimulating hormone
 (d) Progesterone
168. Which one of the following carries out the function in human beings similar to the one which Malpighian tubules perform in cockroaches and other insects?
 (a) Lungs (b) Kidneys
 (c) Heart (d) Reproductive organs
169. Which one of the following is an enzyme?
 (a) Gastrin (b) Keratin
 (c) Trypsin (d) Vasopressin
170. All enzymes are
 (a) Alkaloids (b) Proteins
 (c) Carbohydrates (d) Lipids
171. A typical human ribcage consists of how many ribs?
 (a) 12 (b) 14
 (c) 16 (d) 24
172. Among the given nutrients, milk is a poor source of
 (a) Calcium (b) Protein
 (c) Carbohydrate (d) Vitamin C
173. Crocodiles store fats in
 (a) head (b) stomach
 (c) tail (d) arteries
174. Which part of brain controls fine movement, maintains balance and equilibrium of the body and muscle tone in a human being?
 (a) Cerebrum (b) Thalamus
 (c) Cerebellum (d) Hypothalamus
175. Biological catalysts in living organisms are known as
 (a) hormones (b) vitamins
 (c) steroids (d) enzymes
176. Among the following elements, which one is essential for the transmission of impulses in the nerve fibre?
 (a) Calcium (b) Iron
 (c) Sodium (d) Zinc
177. Which one of the following organs breaks down fat to produce cholesterol?
 (a) Intestine (b) Liver
 (c) Lungs (d) Kidneys
178. Which one among the following statements is correct?
 (a) All arteries carry oxygenated blood
 (b) All veins carry oxygenated blood
 (c) Except the pulmonary artery, all other arteries carry oxygenated blood
 (d) Except the pulmonary vein, all other veins carry oxygenated blood
179. Which one among the following is the hardest part of our body?
 (a) Skull bones of head
 (b) Thumb nails
 (c) Enamel of teeth
 (d) Spinal vertebra
180. Which one among the following completes the given statement correctly?
 In digestive system of living organisms
 (a) glucose is broken down into glycerol
 (b) glucose is converted into glycogen
 (c) glucose is broken down into carbon dioxide and water
 (d) proteins are broken down into amino acids
181. The main thinking part of the brain is
 (a) midbrain (b) hypothalamus
 (c) forebrain (d) hindbrain
182. Which one among the following hormones stimulates the plant cells to grow in a manner such that the plant appears to be bent towards light?
 (a) Cytokinin (b) Auxin
 (c) Gibberellin (d) Abscisic acid
183. The sex of a newborn baby is determined by the chromosome inherited from
 (a) the mother (b) the father
 (c) mother's mother (d) father's father
184. Contractile proteins are found in
 (a) bones (b) blood
 (c) muscles (d) cartilage
185. Bone matrix is rich in
 (a) fluoride and calcium
 (b) calcium and phosphorus
 (c) calcium and potassium
 (d) phosphorus and potassium
186. Book lungs occur in
 (a) earthworms (b) insects
 (c) arachnids (d) mammals
187. Consider the following statements:
 1. Frogs can breathe by lungs as well as skin.
 2. Gills are not present in any stage of lifespan of frogs.
 Which of the statements given above is/are correct?
 (a) 1 only (b) 2 only
 (c) 1 and 2 only (d) Neither 1 nor 2
188. With reference to the work of human kidney, consider the following statements:
 1. After the waste is removed in the kidney, the clean blood is sent back through renal artery.
 2. From Bowman's capsule, the filtered liquid passes through tiny tubes where much of the glucose is reabsorbed and sent back to the blood in the renal vein.
 Which of the statements is/are correct?
 (a) 1 only (b) 2 only
 (c) Both 1 and 2 (d) Neither 1 nor 2
189. Consider the following statements:
Assertion (A): Drinking of whisky increases the frequency of urination.
Reason (R): Alcohol intake speeds up the secretion of vasopressin in the body.
Codes:
 (a) Both A and R are true and R is the correct explanation of A.
 (b) Both A and R are true, but R is not the correct explanation of A.
 (c) A is true, but R is false.
 (d) A is false, but R is true.

190. With reference to the human body, consider the following statements:

1. The production of somatropin goes up when a person exercises.
2. Men's testes produce progesterone.
3. Women's adrenal glands secrete testosterone.
4. Stress causes the adrenal to release very less amount of cortisol than usual.

Which of these statements are correct?

- (a) 1, 2, 3 and 4 (b) 1, 2 and 3
 (c) 2, 3 and 4 (d) 1 and 4

191. Consider the following statements:

Assertion (A): Human diet should compulsorily contain glycine, serine and tyrosine.

Reason (R): Essential amino acids can't be synthesized in the human body.

Codes:

- (a) A and R are true and R is the correct explanation of A.
- (b) A and R are true, but R is not the correct explanation of A.
- (c) A is true, but R is false.
- (d) A is false, but R is true.

192. Oxygen transportation in a human body takes place through

1. Blood
2. Lungs
3. Tissue

The correct sequence of transportation is

- (a) 1, 2 and 3 (b) 3, 1 and 2
 (c) 2, 1 and 3 (d) 1, 3 and 2

193. Match List-I with List-II and select the correct answer from the codes given below:

List-I

(Bone)

- | | |
|-------------------|-------------|
| A. Breast bone | 1. Clavicle |
| B. Collar bone | 2. Patella |
| C. Knee cap | 3. Scapula |
| D. Shoulder blade | 4. Sternum |

Codes:

- | A | B | C | D |
|-------|---|---|---|
| (a) 4 | 1 | 3 | 2 |
| (b) 1 | 4 | 3 | 2 |
| (c) 1 | 4 | 2 | 3 |
| (d) 4 | | 1 | 2 |

194. Match the hormones in List-I with items in List-II and select the correct answer from the codes given below:

List-I

- A. Adrenaline
- B. Oestrogen
- C. Insulin
- D. Pheromones

Codes:

- | A | B | C | D |
|-------|---|---|---|
| (a) 3 | 1 | 4 | 2 |
| (b) 1 | 3 | 2 | 4 |
| (c) 1 | 3 | 4 | 2 |
| (d) 3 | 1 | 2 | 4 |

195. Match List-I with List-II and select the correct answer from the codes given below:

List-I

- A. Ptyalin
- B. Pepsin
- C. Renin
- D. Oxytocin

1. Converts angiotensinogen in blood into angiotensin
2. Digests starch
3. Digests proteins
4. Hydrolyses fats
5. Induces contraction of smooth muscles

Codes:

- | A | B | C | D |
|-------|---|---|---|
| (a) 2 | 3 | 1 | 5 |
| (b) 3 | 4 | 2 | 5 |
| (c) 2 | 3 | 5 | 1 |
| (d) 3 | 1 | 2 | 4 |

196. Consider the following statement about lymph

1. Lymph is another medium of circulation in the human body.
 2. Lymph flows in only one direction - from the heart to body tissues.
 3. Lymph protects the body by killing the germs drained out of the body tissues with the help of Lymphocytes.
- (a) 1 and 3 are correct
 (b) 1 and 2 are correct
 (c) 2 and 3 are correct
 (d) 1, 2 and 3 are correct

197. Consider the following statements

Assertion (A): An enzyme is basically a protein which acts like a catalyst in the metabolic reactions of an organism.

Reason (R): The pancreatic juice is basically composed from three enzymes trypsin, amylase and lipase.

Codes:

- (a) A and R are correct and R is the correct explanation of A.
- (b) Both A and R are true, but R is not the correct explanation of A.
- (c) A is true, but R is false.
- (d) A is false, but R is true.

198. Match List-I with List-II and select the correct answer from the codes given below:

List-I

- A. Gonads
- B. Pituitary
- C. Pancreas
- D. Adrenal

List-II

1. Insulin
2. Progesterone
3. Growth hormone
4. Cortisol

Codes:

- | A | B | C | D |
|-------|---|---|---|
| (a) 2 | 3 | 4 | 1 |
| (b) 2 | 3 | 1 | 4 |
| (c) 3 | 2 | 4 | 1 |
| (d) 3 | 2 | 1 | 4 |

199. Match the following columns

Column I

- A. Ligament
- B. Tendon
- C. Areolar tissue
- D. Adipose tissue

Column II

1. Stores fat
2. Connects bone to bone
3. Connects muscle to bone
4. Forms blood cells
5. Filling tissue

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- (a) Calcium (b) Phosphorus
 (c) Fluorine (d) Iodine

231. The common name of the chemical compound 'Cholecalciferol' is [UP-PCS 2015]
 (a) Bone Calcium (b) Vitamin D
 (c) Vitamin B (d) Vitamin C

232. Which of the following chemicals plays an important role in muscle contraction?
 (a) Iron (b) Phosphorus
 (c) Calcium (d) Magnesium

233. Which of the following enzymes is found in human saliva?
 (a) Pepsin (b) Amylase
 (c) Rennin (d) Erepsin

234. Which of the following acts both as endocrine (ductless) and exocrine (with duct) gland?
 (a) Pancreas (b) Liver
 (c) Adrenal gland (d) Kidney

235. Among the following vegetables, the maximum Vitamin C is found in – [UP-PCS 2016]
 (a) Chilli (b) Pumpkin
 (c) Pea (d) Radish

236. The step that produces largest number of ATP molecules in our system is – [Bihar J. Service 2016]
 (a) glycolysis
 (b) krebs cycle
 (c) terminal respiratory chain
 (d) hydrolysis

237. The class of food having highest caloric value per unit weight is – [Bihar J. Service 2016]
 (a) vitamin (b) fat
 (c) carbohydrate (d) protein

238. In which of the following organs bile is stored? [Bihar J. Service 2016]
 (a) Spleen (b) Pancreas
 (c) Appendix (d) Gallbladder

239. Which of the following foods provides the nutrient for the growth of new tissues in the human body? [Bihar J. Service 2016]
 (a) Fruits (b) Vegetables
 (c) Cheese (d) Sweets

240. The metal present in Vitamin B₁₂ is – [UK-PSC 2015]
 (a) Cobalt (b) Magnesium
 (c) Iron (d) Copper

241. Smooth muscles are likely to be found in – [SSC-CGL 2016]
 (a) muscles of legs (b) muscles of arms
 (c) stomach (d) heart

242. The kidneys in human beings are a part of system for – [MP-PSC 2017]
 (a) nutrition (b) transportation
 (c) excretion (d) respiration

243. Amino acids are the building blocks of –
 (a) Fats (b) Proteins
 (c) Vitamins (d) Carbohydrates

244. Fats and edible oils are –
 (a) Polyhydric Alcohols
 (b) Solid and Liquid hydrocarbon
 (c) Lipids
 (d) Weak carboxylic acids

245. Which of the following pairs is not correctly matched? [BPSC 2017]
 (a) Vitamin B₁ – Orange
 (b) Vitamin D – Cod - liver oil
 (c) Vitamin E – wheat germ oil
 (d) Vitamin K – Alfalfa

246. Which of the following Vitamin is known as ergocalciferol? [BPSC 2017]
 (a) Vitamin D₂ (b) Vitamin D₃
 (c) Vitamin B₁₂ (d) Vitamin B₆
 (e) None of the above / More than one above

247. Dietary intake of 'Iodine' is essential for the normal functioning of thyroid gland. Which among the following is considered to be naturally rich in iodine?
 1. Table salt 2. Sea food
 3. Diary products (a) Only 1
 (c) 1 and 3 (d) 1, 2 and 3

248. Insulin is – [BPSC 2017]
 (a) Fat (b) Vitamin
 (c) Carbohydrate (d) Protein

249. Which of the following hormones play a role in release of milk from mammary glands? [BPSC 2017]
 (a) Adrenaline (b) Thyroxine
 (c) Progesterone (d) Oxytocin

250. In human body, Vitamin A is stored in [BPSC 2017]
 (a) Liver (b) Skin
 (c) Lung (d) Kidney

251. Which of the following vitamins is used as an antidote to anticoagulant poisons? [BPSC 2017]
 (a) Vitamin A (b) Vitamin D
 (c) Vitamin E (d) Vitamin K

252. Which of the following is a part of nervous system?
 (a) Neuron (b) Cyton
 (c) Dendrite (d) All of the above

253. The process in which the food is taken in by body cells and used for energy, growth and repair is called –
 (a) Assimilation (b) Absorption
 (c) Digestion (d) Ingestion

254. In artificial insemination (AI) process. Which of the following is/are introduced into the uterus of the female? [CDS 2016-I]
 (a) Egg only (b) Fertilized egg
 (c) Sperm only (d) Egg and sperm

255. Which one of the following vitamins has a role in blood clotting? [CDS 2016-I]
 (a) Vitamin A (b) Vitamin B
 (c) Vitamin D (d) Vitamin K

256. Which one of the following hormones contains peptide chain? [CDS 2016-I]
 (a) Oxytocin (b) Cortisolopin
 (c) Insulin (d) Cortisone

257. Which one of the following is considered as 'good cholesterol' with reference to individuals facing the risk of cardio-vascular diseases and hypertension? [CDS 2016-I]
 (a) High Density Lipoprotein (HDL)
 (b) Low Density Lipoprotein(LDL)
 (c) Triglyceride
 (d) Fatty acids

258. Cobalt is associated with [CDS 2015-II]
 (a) growth hormone (b) vitamin B12
 (c) hemoglobin (d) intestinal enzymes
259. Absorption of water in the human body can be found in [CDS 2015-II]
 1. renal tubule in kidney 2. hepatic cells in liver
 3. large intestine 4. pancreatic duct
 Select the correct answer using the code given below.
 (a) 1, 2 and 3 (b) 1 and 3 only
 (c) 2 and 4 (d) 3 only
260. Consider the following [NDA 2007 - I]
 Enzymes and protein can be correlated with each other in the following ways
 1. All proteins are enzyme.
 2. All enzymes are protein.
 3. All enzymes are not protein.
 4. All proteins are not enzyme.
 Which of the above are correct?
 (a) 1 and 3 (b) 2 and 4
 (c) 1, 2 and 3 (d) 2, 3 and 4
261. Consider the following statements in respect of thyroid gland. [NDA 2007 - I]
 1. It is situated in the neck.
 2. It is vital to maintain of normal body temperature.
 Which of the statements given above is/are correct?
 (a) Only 1 (b) Only 2
 (c) Both 1 and 2 (d) Neither 1 nor 2
262. Which one of the following vitamins is abundant in guava fruits? [2007 - II]
 (a) Vitamin-A (b) Vitamin-B₁₂
 (c) Vitamin-C (d) Vitamin-D
263. Which one of the following vitamins helps in clotting of blood? [NDA 2007 - III]
 (a) Vitamin-A (b) Vitamin-B₆
 (c) Vitamin-D (d) Vitamin
264. Which one of the following glands produces the growth hormone (somatotrophin)? [NDA 2008 - I]
 (a) Adrenal (b) Pancreas
 (c) Pituitary (d) Thyroid
265. In normal adult human, what is the rate of heart beat per minute? [NDA 2008 - III]
 (a) 72-80 (b) 70-75
 (c) 80-97 (d) 82-87
266. The terms lubb and dubb relates to which one of the following? [NDA 2008 - III]
 (a) Heart (b) Eyes
 (c) Teeth (d) Lungs
267. Which chamber of human heart pumps fully oxygenated blood to aorta and thence to the body? [NDA 2008 - III]
 (a) Right auricle (b) Left auricle
 (c) Right ventricle (d) Left ventricle
268. In human beings, the opening of the stomach into the small intestine is called [NDA 2009 - I]
 (a) caecum (b) ileum
 (c) oesophagus (d) pylorus

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269. Match the following [NDA 2009 - I]
- | List-I | List-II |
|---------------------------|---------------------|
| (Vitamin) | (Chemical Compound) |
| A. Vitamin-A | 1. Thiamine |
| B. Vitamin-B ₁ | 2. Retinol |
| C. Vitamin-C | 3. Ascorbic acid |
| D. Vitamin-E | 4. Tocopherol |
- Codes
- | A | B | C | D |
|-------|---|---|---|
| (a) 4 | 1 | 3 | 2 |
| (b) 2 | 3 | 1 | 4 |
| (c) 4 | 3 | 1 | 2 |
| (d) 2 | 1 | 3 | 4 |
270. Which one of the following is an example of vestigial organ in man? [NDA 2009 - I]
 (a) Jaw apparatus (b) Ear muscles
 (c) Canine teeth (d) Humerus
271. Primary source of vitamin-D for human beings is [NDA 2009-III]
 (a) citrus fruits (b) green vegetables
 (c) yeast (d) sun
272. Which one of the following is considered normal blood pressure in man? [NDA 2009 - III]
 (a) 120/80 mm water (b) 120/80 mm blood
 (c) 120/80 mm mercury (d) 120/80 mm air
273. Which one of the following animals breathe through the skin? [NDA 2009 - III]
 (a) Fish (b) Pigeon
 (c) Frog (d) Cockroach
274. The vitamin(s), which is/are generally excreted in urine, is/are [NDA 2010 - I]
 (a) viamin-A (b) vitamin-B
 (c) viamin-E (d) vitamin-D and K
275. Human body's main organ of balance is located in [NDA 2010 - II]
 (a) inner part of ear (b) middle part of ear
 (c) front part of brain (d) top part of vertebral column
276. Which of the following statements correctly describe the properties of hormones? [NDA 2010 - III]
 1. They are steroids, proteins, peptides or amino acids derivatives.
 2. They are not produced by body organs and are mostly taken as supplements.
 3. They do not influence the working of those organs which have secreted them.
 4. They act as co-enzymes and help enzymes to perform their function.
- Select the correct answer using the code given below
- (a) 1 and 4 (b) 2, 3 and 4
 (c) 1 and 3 (d) 1, 2, 3 and 4
277. Cattle are capable of digesting cellulose present in the grass and/or fodder that they eat. This ability is attributed to the [NDA 2010- III]
 (a) presence of cellulose degrading bacteria in the rumen
 (b) production of cellulose by the cattle rumen
 (c) acids present in the rumen
 (d) prolonged retention of cellulose in the rumen

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278. Which one among the following animal tissues transport hormones and heat and maintains water balance?

[NDA 2010 - II]

- (a) Connective tissue (b) Muscular tissue
 (c) Blood (d) Nervous tissue

Plant Kingdom/ Taxonomy, etc.

279. The photoreceptor cells of the eye are located in the –

- (a) Sclera (b) Iris
 (c) Retina (d) Optic nerve

280. The least distance of distinct vision is – [SSC-CGL 2016]

- (a) 35 cm (b) 25 cm
 (c) 45 cm (d) 15 cm

281. In human eyes, the image of an object is formed on –

[MP-PSC 2017]

- (a) cornea (b) iris
 (c) pupil (d) retina

Plant Physiology: Respiratory, Reproductive Systems, etc.

282. The study of Annual Rings is called

- (a) Dendrology (b) Dendrochronology
 (c) Morphology (d) Horticulture

283. The study of the internal structure of the plants is called

- (a) Taxonomy (b) Agronomy
 (c) Anatomy (d) Morphology

284. The branch of botany under which fungi is studied :

- (a) Phycology (b) Mycology
 (c) Ethology (d) Microbiology

285. Lichens are indicators of

- (a) Air pollution (b) Water pollution
 (c) Soil pollution (d) Radiation pollution

286. The unicellular alga used to supply and regulate the oxygen in space programmes is

- (a) *Spirogyra* (b) *Chlorella*
 (c) *Ulothrix* (d) *Odogonium*

287. The red colour of the red sea is due to the presence of :

- (a) Moss (b) Bacteria
 (c) Algae (d) Fungi

288. Lichen is a composite combination of two organisms.

- (a) Fungi and Bryophyta (b) Fungi and Fern
 (c) Algae and Bryophyta (d) Algae and Fungi

289. The litmus paper utilized in the chemical laboratories is made of :

- (a) Fern (b) Algae
 (c) Lichen (d) Fungi

290. Commercial agar agar is obtained from

- (a) *Chlorella* (b) *Gracilaria*
 (c) *Porphyro* (d) *Volvox*

291. *Azolla* is a

- (a) Algae (b) Fungi
 (c) Bryophyta (d) Aqueous fern

292. Which of the following is used as an ornamental plant?

- (a) *Psilotum* (b) *Lycopodium*
 (c) *Selaginella* (d) *Pteris*

293. Which of the following bears naked seeds?

- (a) Angiosperms (b) Gymnosperms
 (c) Bryophytes (d) Pteridophytes

294. Which of the following is a living fossil?

- (a) *Cycas* (b) *Pinus*
 (c) *Sellaginella* (d) *Cidrus*

295. Chilgoza is obtained from

- (a) *Cycas* (b) *Pinus*
 (c) *Sellaginella* (d) *Ginkgo*

296. 'Sago' is obtained from

- (a) *Cycas* (b) *Pinus*
 (c) *Cedrus* (d) *Juniperus*

297. Turpentine oil is extracted from

- (a) Nettle (b) *Cycas*
 (c) Teak (d) *Pine*

298. Coffee is extracted from the

- (a) Flowers (b) Seeds
 (c) Leaves (d) Fruits

299. Which among the following is not a true fruit?

- (a) Apple (b) Date
 (c) Grape (d) Plum

300. Which part of the pear is edible?

- (a) Fleshy thalamus (b) Spores
 (c) Endosperm (d) Mesocarp

301. Epiphytes are plants which depend on other plants for

- (a) Food (b) Mechanical support
 (c) Shade (d) Water

302. Plants which grow in saline soil are

- (a) Xerophytes (b) Hydrophytes
 (c) Halophytes (d) Lithophytes

303. Plants which grow on rocks are known as

- (a) Mesophytes (b) Lithophytes
 (c) Sclerophytes (d) Oxylophytes

304. Which of the following is a good source of protein?

- (a) Pea (b) Pigeon Pea
 (c) Black Gram (d) Soyabean

305. Bamboo is classified as

- (a) Tree (b) Grass
 (c) Shrub (d) Herb

306. Tallest terrestrial tree on the earth is :

- (a) Deodar (b) Eucalyptus
 (c) Sequoia (d) Pine

307. Cloves, used as a spice are derived from which of the following plant parts?

- (a) Seeds (b) Fruits
 (c) Flower buds (d) Leaves

308. Quinine is obtained from which part of the plant?

- (a) Roots (b) Stem
 (c) Leaves (d) Bark

309. Which plant's leaves are used to make outer wrap of 'beedi'?

- (a) Cinchona (b) Tendu
 (c) Opium (d) Areca

310. Saffron is obtained from which part of plants?

- (a) Roots (b) Stem
 (c) Leaves (d) Stigma and Style

311. Apart from quinine, which one of the following herbal drug is used to cure malaria?

- (a) Arteether (b) Glace
 (c) Lutavit (d) Cineraria

312. Which one of the following is a rich source of iron?

- (a) Carrot (b) Pea
 (c) Rice (d) Spinach

313. The chief constituent of cotton is
(a) Protein (b) Fatty acid
(c) Cellulose (d) Glycerine

314. Golden rice has the highest quantity of
(a) Vitamin A (b) Vitamin B
(c) Vitamin C (d) Vitamin K

315. Which of the following leguminous plant is also a petro plant?
(a) Pigeon pea (b) Pea
(c) Gram (d) *Pongamia*

316. Pneumatophores are present in
(a) Mangrove plants (b) Epiphytic plants
(c) Hydrophytic plants (d) Insectivores plants

317. Which one of the following is a useful functional association between fungi and the roots of higher plants?
(a) Biofertilizer (b) Coralloid root
(c) Lichen (d) Mycorrhiza

318. Which one of the following is an active component of oil of clove?
(a) Menthol (b) Eugenol
(c) Menthanol (d) Benzaldehyde

319. Noscapine is obtained from
(a) Poppy (b) Basil
(c) Eucalyptus (d) Ephedra

320. The hotness or pungency of chili pepper is due to
(a) Cucumin (b) Sorbitol
(c) Argenol (d) Capsaicin

321. Which one of the following is not a carnivorous plant?
(a) *Heliamphora* sp. (b) *Drosera* sp.
(c) *Nepenthes* sp. (d) *Thymus* sp.

322. Censer mechanism of dispersal of seeds is found in
(a) Pea (b) Poppy
(c) Cotton (d) Maize

323. Kuttu flour is obtained from
(a) *Tapioca* (b) *Fagopyrum*
(c) *Plantago* (d) *Eleusine*

324. Which one of the following is the longest flower in the world?
(a) Lotus (b) Sunflower
(c) *Rafflesia* (d) Glory Lily

325. The common wheat is
(a) *Triticum aestivum* (b) *Oryza sativa*
(c) *Pennisetum setaceum* (d) *Hordeum vulgare*

326. Coconut water is technically
(a) pericarp (b) endosperm
(c) Seutellum (d) soft drink

327. A characteristic odour of garlic is due to
(a) a chloro compound (b) a fluorine compound
(c) a sulphur compound (d) acetic acid

328. Mushroom is a
(a) fungus (b) alga
(c) fern (d) moss

329. Which one among the following is the fastest growing plant in the world ?
(a) *Populus tremuleoides* (b) *Armillaria ostoyae*
(c) *Macrocystis pyrifera* (d) *Macropanesthia rhinoceros*

330. The leading probiotic drink yakult contains which of the following bacterium ?
(a) *Escherichia coli*
(b) *Lactobacillus casei*
(c) *Saccharomyces cerevisiae*
(d) *Lactobacillus plantarum*

331. Which one of the following completes the given statement correctly ?
A seed is a ripened
(a) ovary (b) flower
(c) gynoecium (d) ovule

332. Which one of the following is the largest phylum in the animal kingdom ?
(a) Annelida (b) Arthropoda
(c) Chordata (d) Protozoa

333. Silver fern is
(a) *Adiantum* (b) *Cheilanthes*
(c) *Selaginella* (d) *Equisetum*

334. Ginger is a stem and not a root because
(a) it stores food
(b) it lacks chlorophyll
(c) it has nodes and internodes
(d) None of the above

335. Two bacteria found to be very useful in genetic engineering experiments are
(a) *Escherichia* and *Agrobacterium*
(b) *Nitrobacter* and *Azotobacter*
(c) *Rhizobium* and *Diplococcus*
(d) *Nitrosomonas* and *Klebsiella*

336. Red snow causing alga is
(a) *Chlamydomonas nivalis*
(b) *Chlamydomonas reinhardtii*
(c) *Chlamydomonas debaryanum*
(d) *Chlamydomonas media*

337. Which place in India is called "The Golden Mine of Liverworts"?
(a) Eastern Himalayas (b) Western Himalayas
(c) Western Ghats (d) Eastern Ghats

338. Eutrophication is the result of
(a) bryophyte
(b) algae and aquatic plants
(c) gymnosperm (d) pteridophyte

339. The deadliest mushroom is
(a) *Agaricus* (b) *Amanita*
(c) *Pleurotus* (d) *Volvariella*

340. The group of animals belonging to phylum protozoa is
(a) *Paramecium* and *Leucosolenia*
(b) *Hydra* and *Amoeba*
(c) *Euglena* and *Ascaris*
(d) *Paramecium* and *Plasmodium*

341. ICBN stands for
(a) International Council for Botanical Nature
(b) International Code of Botanical Nomenclature
(c) Indian Code of Botanical Nomenclature
(d) None of the above

342. Largest flower *Rafflesia* is
(a) total stem parasite (b) total root parasite
(c) partial stem parasite (d) partial root parasite

BIOLOGY**F-89**

343. 'Pond silk' is the common name of

- (a) *Spongilla* (b) *Chlorella*
(c) *Selaginella* (d) *Spirogyra*

344. Match List-I with List-II and select the correct answer by using the codes given below:

List-I

- A. Sundew
B. Venus flytrap
C. Bladderwort
D. Pitcher plant

List-II

1. *Drosera*
2. *Dionaea*
3. *Utricularia*
4. *Nepenthes*

Codes:

A	B	C	D
(a) 1	2	3	4
(b) 2	3	4	1
(c) 3	4	1	2
(d) 4	1	2	3

345. Match List-I with List-II and select the correct answer by using the codes given below:

List-I

- A. *Cycas*
B. *Zamia pygmaea*
C. *Sequoia gigantea*
D. *Abies balsamea*

List-II

1. Living fossil
2. Smallest gymnosperm
3. Tallest gymnosperm
4. Canada balsam

Codes:

A	B	C	D
(a) 1	2	3	4
(b) 2	3	4	1
(c) 4	1	2	3
(d) 3	4	1	2

346. Consider the following statements:

1. *Sphagnum* is used as a packing material for transporting living plants.
2. Drug ephedrine is obtained from stem of *Sphagnum*.

Which of the statements given above is/are correct?

- (a) 1 only (b) 2 only
(c) Both 1 and 2 (d) Neither 1 nor 2

347. Match List-I with List-II and select the correct answer by using the codes given below:

List-I

- A. Sanjeevani
B. Maiden hair fern
C. Horse tail
D. Male shield fern

List-II

1. *Adiantum sp.*
2. *Dryopteris sp.*
3. *Equisetum sp.*
4. *Selaginella sp.*

Codes:

A	B	C	D
(a) 1	2	4	3
(b) 4	3	1	2
(c) 4	1	3	2
(d) 3	1	2	4

348. Consider the following statements:

1. Bryophytes are the amphibians of plant kingdom.
2. Bryophytes do not have vascular tissue.
3. *Selaginella* is an example of Bryophytes.

Which of the statements given above is/are correct?

- (a) 1 only (b) 1 and 2 only
(c) 1, 2 and 3 (d) Neither 1 nor 2 only 3

349. Consider the following statements:

1. Lichens show symbiotic association between algae and bryophytes.

2. Lichens are sensitive to SO₂ and indicators of pollution.

Which of the statements given above is/are correct about lichens?

- (a) 1 only (b) 2 only
(c) Both 1 and 2 (d) Neither 1 nor 2

350. Consider the following statements:

1. *Chlorella* is present in sewage.
2. *Chlorella* produces food rich in vitamins, proteins, etc.
3. *Chlorella* is used in prolonged space flight for O₂.
4. *Chlorella* yields an antibiotic, penicillin.

Which of the statements given above is/are correct?

- (a) 1 and 2 only (b) 2 and 3 only
(c) 1, 2 and 3 only (d) 1, 2, 3 and 4

351. Match List-I with List-II and select the correct answer by using the codes given below:

List-I

- A. Agroforestry

List-II

1. Growing plant without soil in water containing nutrients

- B. Hydroponics

2. Growing of tree with cultivation of crop in the same field

- C. Pomology

3. Study of fruits

- D. Palynology

4. Study of pollen grains

Codes:

A	B	C	D
(a) 2	1	3	4
(b) 3	4	2	1
(c) 1	3	4	2
(d) 4	2	1	3

352. Consider the following plants:

1. Bougainvillea 2. Carnations
3. Cocoa 4. Grapes

Which of these plants are propagated by stem cutting?

- (a) 1 and 2 (b) 2, 3 and 4
(c) 1, 3 and 4 (d) 1, 2, 3 and 4

353. Match List-I with List-II and select the correct answer by using the codes given below:

List-I

- A. Fruit

List-II

1. Ovule

- B. Seed

2. Leaf

- C. Wood

3. Stem

- D. Starch

4. Ovary

Codes:

A	B	C	D
(a) 2	1	3	4
(b) 2	3	1	4
(c) 4	1	3	2
(d) 4	3	1	2

354. Match List-I with List-II and select the correct answer by using the codes given below:

List-I

- A. Rhizome

List-II

1. Colocasia

- B. Corm

2. Ginger

- C. Tuber

3. Potato

- D. Bulb

4. Onion

Codes:

A	B	C	D
(a) 2	1	3	4
(b) 1	3	4	2
(c) 3	4	2	1
(d) 4	2	1	3

F-90

GENERAL SCIENCE

355. Consider the following statements:

1. Lateral outgrowth of leaf base is called stipule.
 2. Leaves with stipules are called as exstipulate leaves.
 3. Leaves without stipules are called as stipulate leaves.
- Which of the statements given above is/are correct?
- (a) 1, 2 and 3
 - (b) 1 only
 - (c) 2 and 3
 - (d) 1 and 3

356. Consider the following statements:

1. During rainy season, wood swells up due to imbibition.
 2. Excessive supply of fertilizers often causes death of crop plant due to exosmosis.
 3. Water present in soil for the roots of plant is surface water.
- Which of the statements given above is/are correct?
- (a) 1 and 2
 - (b) 2 and 3
 - (c) 3 and 4
 - (d) 1, 2 and 3

357. Match List-I with List-II and select the correct answer by using the codes given below:

List-I

- A. Mango
- B. Coconut flesh and water
- C. Litchi
- D. Apple

List-II

1. Endosperm
2. Mesocarp
3. Aril
4. Fleshy thalamus

Codes

A	B	C	D
(a) 4	3	1	2
(b) 1	4	2	3
(c) 2	1	3	4
(d) 1	3	4	2

358. Match the List-I with List-II and choose the correct code given below:

List - I

- A. Largest perennial alga
- B. Smallest flowering plant
- C. Living fossil
- D. Rhizophore

List-II

1. *Wolffia*
2. *Macrocystis*
3. *Selaginella*
4. *Ginkgo*

Codes

A	B	C	D
(a) 1	2	3	4
(b) 2	1	4	3
(c) 4	3	2	1
(d) 2	3	1	4

359. Read the following statements and choose the correct Codes:

Assertion (A): Angiosperms have dominated the land flora.

Reason (R): Angiosperms are highly adaptable in diverse habitats.

Codes

- (a) Both A and R are correct and R is the correct explanation of A.
- (b) Both A and R are true, but R is not the correct explanation of A.
- (c) A is true, but R is false.
- (d) A is false, but R is true.

360. Match List-I with List-II and select the correct answer using the codes given below:

List-I

- A. Barleycorn
- B. Corn
- C. Grapes
- D. Molasses

List-II

1. Wine
2. Beer
3. Whisky
4. Rum

Codes

A	B	C	D
(a) 3	1	4	2
(b) 4	2	3	1
(c) 2	3	1	4
(d) 1	4	2	3

361. Match List-I with List-II and select the correct answer by using the codes given below:

List-I

- A. Respiratory root
- B. Fasiculated root
- C. Climbing root
- D. Epiphytic root

List-II

1. Orchids
2. Piper betle
3. Dahlia
4. Rhizophora

Codes:

A	B	C	D
(a) 1	2	3	4
(b) 3	1	4	2
(c) 4	3	2	1
(d) 2	3	4	1

362. Match List-I with List-II and select the correct answer by using the codes given below:

List-I

- (Family)
- A. Solanaceae
 - B. Malvaceae
 - C. Liliaceae
 - D. Cruciferae

List-II

- (Example)
1. Radish
 2. Onion
 3. Cotton
 4. Potato

Codes

A	B	C	D
(a) 4	3	2	1
(b) 2	1	4	3
(c) 3	2	1	4
(d) 1	4	3	2

363. Consider the following statements:

1. Camphor
2. Chicory
3. Vanilla

Which of the above is/are correct plant product?

- (a) 1 and 2
- (b) 3 only
- (c) 2 and 3
- (d) 1, 2 and 3

364. Consider the following statements:

1. Bisexual flowers contain both male and female reproductive organs.
2. Unisexual flowers have only one essential floral whorl either androecium or gynoecium.
3. Flowers having only male reproductive structure are called pistillate flowers.
4. Flowers having only female reproductive part are called staminate flowers.

Which of the statements given above is/are correct?

- (a) 1 only
- (b) 2 only
- (c) 1 and 2
- (d) 1, 2, 3 and 4

BIOLOGY

F-91

365. Consider the following statements:
- Largest family of flowering plants is Malvaceae.
 - Agaricaceae includes mushrooms.
- Which of the statements given above is/are correct?
- 1 only
 - 2 only
 - Both 1 and 2
 - Neither 1 nor 2
366. Consider the following statements:
- Cambium is responsible for the secondary growth.
 - Cork is obtained from apical meristem.
 - Vascular cambium and cork cambium are the examples of lateral meristem.
- Which of the statements given above is/are correct?
- 1 only
 - 2 only
 - 1 and 3
 - 1, 2 and 3
- Animal Kingdom/ Taxonomy/ Morphology**
367. The only snake that builds a nest is
- Chain viper
 - King cobra
 - Krait
 - Saw-scaled viper
368. Which one of the following is monogamous?
- Wolf
 - Walrus
 - Seal
 - Deer
369. Octopus is
- an arthropod
 - an echinoderm
 - a hemichordate
 - a molluscs
370. The study related to the fishes is called
- Cryptology
 - Sicrotology
 - Ichthyology
 - Lepidopterology
371. Which of the following is also called Jelly-Fish?
- Hydra
 - Physelia
 - Aurelia
 - Matrideam
372. The Devil fish belongs to the genus of
- Pyla
 - Cipia
 - Teridi
 - Mobula
373. The sea horse belongs to the class of
- fishes
 - mammals
 - reptiles
 - mollusc
374. Which of the following is cold blooded?
- Fish
 - Frog
 - Lizard
 - All of these
375. Which one among the following is not a living fossil?
- Elephant Shrew
 - Ginkgo
 - Stromatolite
 - Diplodocus
376. Lobsters belong to which one of the following classes of organisms?
- Arachnids
 - Crustaceans
 - Insects
 - Myriopods
377. Which one among the following is the largest monkey?
- Spider monkey
 - Baboon
 - Gorilla
 - Howler monkey
378. The largest invertebrate is
- octopus
 - squid
 - coral
 - jelly fish
379. Which one of the following is not a chordate?
- Starfish
 - Dolphin
 - Shark
 - Snake
380. Which of the following is a fresh water sponge?
- Sycon
 - Euspongia
 - Spongilla
 - Pleurobrachia
381. Marsupial Kangaroo is
- viviparous
 - oviparous
 - ovoviviparous
 - a distinct category
382. Karyotaxonomy is the modern branch of classification which is based on
- number of chromosomes
 - bands found on chromosomes
 - organic evolution
 - trinomial nomenclature
383. Animals/organisms floating on the surface of water are
- plankton
 - pelagic
 - benthon
 - neritic
384. In which phylum nerve cells are found but nerves are absent?
- Porifera
 - Coelenterata
 - Platyhelminthes
 - Nemathelminthes
385. Lung Fluke is
- Hymenolepis nana
 - Paragonimus westermani
 - Schistosoma haematobium
 - Echinococcus granulosus
386. Which of the following is not an insect?
- Cockroach
 - Bed bug
 - Mosquito
 - Spider
387. Frog is
- aminotelic
 - ammonotelic
 - ureotelic
 - uricotelic
388. Snakes receive sound vibrations by
- tympanum
 - body
 - internal ear
 - earth
389. Which one is a link between chordates and nonchordates?
- Sphenodon
 - Balanoglossus
 - Crocodylia
 - None of these
390. Which of the following is a non-poisonous snake?
- Python
 - Cobra
 - Dryophis
 - All of these
391. Consider the following statements:
- Warm-blooded animals can remain active in cold environment in which cold-blooded animals can hardly move.
 - Cold-blooded animals require much less energy to survive than warm-blooded animals.
- Which of the statements given above is/are correct?
- 1 only
 - 2 only
 - Both 1 and 2
 - Neither 1 nor 2
392. Match List-I (animals) with List-II (class/phylum) and select the correct answer from the codes given below:
- | List-I | List-II |
|----------------|-----------------|
| A. Octopus | 1. Pisces |
| B. Jellyfish | 2. Arthropoda |
| C. Silver fish | 3. Mollusca |
| D. Bombay duck | 4. Coelenterata |
- Codes**
- | A | B | C | D |
|-------|---|---|---|
| (a) 3 | 4 | 2 | 1 |
| (b) 3 | 2 | 4 | 1 |
| (c) 2 | 3 | 1 | 4 |
| (d) 2 | 1 | 3 | 4 |

393. Which one of the following animals is correctly matched with its one characteristic and taxon?

Animal	Characteristic	Taxon
(a) Sea anemone	Ventral nerve cord	Arachnid
(b) Millipede	Triploblastic	Cnidaria
(c) Duckbilled platypus	Oviparous	Mammalia
(d) Silver fish	Pectoral fins	Chordate

394. Consider the following statements and choose the correct ones.

1. Commensalism can be seen between sea anemone and pagurus.
 2. Viceroy butterfly mimics monarch butterfly to avoid predation.
- | | |
|------------------|----------------------|
| (a) 1 only | (b) 2 only |
| (c) 1 and 2 only | (d) Neither 1 nor 2. |

395. Match List-I with List-II and select the correct answer from the codes given below:

List-I (Organisms)	List-II (Scientific name)
A. Man	1. <i>Homo sapiens</i>
B. Cat	2. <i>Felis domesticata</i>
C. Cow	3. <i>Bos indicus</i>
D. Dog	4. <i>Canis familiaris</i>

Codes

	A	B	C	D
(a)	1	2	3	4
(b)	1	3	2	4
(c)	4	3	2	1
(d)	3	4	1	2

396. Match List-I (generic name) with List-II (scientific name) correctly and select the correct answer from the codes given below:

List-I	List-II
A. Buffalo	1. Caprine
B. Sheep	2. Ovine
C. Goat	3. Bovine
D. Horse	4. Equine

Codes

	A	B	C	D
(a)	1	2	3	4
(b)	3	2	1	4
(c)	4	2	1	3
(d)	2	1	3	4

397. Match List-I with List-II and select the correct answer from the codes given below:

List-I (Wildlife species)	List-II (Scientific names)
A. Asiatic wild ass	1. <i>Boselaphus tragocamelus</i>
B. Barasingha	2. <i>Rucervus duvaucelii</i>
C. Chinkara	3. <i>Equus hemionus khur</i>
D. Nilgai	4. <i>Gazella bennettii</i>

Codes

	A	B	C	D
(a)	2	3	1	4
(b)	3	2	4	1
(c)	2	3	4	1
(d)	3	2	1	4

398. Consider the following statements:

1. Toothless mammals, such as pangolins, are not found in India.
 2. Gibbon is the only ape found in India.
- Which of the statements given above is/are correct?
- | | |
|------------------|---------------------|
| (a) 1 only | (b) 2 only |
| (c) Both 1 and 2 | (d) Neither 1 nor 2 |

399. The only snake that builds its nest is :

- | | |
|-----------------|----------------------|
| (a) Krait | (b) King cobra |
| (c) Chain viper | (d) Saw scaled viper |

400. Insectivorous fish used for mosquito control is :

[UP-PCS 2011]

- | | |
|--------------|------------|
| (a) Hilsa | (b) Labeo |
| (c) Gambusia | (d) Mystus |

401. Pneumatic bones of birds –

- | |
|---------------------------------------|
| (a) Increase the respiratory rate |
| (b) Increase the heart beat |
| (c) Increase the CO_2 output |
| (d) Increase the buoyancy |

402. Which one among the following is the largest monkey?

- | | |
|-------------------|-------------------|
| (a) Spider Monkey | (b) Baboon |
| (c) Gorilla | (d) Howler Monkey |

403. Which of the following statements is correct about 'Amphibious animals'?

- I. They can live on land as well as in water.
 - II. They have large number of mucus glands that keep the skin moist.
 - III. Respiration is by gills, lungs and through skin.
 - IV. Their heart is three chambered.
- | |
|--------------------------------|
| (a) All are correct |
| (b) I, II and III are correct |
| (c) II, III and IV are correct |
| (d) I, II and IV are correct |

404. The colour of the body of earthworm is brown due to the presence of –

- | | |
|---------------|-----------------|
| (a) Porphyrin | (b) Haemoglobin |
| (c) Blood | (d) Haemocyanin |

405. With reference to 'Gambusia' consider the following statements –

1. Gambusia is a large genus of fish in family Poeciliidae.
2. Gambusia species are known as mosquito fish
3. Insectivorous fish used for mosquito control is Gambusia.

Which of the above sentence(s) is/are true?

- | | |
|------------------|----------------|
| (a) 1 and 2 only | (b) 3 only |
| (c) 2 and 3 only | (d) 1, 2 and 3 |

406. Which of the following Reptiles has four chambered heart?

- | | |
|------------|----------------|
| (a) Lizard | (b) Snake |
| (c) Turtle | (d) Crocodiles |

407. Poisonous fangs of a snake are modified form of –

[UP-RO 2016]

- | | |
|----------------------|---------------------|
| (a) Mandibular teeth | (b) Palatine teeth |
| (c) Canine teeth | (d) Maxillary teeth |

408. Which of the following is not a bird? [NDA 2007 - III]

- | | |
|----------|-------------|
| (a) Bat | (b) Emu |
| (c) Kiwi | (d) Ostrich |

BIOLOGY

Diseases

415. Electron beam therapy is a kind of radiation therapy to treat

 - (a) enlarged prostate gland
 - (b) gall bladder stones
 - (c) certain types of cancer
 - (d) kidney stones

416. Cobalt (60) isotope is used in the treatment of
(a) heart diseases (b) skin diseases
(c) diabetes (d) cancer

417. Which of the following is an antidiabetic drug?
(a) Insulin (b) Penicillin
(c) Chloroquine (d) Aspirin

418. The organ of the human body directly affected by the disease of hepatitis is
(a) Liver (b) Lungs
(c) Heart (d) Brain

419. Which one of the following disease is not caused by virus?
(a) Polio (b) Rabies
(c) Small pox (d) Diphtheria

420. Of the following, ELISA test is performed to test
(a) Diabetes (b) Tuberculosis
(c) AIDS (d) Syphilis

421. The radio-isotope used to detect blood-clots in the circulatory system is
(a) Arsenic-74 (b) Cobalt-60
(c) I-131 (d) Sodium-24

422. Keeping pigs away from human settlements helps in the eradication of
(a) Malaria (b) Japanese encephalitis
(c) Elephantiasis (d) Polio

423. Which one of the following human organs is less susceptible to harmful radiations ?
(a) Eyes (b) Heart
(c) Brain (d) Lungs

424. Artemisinin, a drug to cure malaria is obtained from a
(a) Seed plant (b) Fungus
(c) Bacterium (d) Moss

425. The Minamata disease of Japan in 1953 was caused by eating fish contaminated with
(a) Nickel (b) Lead
(c) Mercury (d) Cadmium

426. The disease caused by swelling of the membrane over spinal cord and brain is
(a) Leukaemia (b) Paralysis
(c) Sclerosis (d) Meningitis

427. Emphysema is a disease caused by environmental pollution in which the affected organ of the body is
(a) Liver (b) Kidney
(c) Lungs (d) Brain

428. The mad cow disease is caused by
(a) Bacteria (b) Viruses
(c) Fungus (d) Prions

429. Which of the following decrease in number in the human body due to Dengue fever ?
(a) Platelets (b) Haemoglobin
(c) Sugar (d) Water

430. What is MRI?
(a) Magnetic Record of Intestines
(b) Magnetic Recording of Investigations
(c) Magnetic Resonance Imaging
(d) Magnetic Resonance in Intestines

431. Which of the following disease is caused by Vitamin B₃?
(a) Beri - beri (b) Night blindness
(c) Rickets (d) Pellagra

BIOLOGY**F-95**

463. The blue baby pollution disease is due to the excessive presence of which of the following in drinking water?
- Fluoride
 - Chloride
 - Nitrate
 - Arsenic
464. Which of the following strains of H.I.V. is dominant in India?
- HIV 1A
 - HIV 1B
 - HIV 1C
 - HIV 1D
465. Which of the following is a bird flu virus?
- N5H1
 - NH5
 - HN5
 - H5N1
466. Which of the following drugs has been recently reported to be responsible for the decline of the population of Vultures?
- Aspirin
 - Chloroquine
 - Diclofenac sodium
 - Penicillin
467. AIDS is the short form of which of the following diseases?
- Acquired Immune Deformity Syndrome
 - Anticipated Immune Deficiency Syndrome
 - Acquired Immune Deficiency Syndrome
 - Abnormal Immune Deficiency Syndrome
468. Which one of the following diseases can not be controlled by vaccination?
- Diabetes
 - Polio
 - Whooping cough
 - Small pox
469. Night blindness is caused by the deficiency of
- Vitamin A
 - Vitamin B₁
 - Vitamin C
 - Vitamin E
470. Iodine is administered to patients suffering from
- Rheumatism
 - Night blindness
 - Rickets
 - Goitre
471. Sleeping sickness happens due to
- Deficiency of vitamin A
 - Deficiency of calcium in body
 - Rising of Blood pressure
 - Trypanosoma*
472. Which one of the following processes takes place in lakes during eutrophication?
- Rapid destruction of algal growth
 - Excessive availability of dissolved oxygen
 - Loss of dissolved nutrients from water
 - Excessive entry of nutrient into water
473. Sandalwood tree is considered a
- total root parasite
 - total stem parasite
 - stem parasite
 - partial root parasite
474. Which one of the following is a hereditary disease?
- Cataract
 - Haemophilia
 - Pellagra
 - Osteoporosis
475. Contaminated water can cause the following diseases except which one of the following?
- Hepatitis A
 - Typhoid
 - Measles
 - Cholera
476. Which one of the following diseases is caused by bacteria and spreads through faecal matter by houseflies?
- Pertussis
 - Typhoid
 - Diphtheria
 - Chickenpox
477. Which one of the following is not a genetic disorder?
- Colour blindness
 - Down's syndrome
 - Haemophilia
 - Xerophthalmia
478. Which one of the following insects spreads Kala-azar?
- Fruit fly
 - Tsetse fly
 - Sand fly
 - Mosquito
479. Jaundice in human beings is the result of
- incomplete metabolism of biliverdin
 - complete metabolism of biliverdin
 - incomplete metabolism of bilirubin
 - complete metabolism of bilirubin
480. Sickle-cell anaemia is a disease caused due to the abnormality in
- white blood cells
 - red blood cells
 - thrombocytes
 - blood plasma composition
481. Which one among the following water-borne diseases is not caused by a bacteria?
- Cholera
 - Typhoid
 - Bacillary dysentery
 - Hepatitis A
482. After entering the human body through mosquito bite, the malarial parasite (*PLASMODIUM*) shows initial multiplication in
- Spinal chord
 - Blood
 - Liver
 - Spleen
483. Which of the following systems in man is affected by the bite of cobra?
- Digestive
 - Nervous
 - Excretory
 - Circulatory
484. Ephedrine obtained from the stem of *Ephedra* is given to cure
- asthma
 - respiratory disorder
 - cold and cough
 - All of these
485. Which of the following diseases are infectious in milch animals?
- Hand diseases
 - Anthrax
 - Black quarter
 - Cowpox
- Select the correct answer from the codes given below:
- 1, 2 and 3
 - 2, 3 and 4
 - 1 and 4
 - 1, 2, 3 and 4
486. Consider the following statements:
- Meningococcal meningitis is transmitted from person to person by mosquito bites.
 - Vomiting and neck pain are two of the symptoms of meningococcal meningitis.
- Which of the statements given above is/are correct?
- 1 only
 - 2 only
 - Both 1 and 2
 - Neither 1 nor 2
487. Consider the following statements and select the correct answer from the codes given below:
- Assertion (A):** If somebody stops taking green vegetables, he will suffer from night blindness.
- Reason (R):** He will suffer from vitamin A deficiency.
- Codes**
- Both A and R are true and R is the correct explanation of A.
 - Both A and R are true, but R is not the correct explanation of A.
 - A is true, but R is false.
 - A is false, but R is true.

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GENERAL SCIENCE

488. Consider the following statements:

1. Dengue is a protozoan disease transmitted by mosquitos.
2. Retro-orbital pain is not a symptom of dengue.
3. Skin rash and bleeding from nose and gums are some of the symptoms of dengue.

Which of the statements given above is/are correct?

- (a) 1 and 2 only (b) 2 only
 (c) 3 only (d) 1 and 3 only

489. Consider the following statements:

1. ELISA test is employed as the first and most basic test for an individual to detect cancer.
2. Almost 50% human being have Rh+ blood while the remaining have Rh- blood.

Which of the statements given above is/are correct?

- (a) 1 only (b) 2 only
 (c) Both 1 and 2 (d) Neither 1 nor 2

490. Match List-I with List-II and select the correct answer from the codes given below the lists:

List-I		List-II	
A. Plague		1. Protozoa	
B. AIDS		2. Fungus	
C. Baldness		3. Virus	
D. Malaria		4. Bacteria	

Codes

A	B	C	D
(a) 1	2	3	4
(b) 2	3	4	1
(c) 3	4	1	2
(d) 4	3	2	1

491. Consider the following statements and choose the correct ones.

1. Once the HIV gains a foothold, it can never be eradicated from the body.
 2. Many HIV patients, however, can manage the infection with a cocktail of drugs.
 3. It is very mutable and infects the respiratory system itself.
- (a) 1 and 2 only (b) 2 and 3 only
 (c) None (d) All are correct

492. Match the List-I and List-II:

List-I		List-II	
(Organs of the Body)		(Process of Treatment)	
A. Heart		1. Cataract Operation	
B. Kidney		2. Angioplasty	
C. Eye		3. Hysterectomy	
D. Uterus		4. Dialysis	

Codes

A	B	C	D
(a) 1	2	3	4
(b) 2	4	1	3
(c) 4	2	1	3
(d) 1	2	4	3

493. Consider the following statements and choose the correct code.

Assertion (A): Osteoporosis is a reduction in bone mass causing weakness of skeletal bones.

Reason (R): It is caused by excessive resorption of calcium and phosphorus from the bone.

Codes

- (a) Both A and R are true and R is the correct explanation of A
- (b) Both A and R are true, but R is not the correct explanation of A
- (c) A is true, but R is false.
- (d) Both A and R are false.

494. Match the List-I with List-II

List-I		List-II	
Carcinogens		Organs affected	
A. Cigarette smoke		1. Lungs and arteries	
B. Mustard gas		2. Lungs	
C. Asbestos		3. Lungs and pleural membrane	
D. Vinylchloride		4. Liver	

Codes

A	B	C	D
(a) 4	3	2	1
(b) 1	2	3	4
(c) 4	2	1	3
(d) 3	1	2	4

495. Match the List-I with List-II

List - I		List - II	
A. Phobia		1. Maladaptive habit	
B. Neurosis		2. Undue concern about health	
C. Hypochondria		3. Lack of sleep	
D. Insomnia		4. Intense fear	

Codes

A	B	C	D
(a) 1	3	4	2
(b) 2	4	3	1
(c) 4	1	2	3
(d) 3	2	1	4

496. Match the List-I with List-II

List-I		List-II	
(Disease)		(Meanings)	
A. Jaundice		1. Allergic inflammation of nose	
B. Stenosis		2. Loss of motor functions	
C. Rhinitis		3. Defect of heart valves	
D. Paralysis		4. Increase in bile pigments in the blood	

Code

A	B	C	D
(a) 1	4	2	3
(b) 3	2	4	1
(c) 4	3	1	2
(d) 2	1	3	4

497. The main reason why antibiotics could not solve all the problems of bacterial diseases is

- (a) Insensitivity of the individual following prolonged exposure to antibiotics
- (b) Inactivation of antibiotics by bacterial enzymes
- (c) Decreased efficiency of the immune system
- (d) The development of mutant strains resistant to antibiotics

498. Diabetes mellitus takes place only when

- (a) α -cells of pancreas are in excess
- (b) β -cells of pancreas are in excess
- (c) α -cells of pancreas are in hypo
- (d) β -cells of pancreas are in hypo

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499. Consider the following statements and select the correct answer from the codes given below:

Assertion (A): In filariasis, the lower legs and scrotum are swelled to unproportionate level

Reason (R): The filarial worms block the lymph vessels and lymph node.

Codes

- (a) Both A and R are true and R is the correct explanation of A.
- (b) Both A and R are true, but R is not the correct explanation of A.
- (c) A is true, but R is false.
- (d) A is false, but R is true.

500. Consider the following statements:

1. Progeria is the genetic disease associated with fast ageing.
2. Progeric patients never live beyond early years of 5 or 6.

Which of the statements given above is/are correct?

- | | |
|------------------|---------------------|
| (a) 1 only | (b) 2 only |
| (c) Both 1 and 2 | (d) Neither 1 nor 2 |

501. Match the List-I with List-II

List-I**Disease**

- A. Amoebiasis
- B. Sleeping sickness
- C. Syphilis
- D. Bubonic plague

Codes

- | A | B | C | D |
|-------|---|---|---|
| (a) 1 | 3 | 4 | 2 |
| (b) 3 | 1 | 2 | 4 |
| (c) 4 | 2 | 3 | 1 |
| (d) 2 | 4 | 1 | 2 |

List-II**Causative agent**

1. *Trypanosoma gambiense*
2. *Treponema pallidum*
3. *Entamoeba histolytica*
4. *Pasteurella pestis*

505. Match the List-I with List-II

List-I

- A. Neoplasm
- B. Benign tumour
- C. Carcinomas
- D. Sarcomas
- E. Lymphomas

List-II

- 1. Haematopoietic cell tumours
- 2. Bone, cartilage tissue cancers
- 3. Malignant tumour
- 4. Cancer of epithelial tissues
- 5. Non-cancerous tumour
- 6. Initiation of new tumours

Codes

- | A | B | C | D | E |
|-------|---|---|---|---|
| (a) 3 | 5 | 4 | 2 | 1 |
| (b) 2 | 5 | 4 | 3 | 6 |
| (c) 6 | 4 | 3 | 2 | 1 |
| (d) 2 | 3 | 5 | 6 | 4 |

506. Consider the following statements:

1. A colour blind person cannot distinguish red and green.
2. Colour blindness is related with a defect in nerve cells.

Which of the statements given above is/are correct?

- | | |
|------------------|---------------------|
| (a) 1 only | (b) 2 only |
| (c) Both 1 and 2 | (d) Neither 1 nor 2 |

507. Consider the following statements:

1. Swine flu is also called swine influenza.
2. It is an infection caused by swine influenza viruses.
3. Swine flu is transmitted from person to person by inhalation or ingestion of droplets containing virus from people sneezing or coughing.
4. It is also spread by eating cooked pork.

Which of the statements given above are correct?

- | | |
|---------------------|---------------------|
| (a) 1 and 2 only | (b) 1, 2 and 3 only |
| (c) 2, 3 and 4 only | (d) 1, 2, 3 and 4 |

508. AIDS is transmitted by

1. Sexual intercourse
2. Blood transfusion
3. Mosquitoes and other blood sucking insects
4. Across the placenta

Select the correct answer from the codes given below:

- | | |
|----------------|----------------|
| (a) 1, 2 and 3 | (b) 1 and 2 |
| (c) 1, 2 and 4 | (d) 1, 3 and 4 |

509. Match List-I with List-II and select the correct answer from the codes given below the lists:

List-I**(Diseases)**

- A. Myxedema
- B. Nephrosis
- C. Paralysis
- D. Syphilis

List-II**(Organs)**

- 1. Reproductive system
- 2. Nervous disorder
- 3. Endocrine gland
- 4. Excretory system

Codes

- | A | B | C | D |
|-------|---|---|---|
| (a) 3 | 4 | 1 | 2 |
| (b) 3 | 4 | 2 | 1 |
| (c) 1 | 2 | 4 | 3 |
| (d) 2 | 1 | 3 | 4 |

510. Consider the following statements:

1. Hepatitis-B is several times more infectious than HIV/AIDS.
2. Hepatitis-B can cause liver cancer.

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522. Consider the following statements and select the correct answer from the codes given below:

Assertion (A): The person with diabetes insipidus feels thirsty.

Reason (R): A person with diabetes insipidus suffers from low secretion of vasopressin.

Codes

- Both A and R are true and R is the correct explanation of A.
- Both A and R are true, but R is not the correct explanation of A.
- A is true, but R is false.
- A is false, but R is true.

523. Which of the following are associated with diabetes mellitus, a common disease in adults?

- Higher sugar level in blood
- Lower sugar level in blood
- Lower insulin level in blood
- Higher insulin level in blood

Select the correct answer from the codes given below:

- | | |
|-------------|-------------|
| (a) 2 and 4 | (b) 2 and 3 |
| (c) 1 and 3 | (d) 1 and 2 |

524. Match List-I with List-II and select the correct answer from the codes given below the lists:

List-I**(Diseases)**

- Haemophilia
- Diabetes
- Rickets
- Ringworm

Codes

- | A | B | C | D |
|-------|---|---|---|
| (a) 2 | 3 | 4 | 1 |
| (b) 2 | 3 | 1 | 4 |
| (c) 3 | 2 | 1 | 4 |
| (d) 3 | 2 | 4 | 1 |

525. Match List-I with List-II and select the correct answer from the codes given below:

List-I

- Malaria
- Filaria
- Encephalitis
- Leukaemia

Codes

- | A | B | C | D |
|-------|---|---|---|
| (a) 5 | | 3 | 2 |
| (b) 5 | | 4 | 2 |
| (c) 5 | | 4 | 1 |
| (d) 4 | | 3 | 5 |

526. Match List-I with List-II and select the correct answer from the codes given below:

List-I**(Disease)**

- Malaria
- Poliomyelitis
- Tuberculosis
- Ringworm

List-II

- | |
|-------------------|
| (Organism) |
| 1. Fungi |
| 2. Bacteria |
| 3. Virus |
| 4. Protozoan |

Codes

- | A | B | C | D |
|-------|---|---|---|
| (a) 4 | 3 | 2 | 1 |
| (b) 3 | 4 | 2 | 1 |
| (c) 3 | 4 | 1 | 2 |
| (d) 4 | 3 | 1 | 2 |

527. Match the following causal agents and the disease they cause in plants.

List-I

- Xanthomonas spp.*
- Magnaporthe grisea*
- Phytophthora infestans*
- Xanthomonas axonopodis*

List-II

- Bacterial leaf blight of rice
- Citrus canker
- Blast of rice
- Blight of potato or late blight

Codes

- | A | B | C | D |
|-------|---|---|---|
| (a) 4 | 3 | 2 | 1 |
| (b) 1 | 3 | 4 | 2 |
| (c) 3 | 1 | 2 | 4 |
| (d) 1 | 4 | 2 | 3 |

528. Consider the following statements regarding the recent global outbreak of 'Swine flu'

- The agent of infection is not well identified
- The risk is higher in those who consume pork
- It has a propensity to spread from contact with an infected person
- Absence of an effective treatment or vaccine makes it risk for a global pandemic

Which of the statements given above is/are correct?

- | | |
|------------------|----------------|
| (a) I, II and IV | (b) III and IV |
| (c) II and III | (d) III only |

529. Acupuncture is a medical system of treatment in which

- herbs are used to relieve pain
- needles are inserted into particular parts of the body to relieve pain
- surgery is done to relieve pain
- none of these

530. When a person, after a certain degree of exertion, suffers from pain in the chest or below the collar bones, in the events of inadequate supply of oxygen to the heart muscles, he is said to suffer from

- coronary thrombosis
- myocardial infarction
- angina pectoris
- arteriosclerosis

531. Excessive exposure of humans to U V-rays results in

- damage to immune system
 - damage to lungs
 - skin cancer
 - peptic ulcers
- | | |
|-------------------|--------------------|
| (a) (i) and (ii) | (b) (ii) and (iv) |
| (c) (i) and (iii) | (d) (iii) and (iv) |

532. Which of the following statements are correct? Select the correct answer from the codes given below :

[IUP-PCS 2008]

- Femur is the longest bone in the human body.
- Cholera is a disease caused by bacteria.
- "Athlete's foot" is a disease caused by virus.

Codes :

- | | |
|---------------------|------------------|
| (a) 1, 2 and 3 only | (b) 1 and 3 only |
| (c) 1 and 2 only | (d) 2 and 3 |

BIOLOGY

- (a) Only 2 and 4 are correct
 (b) Only 1 and 2 are correct
 (c) Only 3 and 5 are correct
 (d) Only 2 and 5 are correct

582. Which one of the following pairs is not correctly matched? [UP-RO 2016]
 (a) Vitamin A – Night Blindness
 (b) Vitamin B₃ – Pellagra
 (c) Vitamin D — Colour Blindness
 (d) Folic acid – Anaemia

583. Karnal Bunt is a disease of – [UP-RO 2016]
 (a) Barley crop (b) Wheat crop
 (c) Bajra Crop (d) Jowar crop

584. A myopic person has a power of 1.25 dioptre, what is the local length an nature of his lens ? [CDS 2016-I]
 (a) 50 cm and convex lens
 (b) 80 cm and convex lens
 (c) 50 cm and concave lens
 (d) 80 cm and concave lens

585. Which of the following pairs of vitamin and disease is / are correctly matched ? [CDS 2016-I]
 1. Vitamin A Rickets
 2. Vitamin B Beriberi
 3. Vitamin C Scurvy
 Select the correct answer using the code given below:
 (a) 2 only (b) 2 and 3 only
 (c) 1 and 3 only (d) 1, 2 and 3

586. Dengue virus is known to cause low platelet count in blood of patient by : [CDS 2016-II]
 1. interfering in the process of platelet production in bone marrow
 2. infecting endothelial cells
 3. binding with platelets
 4. accumulating platelets in intestine
 Select the correct answer using the code given below:
 (a) 1 and 2 only (b) 1 and 3 only
 (c) 3 and 4 (d) 1, 2 and 3

587. Measles is a disease caused by [CDS 2015-II]
 (a) bacteria (b) virus
 (c) protozoa (d) worm

588. Penicillin inhibits synthesis of bacterial [CDS 2015-II]
 (a) cell wall (b) protein
 (c) RNA (d) DNA

589. Most antibiotics target bacterial parasites interfering with various factors of growth of metabolism such as [CDS 2015-II]
 1. synthesis of cell wall
 2. bacterial protein Synthesis
 3. synthesis of nuclear membrane
 4. mitochondrial function
 Select the correct answer using the code given below
 (a) 1, 2 and 3 (b) 1 and 4
 (c) 2 and 3 only (d) 1 and 2 only

590. One of the occupational health hazards commonly faced by the workers of ceramics, pottery and glass industry is [NDA 2011 - II]
 (a) stone formation in gall bladder
 (b) melanoma
 (c) silicosis
 (d) stone formation in kidney

591. Which one of the following causes the chikungunya disease? [NDA 2007 - II]
 (a) Bacteria (b) Helminthic worm
 (c) Protozoan (d) Virus

592. Which of the following diseases are preventable by vaccine? [NDA 2007 - II]
 1. Tetanus 2. Polio
 3. Leprosy 4. Pertusis
 Select the correct answer using the code given below
 (a) 1 and 3 (b) 2 and 4
 (c) 1, 2 and 4 (d) All of these

593. Which one of the following is not an insect borne disease? [NDA 2008 - I]
 (a) Beri-beri (b) Kala-azar
 (c) Malaria (d) Plague

594. Consider the following statements. [NDA 2008 - I]
 1. Cigarette smoking exposes a person to benzene.
 2. Benzene is a known carcinogen.
 Which of the statements given above is/are correct?
 (a) Only 1 (b) Only 2
 (c) Both 1 and 2 (d) Neither 1 nor 2

595. Which one of the following diseases is caused by virus? [NDA 2008 - II]
 (a) Tuberculosis (b) Typhoid
 (c) Influenza (d) Diphtheria

Human Welfare/ Economic Biology

596. Which fertilizer is assimilated directly by the plant?
 (a) Super phosphate (b) Nitrolim
 (c) Muriate of Potash (d) Humus

597. For retting of jute the fermenting microbe used is
 (a) Methophilic bacteria (b) *Clostridium butyricum*
 (c) *Helicobacter pylori* (d) *Streptococcus lactis*

598. The aquatic fern which is an excellent biofertilizer is
 (a) *Azolla* (b) *Salvinia*
 (c) *Marsilea* (d) *Pteridium*

599. Consider the following statements about Vechur cattle breed
 1. Vechur is the world's largest cow.
 2. It is indigenous breed found in Kerala.
 3. Its milk protein has medicinal value.
 4. Commonly used in farming as draught animal.
 Which of the statements given above are correct?
 (a) 1, 2, 3 and 4 (b) 1, 2 and 3
 (c) 2, 3 and 4 (d) 3 and 4

600. Consider the following statements:
 1. Gibberellins were discovered in rice plants.
 2. Dwarfness can be controlled by treating the plant with gibberellic acid.
 3. Vernalization cannot be replaced by gibberellins.
 Which of the statements given above is/are correct?
 (a) 1 only (b) 2 only
 (c) 3 only (d) 2 and 3 only

601. Match the List-I with List-II and choose the correct code given below:

List - I	List-II
A. Sericulture	1. Bee keeping
B. Pisciculture	2. Rearing of silk worm
C. Apiculture	3. Micropropagation
D. Tissue culture	4. Fish farming

Codes	A	B	C	D
(a)	2	4	1	3
(b)	4	2	3	1
(c)	2	4	3	1
(d)	1	2	3	4

602. Match List-I with List-II and select the correct answer using the codes given below:

List-I (Sugar)	List-II (Source)
A. Cellulose	1. Honey
B. Fructose	2. Sugarcane
C. Maltose	3. Cotton wool
D. Sucrose	4. Disaccharide

Codes	A	B	C	D
(a)	1	2	3	4
(b)	3	1	4	2
(c)	2	3	4	1
(d)	4	1	2	3

603. Consider the following statements and choose the correct ones.

1. *Flavr savr* is a genetically modified tomato that remains fresh and flavourful for longer than normal tomato.
 2. This GM tomato has blocked the enzyme polygalacturonase.

3. This enzyme is responsible for cell wall formation.

- (a) 1 only
 - (b) 2 only
 - (c) 1 and 2
 - (d) 1, 2 and 3

604. Consider the following statements and choose the correct ones.

1. Hirudin, an anticoagulant protein, is obtained from GM *Brassica napus*.

2. Pyrethrin is an insecticide obtained from floral heads of *Vinca rosea*.

605. Match List-I with List-II and select the correct answer from the codes given below:

List-I	List-II
A. Indian buffalo	1. Tallest
B. Tamaraw buffalo	2. Dwarf smallest
C. Anoa buffalo	3. Dwarf
D. Cape buffalo	4. Medium

Codes	A	B	C	D
(a)	1	2	3	4
(b)	4	3	2	1
(c)	1	3	4	2
(d)	4	1	3	2

Hints & Solutions

1. (b) When the osmotic pressure outside the red blood cells is the same as the pressure inside the cells, the solution is isotonic with respect to the cytoplasm. This is the usual condition of red blood cells in plasma. Hence the cells do not shrink.

2. (b) Xylem tissue is the specialized conducting system of the plants. It is the main conducting system for water and some mineral nutrients from roots to the shoot.

3. (c) Foreign particles possessing the antigens can elicit immune response in the body.

4. (d) Mitochondria contain DNA other than nucleus. Mitochondria are thought to be the parasites in the eukaryotic cells that got inside the latter as a result of the endo-symbiotic event that took place earlier in the evolution. Centriole is a small set of microtubules, Golgi apparatus is a complex of vesicles and folded membranes within the cytoplasm of most eukaryotic cells, involved in secretion and intracellular transport. Lysosome is an organelle in the cytoplasm of eukaryotic cells containing degradative enzymes enclosed in a membrane.

5. (b) When multiple traits are controlled by one particular gene, that gene is known as pleiotropic gene and its effect is known as pleiotropic effect. Polyteny is a special nuclear differentiation reported in larval and adult Diptera, Collembola, Protista and angiosperm ovular nuclei. Apomixis is an asexual reproduction in plants, in particular agamospermy. Polyploid cells and organisms are those that contain more than two paired (homologous) sets of chromosomes.

6. (b) Virus is not a cell; it remains just in the form of a genetic material or encapsulated on outside with a protein capsid. It generally injects its genetic material into the host cells wherein the viral proteins get synthesised.

7. (b) Ferns, a group under pteridophytes have large number of chromosomes e.g., *Ophioglossum reticulatum* has $2n=1260$, highest known in all life forms.

8. (d) The ribosomes are the protein-synthesizing factories. DNA, RNA and chromosomes are all genetic materials made of nucleotides, which are the sites of genetic mutations e.g., transversion and transition, point mutations, etc. DNA, RNA are genetic material which helps in replication of genetic material, while chromosomes are the part of DNA.

9. (d) The Golgi complex and rough ER work closely. When a protein is made in the ER, then transition vesicles are synthesized. These vesicles float through the cytoplasm to the Golgi apparatus and are absorbed. After the Golgi does its work on the molecules inside the sac or the vesicle a secretory vesicle is created and released into the cytoplasm. So the main function of the Golgi bodies is secretion.

- Respiration occurs in both plants and animals, cell division occurs during the phase of cytokinesis i.e. mitosis and meiosis, and gastric juices are those which help in digestion.
10. (c) A person containing O⁺ blood group does not possess any antigen to elicit any antibody reaction in the acceptor. Thus, a person with O⁺ is the universal donor. AB⁺ on the other hand is a universal acceptor.
11. (c) Sclerenchyma tissues are found in hard parts of plant body, in cortex, pith, hypodermis, in the pulp of fruits. Young cells are living and they have protoplasm. But matured cells becomes dead due to deposition of secondary walls. They give mechanical support, strength and rigidity to the plant body.
12. (b) Chloroplast is considered as cell within a cell because it contains its own DNA. Hence, it is a semiautonomous organelle. It helps in photosynthesis.
13. (d) Mitochondria contain enzymes for cellular respiration. Mitochondria are known as the powerhouse of the cell. These are organelles that act like a digestive system which take nutrients, breaks them down, and creates energy for the cell. The process of creating cell energy is known as cellular respiration. Most of the chemical reactions involved in cellular respiration happen in the mitochondria.
14. (d) Among the given example only nucleus is a cell organelle. Which bears DNA the genetic material which carries the characteristics which are transported from the parent to offspring.
15. (d) Calcium activates enzymes, is a structural component of cell walls, influences water movement in cells and is necessary for cell growth and division. Potassium helps in energy flow, manganese is involved in enzyme synthesis and phosphorus makes up backbone of genetic materials like DNA and RNA.
16. (b) Collenchymas provides malleability and flexibility to certain parts of the plants. Parenchyma is considered to be the soft tissue which makes most of the cell and sclerenchyma is the dead tissue which makes up fibre and provides rigidity to the cell.
17. (c) Blood plasma cells form 55 – 60% by volume of blood. Antibodies and some other substances such as lysozyme and properdin always occur in the plasma. They serve to destroy bacteria, viruses and toxic substances that may enter into the blood from outside or from body tissues.
18. (d) As, AB is the universal recipient, B thus donate blood to these two groups of people (B and AB)
19. (b) The most important carbohydrate is glucose, a simple sugar (monosaccharide) that is metabolized by nearly all known organisms. Glucose and other carbohydrates are part of a wide variety of metabolic pathways across species: plants synthesize carbohydrates from carbon dioxide and water by photosynthesis storing the absorbed energy internally, often in the form of starch or lipids.
20. (c) Nucleus, cell membrane, mitochondria and cytoplasm are present in animal cells.
21. (c) The average life span of human RBC is 120 days.
22. (c) Mostly dicotyledonous plants exhibit an increase in girth called the secondary growth. The tissues involved in secondary growth are the two lateral meristems : vascular cambium and cork cambium.
23. (c) Connective tissues are named so because of their special functions of linking and supporting other tissues/organs of the body. They range from soft connective tissues to specialised types, which include cartilage, bone, adipose, blood and lymph.
24. (c) Proline is an α -amino acid, one of the twenty DNA-encoded amino acids. L-Proline is an osmoprotectant and therefore is used in many pharmaceutical, biotechnological applications.
25. (a) The replication of DNA is a pre-requisite for a eukaryotic cell to undergo division. During the cell cycle, the DNA replicates in S phase (synthesis phase).
26. (d) Telophase is the stage where cytokinesis usually occurs in animals, which means the cell divides into two daughter cells and is identical to each other.
27. (d) Thromboplastin is a plasma protein aiding blood coagulation through conversion of prothrombin to thrombin. Thromboplastin causes blood coagulation at the site of injury. It is a plasma protein aiding coagulation through conversion of prothrombin to thrombin. Fibrinogen is a glycoprotein that helps blood to clot in vertebrates. Heparin acts as an anticoagulant.
28. (b) Lysosomal membrane is formed in ER, later it is modified and transferred to the cis face of Golgi apparatus where further processing releases lysosome.
29. (a) pH of human blood is 7.4
30. (b) One of the secondary structures exhibited by DNA is the famous Watson-Crick model. This model says that DNA exists as a double helix. The two strands of polynucleotides are antiparallel i.e., run in the opposite direction.
31. (c) During G₁ phase the cell is metabolically active and grow continuously. S or synthesis phase marks the period during which DNA synthesis or replication takes place. In G₂ phase, proteins are synthesised. M phase represents the phase when the actual cell division or mitosis occurs.
32. (d) Biological membranes are composed of 60% proteins and 40% lipids.
33. (c) Oxysomes (Elementary particles or inner membranes sub-units or F₁ particles); are responsible for respiratory chain phosphorylation.
34. (a) Almost all the proteins synthesized by ER bounded ribosomes are converted into glycoproteins and this glycosylation occurs in the rough ER.
35. (c) The function of nucleus is the synthesis of r-RNA or ribosomal RNA (mRNA) is a large family of RNA molecules that convey genetic information from DNA to the ribosome. Transfer ribonucleic acid (tRNA) is a type of RNA molecule that helps decode a messenger RNA (mRNA) sequence into a protein. Deoxyribonucleic acid

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- is a molecule that carries the genetic instructions used in the growth, development, functioning and reproduction.
36. (c) The shape of chromosome is clearly visible at the metaphase stage of mitosis. In Prophase stage of mitosis, the chromatin condenses into two rod-shaped structures called chromosomes. Anaphase is a stage of mitosis where the sister chromatids are separated from each other and move towards the opposite poles; telophase is the last stage of cell division where the two daughter cells are separated from each other and form a new cell.
37. (c) Chromosomes start separating at early anaphase stage, where the sister chromatids move away in opposite directions.
38. (b) Endomitosis refers to the division of chromosomes without nuclear division.
39. (c) The camel's hump is composed of adipose tissue.
40. (c) Peroxisomes are involved in the synthesis of glycine and serine in the process of photorespiration.
41. (d) The major constituent of connective tissue is collagen.
42. (b) Bone forming cells are osteoblasts. Osteoclast is a large multinucleate bone cell which absorbs bone tissue during growth and healing. Chondroblast or perichondrial cells, is the name given to mesenchymal progenitor cells in situ which, from endochondral ossification, will form chondrocytes in the growing cartilage matrix; Chondroclasts are mature osteoclasts which are capable of cartilage matrix resorption.
43. (b) When the concentration of water and solutes on either side of the cell membrane is same, then the solution is said to be isotonic.
44. (c) The smooth muscle fibres taper at both ends (fusiform) and do not show striations. Cell junctions hold them together and they are bundled together in a connective tissue sheath. The wall of internal organs such as the blood vessels, stomach and intestine contain this type of muscle tissue.
45. (c) Bacteria are (were) considered more as plants than animals because of the presence of cell wall. The cell wall is composed of peptidoglycan.
46. (d) All single celled eukaryotes are placed under Protista. This kingdom forms a link with others dealing with plants, animals and fungi.
47. (c) In many bacteria (specially gram +ve) the plasma membrane gives rise to infoldings called mesosome. They have respiratory enzymes like succinic dehydrogenase, cytochrome oxidase for respiration.
48. (a) Collar cells occurs in sponges and located at the anterior end of each choanocyte.
49. (b) Humans are diploid organisms as they have two members or homologous chromosomes in a pair. 23 pairs of chromosomes exist in each somatic cell of the body. Total 46 chromosomes occur. One particular pair individually in males and females determines their respective sex. This one pair is XX in females and XY in males. All the 46 chromosomes in pairs can be seen under microscope at metaphase stage in the cells which are undergoing mitosis.
50. (d) All the statements are correct. The term gene was coined by Danish biologist Wilhelm Johannsen in 1909. Genes are the discrete DNA segments located in the chromosomes which express to give rise to a particular protein. Alleles are the alternative forms of the same gene. In diploid organisms, there are two alleles on the two homologous chromosomes. If there exists multiple number of alleles of same gene, it means all the alleles are multiple or simply called multiple alleles.
51. (c) Humans are diploid with 23 pairs of chromosomes. Of this, 22 pairs are somatic and the one pair is sex chromosomes. This particular pair exists as XX in human females and XY in males. The presence of two X chromosomes contributes to the female phenotype while presence of only one Y chromosome is responsible for the human to be male. Females produce only X-type haploid gametes and males produce two types (X and Y) of haploid gametes. Fusion of either X or Y of male gamete with the female gamete determines the sex of the offspring.
52. (a) In genetic engineering, a DNA segment from any foreign source can be inserted into any other genetic material. The enzymes, called *restriction endonucleases*, act like scissors that cut apart a particular or specific part of the DNA. This cut out DNA piece can be inserted into other genetic material which has been cut to make space for containing the foreign DNA. The DNA once inserted can be ligated by enzymes known as ligases.
53. (a) DNA (Deoxyribonucleic acid) is the core material which constitutes the genetic make up of an individual. The DNA of every individual shows unique proportions of nucleotide bases that renders a particular fingerprint. DNA is found in all types of body cells. Thus, both the given statements are correct.
54. (a) Leucocytes are white blood cells. These comprise of neutrophils which provide protection to the body through phagocytosis of bacteria and thus act as scavengers. The basophils are the granulocytes which contain histamines and heparin. Heparin thins blood to prevent clotting. Histamines dilate the blood vessels and increase the permeability of capillaries. Monocytes are of two types namely macrophages and dendritic cells. Acidophils take up role in anti-allergic reactions and wound healing. The lymphocytes are B cells, T cells and natural killer cells. These are mainly involved in the immune responses by producing specific antibodies.
55. (a) In the prokaryotes, all the genetic materials lie inside the cell, no clear or separate nuclear wall is recognized in these cells. In fact no membrane-bound organelles are found in the prokaryotes. While on the other hand, one of the characteristic features of the eukaryotic cells is the presence of membrane bound organelles. Clear and distinguished nuclear membrane bounds the genetic material inside.
56. (d) Both assertion and reason are false. Regeneration is not itself a strategy but rather the shedding off of any

- organ is a strategy to avoid predation. The strategy to regenerate the body parts from the pre-existing tissue or adult stem cells this actually involves the de-differentiation of the mature cells to make them a sort of stem cells again which can then differentiate to make the lost part. The later strategy is different than the strategy involved in escaping predation.
57. (a) Ribosomes are the sites of protein synthesis in the cytoplasm of the cells. The RNA template sits in between the two subunits of the ribosomes and the peptide synthesis take place. Intracellular digestion occurs via lysosomes. Mitochondria are the sites of cellular respiration and power house of the cells generating ATPs. Nucleus contains all the genetic materials which get expressed to produce a phenotype thus, making nucleus the controller of the cell.
58. (d) Somatic cells undergo mitosis during the cell cycle. The phase in which the cells undergo division is called M-phase. The first stage of this phase is prophase, the second is metaphase in which the chromosomes come and lie at the equatorial plate. This stage is followed by anaphase in which the sister chromatids separate out and go to the poles. The telophase is the last stage when the cell's cytoplasm divides and give rise to two daughter cells.
59. (c) The site of photosynthesis are the thylakoid membranes of the chloroplasts. The entire mineral uptake by the cells is done via the plasma membrane which is selectively permeable for some minerals and not permeable for most of the substances. The cellular respiration to derive out the energy occurs in the mitochondria. Ribosomes act as the sites for the peptide synthesis. The RNA template sits on the two subunits of the ribosomes to carry out translation.
60. (c) Chloroplasts and mitochondria are considered to be the membrane bound endosymbionts in the eukaryotic cells. Both possess their own genetic material or genome. But most of their genes have been integrated into the nucleus. So, many proteins are transferred from the cytoplasm into the organelles.
61. (a) Blood group A contains antigen A and anti-B antibodies in the blood plasma. Similarly, blood group B contains antigen B and anti-A antibodies in the blood plasma. A particular blood group known as AB contains both A and B antigens but no antibodies. The blood group O contains no antigens but both anti-A and anti-B antibodies in the blood plasma.
62. (c) Blood is the medium through which oxygen is transported in every tissue. The hormones secreted by endocrine glands are transported to the site of action via blood. Although, the core body temperature remains at 37 degrees centigrade, the tips of fingers and toes can become cold as blood transfers energy to outside at those places. Platelets, which are the constituent of blood, are responsible to prevent bleeding from the body.
63. (d) All the DNAs are found to be inside the nucleus of the cell. In DNA, the four nucleotide bases which are present are adenine, cytosine, thymine and guanine. But in RNA, no thymine is present instead only uracil

is present which pairs up with adenine. All the RNAs which are synthesized inside the nucleus during transcription, come out to the cytoplasm for becoming the template for protein synthesis (translation).

64. (a) Humans have 23 pairs of chromosomes. Houseflies have 6 pairs of chromosomes. Mosquitoes have 3 pairs of chromosomes. Dogs have 39 pairs of chromosomes.
65. (c) Lysosome occurs in animal cells.
66. (a) Osmosis is the spontaneous net movement of solvent molecules through a partially permeable membrane into a region of higher solute concentration, in the direction that tends to equalize the solute concentrations on the two sides.
67. (b) Osmosis is defined as the movement of solvent molecules through a semi-permeable membrane to a region that has a higher solute concentration. Osmosis helps animal cell by bringing about a state of balance between important minerals and body solutions.
68. (b) Haemocyanin contains copper.
69. (c) Single drop of blood contains millions of RBCS.
70. (d) Human blood contains 55% plasma and 45% blood cells.
71. (d) Rh factor is a protein found in blood. A person having Rh factor in blood is called Rh positive whereas that who does not carry this protein in the blood is called Rh negative. Marriage should be avoided in between Rh negative female & Rh positive male. This can be fatal for the mother as well as the baby of such parents.
72. (d) Human beings show two types of sex determining chromosomes-xx in females and xy-in males. In human beings, males are hemizygous; meaning any character present in either of the sex chromosomes will be reflected in the male individual. A boy inherits the y chromosomes from the father, which is why a disorder linked to the y chromosome will have to be transmitted from the father to the son.
73. (b) Normal range of Haemoglobin in adult human male is 14-17 g/dl of blood.
74. (a) New species can be formed if there is considerable change in the genetic make up of an organism. This change can be a significant change in the DNA of germ cells or changes in the number of chromosomes.
75. (b) Change in gene frequency is needed for evolution to occur.
76. (b) Genes codes for an amino acid which give rise to proteins. Each chromosome has many genes.
77. (b) Different types of WBCs or white blood cells help in fighting against infectious agents. These are named as macrophages, lymphocytes etc.
78. (b) The sex of a fetus is determined by father as male parent provides gamete X and Y, while female parent provides only X. If gamete Y from father fuses with X from mother it will produce male while if gamete X from father fuses with X from mother it will produce female, hence it is the father who is responsible for the sex of the baby.
79. (d)
80. (a) Gene is the functional unit of inheritance which controls the transmission and expression of one

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- or more characters. It does so by specifying the structure of a particular protein. Genes are generally composed of deoxyribonucleic acid (DNA), except in some viruses where it is composed of ribonucleic acid (RNA).
81. (b) Protoplasm is the whole content of a cell enclosed within the cell membrane, including both the cytoplasm and nucleus.
82. (a) Genetic screening is a process through which analysis of gene is performed to find out defective gene causing a specific disorder in a person.
83. (c) Epigenetic Changes (due to tissue damage or disease), mutations (due to change in DNA structure) and sexual reproduction (due to change during meiosis process) cause variation in the genetic material of offspring.
84. (c) Bone marrow is located within the bone cavities. It is composed of stromal cells and parenchymal cells. Neutrophils and lymphocytes are blood cells which are produced within bone marrow.
85. (b) The blood group of father of the child could be A or B or O.
86. (b) White blood cells (WBC) bring out the function of body defence.
87. (a)
88. (c) O is the universal donor, but can obtain blood only from O so option (a) and (d) are not possible. Regarding (b), B can't provide blood to A because of presence of antibodies against A antigen. So, (c) is the only condition of possible blood transfusion as AB is the universal recipient.
89. (a) White blood cells destroy foreign proteins (bodies) e.g. pathogens by the process of phagocytosis and in this way protects the body from infection.
90. (b) Algae, bryophytes and pteridophytes are true plants and contain chlorophyll. While fungi have characteristics that put this kingdom more close to animals, one of the features is that all fungi are heterotrophs and contain no chlorophyll.
91. (d) Counting the annual rings in horizontal cross section of a tree is a measure of its age. This study comes under dendrochronology.
92. (d) Carbon dioxide is one of the essential raw materials for the process of photosynthesis. Carbon dioxide is fixed and converted into sugar via green plants. Oxygen is released by the plants in this process. Carbon monoxide and nitrous oxide are the primary and secondary air pollutants.
93. (b) Magnesium is present in the porphyrin ring of the chlorophyll molecule. Iron, Zinc and Cadmium are micronutrients which are utilized by the plants for their growth and development.
94. (a) Oxygen is released as a by-product in the process of photosynthesis by green plants. While gases like nitrogen, carbon dioxide are utilized by the plants and releases water vapour by the process known as transpiration.
95. (a) Photosynthesis can only happen in the presence of sunlight, as excitation of chlorophyll molecules need photons. Sunlight can be replaced by artificial white light.
96. (c) Leaves having stomata are the site at which gaseous exchange occur. Water is also transpired and evaporated in the form of water vapor from the leaf surface.
97. (a) Roots and stem doesn't consist of any stomata, hence, evaporation doesn't occur from these plant organs.
98. (b) In the visible spectrum of light the most of the light energy which is absorbed by green plants for carrying out photosynthesis, are from red and blue regions. Green light is mostly reflected back.
99. (d) The site of cellular respiration is mitochondrion as it involved in generation of energy, (ATP). Nucleus consists of genetic material which is transferred from one generation to another, ribosome helps in protein synthesis and Golgi apparatus helps in glycosylation.
100. (a) Auxin is the plant hormone and is responsible for root formation. Adrenaline, Insulin and Oxytocin are animal hormones.
101. (b) Xylem is responsible for transporting water and various mineral salts. Phloem is responsible for transportation of sucrose, cambium helps in secondary growth which gives rise to xylem and phloem and cortex is a ground tissue present in the plant organ, usually consisting of vascular bundles.
102. (c) The products of photosynthesis in green plants are made in leaves (mesophyll cells). Sugar molecules are synthesized, which are generally called as photosynthates. Phloem tissue carries these photosynthates to distant plant organs. Unlike conduction in xylem, the transport through phloem is multidirectional.
103. (c) Low humidity and high temperature are the suitable conditions for increasing the rate of evaporation. While in conditions of at low speed of wind, excess amount of water and high humidity the water content will be less and slow process of evaporation will occur.
104. (a) Photosynthesis is the process by which plants take up water from soil, CO_2 from atmosphere, and absorbs photons from sunlight to synthesize sugars. Photorespiration is known as the oxidative photosynthetic carbon cycle, or C₂ photosynthesis.
105. (a) In the process of photosynthesis the light energy or the solar energy is directly converted into chemical energy in the form of sugars or carbohydrates.
106. (c) The actual site where photosynthesis occurs is the grana or thylakoid membranes of the chloroplast as the machinery for the process are embedded in the grana. Mitochondria are involved in the process of generation of energy, Golgi apparatus is involved in glycosylation and endoplasmic reticulum is involved in protein synthesis due to the presence of ribosome on the surface.
107. (b) The movement of water in plants is caused by transpiration, which involves the pulling of water due to cohesion-tension force or rather known as cohesion-tension theory. Osmosis is the process by which the solvent moves through a semi-

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- permeable membrane from low concentration to high concentration. Photosynthesis is the conversion of light energy into chemical energy. Diffusion is a process which involves the movement of water from higher concentration to lower concentration.
107. (d) Botanically a fruit is a swollen and ripened ovary and the seeds are actually the fertilized ovules, inside which the small embryos are nestled in.
108. (c) The production of naked seeds or ovules without fruits is one of the main characteristic features of Gymnosperms. *Cycas sp.* is a gymnosperm.
109. (d) Photosynthetically Active Region for green plants is 400nm to 700nm. While some green bacteria, purple bacteria and Helio bacteria, can also exploit solar light by absorbing its near-infrared component for photosynthesis.
110. (c) Sodium is not an essential micronutrient boron is involved in maintaining the meristematic tissue of the plant, zinc is responsible for enzyme synthesis or hormone development and copper is required for lignin synthesis.
111. (c) Ethylene is the chemical compound which works as a phytohormone causing fruit-ripening. Cytokinin is responsible for cell division, abscisic acid provides drought resistance.
112. (d) Pollination by snails or slugs is known as Malacophily, which is rare phenomenon. While entomophily is pollination by insects and chiropterophily is pollination by bats.
113. (d) Turmeric, the most popular spices of India, belongs to genus 'Curcuma' due to the presence of a yellow pigment 'Curcumin' which imparts yellow colour to it. The chemical structure of 'curcumin' is methyl orange and phenolphthalein are the chemicals used for acid-base titrations. Cinnaman is one of the spices.
114. (c) Inner bark of a woody plant is phloem & function of phloem is to transport food from the leaves to the other parts of the plant. Xylem is another transporting duct of plant that transports minerals & water from the roots to the leaves.
115. (d) Chlorenchyma (parenchymatous cells having chloroplasts) participates in photosynthesis. It is present in mesophyll cells of leaves and differentiated into palisade parenchyma and spongy parenchyma.
116. (a) A vessel element is one of the cell types found in xylem, the water conducting tissue of plants. Vessel elements are typically found in the angiosperms but absent from most gymnosperms such as the conifers.
117. (a) Temperate climatic zones see spring and autumn distinctly in a year. Spring brings plenty of water that the trees can take up to form larger xylem vessels and a broader and soft 'spring wood'. In late summer or in winters, the climate becomes dry severing enough water supply, thus, the vascular cambium cuts off smaller xylem vessels forming a narrow and darker dense 'autumn woods'. Spring and autumn woods together form a growth ring or annual growth ring. Each growth ring serves as a measure of the age of the tree.

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118. (a) The dark reactions of photosynthesis occur in the stroma of the chloroplast. The light reactions occur in the thylakoid membranes or the grana of the chloroplasts. The glycolytic pathways occur in the cytoplasm of the cells. Kreb's cycle or tricarboxylic acid or citric acid cycle occurs in the mitochondria to produce energy through oxidation.
119. _____
120. (a) Pure capsaicin is a white crystalline powder. Capsaicin is a capsaicinoid which belongs to the alkaloid family. It is present in chili peppers. It is beneficial for heart as it has role in controlling cholesterol. Geraniol is a natural antioxidant. Geraniol has been suggested to help prevent cancer. It is found in coriander, lavender, lemon, lime, nutmeg, oranges. Allicin is an antioxidant found in garlic and is effective against cancers. Lycopene is a carotenoid present in tomatoes. It is a very efficient antioxidant, which can neutralize oxygen-derived free radicals.
121. (c) The raw materials needed by plants to undergo photosynthesis are sunlight, water, soil nutrients, and carbon dioxide. The chlorophyll molecules capture the photons of sunlight to pass it to reaction centre. The range of the spectrum of sunlight absorbed by chlorophylls in photosynthesis is red and blue. They do not absorb the green portion of the spectrum. The concentration of oxygen when increases beyond a limit it causes the rate of photosynthesis to decrease. Anthesis is the phenomenon of opening of flower buds to become flowers. Fruits which are developed without fertilization are called parthenocarpic fruits. These do not have seeds. The plants undergo double fertilization as the egg fuses with the male gamete and the two polar bodies also get fused with another male gamete. The fertilized egg develops into the diploid embryo while the double fertilized polar bodies become the triploid endosperm.
122. (c)
123. (b) The breakdown of water molecules to the constituent atoms by light energy is known as 'photolysis'. The chlorophyll molecules absorb the light energy and funnel it to a specific chlorophyll molecule in the reaction centre which gets excited to a higher energy state. All green plants undergo oxygenic photosynthesis in which the byproduct of carbon dioxide fixation and electron transport chain, is molecular oxygen.
124. (d) When vaseline is applied to both surfaces of the leaf of a plant, all the three processes will be affected. Stomata of both surfaces will get closed. As a result there will be no exchange of gases like CO_2 , O_2 and water vapour. This will affect all the three processes.
125. (d) The enzyme nitrogenase reduces N_2 to form ammonia. Mutant strains of *Rhizobium* are not able to secrete excess protein into the soil.
126. (a) Carbon dioxide and water vapour in plants are produced as wastes during respiration. Oxygen is produced as a waste during photosynthesis. All these gaseous wastes of photosynthesis and respiration are removed through stomata.

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127. (a) Androecia contain stamens and gynoecia contain carpels. The calyx and corolla are the accessory reproductive organs. Corolla is the whorl of petals around the male and female reproductive organs. Corolla is the outermost whorl of sepals, which persists after fertilization and fruit development.
128. (a) Fern plants are related to Pteridophyta which have true vascular system i.e. xylem and phloem present. Vessels are absent in xylem and companion cells are absent in phloem.
129. (b) Stamen produces pollen grains in the anther which is a bilobed structure and placed terminally. Mammalian germ cells give rise to spermatozoa and ova which fuse during fertilisation to produce a cell called a zygote, which develops into an embryo.
130. (d) Viviparous plants produce seeds that germinate before they detach from the parent plant.
131. (b) Most plants absorb nitrogen in the form of nitrates and nitrites and urea. Atmospheric nitrogen is not available to the plants because the plants do not have enzymes to break the triple bond between the two atoms of Nitrogen.
132. (c) Fermentation takes place in anaerobic bacteria. It occurs in the cytoplasm.
133. (a) Offsprings formed by asexual reproduction show greater similarity among themselves because asexual reproduction involve only one parent and their is no involvement of gametes in the process.
134. (c) In the presence of moisture and nutrients, the fungi show enormous growth and produce large number of spores. Rhizopus stolonifer is the common bread mould. The hyphae of these species is coenocytic, filamentous and unbranched. Sporangia are borne on top a long stalk and are clustered.
135. (b) CO_2 is a life providing gas for plants. Its ratio in atmosphere is about 0.3%. It is liberated by animals in breathing process which is taken by plants and is used for photo synthesis.
136. (c) Chlorophyll is a green photosynthetic pigment found in plants, algae, and cyanobacteria. It contains Mg^{2+} ion as an important constituent.
137. (c) Green plants and most autotrophs use Photosynthetically active region of sunlight in the visible range 400nm to 700nm. Some bacteria like purple bacteria, Heliobacteria and others can harvest solar light by absorbing its near-infrared component for photosynthesis.
138. (d) Tomato is red in colour due to the presence of lycopene pigment found in the chromoplasts.
160. (a)
140. (a) At a very high temperature enzyme become denatured i.e. they can no longer perform the action that they were created to do.
141. (a) Fat has maximum calorific value. Calorific value is the energy produced by the complete combustion of a material or fuel (unit is kJ kg^{-1}) carbohydrate, fats and proteins all supply energy to the body, but amount of energy obtained i.e. calorific values differ. 1 gram of carbohydrate or protein and fat gives 4 calories and 9 calories of energy respectively.
142. (c) In order to survive the body must maintain the proper acid/alkaline balance is pH has to be maintained. The optimum pH of the blood is alkaline, 7.3-7.4. If blood pH goes beyond 7.4, there is a tendency to develop degenerative conditions.
143. (a) Thyroxin hormone is secreted by from the thyroid gland. It is the iodine containing hormone. Insulin is released by pancreas and helps in the release of glucose. Testosterone is the primary male sex organ which helps in the development of male sex tissues and Adrenaline, is a hormone which is released by adrenal glands and it plays an important role in the fight-or-flight response by increasing blood flow to muscles, output of the heart.
144. (c) Coronary arteries supply blood to the heart muscle. The main pulmonary artery is responsible for transporting oxygen-depleted blood away from the heart and back towards the lungs. Hepatic artery supplies oxygen-rich blood to the liver, pylorus, pancreas, and duodenum. The carotid arteries are major blood vessels in the neck that supply blood to the brain, neck, and face.
145. (c) Insulin is a kind of peptide hormone. It is secreted from the beta cells of the pancreas. It is the main hormone that regulates the glucose metabolism in humans. A glycolipid is a lipid that has an attached carbohydrate; its function is to contribute energy. Fatty acid is a carboxylic acid consisting of a hydrocarbon chain and a terminal carboxyl group, and sterols, also known as steroid. They occur naturally in plants, animals, and fungi, with the most familiar type of animal sterol being cholesterol.
146. (b) The formation of lymphocytes is known as lymphopoiesis. It occurs in the bone marrow. Bone marrow is the flexible tissue in the interior of bones. Lymphocytes are the key components of the lymphatic system involved in immunity. Liver has a wide range of functions, including detoxification of various metabolites, protein synthesis, and the production of biochemicals necessary for digestion. Spleen is an abdominal organ involved in the production and removal of blood cells in most vertebrates and forming part of the immune system. Pancreas is a glandular organ in the digestive system and endocrine system of vertebrates.
147. (c) Parathyroid hormone is a small protein that controls the calcium and phosphate homeostasis, as well as bone physiology. Parathyroid hormone has effects antagonistic to those of calcitonin. Glucagon is a peptide hormone, produced by alpha cells of the pancreas. It works to raise the concentration of glucose in the bloodstream. Growth hormone (GH), also known as human growth hormone is a peptide hormone that stimulates growth, cell reproduction, and cell regeneration in humans and other animals. Thyroxine hormone is released from the thyroid gland. It is the iodine containing hormone.
148. (b) The ampullary- isthmus junction of fallopian tube is the particular place where fertilization actually

- occurs. Fallopian tube is a part of the female reproductive system.
- Cervix is the narrow neck-like passage forming the lower end of the uterus. The lower part is called the "lower uterine segment" or the isthmus. The upper part of the uterus above the insertion of the fallopian tubes is called the fundus.
149. (c) Eating and swallowing are complex neuromuscular activities, co-ordinated by the swallowing centre in the medulla oblongata and pons. Vomiting is also regulated by medulla oblongata. Cerebellum, the part of the brain at the back of the skull in vertebrates, which coordinates and regulates muscular activity. Cerebrum is responsible for the integration of complex sensory and neural functions and the initiation and coordination of voluntary activity in the body. Cortex is the outermost (or superficial) layer of an organ.
150. (b) Urea is produced as a metabolite in the liver. It is produced as a breakdown product of amino acids. Ammonium ions are also formed in the breakdown of amino acids, some of which are utilised in the biosynthesis of nitrogen compounds. Excess ammonium ions are converted to urea. Lipase is an enzyme the body uses to break down fats in food so they can be absorbed in the intestines; these are produced in the pancreas, mouth, and stomach. In vertebrates, mucus is a slippery secretion produced by, and covering, the mucous membranes. Mucous fluid is rich in glycoprotein and water.
151. (b) Gastrin is a peptide hormone that stimulates secretion of gastric acid (HCl) by the parietal cells of the stomach and aids in gastric motility. Trypsin, ptyalin and pepsin are digestive enzymes. Trypsin and pepsin are proteolytic enzymes, Ptyalin or amylase is a starch degrading enzyme.
152. (a) In humans, the vermiform appendix is a small, finger-sized structure, found at the end of the caecum located near the beginning of the large intestine or at the junction of large and small intestine. The small intestine or small bowel is the part of the gastrointestinal tract. In vertebrates the gallbladder is a small organ where bile (a fluid produced by the liver) is stored and concentrated before it is released into the small intestine. Humans can live without a gallbladder. The stomach is a muscular, hollow, dilated part of the gastrointestinal tract that functions as an important organ in the digestive system.
153. (c) The gall bladder is a small sac and is the storage depot for bile. Bile is only concentrated in the gall bladder. Rat does not have a gall bladder. Camel, giraffe and fish have gall bladders which helps in secretion of bile.
154. (d) Vitamin D is a steroid hormone, a group of fat-soluble secosteroids that plays a vital role in calcium and phosphate absorption. Vitamin D also enhances intestinal absorption of calcium, iron and magnesium, while vitamin A deficiency causes night blindness, vitamin C deficiency causes scurvy and vitamin B deficiency causes beriberi.
155. (b) The study of bones is caused osteology. Orology is the study of mountains, seromology deals with the blood results and geology is the science which deals with the physical structure and substance of the earth, their history, and the processes which act on them.
156. (b) The thickest skin is present in the sole of the foot being around 4mm thick. The heel portion of the foot being the thickest portion. The skin under the eye and the area around the eyelids is around 0.5mm thick and it is the thinnest skin in the body.
157. (c) Muscles of eardrum and tailbone are vestigial organs in humans. The frontal teeth or incisors are functional and not vestigial. They take part in biting of food materials.
158. (c) Cockroach has blood known as homocoel, snails and kangaroos also have blood in their bodies. But hydra does not contain any blood but still it respire. It does not have any respiratory organs but it respire and thus exchanges gases throughout its body.
159. (c) Mammals have 4 chambers in their hearts. Fishes have 2, and reptiles have 3 chambers in their hearts. 5 chambers in a heart is an anomaly.
160. (d) A child has approximately 300 (270-300) bones in total in its body, as the child grows many bones especially in the head fuse together leading to decrease in the total number of bones to 206. Thus adults have 206 bones.
161. (b) The thigh-bone or femur is the longest, heaviest and by most measures the strongest bone in the human body. Its length is 26% of the person's height.
162. (a) Gastrin is a peptide hormone that stimulates secretion of gastric acid (HCl) by the parietal cells of the stomach and aids in gastric motility. Secretin is a hormone that both controls the environment in the duodenum by regulating secretions of the stomach and pancreas, and regulates water homeostasis throughout the body. Trypsin and Pepsin are proteolytic enzymes.
163. (d) The bone marrow (flexible tissue inside of the bones) is the site where red blood cells and other blood cells are formed in the process called haematopoiesis. Heart helps in pumping of blood, spleen acts as a filter for +963.5.0blood as part of the immune system and liver also detoxifies chemicals and metabolizes drugs and also makes proteins important for blood clotting and otherfunctions.
164. (c) The Pineal gland regulates the sleep patterns in humans by secreting melatonin and serotonin. It is a small endocrine gland resting in the middle of the brain. Medulla oblongata helps regulate breathing, heart and blood vessel function, digestion, sneezing, and swallowing; The cerebellum coordinates voluntary movements such as posture, balance, coordination, and speech, resulting in smooth and balanced muscular activity and pituitary gland is a pea-sized structure located at the base of the brain, just below the hypothalamus, to which it is attached via nerve fibers.

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165. (d) Liver is the site of storage of extra carbohydrate or glucose by converting it into glycogen. Where there is energy deficit, the stored glycogen is again broken down to glucose. The deprivation of the hormone insulin imbalances this carbohydrate homeostasis in the body. While, The pancreas is a glandular organ in the digestive system and endocrine system of vertebrates. It is located in the abdominal cavity behind the stomach in humans. It is an endocrine gland producing several important hormones, including insulin, glucagon, somatostatin, and pancreatic polypeptide which circulate in the blood. Stomach is the internal organ in which the major part of the digestion of food occurs, a pear-shaped enlargement of the alimentary canal linking the oesophagus to the small intestine.
166. (d) Thyroxine deficiency in childhood or infancy results in a condition called cretinism. Its symptoms are :
 (i) Lack of skeletal development resulting in deformed bones and stunted body growth.
 (ii) Mental deficiency, retardation of development of sex organs and Low BMR along with slow pulse and respiration rate.
167. (a) In women, luteinizing hormone stimulates the last stage of oogenesis, ovulation, development of corpus luteum and secretion of progesterone by the corpus luteum. Ovulation is controlled by the increased level of LH in the blood.
168. (b) Excretion is the removal of waste products of metabolism from body. The excretory organs in cockroach and other insects are Malpighian tubules. Likewise in man, kidney is a part of excretory system. Excretory system consists of a pair of kidney, a pair of ureter, a urinary bladder and a urethra.
169. (c) Trypsin is an enzyme. The pancreas adds a collection of protein-cutting enzymes, with trypsin playing the central role, that chop the protein chains into pieces just a few amino acids long. Then, enzymes on the surfaces of intestinal cells and inside the cells chop them into amino acids, ready for use throughout the body. Trypsin uses a special serine amino acid in its protein-cutting reaction, and is consequently known as a serine protease.
170. (b) Enzymes are proteinaceous substances which are capable of catalysing chemical reactions of biological origins without themselves undergoing any change. The term enzyme was used by Willy Kuhne in 1878.
171. (a) Human ribcage consists of 12 pairs of ribs. The upper seven pairs of ribs are attached in front directly to the sternum by hyaline cartilage. These are called true ribs. The next three pairs of ribs attach indirectly to sternum. They are termed false ribs. The ribs protect the heart, large blood vessels and lungs.
172. (d) Milk is a poor source of vitamin C. Citrus, amla, etc are rich source of vitamin C. Milk is a rich sources of calcium
173. (c) Crocodiles store fats in their tail, because of which they can survive for a long time without food.
174. (c) Cerebellum, a part of hindbrain, controls fine movement, maintains balance and equilibrium of the body and muscle tone in human beings.
175. (d) Enzymes are biological catalysts that increase the rate of reaction without altering its structure.
176. (c) Sodium, chloride and potassium ions are essential for the transmission of nerve impulses.
177. (b) Liver cells secrete bile, biles help in emulsification of fat i.e. breaking down of fats into small micelles. Lungs help in respiration, kidneys help in regulation of extra cellular fluid.
178. (c) The pulmonary arteries transport deoxygenated blood to the left and right lungs. An interesting fact is that the pulmonary arteries are the only arteries that carry deoxygenated blood. All other arteries deliver blood enriched with oxygen and other nutrients to our body's tissues. Conversely, the pulmonary veins transport oxygenated blood from the left and right lungs to the heart, while all other veins carry deoxygenated blood and waste products. Pulmonary arteries carry deoxygenated blood from heart to lungs.
179. (c) Enamel of teeth is the hardest part of our body.
180. (d) In digestive system of living organisms proteins are broken down into amino acids. Glucose is the end product of metabolism of carbohydrates.
181. (c) Cerebrum (a major part of forebrain) is the main thinking part of brain. It has sensory, motor and association areas.
 Midbrain is a small central part of the brainstem, developing from the middle of the primitive or embryonic brain, the hypothalamus is a portion of the brain that contains a number of small nuclei with a variety of functions and the lower part of the brainstem, comprising the cerebellum, pons, and medulla oblongata.
182. (b) Darwin (1881) found that bending movement of coleoptile of canary grass (*Phalaris canariensis*) was due to exposure of tip to unilateral light. Boysen-Jensen (1910, 1911) found that the tip produces a chemical which was later named Auxin. Abscisic acid induces dormancy.
 Cytokinin induces cell division. Gibberellin causes Stem elongation
183. (b) In case the ovum (female) is fertilised with a sperm (male) carrying X-chromosome the zygote develops into a female (XX) and the fertilisation of ovum with a Y-chromosome carrying sperm results into a male offspring (XY). Thus, it is evident that it is the genetic makeup of the sperm (male/father) that determines the sex of the child.
184. (c) Contractile proteins are found in muscles. Bone is a connective tissue largely composed of an organic protein; collagen and the inorganic mineral hydroxyapatite, which combine to provide a mechanical and supportive role in the body, Blood contains hemoglobin protein which makes up the blood and Cartilage is a connective tissue found in many areas of the body including, joints between bones
185. (b) The matrix comprises the major constituents of bone. It has inorganic and organic parts. The inorganic is mainly crystalline mineral salts and calcium, which

- is present in the form of hydroxyapatite. The matrix is initially laid down as unmineralized osteoid mineralisation involves osteoblasts secreting vesicles containing alkaline phosphatase. This cleaves the phosphate groups and acts as the foci for calcium and phosphate deposition.
186. 187. (c) Book lungs occur in Arachnids.
188. (a) Frogs generally breathe by their lungs but they can also breathe with their skin too. Their skin is glandular which can exchange oxygen and carbon dioxide along with some other bodily secretions. The mature frogs have no gills, but before their larval stage have tail as well as internal gills like fishes through which most of the breathing occurs. These two particular features disappear once the tadpoles are ready to metamorphose.
189. (b) After the removal of wastes from the kidneys, the clean blood is sent back through the renal veins. From Bowman's capsule, the filtered liquid passes through tiny tubes where much of the glucose is reabsorbed and sent back to the blood in the renal vein.
190. (c) Alcohol acts as a diuretic. It actually promotes urine production by inhibiting the release of antidiuretic hormone, or vasopressin from the pituitary gland. In turn, reduced levels of antidiuretic hormone prevents the kidneys from reabsorbing water and thereby increasing urine production.
191. (d) During exercise, the level of somatotropin goes up. Testes secrete testosterone and females' adrenal glands secrete progesterone. Stress causes the adrenal glands to release very less amount of cortisol (a steroid hormone) than usual.
192. (d) Essential amino acids or indispensable amino acids are those amino acids which cannot be synthesized *de novo* by any particular organism. In humans also, some amino acids are essential and must be supplied in the diet. The amino acids regarded as essential for humans are phenylalanine, valine, threonine, tryptophan, methionine, leucine, isoleucine, lysine, and histidine.
193. (c) Lungs are the organs which actually oxygenate up the blood by exchanging the carbon dioxide to outside and taking up oxygen which comes to them by breathing in by the organism. This oxygen in the blood is then transported to each tissue of the body. Integrated and coordinated works of circulatory and respiratory systems are responsible for this.
194. (d) Sternum is the breast bone. Clavicle is the collar bone. Patella is the knee cap. Scapula is the shoulder blade.
195. (c) Adrenalin is secreted in the situations of exercise, fear or any kind of dangerous situation. Oestrogens are steroid hormones or female primary sex hormones. Insulin is responsible for the metabolism of sugar in the body. Pheromones are the compounds which are secreted generally from insects; to attract partners for mating and affects the behaviour or physiology of other insects or predators. Some of the pheromones include alarm pheromones, food trail pheromones, and sex pheromones.
196. (a) Ptyalin digests the starch in the mouth. Pepsin is a proteolytic enzyme which breaks down the proteins into simple peptides. Renin is responsible for converting angiotensinogen to angiotensin. Oxytocin is a hormone that stimulates the contraction of smooth muscles of the body.
197. (a) Lymph provides protection against invading germs and is a medium of circulation in the body lymph, however, unlike blood, flows in only one direction. The direction of flow is upwards, towards the neck.
198. (b) An enzyme is basically a protein which acts as a catalyst in the metabolic reaction and the juice of the pancreas is basically composed of three enzymes trypsin, amylase and lipase.
199. (b) Progesterone is released from the female gonads. It has roles in the female menstrual cycle, pregnancy and embryogenesis. Growth hormone or somatotropin, is a peptide hormone that stimulates growth, cell reproduction and regeneration in humans and other animals, the pituitary gland secretes this hormone. The pancreas secretes insulin that regulates the sugar metabolism in the body. Cortisol is released from the zona fasciculata of the adrenal cortex in response to stress.
200. (b) Ligaments connect two bones together. Tendon connects muscles. Areolar tissue is filling tissue. Fats are stored in adipose tissue.
201. (a) All the arteries carry oxygenated blood from the heart to various parts of the body except the pulmonary artery which carries the deoxygenated or impure blood from the heart to the lungs to make it oxygenated. All the veins carry deoxygenated blood from various parts of the body towards the heart except the pulmonary vein which brings the oxygenated blood from the lungs to the heart.
201. (d) Arteries carry blood from heart to various body organs. Veins carry blood from body organs to heart.
202. (c) Femur is the most proximal bone of the leg in the tetrapod vertebrates. It is the single bone in the thigh and longest bone in the human body. The stapes is a bone in the middle ear of the humans. It is the smallest in the human body. Enamel is the hardest substance in the human body which is made up of 96% of minerals.
203. (d) The digestion of protein begins in stomach. The enzyme pepsin acts on protein and brings about their breakdown in the stomach. The protein-digesting enzymes from pancreas are released into small intestine.
204. (b) The common bile duct releases its contents into the small intestine. The pancreatic duct releases its contents into duodenum.
205. (c) A balanced diet is a diet which provides sufficient amount of carbohydrates, fats, proteins, vitamins and minerals nutrients to maintain good health and with a small provision for periods of leanness or scarcity.
206. (b) Some antioxidants are produced by our body whereas those the body cannot produce are obtained from the diet.

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207. (a) Spinach is a rich source of protein. Potatoes are rich in carbohydrates and peas have more protein as compared to potatoes.
208. (b) Cow milk contains higher percentage of Vitamin B complex.
209. (c) Fishes have 2 chambered heart. Birds have four chambered heart. Frogs, toads, newts and salamanders have four legs. But caecilians, which form the least known group of amphibians, have no limbs and only a very short tail. They resemble snakes, worms or eels.
210. (d) Urochrome is the chemical which is responsible for the yellow colour of urine.
Bile is a yellowish to dark green fluid produced by the liver of most vertebrates that helps in the digestion of lipids and fats in the small intestine. Lymph is the fluid that circulates throughout the lymphatic system; it is found in the interstices of the body tissues. Cholesterol is a wax like fatty substance present in almost every cell of the human body that aids in digestion and formation of hormones.
211. (b) The SA node is called as the natural pacemaker of the heart. It is comprised of a cluster of cells that are situated in the upper part of the wall of the right atrium. It is called as the pacemaker as the electrical impulses are generated here.
212. (a) Animals release certain types of sex pheromones for the purpose of mating during the breeding season to attract the opposite sex.
213. (d) In yeast, respiration in absence of oxygen causes conversion of pyruvate into ethanol and carbon dioxide in the cytoplasm, whereas anaerobic respiration in muscle cells causes conversion of pyruvate to lactic acid in the cytoplasm.
214. (d) During inhalation, the diaphragm contracts and moves downward. This increases the space in the chest cavity and thus the lungs expand. The intercostal muscles contract to pull the rib cage upward and outward.
Haemoglobin binding affinity for carbon monoxide is 250 times greater than its affinity for oxygen.
215. (c) Left atrium receives oxygenated blood from lungs while right atrium receives deoxygenated blood from different parts of the body. Left atrium transfers oxygenated blood to left ventricle which sends it to different parts of body.
216. (c) Sensory neurons carry signals from receptors to spinal cord. Motor neurons carry signals from spinal cord to the effector muscles which take action accordingly.
217. (c) The fore-brain is the main thinking part of the brain. Cerebellum controls the posture and balance of the body.
- 218.
219. (c)
220. (b) Correct matching will be as following –
- | <i>List I</i> | <i>List II</i> |
|---------------|----------------|
| A. EEG | 3. Brain |
| B. ECG | 4. Heart |
| C. EOG | 2. Eye |
| D. EMG | 1. Muscle |
221. (d) ‘Nutraceuticals’ terms is made of two words - Nutrition and pharmaceutical Nutraceuticals products are known for regular Nutrition, Values and Medicinal values.
222. (a)
223. (c) The enzyme which help in the digestion protein is called trypsin.
224. (a) Golden rice is a genetically modified rice rich with vitamin A. It was developed after research of 10 years to produce golden rice. Its plant is transplanted with three genes and as a result of it the plant becomes able to produce beta Karotene. Beta Carotene is an element which is changed into vitamin A.
225. (b) Regulation of Sugar level in blood is not the normal function of human kidney. The glucose level is controlled by insulin produced by Pancreas.
226. (b)
227. (a) Tyrosine is one of the standard amino acid and contains a phenol group. This non-essential amino acid was first discovered from casein protein isolated from cheese.
228. (c) The term menopause is defined as permanent stoppage of menstruation cycle in normal adult female. It is characterized by less or no female hormone secretion mainly estrogen and progesterone.
229. (a) Haemoglobin is a type of heme protein in vertebrate RBCs and in the plasma of many invertebrates. It acts as a carrier of oxygen and carbon dioxide.
230. (d)
231. (b) Vitamin D is a fat soluble vitamin also known as cholecalciferol. It is synthesized on skin surface upon exposure to sunlight. It is further metabolized in the liver and kidney into metabolically active form called $1\alpha, 25$ -dihydroxyvitamin D.
232. (c) Calcium triggers process of muscle contraction by reaction with regulatory proteins. Calcium plays an important role in actin and myosin interaction.
233. (b) Major enzyme present in human saliva is α -amylase, which acts on the starch.
234. (a) Pancreas acts as exocrine as well as endocrine gland. It acts as exocrine gland as it has a duct to store pancreatic juice secreted by the pancreas and used for digestion of food. It is considered as an endocrine gland as it releases hormones insulin and glucagon directly to the blood.
235. (a) Availability of Vitamin ‘C’ –
 (A) Chilli : 143.7 mg/100 gm
 (B) Pumpkin : 9 mg/100 gm
 (C) Pea : 40 mg/ 100 gm
 (D) Radish : 14.8 mg/ 100 gm
236. (c) Largest number of ATP produced in these processes is through respiratory chain. It produces higher ATP than glycolysis, hydrolysis and Kreb’s cycle
237. (b) Fats food groups have highest caloric value per unit weight, eg. oil, ghee, butter, cream etc. These give warmth to body due to supply of protein & Vitamin ‘A’ & ‘D’.
238. (d) Gall bladder is an important organ where bile is stored and concentrated before it is released into the small intestine.

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239. (c) 257. (b) Good Cholesterol refers to LDL (Low Density Lipoprotein), Lipoproteins are complex particles composed of multiple type of proteins.
240. (a) The metal present in Vitamin B12 is cobalt, One of the types of Vitamin B12 is also known as Cyanocobalamin.
241. (d) Smooth muscles are present inside internal organs like the stomach, intestines etc.
242. (c) The kidneys are two bean shaped organs found on the left and right sides of the body in vertebrates. They filter the blood in order to make urine, to release and retain water and to remove waste (the excretory system). They also control the ion concentrations and acid - base balance of the blood. Each kidney feeds urine into the bladder by means of a tube known as the ureter.
243. (b) Amino acids are building blocks of proteins. Proteins are composed of combination of 20 amino acids. The combinations may involve one or more amino acids.
244. (c) Lipids are naturally occurring hydrophobic molecules. They are heterogenous group of compounds related to fatty acids. They include fats, oils, waxes, phospholipids and many related molecules.
245. (a) Oranges and other citrus foods are rich in Vitamin C or Ascorbic acid. The disease scurvy is prevented and treated with intake of vitamin C.
246. (a) Vitamin-'D₂' is known as ergocalciferol. The sources of vit. 'D' are egg, sunlight, sun - cured - hay etc.
247. (d) 1, 2 and 3
248. (d)
249. (d) 'Oxytocin' hormone plays a role in release of milk from mammary glands in cows / bull aloes as well as to increase lauki (bottle gourd) length, infact it is not useful.
250. (a) The Liver Stores fat-Soluble Vitamins. It is the largest gland of the body and releases these vitamins into circulation when need arises.
251. Anticoagulant poisons are agents that prevent clotting of the blood. Vitamin K helps in clotting of blood and is used as antidote to poisoning caused by anticoagulant poisons
252. (d) Neurons are the basic units of the nervous system. A neuron is made of a cell body (cyton or soma), dendrites and an axon. The basic purpose of a neuron is to receive incoming information and based upon that information; send a signal to other neurons, muscles or other organs.
253. (a) Assimilation is the process which includes absorption of nutrients into the body after digestion in the intestine and its transformation into biological tissues and fluids. Assimilation takes place in each and every cell of the body to develop new cells and production of energy.
254. (c) The Artificial Insemination (AI) is the process in which a thin, flexible tube (Catheter) is used to put sperm artificially into a woman's cervix.
255. (d) Vitamin K is essential for the functioning of several proteins involved in physiological processes that encompass, but are not limited to, the regulation of blood clotting.
256. (c) Insulin is a peptide hormone produced by beta cells in the pancreas and by Brockmann body in some teleost fish.
257. (b) Cobalt is an element taking part in the composition of Vitamin B₁₂ ($C_{63}H_{88}CoN_{14}O_{14}P$). It plays an important role in production of blood cells.
258. (b) **Large intestine** is the last part of alimentary canal where extra water is absorbed to prepare the waste as a solid stool.
259. (b) **Renal tubule** in kidney is responsible for absorption of water to produce proper concentration of urine.
260. (a) All enzymes are protein by composition but all proteins are not enzymes.
261. (c) Thyroid gland is one of the largest endocrine glands which is present in the neck. It is responsible to control body's metabolism, temperature, appetite and muscle strength, etc.
262. (c) Vitamin-C is enough in guava fruits. Vitamin-C helps in strengthening of immunity, serves as an antioxidant and provides relief in hypertension too.
263. (d) Vitamin-K adds in blood clotting. Vitamin-K acts as an essential cofactor for factor-II, VII, IX, X and also for proteins Z, C and S.
264. (c) Somatotrophin is produced by the anterior pituitary. It is a peptide hormone that induces growth, cell reproduction and regeneration.
265. (a) In the normal human adult, heart beats at the rate of about 72-80 per minute in the resting state.
266. (a) The term lubb and dubb is concerned with heart. Lubb is the first sound in the heart produced by the closure of atrioventricular valves (tricuspid and bicuspid) at the beginning of ventricular systole. Dup is the second sound produced by the closure of semilunar valve towards the last point of ventricular systole.
267. (d) The human heart possesses four chambers, two superior atria and two inferior ventricles. The atria are receiving chambers and ventricles are providing chambers. Left ventricle pumps fully oxygenated blood to aorta then to the body. Right atrium gets deoxygenated blood from superior vena cava.
268. (d) The stomach shows division into two parts fundic and pyloric region. The pyloric region enters small intestine through pyloric valve of pylorus.
269. (d) Vitamin-A-Retinol, Vitamin-B₁-Thiamine, Vitamin-C-Ascorbic acid, Vitamin-E-Tocopherol.
270. (b) The ear muscles are vestigial organs in man. Vestigial organs are not functional in organisms. These are not active in related animals but were functional in their ancestors. There are more than 90 vestigial organs in human beings.
271. (d) Sun is the primary source of vitamin-D. The body can synthesise vitamin-D itself in presence of sunlight. Vitamin-D is soluble in fat and assists the body to absorb calcium. Its deficiency can cause osteoporosis.
272. (c) Systolic pressure in an adult man is 120 mm Hg whereas diastolic pressure is 80 mm Hg normally. High or low blood pressure can create serious conditions in humans.
273. (c) Frog takes respiration in water through the moist skin. Whereas on the Earth respiration occurs through

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- lungs Fish has gills, Cockroach has spiracles and pigeon possesses lungs to respire.
274. (b) Vitamin-B is water soluble. Its over-dose is excreted out in urine, vitamin A, D, E and K are fat soluble therefore, they are not excreted in urine.
275. (a) The internal ear of human beings consists of three parts viz. cochlea, utricle and saccus. The cochlea helps in hearing whereas utricle and saccus help to maintain the body balance.
276. (a) The hormones are secreted by endocrine glands of body. They can behave as coenzymes, e.g., thiamine pyrophosphate can help in the transfer of aldehyde group. Enzymes can be protein or steroid in composition.
277. (a) Mammalian digestive system do not secrete enzymes to digest cellulose, but the cellulose digesting bacteria present in the rumen of cattle can digest the cellulose existing in fodder.
278. (c) Blood is a fluid connective tissue. It carries hormones from endocrine glands to target organs. It carries heat and set homeostasis. It also aids in osmoregulation by carrying fluid to the kidney and skin, etc.
279. (c) Photoreceptor Cells are the light sensitive cells. These cells are present mainly in the retina of the eye and absorb light and convert it into an electrical signal that is passed to the brain through the optic nerve.
280. (b) The Least distance of distinct vision is defined as the minimum distance between the eye lens and the object to form a clear image. It is also defined as the minimum comfortable distance between the naked human eye and a visible object and is 25cm for normal adult without any visual defect.
281. (d) The retina is the third and inner coat of the eye which is a light - sensitive layer of tissue. The optics of the eye create an image of the visual world on the retina, which serves much the same function as the film in a camera. An image is produced by the patterned excitation of the cones and rods in the retina.
282. (b) The annual rings or growth rings in a tree trunk are a measure to date the age of the trees. This study which includes the counting and observing the patterns of the tree trunks, comes under a branch of science called Dendrochronology. The annual rings are seen as concentric rings in the cross section of the tree trunk.
Morphology is the study of form of things, patterns and Horticulture is the art or practice of garden cultivation and management.
283. (c) The study of internal organs and tissues of not only plants but any organism comes under Anatomy. While morphology is the study of external features of plants and animals.
Taxonomy, the branch of science concerned with classification, especially of organisms; systematic, Agronomy, the science of soil management and crop production.
284. (b) The branch of biology under which morphological, anatomical, pathological and genetic studies of fungi are done, comes under the field of mycology. While phycology, ethology, microbiology deal with Algae, Animal behavior and microbes respectively.
285. (a) Lichens generally are the indicators of air pollution especially sulphur-dioxide. The change in habit of particular lichens indicates the level of pollution, e.g., bushy lichens can only grow well when air is absolutely clean. Lichens grow as crusty forms when there is high level of air pollution. While leafy lichens grow at moderate levels of air pollution.
286. (b) It is estimated that 2.3 kilograms of alga *Chlorella pyrenoidosa* produce enough oxygen to supply one man in space.
287. (c) The Red Sea is a seawater inlet of the Indian ocean, lying between Africa and Asia. An alga, of phylum Cyanobacteria called *Trichodesmium erythraeum* is present in this sea. It contains abundant quantities of pigments, phycobilin, phycoerythrin and phycocyanin, due to which the sea appears red or pinkish.
While fungi, bacteria and moss don't contain these pigments hence they don't impart any color.
288. (d) Lichen is a symbiotic association of a fungal member (mycobiont) and an algal or cyanobacterial member (phycobiont). The phycobiont is photosynthetic and synthesizes carbohydrates, which is consumed by the mycobiont. The mycobiont provides mechanical support to the alga and also helps absorbing the minerals from the substrata.
289. (c) Litmus paper is used to measure pH of any substance. It can be made from a mixture of cellulose, lichen and some adjunct compound. Lichen which is used commonly in litmus paper is *Rochella tinctoria* and *Lecanora tartaria*.
290. (b) *Gracilaria* and *Gigartina*, members of Rhodophyta (Red algae) are the commercial source of agar- agar.
291. (d) *Azolla* is an aqueous fern. A blue-green alga called *Anabaena* sp. lives symbiotically in its leafy thallus. It is a potential commercial biofertilizer for paddy fields due to the nitrogen fixing capability of the alga.
292. (c) Selaginella, the spike moss is a genus of the family Selaginellaceae. It is stored by dipping its roots in water. While *Psilotum*, *Lycopodium* and *Pteris* belong to the family of Pteridophytes.
293. (b) Gymnosperms possess naked seed, that is they lack seed coat. Angiosperms are those plants. Where the seeds are covered, bryophytes and pteridophytes are the plants which do not consist of seed formation, rather they directly develop into zygote.
294. (a) Living fossil is an organism which closely resembles to the fossil record of the same organism although it has no close living relative. Cycas is considered to be the living fossil among the options. *Selaginella* is a Pteridophyte, *Pinus* and *Cedrus* belong to the family Pinaceae (gymnosperm).
295. (b) Chilgoza is obtained from *Pinus gerardiana*. It is an edible pine nut rich in carbohydrates and proteins. These seeds or nuts are locally called and marketed as 'Chilgoza' or 'Neja'.
296. (a) *Cycas revoluta* is one of the sources of sago, which is nothing but edible starch. Sago is also extracted from the spongy centre, or pith, of various tropical palm stems, especially *Metroxylon sagu*.

297. (d) Turpentine is a volatile essential oil which is extracted from the resinous compound obtained from Pine trees' needles, twigs. Turpentine oil has antibacterial properties, used in chemical industries, paints and varnishes.
298. (b) Coffee tree bears berries as fruits which contain seeds. These seeds are roasted in the process of producing coffee. The seeds are generally called coffee beans. *Coffea canephora* and *C. arabica* are two economic coffee plants.
299. (a) Technically, apple is not a true fruit. A fruit is a ripened ovary. Inside the apple fruit, the structure holding the seeds is actually the fruit while the edible fleshy part is actually the swollen wall material of ovary.
300. (a) The fleshy edible part of the pear fruit is actually the swollen thalamus.
301. (b) Epiphytes are the plants which grow non-parasitically on other plants generally for mechanical support and sometimes for moisture and nutrients absorption. Common epiphytes are mosses, bromeliads, orchids, etc.
302. (c) Halophytes are those plants which grow successfully in soils or water with high concentration of salts or in either at saline semi-deserts, mangrove swamps, marshes and sloughs and seashores. Xerophytes are those plants which thrive under desert area, hydrophytes are those plants which thrive under water area and lithophytes are those plants which survive on rocks or land.
303. (b) Plants that grow on rocks are called lithophytes. They are also known as *epipetric* or *epilithic* plants. Examples include *Paphiopedilum* orchids, ferns, some algae and liverworts. They use rainwater, and absorb organic nutrients from the dead and decaying tissue of other plants or their own dead tissue. Oxylophytes are those plants which survive in acidic soil, Mesophytes are those plants which thrive under moderate environment.
304. (d) The protein content per 100g of pulse is estimated to be 5g for pea (*Pisum sativum*), 22g for pigeon pea (*Cajanus cajan*), 25g for black gram (*Vigna mungo*) and 36g and highest for soyabean (*Glycine max*). The protein content of egg is around 13g/100g.
305. (b) Bamboo or *Bambusa* sp. is a member of grass family- *Poaceae*. More than 10 genera and 1,450 species are known, which are flowering perennial monocot plants.
306. (c) The tallest trees in the world are redwoods *Sequoia sempervirens* with a height of around 115.72 m (379.65 ft). These trees are growing in Hyperion, Redwood National Park, California, United States.
307. (c) Cloves are the aromatic unopened flower buds of a tree called *Syzygium aromaticum* of the family *Myrtaceae*.
308. (d) Quinine is a natural white crystalline alkaloid obtained from the bark of *Cinchona* sp. of family Rubiaceae. It has antimalarial, analgesic (painkilling), and anti-inflammatory and antipyretic (fever-reducing) properties.
309. (b) Leaves of Tendu (*Diospyros melanoxylon*) are used to make wrappers of 'beedi' or poor man's cigarette.
310. (d) Saffron is derived from the plant called *Crocus sativus* of family *Iridaceae*. Saffron is used as spice or condiment especially in sweet dishes and some meat preparations. The part which is used is style and stigma of the flower.
311. (a) Apart from quinine, Arteether herbal drug is used to cure malaria. While, Lutavit and Cineraria (eye drops) are used for the treatment of eye diseases like cataract etc.
312. (d) Spinach or *Spinacea oleracea* of family *Amaranthaceae* is one of the good sources of iron. The United States Department of Agriculture states that a 180-g serving of boiled spinach contains 6.43 mg of iron. Carrot is rich in vitamin A, Pea is rich in vitamin K and Rice is rich in carbohydrate content.
313. (c) The chief constituent of cotton is fibre, majorly made up of cellulose and some hemicelluloses.
314. (a) The golden rice is a genetically modified rice to synthesize beta-carotene, a precursor of vitamin-A. It has been developed with the aim to provide a fortified food to people consuming Vitamin A deficient food. *Pongamia pinnata* is believed to be a potential source of petrochemicals. Pigeon pea is not considered as a petro plant.
315. (d) Pneumatophores are the aerial root system of mangroves. These are the special adaptations to breathe and allow exchange of gases and water the salty medium in which these plants grow. Some plants having pneumatophores are *Avicennia germinans* and *Laguncularia raeemosa*.
316. (a) Epiphytic plant are those which depend on other plants for mechanical support, hydrophilic plants are those which grow in water and insectivores are insect eating plants.
317. (d) Mycorrhiza is the symbiotic association between roots of vascular plants and some ecto-parasitic fungus. The fungal hyphae make a mesh around the roots which increases the surface area for absorption of water and mineral nutrients by the roots. The fungus in turn takes up carbohydrates and sugars from the roots.
318. (b) Coralloid roots are mainly present in Cycas sp. Lichen a symbiotic relationship between fungi and algae.
319. (a) Clove oil contains eugenol, which is an antiseptic, analgesic, and used in dentistry for relief from tooth ache and bad breath.
- Methanol is mainly used in motor vehicles as it is inflammable and can easily be mixed with water, benzaldehyde is the flavoring agent, which is used to flavor cakes and other baked goods.
- Noscapine is a benzylisoquinoline alkaloid obtained from plants of the *Papaveraceae* family. Although it has no painkilling properties but is primarily used for its antitussive (cough-suppressing) effects.
- Eucalyptus belongs to the family *Myrtaceae* and Ocimum belongs to the family *Lamiaceae* and is mainly used in culinary purposes.

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320. (d) The active chemical ingredient in chili peppers which is responsible for hotness, is chemically known as 8-methyl-N-vanillyl-6-nonenamide, commonly called as Capsaicin. Curcumin is obtained from turmeric, sorbitol is a sweet sugar alcohol mainly present in the body and easy to digest.
321. (d) *Heliamphora sp.*, *Drosera sp.*, *Nepenthes sp.* are all carnivorous plants. *Thymus sp.* is a common thyme plant which is not a carnivore.
322. (b) Censer mechanism of seed dispersal is a type of dispersal by wind, which generally occur in poppy. Its seeds bear hairy fibers outside and are very light in weight, which aid in easy dispersal by wind.
323. (b) Kuttu's flour is flour made from buckwheat, botanically known as *Fagopyrum esculentum*. Its grain like seeds is used to obtain flour. Tapioca flour is used to make tender breads, cakes, biscuits, cookies, and other delicacies and Eluesine flour is made from a finger millet and is a whole grain flour.
324. (c) *Rafflesia arnoldii* produces the largest flower on the earth. It is also known as corpse flower due to its peculiar strong odour that resembles rotten and decaying flesh.
325. (a) *Triticum aestivum* is the common wheat used to make bread. *Pennisetum sp.* is pearl millet, *Oryza sativa* is rice, *Hordeum vulgare* is barley.
326. (b) The coconut is actually a drupe not a nut and technically, the sweet water inside the coconut is the cellular endosperm, which accumulates during the later phases of seed development. Pericarp is the part of a fruit formed from the wall of the ripened ovary. Scutellum is a part which shields the developing seed.
327. (c) Garlic contains sulphuric compound called allyl methyl sulphide that renders it the typical pungent smell.
328. (a) Mushroom is actually the fruiting body of the fungus, which is produced to bear millions of germinative spores. Most mushrooms belong to the *Basidiomycota* and *Agaricomycetes*. Alga is a group photosynthetic organisms, ferns are the vascular plants which reproduce through spores. Mosses are small flowerless plants that typically grow in dense green clumps or mats.
329. (c) *Macrocystis pyrifera* is a giant kelp and the largest of all algae and plants. It is the fastest-growing organism. They can grow at a rate of two feet a day to reach over 50 metres long in one growing season. *Populus tremuloides* is a tree, *Armillaria ostoyae* is a type of fungus. *Macropanesthia rhinoceros* is the Australian giant burrowing cockroach.
330. (b) *Lactobacillus casei* strain Shirota is the bacterium used in the probiotic drink Yakult, which is a fermented mixture of skimmed milk and the bacteria. Yakult has been created by Japanese scientist Minoru Shirota.
331. (d) A seed is a ripened ovule. The typically enlarged, bottom part of the pistil where ovules are produced is the ovary. Gynoecium is the female reproductive part of a flower that contains ovary.
332. (b) Arthropoda is the largest phylum in the animal kingdom in terms of both number of taxa and biomass.
333. (b) Silver fern is Cheilanthes. Equisetum and Selaginella belong to Pteridophytes or lower plants.
334. (c) Ginger is a stem and not a root because it has nodes and internodes.
335. (a) Two bacteria found to be very useful in genetic engineering experiments are Escherichia and Agrobacterium.
336. (a) Red Snow causing alga is Chlamydomonas rivialis.
337. (b) Western Himalayas is known as "The Golden Mine of Liverworts".
338. (b) Eutrophication is the enrichment of bodies of fresh water by inorganic plant nutrients (e.g., nitrate, phosphate). These typically promote excessive growth of algae. As the algae die and decompose, high levels of organic matter and the decomposing organisms deplete the water of available oxygen, causing the death of other organisms, such as fish.
339. (b) The most poisonous mushroom is the death cap toadstool (*Amanita phalloides*). It is commonly found where beech and oak trees grow.
340. (d) *Paramecium* is a ciliated protozoan because of the presence of thousands of cilia. *Plasmodium* (malarial parasite) is a sporozoan, causing malaria which has staggering effect on human population.
341. (b) ICBN stands for "International Code of Botanical Nomenclature"
342. (b) The tip of the root of *Rafflesia* makes haustorial contact with the root of host and absorbs food from the host.
343. (d) *Spirogyra* is a freshwater alga found freely floating on the surface of the stagnant pools, ponds and ditches, etc. It is commonly known as water silk or pond silk. Sundews are one of the largest genera of carnivorous plants. These are the members of the family Droseraceae. So, *Drosera* is a sundew carnivorous plant. *Dionaea* is the member of the family Tachinidae, commonly called as venus flytrap. *Utricularia* is a member of the family Lentibulariaceae, which are carnivorous, plants commonly known as bladderworts. *Nepenthes* are genera comprising tropical carnivorous plants and also known as monkey cups. These are generally found in old world tropics.
344. (a) Living fossils are those organisms whose close relatives are not living on the earth. *Cycas* is a living fossil. *Zamia pygmaea* is endemic to Cuba and is the smallest gymnosperm on the earth. *Sequoiadendron giganteum* is the tallest coniferous gymnosperm known as redwoods. Canada balsam is obtained from the *Abies balsamea* (a North American fir) also known as Canada balsam.
345. (a) *Sphagnum* is also called as peat moss. These have leaf-like appendages that have many circular openings which enable them to absorb liquids readily. Thus they are commercially important as

- soil structure enhancer, packing material for living plants. Ephedrine is a sympathomimetic amine commonly used as a stimulant, appetite suppressant, concentration aid, decongestant. Ephedrine is obtained from the plant *Ephedra sinica* and other members of the *Ephedra* genus.
347. (c) *Selaginella bryopteris*, a lithophytic plant, is used as a medicinal plant in India and commonly known as 'Sanjeevani' or one that infuses life. It is very much drought hardy and can remain alive for many years without water. *Adiantum* is the maiden hair fern. *Equisetum* or horsetail is a living fossil and the only living genus of class Equisetopsida. *Dryopteris* is commonly known as wood fern or male fern.
348. (b) Bryophytes are the phylum of small simple plants with no vascular tissue and root like rhizoids. They are called the amphibians of the plant kingdom as they can survive in both conditions with and without water. *Selaginella* is an example of Pteridophyte.
349. (b) Lichens are the symbiotic association of algae and fungi. The algal member is generally a green alga or blue-green alga. The fungal partner is usually of Ascomycota. Lichens are sensitive to pH change, thus making them good indicators of pollution or SO_2 as the latter makes H_2SO_4 with water.
350. (b) In sewage treatment tanks, different aerobic bacteria are used to degrade organic wastes. '*Chlorella*' is used as a source of providing oxygen to the bacteria. *Chlorella* is an attractive food source as it is high in protein and other essential nutrients. Dried *Chlorella* contains around 45% protein, 20% fat, 20% carbohydrate and pretty good amount of vitamins. *Chlorella* is a potential plant to be used in space flight shuttles for continuous oxygen supply. Chlorellin is an antibiotic obtained from chlorella.
351. (a) Agroforestry involves the practice of growing trees with the cultivated crops on the same field. Hydroponics is a scientific technique of growing plants on soil less artificial liquids or water media that contain the nutrients. The scientific study of fruits and cultivation of fruits comes under the branch of biology known as Pomology. Palynology is the scientific study of pollen grains and spores, live as well as fossilized.
352. (d) The process of stem cutting is also known as striking or cloning. It is a vegetative mode of propagation of plants. Stems, roots or both can be used to propagate the plants. Bougainvillea, carnations, cocoa and grapes can all be propagated with stem cuttings.
353. (c) In the flower, the ovules undergo fertilization by fusing the egg with the pollen. These then develop into seeds nestling the small embryo inside. The ovary swells to become the fleshy fruit. The wood in trees is the result of secondary growth of the outer layers of stem by cell divisions. The leaves are the site of photosynthesis and the photosynthates (the sugars are converted into starch) are stored in the form of starch.
354. (a) Ginger is an underground stem modification known as rhizome, which is a horizontal underground stem. Corm is an underground modified stem, in a form of short swollen food-storing stem surrounded by protective scale leaves, e.g. *Colocasia*. Tuber, a modified stem has many nodes and internodes, e.g. potato. Onion is a modified stem in the form of a bulb.
355. (b) A small lateral outgrowth present at the leaf base is called stipule. Leaves with stipule are called as stiupulate and leaves without stipule are called exstipulate.
356. (a) The absorption of moisture or water by a solid substance is known as 'imbibition'. Imbibition causes the solid substance to increase a little in volume. In rainy season, wood imbibes moisture to swell up. Excessive fertilizers in soil causes increase of their concentration when dissolved in water. It becomes hypertonic than the solutes present in plant roots thus, exosmosis may occur. The capillary water is the water in the roots causing a negative root pressure.
357. (c) The pulpy edible part of mango fruit is a mesocarp which is the middle layer of pericarp (fruit wall). Coconut flesh and water are technically the endosperm. Litchi is an aril which is an outgrowth from the testa of a seed. Apple is also not a true fruit, being a fleshy thalamus. The actual fruit lies inside the apple containing the seeds.
358. (b) The largest perennial plant is a marine alga, *Macrocystis* sp. The smallest flowering plant is *Wolffia*, which is under 2 mm (0.079 in) long. *Ginkgo* is one of the living fossils. Rhizophores are root-like water and nutrient absorbing organs found in a pteridophyte *Selaginella* sp.
359. (a) Angiosperms could dominate the land flora among other plants, such as gymnosperms, pteridophytes or bryophytes because they inhabit diverse habitats and have adapted better to those areas. Moreover, they also have better seed dispersal mechanisms.
360. (c) Wine is a fermented drink made from the grapes or sugarcane or other fruits. Beer is an alcoholic beverage produced by the saccharification of starch and fermentation of the resulting sugar. The starch and saccharification enzymes are often derived from malted cereal grains of barley and wheat. Whisky is made from fermented grain mash of barley, malted barley, rye, malted rye, wheat, buckwheat and corn. Rum is made from molasses.
361. (c) *Rhizophora* constitutes the red mangroves which have respiring roots known as pneumatophores. Fasciculated roots are tuberous roots. Dahlias have fasciculated roots. Climbing roots are developed in *Piper betle*. Orchids have a characteristic feature of developing epiphytic roots. Epiphytic plants are those plants which develop aerial roots.
362. (a) Potato, *Solanum tuberosum*, belongs to the family Solanaceae, other member being tomato and brinjal. Malvaceae includes cotton (*Gossypium* sp), okra (*Abelmoschus esculentus*), *Hibiscus* sp., *Theobroma cacao*. Liliaceae members are herbaceous, bulbous, flowering monocots, e.g. onion (*Allium cepa*). Cruciferae or Brassicaceae members are economical

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- crops to which cabbage (*Brassica oleracea*), radish (*Raphanus sativus*), mustard (*Brassica juncea*) belong.
363. (d) Camphor is a waxy, flammable, white or transparent solid with a strong aromatic odour. *Cinnamomum camphora* is the source of camphor. *Vanilla* is a flavour obtained from the orchid of the genus *Vanilla*, generally from Mexican *Vanilla planifolia*. Chicory is a root extract or roots of *Cichorium intybus* used commercially as a substitute for coffee.
364. (c) Bisexual flowers are those flowers which have both stamens (male reproductive organ) and carpels (female reproductive organs). Those plants which have only one, either male or female reproductive part are called unisexual flowers. Flowers having only male reproductive part are called staminate and the flowers having only female reproductive part are called pistillate flowers.
365. (b) The largest family containing most number of genera is Asteraceae. Mushrooms are the fruiting bodies of the fungus belonging to the order Agaricales and family Agaricaceae.
366. (c) Cambium is the lateral meristematic tissue that gives off secondary xylem cells towards inside and secondary phloem towards outside. Cork cambium is a tissue found in many vascular plants as part of the periderm. It is responsible for developing cork. Commercial cork is derived from the bark of the cork oak (*Quercus suber*).
367. (b) The only snake that builds a nest is king cobra, since, it lays eggs in nest. Chain viper lives in a grassy and bushy areas of the forest, where the eggs are present inside the female body until there's a time to hatch. Krait and saw – scale viper lays eggs in a pile of litters and remain with them until there's a time to hatch.
368. (a) Wolves are the monogamous animals i.e., they mate with only one partner throughout their lives.
369. (d) The octopus is a mollusc of the order Octopoda and family Cephalopoda, with bilaterally symmetrical bodies.
- An arthropod is an invertebrate animal having an exoskeleton (external skeleton), a segmented body, and jointed appendages. Hemichordate is a phylum of marine deuterostome animals, generally considered the sister group of the echinoderms. Echinoderm is the common name given to any member of the phylum Echinodermata of marine animals. The adults are usually five-point, radial symmetry, and include such well-known animals as sea stars.
370. (c) Ichthyology is the branch of zoological sciences which is devoted to the study of fishes. Cryptology is the study of mathematical, linguistic, and other coding patterns and histories. Lepidopterology is the study of butterflies and moths. The term sicrotology does not exist.
371. (c) Jellyfish belongs to the genus *Aurelia* of phylum Cnidaria.
372. (d) The devil fish or giant devil ray is a species of eagle ray, of family Myliobatidae and genus *Mobula*.
373. (a) The title, Seahorse has been given to 54 species of marine fish in the genus *Hippocampus*.
374. (d) Cold blooded animals do not use internally generated energy to regulate their body temperature. On the other hand warm blooded animals such as human beings have internal mechanisms that maintain their body temperature within a certain range, regardless of the ambient temperature of surroundings. Fish, frog and lizard are all cold blooded organisms.
375. (d) *Diplodocus* is a fossil of a dinosaur species unearthed in late 18th and early 19th century and it is not a living fossil. While the other three are living fossils. Elephant shrews are small insectivorous mammals native to Africa, they resemble the extinct Leptictidium of Eocene Europe, Ginkgo is a gymnosperm, and Stromatolites are a layered structure created as sediment trapped by shallow-water, oxygen-creating, blue-green bacteria. They provide the most ancient records of life on Earth by fossil remains which date from more than 3.5 billion years ago.
376. (b) Lobsters belong to class Crustaceae of phylum Arthropoda. Phylum Arthropoda is the largest phylum.
377. (b) Baboon is the largest monkey, it is 47 inch long & weighs around 90 pounds.
378. (b) The largest invertebrate is Squid.
379. (a) Starfish are echinoderms belonging to the class Asteroidea. All are marine with organ-system level of organization.
380. (c) Spongilla is also known as fresh water sponge.
381. (a) Marsupial kangaroo is viviparous. Oviparous, animals produce young ones by means of eggs which are hatched after they have been laid by the parent, as in birds.
382. (b) Karyotaxonomy is the modern branch of classification which is based on “bands found on chromosomes”.
383. (a) Planktons are the animals which float on the surface of water bodies. Pelagic, benthon and neritic organisms which are found in these zones i.e. being neither close to the bottom nor near the shore, organisms living in deep water and organism living near the shallow water or near the continental shelf.
384. (b) Coelenterate is the phylum where nerve cells are found but nerves are absent.
385. (b) Human lung fluke, *Paragonimus westermani*, infects 22 million people in Africa, Asia and South and central America. Humans get infected by eating raw crabs or fishes that are carrying the parasite. Lung flukes cause pain and severe coughing.
386. (d) Spider belongs to class arachnida.
387. (c) Spider is not an insect. While cockroach, bed bug and mosquito are insects.
388. (b) Frog is ureotelic because nitrogenous excretory product is usually urea.
389. (b) A snake has no middle ear. It perceives sound from earth through skin.
- Balanoglossus forms a link between chordates and non chordates. Sphenodonts are reptiles endemic to New Zealand. The Crocodilia are an order of mostly large, predatory, semiaquatic reptiles.

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390. (a) Python or some species of python is non-venomous snake. All the other snakes are poisonous.
391. (c) Cold-blooded animals require much less energy to survive than warm-blooded animals. Warm blooded animals can regulate their body temperature according to the temperature of the environment, whereas cold blooded animals cannot do so. The warm blooded animals can thus remain active in a cold environment.
392. (a) Octopus belongs to Mollusca. Jellyfish belongs to Coelenterata. Silver fish belongs to Arthropoda. Bombay Duck belongs to Pisces.
393. (c) Duckbilled platypus is that rare mammal which is oviparous. Oviparous animals are those that lie eggs, inside which the young ones develop before hatching.
394. (c) Commensalism is a class of relationship between two organisms where one organism benefits without affecting the other, e.g. sea anemone hitches a ride on a hermit crab (*Pagurus*). Batesian mimicry is demonstrated by Viceroy butterfly to avoid predation. Batesian mimicry is a case of protective or defensive mimicry. Viceroy, a palatable one mimics itself as an unpalatable Monarch butterfly or queen butterfly.
395. (a) Man is called *Homo Sapiens*. Cat is called *Felis domestica*. Cow is called *Bos indicus*. Dog is called *Canis familiaris*.
396. (b) Bovines are medium to large-sized ungulates and ruminants, buffalo (*Bubalus bubalis*) is a bovine. Ovines are quadrupedal, ruminant mammals generally kept as livestock. Sheep (*Ovis aries*) is ovine. Goats (*Capra aegagrus hircus*) are caprine. Horse (*Equus ferus*) is equine.
397. (b) The Indian or Asian wild ass is *Equus hemionus khur*. It is a subspecies of the onager native to Southern Asia. The barasingha or the swamp deer is *Rucervus duvaucelii syn. Cervus duvaucelii*. It is a deer species distributed in the Indian subcontinent. Chinkara is *Gazella bennettii*. Nilgai or *Boselaphus tragocamelus* is the largest Asian antelope.
398. (b) Pangolins (*Manis crassicaudata*) is found in India, Sri Lanka, Nepal and some parts of Pakistan. Gibbons are the only apes found in India. The Hoollongapar Gibbon Sanctuary is in Assam which is a safe reclusive for gibbons.
399. (b) King Cobra is the only snake in the world that builds a nest. The female snake, which is about 13 feet long, builds a nest to lay its eggs.
400. (d)
401. (c) Gambusia is a fish of fresh water. It eats larva and eggs of mosquito as well as aquatic plants.
402. (d)
403. (a)
404. (a) Body of earthworm is dark-brown in color due to the presence of porphyrin pigment. It is found in dorsal surface of the body.
405. (d)
406. (d) Amphibians and reptiles have three-chambered heart consisting of two atria and one ventricle. Only exception is crocodile families which have four-

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chambered heart consisting of two atria and two ventricles.

407. (d) In poisonous snakes a few maxillary teeth are modified to act as poisonous teeth or fangs. These fangs are conical, curved shaped, sharply pointed and are enlarged maxillary teeth which regenerate when lost.
408. (a) Bat is mammal not a bird.
409. (c) The parrot, platypus and kangaroo fall in the group of warm blooded animals. They show homothermy.
410. (c) The warm blooded animals produce heat by converting their food to energy and maintain a constant body temperature thus may be active even in cold environment whereas cold blooded animals hibernate and need much less energy to survive.
411. (c) Polar bears and penguins live in different polar regions i.e. polar bears live in the North Pole while the penguins live in Antarctica (the Southern Hemisphere).
412. (a) Birds are warm blooded animals maintaining a constant body temperature through the process of homeostasis. Fishes, amphibians and reptiles are cold blooded animals.
413. (d) If owl population decreases, it will indirectly affect wood lice population. If owl population will decrease, the population of wood lice increases. Reason is that owl is not present to eat the wood lice population.
414. (c) Among the given options, bug possesses only three pairs of legs. All the insects in phylum Arthropoda have three pairs of legs in given option only bug belongs to class-insecta.
415. (c) Electron beam therapy is a special type of radiotherapy that consists of very tiny electrically charged particles generated in a machine called a linear accelerator and directed towards the skin. It is used for treating certain types of cancer. It is advantageous because it delivers a reasonably uniform dose from the surface to a specific depth, after which dose falls off rapidly, eventually to a near zero value.
416. (d) Cobalt-60 is radioactive isotopic of Cobalt-59 emitting radioactive beta (β) ray and gamma (γ) ray γ -ray is used to destroy tumors. Cobalt-60 therapy is also called Gamma knife therapy.
417. (a) Insulin is an antidiabetic drug.
418. (a) The organ which is affected by hepatitis is the liver. There is inflammation of the liver and the disease is characterized by the presence of inflammatory cells in the tissue of the liver.
419. (d) Diphtheria is caused by a bacterium *Corynebacterium diphtheriae*. Polio, Rabies and small pox are mainly affected by viruses which has the tendency to multiply itself.
420. (c) The primary diagnostic test to detect AIDS is ELISA, if antibodies are detected in it, then Western blotting is done for final confirmation of HIV.
- The tests for diabetes, tuberculosis and syphilis are different ELISA test is conducted for AIDS only
421. (d) Na-24 is used as a radionuclide which is injected into the human bloodstream to detect any clots. The half-life of Na-24 is 15.6 hrs.

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- Arsenic 74 is mainly used to diagnose brain cancer, Cobalt-60 therapy is also known as Gamma Knife therapy. I 131 is a radioactive isotope mainly used in nuclear fission.
422. (b) Japanese encephalitis is a viral disease caused by viruses of family Flaviviridae. Domestic pigs and herons are the potential reservoirs of these viruses. Malaria is protozoan disease which is mainly transmitted by female Anopheles mosquito, while Polio is caused by virus.
423. (d) Lungs are supposed to be least damaged by harmful radiations. Heart, eyes and brain are more susceptible to harmful radiations like UV-rays which can cause cancer.
424. (a) Artemisinin is an antimalarial drug of Chinese-Vietnamese origin, which is derived from the plant *Artemisia annua* which is a seed plant. Bacteria, fungus and moss do not contain any antimalarial compound.
425. (c) Minamata disease which is a neurological disease was first discovered in Minamata city in Kumamoto prefecture, Japan, in 1956. It was caused in humans by eating fish contaminated with methyl-mercury. Lead, results in lung infection and neurological disorder, contamination with cadmium, lead and nickel will result in Itai-Itai disease, lung infection and allergy respectively.
426. (d) Meningitis is an acute inflammation of the protective membranes covering the brain and spinal cord. The inflammation can be caused by bacteria, virus or any other pathogen. Leukemia is a cancer in blood or bone marrow, Sclerosis is a demyelinating disease in which the insulating covers of nerve cells in the brain and spinal cord are damaged.
427. (c) Emphysema is chronic obstructive pulmonary disease in which the air sacs (alveoli) in the lungs are damaged. Due to which most of the body parts do not get oxygen.
428. (d) Mad cow disease is the common name of Bovine Spongiform Encephalopathy (BSE). It is a fatal neurodegenerative disease (encephalopathy) in cattle that causes a spongy degeneration in the brain and spinal cord. The probable cause of BSE is believed to be prions.
429. (a) The normal platelet count in human being is 150,000 to 250,000 per micro litre. In Dengue fever the viral attack is primarily on platelets. Their count is reduced to a significant number in the fever. It can reach below 50,000 per micro litre which can prove to be fatal.
430. (c) MRI stands for Magnetic Resonance Imaging. It is the medical imaging technique. It is used as a radiological technique to study the anatomy and function of the diseased and healthy tissues of the body. This is a safe medical technique as no ionizing rays are used in it.
431. (d) Pellagra is the disease caused by the deficiency of vitamin B3 or niacin in the diet. Skin develops many anomalies in this disease.
432. (d) Night blindness, rickets and beri-beri is caused by the deficiency of vitamin A, Vitamin D and Vitamin B1 respectively.
433. (d) Salk's vaccine is known as Polio vaccine. Two vaccines are used to combat Poliomyelitis. The first being developed by Jonas Salk and first tested in 1952.
434. (b) Iodine is given as a supplement in the common salt used in cooking to combat Iodine deficiency syndromes in humans as iodine as such is present in small quantity in the sea water.
435. (a) Beriberi is a disease caused by the deficiency of vitamin B₁ (thiamin). East-Asian countries in which people eat predominately polished rice Beriberi is a prolonged problem. Pellagra and scurvy is caused due to the deficiency of vitamin B and vitamin C respectively.
436. (b) When there is oxygen deficit in the muscles, the latter starts converting the pyruvate into lactic acid due to which some side-effects occur like acidification of muscles and fatigue.
437. (d) In anosmia the olfactory sensation is affected where ability to smell and recognize a particular odor is malfunctioned. A related term, hyposmia, refers to a decreased ability to smell, while hyperosmia refers to an increased ability to smell.
438. (c) The causal organism in AIDS is Human Immune Deficiency virus. It's a kind of lentivirus of retrovirus family.
439. (b) BMD stands for Bone Mineral Density Test which measures the quantity of calcium and minerals in the bones. Osteoporosis is also checked via this test.
440. (d) The test for Dengue is done by counting the number of platelets present in the blood, the test for malaria is known as smear test.
441. (b) Pneumoconiosis is an occupational lung disease caused by the inhalation of dust. The workers of mines often get this disease.
442. (a) Foot and mouth disease in cattle is caused mainly by virus. In 2010-2011 Japan, Korea and Bulgaria had got their cattle infected with this disease.
443. (d) Athlete's foot is most commonly caused by the fungi *Trichophyton rubrum* or *Trichophyton mentagrophytes*.
444. (d) Haemophilia is a recessive sex-linked, X chromosome disorder. Therefore, it is more likely to occur in males than females as single copy of X is enough to cause the disease.
445. (d) Haemophilia lowers blood plasma clotting factor levels of the coagulation factors needed for a normal process of blood clotting. If bleeding occurs in normal injuries it does not stop itself.
446. (d) The evidences of the treatments by plastic surgery of a broken nose are found in the Edwin Smith Papyrus, a transcription of an Ancient Egyptian medical text, the oldest known surgical treatise, dated to the Old Kingdom from 3000 to 2500 BC.
447. (d) According to the data updated in 2013 World Health Organization it has been shown that Ischaemic heart disease, stroke, lower respiratory infections, chronic

- obstructive lung disease, diarrhoea and HIV/AIDS are the top major killers during the past decade. TB is no longer among the top ten but it is still top 15 of the diseases causing maximum deaths.
446. (d) Rifampicin is used as an antibiotic drug against *Mycobacterium* sp. causing TB and Leprosy.
447. (a) Malaria is a mosquito-borne infectious disease of humans and other animals. It is caused by parasitic protozoan of the genus *Plasmodium*. Jaundice is caused by increased amount of bilirubin in the blood; Cholera is caused by an agent *Vibrio cholerae* which is spread mainly by contaminated food and water.
448. (d) Vitamin K takes part in the blood clotting in humans. Out of the three forms of Vitamin K, Vitamin K₁, or phylloquinone is responsible to maintain healthy blood clotting. The natural source of it is in green vegetables. Vitamin A is essential for the people suffering from night blindness and Vitamin B1 is essential for the people suffering from beri-beri
449. (c) Itai-Itai is a disease caused by cadmium poisoning. The bones are softened and kidney failure are some of the symptoms of this disease. Lead causes respiratory diseases. Minamata disease is caused by excess of mercury in contaminated water, while nickel and lead leads to allergy and neurological disorder respectively.
450. (d) The long term effect of alcoholism may lead to 'Liver cirrhosis' which is characterized by replacement of liver tissue by fibrosis and regenerative nodules.
451. (b) *P. vivax* is one of the six species of malaria parasites that commonly infect humans. It is responsible for the 65% of malarial cases in Asia.
452. (c) Rabies is an acute central nervous system infection. It is caused by virus Neurotropic lyssavirus, a member of the Rhabdovirus family.
453. (c) Electron beam radiation therapy is used to treat certain types of cancers, especially skin lymphomas.
454. (d) **Blind spot** is present in the posterior region of the eyeball where optic nerve leaves the eyeball at the retina. Rods and cones are totally absent in this region. **Yellow spot** is the small elevation of the retina present near the blind spot called macula lutea.
455. (b) Gout is a painful medical condition in which needle-like uric acid crystals precipitate in the joints, skin, capillaries and other tissues. This is caused when the quantity of uric acid is excessive in the blood plasma.
456. (c) During dehydration the body loses much of the fluids, sodium chloride and other minerals. Thus electrolyte solution is given to such a patient to replenish the lost minerals and salts.
457. (b) *Mycobacterium* is a genus of Actinobacteria, known to cause tuberculosis and leprosy in humans. Athletes foot and ringworm are fungal infections. Thrush is an infection caused by yeast.
458. (a) Diarrhoea is a medical condition caused by bacteria or virus, in which the body loses most of the fluid and mineral nutrients. According to the World Health Organization (WHO) approximately 3.5 million

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- deaths each year are attributable to diarrhoea. 80% of those deaths occur in children under the age of 5 years.
459. (b) Polio is caused by a enterovirus which is a member of the family of Picornaviridae. Bird flu is caused by virus H1N1 or H5N1. Poilo and bird flu are caused by enterovirus which is a member of the family of Picornaviridae. Bird flu is caused by virus H1N1 or H5N1, avian influenza virus.
460. (a) Hepatitis -B is caused by DNA virus, the genome of hepatitis B virus is made up of circular DNA, but it is unusual because the DNA is not fully double standard.
461. (d) Cobalt-60 is used as a radioisotope in treatment of leukemia. Co-60 is used as a radioisotope in treatment of leukemia.
462. (c) Arsenic-74 is used in the diagnosis of certain tumours. Arsenic-74 is used in the diagnosis of certain tumors.'
463. (c) It is believed that blue baby syndrome is caused by consumption of water contaminated by high levels of nitrate. It results in decreased oxygen carrying capacity of haemoglobin in babies leading to death.
464. (c) HIV of Group M and subtype C is the dominant form of HIV in Southern Africa, Eastern Africa, India, Nepal, and parts of China.
465. (d) H5N1 is the virus causing bird flu. H stands for Hemagglutinin 5 for Type 5 and N for Neuraminidase Type 1 (Avian Influenza A). It has also been called "Asian lineage HPAI A(H5N1)". The terms, N5H1, NH5 and HN5 is not related to bird flu and neither it exist.
466. (c) Diclofenac sodium is responsible for the decline of the population of vultures. According to IUCN, these declines have been directly attributed to the veterinary use of non-steroidal anti inflammatory drug diclofenac ingested by vultures that ate carcasses of cattle. While other drugs like Penicillin are an antibiotic drug and aspirin is known for relieving of pain, fever etc.
467. (c) AIDS stands for Acquired Immuno Deficiency Syndrome caused by Human Immuno- deficiency Virus.
468. (a) Whooping cough is caused by a bacterium called *Bordetella pertussis*. Polio is caused by virus; Small pox is also caused by virus. All the three can be prevented by vaccination. Diabetes is a disease associated with insulin imbalance which cannot be prevented by vaccination.
469. (a) Night blindness is medically known as Nyctalopia in which the rod cells in the retina gradually lose their ability to respond to the light. Vitamin-A deficiency in the diet of humans is one of the causes of night blindness. Scurvy is caused by deficiency of vitamin C, Beri-Beri is caused by deficiency of vitamin B1 and weakness, muscle degradation is caused by deficiency of vitamin E.

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470. (d) Goitre is a medical condition in which neck or larynx swells due to enlargement of thyroid gland (thyromegaly). Goitre is treated depending on the severity. If it is caused by iodine deficiency, small doses of iodide in the form of Lugol's Iodine or KI solution are given to the patients.
471. (d) Sleeping sickness is also called "Human African Trypanosomiasis", caused by parasitic protozoa of the species *Trypanosoma brucei* and transmitted by the vector as well as host called tsetse fly. The trypanosomal parasite secretes a chemical inside the human body known as *Tryptophol* which induces sleep all the time in them.
472. (d) Eutrophication is the natural ageing of a lake due to excessive entry of nutrients into water. The streams draining into the lake introduce nutrients such as nitrogen and phosphorus that encourages the growth of alga at the surface of water or pond. The excessive accumulation of algae at the surface of pond is called algae bloom. Later due to death of these algae, their organic matter get decomposed due to which oxygen gets depleted and thereby aquatic animals die. If these activities keeps on occurring for a long time, then the pond may have more organic matter and less water.
473. (d) Sandalwood tree is a partial root parasite because roots develop haustoria that make contact with roots of *Dalbergia*, *Eucalyptus* etc.
474. (b) Haemophilia is a genetic disorder in which blood clotting not easily takes place because of recessive X linked chromosome. The other diseases are caused due to infections and deficiencies, but are not hereditary.
475. (c) Measles is caused by virus. While, Hepatitis A, Typhoid and Cholera are spread or caused by contaminated water.
476. (b) Typhoid is caused by a bacteria *Salmonella typhi*, and it spreads through fecal matter by houseflies. Diseases like pertussis and chicken pox are caused by viruses. Pertussis, a respiratory illness commonly known as whooping cough is commonly spread by bacteria and chicken pox is spread through virus.
477. (d) Xerophthalmia is not a genetic disorder. It is a severe drying of the eye surface caused by a malfunction of the tear glands. Also found in people with immune disorders, it occurs most commonly because of decreased intake or absorption of vitamin A. Symptoms include night blindness and eye irritation. In addition to the eyes being very dry, there is a loss of lustre on their surface. At later stages, the corneas become soft, with increased opacity. Down's syndrome is due to trisomy in chromosome 21, Haemophilia and colourblindness are sex linked disorders.
478. (c) Sand fly insects spread Kala-azar. Kala-azar is a chronic and potentially fatal parasitic disease of the viscera (the internal organs, particularly the liver, spleen, bone marrow and lymph nodes) due to infection by the parasite called *Leishmania donovani*. The agent of kala-azar, *Leishmania donovani*, is transmitted by sandfly bites.
479. (c) Jaundice in human beings is the result of incomplete metabolism of bilirubin. Bilirubin is a bile pigment that is metabolised and excreted out as stercobilinogen in faeces. However when a pathological process interferes with its normal functioning, it leads to jaundice. The symptoms of jaundice is yellowing of skin and eyes due to deposition of bile pigments.
480. (b) Sickle cell anemia is an inherited blood disorder that causes chronic anemia, periodic episodes of pain, and other complications. In sickle cell anemia, the red blood cells become rigid and shaped like crescents, or sickles, rather than being flexible and round. This change in shape prevents red blood cells from getting into small blood vessels. As a result, the tissues do not get enough oxygen. Lack of oxygen can cause pain and damage in the arms, legs, and organs (e.g., spleen, kidney, brain).
481. (d) Hepatitis A is caused by infection with the hepatitis A virus. The hepatitis virus is usually spread when a person ingests tiny amounts of contaminated faecal matter. The hepatitis A virus infects the liver cells and causes inflammation. The inflammation can impair liver function and cause other signs and symptoms of hepatitis A.
482. (c) **Plasmodium** shows initial multiplication in liver.
483. (b) Poison of cobra is most virulent. It is a neurotoxin attacking nerve centres and causing paralysis of muscles, especially those of respiratory muscles.
484. (d) All of these
485. (b) Milch animals are those animals which are source of milk, e.g. cow, goat, buffalo that affects cloven-hoofed animals. Anthrax is an acute infectious disease caused by the bacterium *Bacillus anthracis*. Blackleg, black quarter is an infectious bacterial disease caused by *Clostridium chauvoei* affecting cattle, sheep and goats. Cowpox is caused by cowpox virus and is infectious.
486. (b) *Meningococcal meningitis* is transmitted from person to person through air via droplets of respiratory secretions and direct contact with an infected person like oral contact with shared items.
487. (a) Vitamin A has a major role in photo-transduction. Its deficiency causes night blindness in humans. Xerophthalmia, keratomalacia can also occur with its deficiency. Green, yellow-orange-red (dark-coloured) fruits and vegetables, eggs, milk; fortified cereals are rich source of vitamin A. Their avoidance over a long period may cause the vit-A deficiency symptoms.
488. (c) Dengue is a viral disease transmitted through mosquito. Fever, headache, pain in joints, back muscles and eyeballs, skin rash for a few days, bleeding from nose and gums are some of the symptoms of the dengue fever.
489. (d) ELISA (Enzyme-linked immunosorbent assay) is an important test for diagnosing viral diseases like AIDS (caused by HIV). Majority of the human beings are Rh+ while very few are Rh-.
490. (d) Plague is a deadly infectious disease, caused by the enterobacteria *Yersinia pestis*. Until 2007, plague,

- yellow fever, and cholera were the three epidemic diseases reported to WHO.
- AIDS is caused by human immunodeficiency virus. Baldness can be caused by a fungus *Microsporum audouinii*, a common cause of ringworm and associated hair loss. Malaria is mosquito-borne infectious disease of humans caused by protozoan of genus *Plasmodium*.
491. (d) All the statements are correct. The HIV is highly mutable retrovirus and if remain dormant in the body for long time, it becomes all the more difficult to detect it and remove it from the body once detected. The most severe thing it does to the body is that, it directly attacks the immune system killing many T-cells. And it takes around 10 years to develop AIDS. However, a patient can lead a normal life via taking antiretroviral therapies (ARTs) which can decrease the virus load to undetectable levels.
492. (b) Angioplasty is a surgery of the heart meant for opening of blocked arteries and restoring of the normal flow of blood to the heart muscle. Dialysis is used for patients with acute disturbance in kidneys. It functions to remove wastes and excess water from the blood stream. Cataract is a condition of the clouding of the eyes that leads to gradual decrease in vision. The operation involves removal of the cloudy lens and replacement with intact artificial lens to restore the clear vision. Hysterectomy is removal of uterus through surgery.
493. (a) Osteoporosis is a disease of bones and cartilage in which there is a reduction in bone tissue mass causing weakness of skeletal bones and fragility. It is caused by excessive resorption of calcium and phosphorous from the bones.
494. (b) Cigarette smoke contains N-nitrosodimethylene and causes accumulation of toxic in lungs and arteries to block the passages. Mustard gas, chemically known as Bis (2-chloroethyl) sulphide, blocks lungs and affects respiration as it is a strong mutagen and carcinogen. Asbestos affects lungs and pleural membranes as it is made up of tiny fibers that enter into lungs when breathed in. Vinylchloride is an organochloride, $H_2C=CHCl$ is highly toxic, flammable and carcinogenic and lungs are affected.
495. (c) Phobia is a kind of intense fear from something, e.g., hydrophobia, ailurophobia is fear of cats, astraphobia is fear of thunder and lightning, achluophobia is fear of darkness. Neurosis is less severe than mental illness and is normal to overcome worry, fear, anxiety and feeling of insecurity. This can also develop due to maladaptive habits. Hypochondria is a condition in which there is undue concern about health by a person about himself. Insomnia is lack of sleep over many nights.
496. (c) Jaundice is a result of increased bile pigments in the blood. Defects of heart valves leads to stenosis, in which the blood vessels are narrowed abnormally so there is abnormal blood sounds. Highly allergic infection and inflammation of nose is known as Rhinitis. Paralysis is the loss of motor functions due to damage to nervous system.
497. (d) Antibiotics act against the growth of microorganisms. Some antibiotics are broad ranged and others are specific being active against many microbial species or selective for only some. The 'resistance genes' in the bacteria develop resistance against a particular antibiotic over a long time due to mutation and thus, that particular antibiotic does not act on this resistant mutant strains.
498. (d) Three types of cells are found in pancreas. α -cells, β -cells, δ -cells. α -cells secrete peptide hormone glucagon. β -cells synthesise and secrete the endocrine hormone, insulin, the hyposecretion of which leads to abnormal metabolism of body's sugar and causes Diabetes mellitus. δ -cells produce somatostatin.
499. (a) Lymphatic filariasis is caused by nematodes of genera, *Wuchereria bancrofti*, *Brugia malayi* and *Brugia timori*, which occupy the lymphatic system, including the lymph nodes. In chronic cases, the worms lead to disease elephantiasis in which legs and sometimes genital organs swell up.
500. (a) Progeria or Hutchinson-Gilford progeria syndrome is a genetic disease with a defect in the gene LMNA, in which the ageing process is manifested at a very early age and the progeric children typically live to their mid-teens to early twenties.
501. (b) *Entamoeba histolytica* causes amoebiasis, the symptoms of which are chronic diarrhoea to fulminant dysentery. *Trypanosoma gambiense* causes sleeping sickness in which there are fevers, joint pains, numbness, poor coordination and trouble in sleeping. Syphilis is a STD, caused by *Treponema pallidum*, a spirochete bacterium. *Pasteurella pestis* causes Bubonic plague, in which the lymph nodes are swollen especially in armpit and groin.
502. (c) Stewart's wilt or disease is caused by *Erwinia stewartii* in maize. This bacterium is carried in corn flea beetle which acts as a vector for its transmission.
503. (b) Hashimoto's thyroiditis is an autoimmune disease in which the thyroid gland is attacked by a variety of cells and antibody-mediated immune processes. It results in hypothyroidism.
- Cretinism is a condition of several stunted physical and mental growth due to untreated congenital deficiency of thyroid hormone or maternal hypothyroidism.
504. (a) ECG is a test that measures the electrical activity of the heart. ECG is used to measure the rate and regularity of heart beats.
505. (a) Benign tumours are those which do not spread from the site of formation and is not cancerous. They can be operated and treated by removal. Malignant tumours are dangerously cancerous as they spread from the place of formation to other tissues. Neoplasm is a malignant tumour.
- Cancer of epithelial tissues are called carcinomas. Sarcoma is the cancer developed in bone and cartilage tissues. Lymphomas are the cancers of blood-forming haematopoietic cells.

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506. (a) A condition in colour blindness known as 'Protanomaly' is where a person is not able to distinguish between red and green. Colour blindness is an X-linked disease condition in which retinal cone cells are not developed properly.
507. (b) Swine flu is caused by swine influenza viruses. It is transmitted person to person by sneezing or coughing. It is not spread by eating cooked pork.
508. (c) The HIV is transmitted by exchange of body fluids during sexual intercourse, any kind of infected blood transfusion. It can also be transmitted from mother to the foetus via blood transfusion across placenta.
509. (b) Myxedema is case of either hypothyroidism or hyperthyroidism due to defect in endocrine thyroid gland. Nephrosis is the disease of nephrons of kidney, which is a part of excretory system. Paralysis is most often caused by damage in the nervous system or spinal cord. Syphilis is a sexually-transmitted disease of the reproductive system.
510. (c) Hepatitis B is around hundred times more infectious than HIV. Hepatitis B kills more than 1 million people every year. In this disease, liver can also swell up and develop cancer.
511. (d) Khaira is a disease of rice, in which the plants develop chlorotic or yellow patches at leaf base on both sides of the midrib. Anaemia is a decrease in the number of red blood cells caused due to iron-deficiency. Deficiency of iodine causes goitre. Scurvy is a gum disease caused due to vitamin-C deficiency.
512. (c) The characteristics of diabetes mellitus are increase of sugar in blood, appearance of sugar in urine and lack of energy.
513. (b) Prophylaxis is a medical or public health procedure whose purpose is to prevent, rather than treat an ailment. For tuberculosis, BCG vaccine is given. DPT vaccine prevents diphtheria, pertussis and tetanus. ATS (antitetanus serum) and DPT vaccines are used to prevent tetanus. TAB vaccine is typhoid-paratyphoid A and B vaccine.
514. (d) Leprosy is caused by bacteria, *Mycobacterium leprae* and *Mycobacterium lepromatosis*. Measles is caused by virus. Kala-azar is caused by a protozoa of the genus *Leishmania*. Athlete's foot is caused by fungi *Epidermophyton floccosum*, *Trichophyton sp.*
515. (a) Cardiologist cures heart diseases. Nephrologist cures kidney. Urologist cures urinary tract ailments. Oculist cures eye.
516. (c) Antipyretics are drugs or herbs that reduce fever. Paracetamol or N-acetyl-p-aminophenol is used as an antipyretic. Antifoaming agent is a chemical that reduces foam formation, is chemically polydimethylsiloxanes or polyamides, silicones. Aspirin is a salicylate drug, used as an analgesic. Saframycin, rifamycin, etc. are antiseptics. Calciferol is antirachitic.
517. (c) Night blindness is caused by deficiency of vitamin-A. Deficiency of vitamin D causes rickets. Deficiency of vitamin C causes scurvy. Deficiency of vitamin B causes beri-beri.
518. (a) Kwashiorkor is caused by protein deficiency in under five years children. Marasmus is deficiency of proteins, energy malnutrition caused by prolonged starvation. Tuberculosis is caused by *Mycobacterium* infection. Hepatitis B is a viral diseases.
519. (a) Cholera is a disease caused by bacterium *Vibrio cholerae*. Athlete's foot is caused by fungal species such as *Epidermophyton floccosum*, *Tricho-phyton sp.*
520. (d) Acquired Immune Deficiency Syndrome (AIDS) is caused by HIV, a retrovirus in which immune system of the body is seriously affected. The symptoms are swollen-lymph nodes, sweating at night, loss of weight and loss of memory.
521. (c) Diphtheria is a respiratory tract illness caused by *Corynebacterium diphtheriae*. Pneumonia is an inflammatory condition of the lung caused by virus or bacteria. Leprosy or Hansen's disease is caused by *Mycobacterium leprae* and *Mycobacterium lepromatosis*. AIDS, syphilis and gonorrhoea are viral diseases. Polio, Japanese encephalitis and plague are viral diseases. Colourblindness, haemophilia, and sickle cell anaemia are X-linked (sex-linked) disease conditions.
522. (a) *Diabetes Insipidus (DI)* is a condition characterized by excessive thirst and excretion of large amounts of severely diluted urine. It is due to deficiency of vasopressin or antidiuretic hormone (ADH).
523. (c) Diabetes mellitus is a metabolic disease in which a person has high blood sugar, either because the pancreas does not produce enough insulin or because cells do not respond to the insulin. Hyposecretion of insulin affects the rate of sugar metabolism.
524. (b) Hemophilia is a group of hereditary genetic disorders that impairs the body's ability to control blood clotting or coagulation. It is an X-chromosome-linked disorder and more likely to occur in males. Diabetes is a hormonal disorder in which sugar metabolism is affected. Deficiency of vitamin-D causes rickets in which bones of legs bend. Ringworm is fungal lesion like skin infection caused by *Trichophyton rubrum*, *Trichophyton tonsurans*, *T. interdigitale*, *Microsporum canis*, *T. mentagrophytes*.
525. (b) 'Filariasis' is a parasitic disease transmitted from black flies and mosquitoes to humans. *Wuchereria bancrofti*, *Brugia malayi*, *Brugia timori* cause 'lymphatic filariasis'. In malaria, red blood cells are infected. 'Encephalitis' is an acute inflammation of the brain. Some of the most common causes of acute viral encephalitis are rabies virus, herpes simplex, poliovirus, measles virus and J.C. virus. 'Leukemia' or Leukaemia is a type of cancer of bone marrow.
526. (a) Malaria is a mosquito-borne infectious disease of humans caused by parasitic protozoans of genus *Plasmodium*. Poliomyelitis is caused by poliovirus. Tuberculosis is caused by *Mycobacterium tuberculosis*. Ringworm is caused by fungi.
527. (b) Bacterial leaf blight of rice is caused by *Xanthomonas spp.* *Magnaporthe grisea* causes rice blast disease.

- Phytophthora spp.* causes late blight of potato. It had caused the Great Irish Famine in 1845–1849.
- Citrus canker is developed in citric fruits by *Xanthomonas axonopodis*.
528. (b) Swine flu is an infection by Swine influenza Virus, (SIV or S-OIV) is any strain of the influenza family of viruses that is endemic in pigs. As of 2009, the known SIV strains include influenza C and the subtypes of influenza A ($H_1N_1, H_1N_2, H_3N_1, H_3N_2$ and H_2N_3).
Swine influenza virus is common throughout pig populations worldwide. People with regular exposure to pigs are at increased risk of swine flu infection. In August 2010, the World Health Organization declared the swine flu pandemic officially all over.
529. (b) Acupuncture is the stimulation of specific acupuncture points along the skin of the body using thin needles.
530. (c) Angina pectoris is the medical term for chest pain or discomfort due to coronary heart disease. It occurs when the heart muscle doesn't get as much blood as it needs. Angina usually causes uncomfortable pressure, fullness, squeezing or pain in the center of the chest.
Coronary thrombosis is the formation of a blood clot within a vessel of the heart. This limits the flow of blood, ultimately causing narrowing of the blood vessels. Myocardial infarction is commonly known as heart attack. It is an irrepressible death of the muscle of the heart due to prolonged lack of supply in oxygen. Arteriosclerosis is the gradual thickening and hardening of the arteries leading to the loss of elasticity in them and restricting the flow of blood.
631. (c) Damage to the immune system is caused by diseases that lower its efficiency such as HIV AIDS. Ashthma, bronchitis and prolonged exposure to aerosols cause damage to the lungs. Peptic ulcer is the formation of sores or ulcers in the lining of the stomach, oesophagus as small intestine is caused due to internal conditions like HCl imbalance.
532. (c)
533. (d) Percentage quantity of iron will be as following.
- | | |
|------------------|-----------|
| Methi vegetables | - 16.9 mg |
| Pudina | - 15.6 mg |
| Spinach | - 10.9 mg |
| Gram | - 9.8 mg |
| Poha | - 8.0 mg |
| Oatemeals | - 5.3 mg |
| Ground Nut | - 8.5 mg |
- An adult person requires approximately 20 mg iron per day.
534. (d) The disease caused by the swelling of membrane over spinal cord and brain is called meningitis. It is caused by Virus and it affects to the brain. In this illness fast fever is caused to the patient which sometimes results in death also.
535. (a) Artecether, which is used for treatment of Malaria, is a by product of artemesinin. It is also come in injection form. It has two isomers called as α and β .
536. (a) Correct matching will be as following :
- | | List I
(Disease) | List II
(Cause) |
|----|---------------------|-------------------------|
| A. | Marasmus | 1. Prolonged Starvation |
| B. | Kwashiorkor | 2. Protein Deficiency |
| C. | T. B. | 3. Bacterial Infection |
| D. | Hepatitis B | 4. Viral Infection |
537. (b) The well known Beri –Beri disease is caused by the lack of vitamin B-1, Vitamin B - 1 helps in the metabolism of carbohydrates due to the lack of it a toxin is produced in the body during the metabolism. The deficiency disease Beri - Beri is found mostly in the country where the people uses polished rice as the main food stuff.
538. (d) Polio is caused by the virus. It affects central nervous system. To prevent from the polio diseases polio vaccine is given in the form of injection after some time of the birth. It was discovered by Jones Salk.
539. (c) Vitamin 'c' is soluble in water and chemically called as ascorbic Acid. It's shortness produces scurvy disease. It is mostly found in citric fruits.
540. (a) Both assertion and reason are correct and reason also explains assertion correctly.
541. (b) Anosmia is loss of sense of smell.
542. (c) Osteoporosis is a bone disease enhancing the danger of fracture due to the less density of bone minerals.
543. (a) Platelets or thrombocytes depletes severely in case of Dengue fever.
544. (b) The year 2011 marked a significant worldwide achievement in the field of livestock health, with the global eradication of Rinderpest. It is highly contagious viral disease of ruminants and also known as steppe murrain, cattle plague and contagious bovine typhus.
545. (d) Plague is caused by the bacterium *Yersinia pestis* and AIDS by HIV virus. Malaria is caused by protozoan *Plasmodium* carried by vector Anopheles mosquitoes and a type of hair loss or baldness (not all) may be due to fungal infection.
546. (d) The Asian tiger mosquito *Aedes albopictus* also known as "tiger mosquito" causes and spreads dengue fever, Chikungunya fever, West Nile virus, Yellow fever virus, St. Louis encephalitis.
547. (a) Marasmus is caused by inadequate intake of protein and calories. It is a type of protein-energy malnutrition (PEM) and is characterized by emaciation or abnormally thin and weak.
548. (c) Sleep apnea is one of the sleep disorders that occur when a person's breathing is paused for a brief moment during sleep. The breathing can also be shallow during condition of sleep apnea.
549. (d) Coronary artery bypass surgery creates a new path for blood to flow to the heart bypassing the blocked artery. In surgery a healthy piece of vein from the leg or artery from the chest (internal mammary artery) or forearm is used.
550. (c) Cerebral palsy is the term used for a group of neurological disorders that appear in infancy or early childhood and permanently affect body movement and muscle coordination.

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551. (a) Malaria is transmitted by female mosquitoes of the genus *Anopheles* carrying the protozoan parasite *Plasmodium*. There are four kinds of malaria parasites that can infect humans, *P. vivax*, *P. ovale*, *P. malariae*, and *P. falciparum*.
552. (b) Yellow vein mosaic disease is the major disease responsible for lower production of okra . The primary symptom is clearing of small veins as the leaf area along the vein is bleached and turns yellow.
553. (c) Dengvaxia is the world's first dengue vaccine first registered in Mexico in December, 2015. It is a live recombinant tetravalent dengue vaccine.
554. (b) Alzheimer's disease is a progressive brain disorder. It typically destroys neurons and their connections in parts of the brain involved in memory. It later stages in can affects areas in the brain responsible for language, reasoning, and social behavior.
555. (a)
556. (b) 'White Rust', causal organism '***Albugo candida***' is an important fungal disease of mustard group (***Brassica spp.***), with the white symptoms on all parts of the plant, except the roots are appeared attacked. Clean cultivation, remove and burn the affected plant debris. Spray of ***zineb (75%)*** @ 2 kg per hectare with 600-700 litre water solution should be done on crop affected by this white rust control.
557. (b) Dengue virus is carried and spread by mosquitoes of genus *Aedes*, which includes a number of mosquito species. The primary vector of the dengue virus is the species *Aedes aegypti*.
558. (d) Vitamin K is one of the fat-soluble vitamins. It plays an important role in blood clotting as it acts as a co-factor for clotting factors.
559. (b)
560. (c) Poliovirus is the causative agent of polio. The poliovirus is composed of single-stranded RNA genome.
561. (d) The Kessler Syndrome is a theory proposed by NASA scientist Donald J. Kessler in 1978, used to describe a self - sustaining cascading collision of space debris in low Earth orbit (LEO). It's the idea that two colliding objects in space generate more debris than that collides with other objects, creating even more shrapnel and litter until the entirety of LEO is an impassable array of super swift stuff. At that point, any entering satellite would face unprecedented risks of headfirst bombardment.
562. (b) The Widal test is one of the diagnostic methods used for diagnosis of typhoid.
563. (b) Magnesium hydroxide also called milk of magnesia. It is commonly used as antacid. It also used as treatment for other gastrointestinal ailments such as heartburn, general upset stomach, indigestion, constipation.
564. (d)
565. (d) Malaria is a mosquito-borne infectious disease affecting humans and other animals caused by parasitic protozoans belonging to the *Plasmodium* type. The disease is most commonly transmitted by an infected female *Anopheles* mosquito.
566. (b) Smallpox was officially declared eradicated in 1980 and is the first disease to have been fought on a global scale
567. (d) Bacteriophages are viruses which infect various bacteria.
568. (b)
569. (c)
570. (d) *Aedes aegypti* is the mosquito vector that transmits the dengue virus to humans. Dengue is characterized by high temperature and the unbearable limb pains that have earned the disease its infamous name 'break-bone fever'. In addition the diseased person can also show measles-like rash, bleeding gums.
571. (a) AIDS is an fatal / dangerous diseases, that reduced resistance / tolerance capacity of body, caused by HIV - named Retrovirus (Human Immuno - Deficiency virus).
572. (d)
573. (d) The causative organism for typhoid is *Salmonella typhi* bacteria. This bacterial infection can lead to a high fever, diarrhoea, and vomiting. The infection is passed on through contaminated food and drinking water.
574. (d) In India, National Vector Borne Disease Control Programme covers prevention and control of vector borne diseases like Malaria, Dengue, Lymphatic Filariasis, Kala-azar, Japanese Encephalitis and Chikungunya.
575. (b) Beriberi is a disease caused by a vitamin B-1(Thiamin) deficiency. Tocopherol is a type of Vitamin E.
576. (c) Chloramphenicol is a broad -spectrum antibiotic first isolated from cultures of *Streptomyces*. It is now produced synthetically. It was the first broad-spectrum antibiotic to be discovered. Quinine is an alkaloid derived from the bark of the cinchona tree and used as an antimalarial drug. Aspirin is a pain reliever and also used to treat mild fever and to prevent heart attacks
577. (c)
578. (a) Grey speck disease in plants is caused by manganese deficiency.
579. (a) Thalassemia is a genetic blood disorder. People with Thalassemia disease are not able to make enough hemoglobin, which causes severe anemia
580. (d) Malaria is transmitted by female mosquitoes of the genus *Anopheles* carrying the protozoan parasite *Plasmodium*. There are four kinds of malaria parasites that can infect humans, *Plasmodium vivax*, *Plasmodium ovale*, *Plasmodium malariae*, and *Plasmodium falciparum*.
581. (a) Myopia also known as near-sighted or short-sighted. Myopia can be corrected by using concave lenses.
582. (a)
583. (b) Tuberculosis (TB) is an infection disease caused by the bacterium *Mycobacterium Tuberculosis (MTB)*. Tuberculosis generally affects the lungs, but can also affect the other parts of the body.
584. (d)

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585. (b) Karnal bunt is a fungal disease of wheat, durum wheat, and triticale. The causative Organism is *Neovossia indica* (*Tilletia indica*).
586. (b) The nature of the lens used to correct myopic eye is a convex lens.
- $$\therefore D = \frac{1}{f} = f(\text{metre}) = \frac{1}{D} = \frac{1}{1.25} = \frac{100}{125}$$
- $$= 0.80 \text{ metre} = 80 \text{ cm}$$
587. (b) Vitamin A - Night blindness
Vitamin B₁ - Beriberi
Vitamin C - Scurvy
588. (d) Dengue virus after infection, interferes the production of platelets in bone marrow, infects endothelial cells and gets binding with platelets.
589. (b) Measles is a viral disease which is also called rubeola. It is a contagious disease spreading through contact sneezing and coughing etc.
590. (b) Penicillin is very effective medicine against bacterial infection. During bacterium division, it prevents the cell wall formation. Thus it helps in prevention of bacterial growth.
591. (d) Mostly antibiotics inhibit the synthesis of cell wall and protein synthesis in bacteria. Due to this reason, bacterial infection is controlled by this type of medicines.
592. (c) Silicosis is a chronic lung disease caused by breathing in silica dust. Silicosis (silico tuberculosis) occurs in workers whose occupation is related to pottery, ceramic, and glass industry.
593. (d) Chickungunya is caused by chickungunya virus which is an insect borne virus of genus *Alphavirus*. Symptoms show high fever, maculopapular rash, headache, etc.
594. (b) Polio and pertussis are caused by virus. So, these can be controlled by vaccines.
595. (a) Beri-beri is not insect borne disease. It is caused by the deficiency of vitamin-B₁ or thiamine.
596. (b) Anaemia is a medical condition in which the red blood cell count or haemoglobin is less than normal. For men, anaemia is typically defined as haemoglobin level of less than 13.5 gram/100 ml and in women as haemoglobin of less than 12.0 gram/100 ml. Vitamin supplements given orally (folic acid or vitamin B12) or intramuscularly (vitamin B12) will replace specific deficiencies. So, the doctor advises the patient iron and folic acid tablets.

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597. (c) Dropsy is a disease, which means swelling of the body. Main symptoms of 'Dropsy' are: (i) swelling of the whole body especially legs (ii) gastrointestinal symptoms like vomiting, diarrhoea, loss of appetite (iii) tingling sensation in the skin (iv) tenderness in the calf muscles (v) increased intra-ocular (inside the eye) pressure which is known as glaucoma. It is caused by adulteration in mustard oil.
598. (b) Leprosy is a disease caused by bacteria called *Mycobacterium Leprae*. It affects mainly the skin and the nerves. Leprosy is also known as Hansen's disease after the scientist M. leprae who discovered it in 1873. Leprosy is spread between people. This is believed to occur through a cough or contact with fluid from the nose of an infected person.
599. (d) Tuberculosis (TB) is a common and in many cases lethal, infectious disease caused by various strains of mycobacterium. TB typically attacks the lungs, but can also affect other parts of the body.
600. (d) Humus is assimilated directly by the plant.
601. (b) In this process bacteria decompose the pectin of the plant to liberate fibres. The process of fibre preparation is known as retting. This process is carried out by *Clostridium butyricum*.
602. (a) Azolla, the aquatic fern is an excellent biofertilizer. Salvinia is an aquatic fern and Pteridium is a land fern and Marsilea is a bryophyte.
603. (c) The Vechur cattle is a rare breed of *Bos indicus*, named after the village Vechoor in Kottayam district of the state of Kerala in India. Its average length is 124 cm and height is 87 cm, according to the Guineas Book of Records, it's the smallest cattle breed in the world. Its milk is considered to have medicinal properties. Unlike other cattle, they can resist drought by being hardy towards it. The female Holstein is claimed to be the world's largest cow.
604. (b) Gibberellins were discovered in the fungus, *Gibberella fujikuroi*. Gibberellic acid causes tallness in plants. Vernalization is stimulus for the plants to flower up. Cold treatment or gibberellic acids also causes flowering and bolting in the plants.
605. (a) Rearing of silkworms for industrial purposes is known as Pisciculture. Sericulture is the farming of fish for breeding or consumption. Apiculture is the practice of rearing of bees for production of honey. Tissue culture involves raising of plants from any part of the plant body capable of meristematic growth. The process is also known as micro propagation.

4

Chapter

Healthcare System in India

1. Living in the atmosphere of CO is dangerous because it
 - (a) Reduces organic matter of tissues
 - (b) Dries up the blood
 - (c) Combined with O₂ present inside to form CO₂
 - (d) Combines with haemoglobin and makes it incapable of absorbing oxygen
2. What is the role of ultraviolet (UV) radiation in the water purification system?
 1. It inactivates / kills the harmful micro-organisms in water.
 2. It removes all the undesirable odours from the water.
 3. It quickens the sedimentation of solid particles and improves the clarity of water.

Which of the statements given above is/are correct?

 - (a) 1 only
 - (b) 2 and 3 only
 - (c) 1 and 3 only
 - (d) 1, 2 and 3
3. A sample of chloroform before using as an anaesthetic, is tested by
 - (a) Fehling's solution
 - (b) Ammonical cuprous chloride
 - (c) Ammonical silver nitrate solution
 - (d) Silver nitrate solution after boiling with alcoholic KOH
4. In the hooch tragedy (casualty occurring due to the wine poisoning) sometimes the incidents of blindness occurs due to the poisonous substance:
 - (a) ethyl alcohol
 - (b) methyl alcohol
 - (c) amyl alcohol
 - (d) benzyl alcohol
5. It is suggested by the doctors that the person suffering from prostrates in the kidney or gallbladder should not consume excessively the food stuffs like tomatoes, eggs, milk etc which are the major causes of the crystal formation as the prostrates, which is made of :
 - (a) Calcium phosphate
 - (b) Calcium Oxalate
 - (c) Calcium chloride
 - (d) Calcium sulphate
6. Which one among the following elements/ions is essential in small quantities for development of healthy teeth but causes mottling of the teeth if consumed in higher quantities?
 - (a) Fluoride
 - (b) Iron
 - (c) Chloride
 - (d) Potassium
7. Which of the following is not included in AYUSH Department under the Ministry of Health and Family Welfare of the Govt. of India?
 - (a) Allopathy
 - (b) Ayurveda
 - (c) Unani
 - (d) Sidhi

Hints & Solutions

1. (d) When CO is not ventilated it binds to haemoglobin, which is the principal oxygen-carrying compound in blood; this produces a compound known as carboxyhaemoglobin. Carbon monoxide toxicity arises from the formation of carboxyhaemoglobin, which decreases the oxygen-carrying capacity of the blood and inhibits the transport, delivery, and utilization of oxygen by the body.
2. (a) Ultraviolet (UV) is an electromagnetic radiation with a wavelength ranging from 10nm to 400nm. Its wavelength is shorter than visible light but longer than X-rays. UV radiations inactivates/hills the harmful micro-organisms in water by damaging their DNA.
3. (c) Chloroform (CHCl₃) undergoes oxidation to give phosgene (Cl₂CO) which is an extremely poisonous gas. Phosgene must not be present in chloroform when used as an anaesthetic agent. Pure chloroform does not give white ppt with silver nitrate but it will give white ppt if phosgene is present in chloroform.
4. (b) Fehling's solution and ammoniacal silver nitrate solution (also known as folin's reagent) are used to differentiate between alcohol and lactones.
5. (b) Prostrate in kidney or gallbladder is composed of calcium oxalate.
6. (a) Consumption of high concentration of fluoride causes mottling of teeth or fluorosis.
7. (a) AYUSH is Department of Ayurveda, Yoga & Naturopathy, Unani, Siddha and Homoeopathy. Allopathy is not included in this department.

5 Chapter

Everyday Science

1. Ventilators are provided at the top of room
 - (a) to bring oxygen for breathing
 - (b) so that sunlight may enter the room
 - (c) to maintain conventional currents to keep the air fresh in the room
 - (d) to provide an outlet for carbon dioxide
2. L.P.G. is mostly liquified
 - (a) hydrogen (b) oxygen
 - (c) butane (d) methane
3. The sprinkling of water slightly reduces the temperature of a closed room because
 - (a) temperature of water is less than that of the room
 - (b) specific heat of water is high
 - (c) water has large latent heat of vaporisation
 - (d) water is a bad conductor of heat
4. The clouds float in the atmosphere because of their low
 - (a) temperature (b) velocity
 - (c) pressure (d) density
5. An iron needle sinks in water whereas a ship made of iron floats on it because
 - (a) the edge of the needle is pointed
 - (b) the ship is flat
 - (c) the ship is driven by powerful engine
 - (d) specific gravity of the needle is greater than that of water displaced by it.
6. The cloudy nights are warmer than clear nights because
 - (a) clouds prevent escape of radiation of heat from the ground and the air.
 - (b) absorb sunlight in the day and radiate the same in night.
 - (c) clouds make the atmosphere damp and generate heat.
 - (d) clouds obstruct the movement of air which creates heat.
7. Food gets cooked faster in a pressure cooker because
 - (a) water starts boiling at a lower temperature due to high pressure
 - (b) water starts boiling at a higher temperature due to high pressure
 - (c) water boils only at 100°C but the heat content is higher at high pressure
 - (d) convection currents are set inside the cooker
8. It is more comfortable to wear white cloths in summer because
 - (a) they reflect heat falling on them.
 - (b) they radiate heat transferred from the body.

9. (c) they absorb perspiration.
(d) they are soothing to the eye.
10. The atmosphere exerts enormous pressure on us. But, we don't feel it because
 - (a) our blood exerts a pressure slightly more than that of the atmosphere.
 - (b) we are used to it.
 - (c) our bones are very strong and can withstand the pressure.
 - (d) the surface area of our head is very small.

10. Match List-I with List-II and select the correct answer from the codes given below the lists:

List-I (Energy conversion)	List-II (Device/process)
A. Heat to electrical	1. Car braking
B. Electric to sound	2. Nuclear reactor
C. Mass to heat	3. Loud speaker
D. Chemical to heat and light	4. Solar cell
	5. Fuel burning

Codes:

	A	B	C	D
(a)	1	2	3	4
(b)	4	3	2	5
(c)	2	1	3	5
(d)	3	1	2	4

11. A car is moving on a road and rain is falling vertically. Select the correct answer
 - (a) The rain will strike the wind screen only
 - (b) The rain will strike the front screen only
 - (c) The rain will strike both the screens
 - (d) The rain will not strike any of the screens
12. An astronaut orbiting the earth in a circular orbit 120 km above the surface of earth, gently drops a spoon out of the space ship. The spoon will
 - (a) fall vertically down to the earth
 - (b) move towards the moon
 - (c) will move along with the space ship
 - (d) will move in an irregular way and then fall down to earth
13. Which one of the following chemicals helps in fruit ripening?
 - (a) Ethephon (b) Atrazine
 - (c) Isoproturan (d) Malathion
14. A pungent smell often present near the urinals is due to
 - (a) sulphur-dioxide (b) chlorine
 - (c) ammonia (d) urea

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15. Alum purifies muddy water by
 (a) Absorption (b) Dialysis
 (c) Emulsification (d) Coagulation
16. Which is used in storage batteries?
 (a) Copper (b) Lead
 (c) Tin (d) Zinc
17. When soggy biscuits are kept inside the fridge for sometime they become crisp because
 (a) cooling releases extra moisture
 (b) humidity inside the fridge is low and extra moisture is absorbed
 (c) humidity inside the fridge is high and extra moisture is absorbed
 (d) pressure inside the fridge is high and helps in releasing extra moisture
18. In cold weather, aquatic animals survive even when water to the top layer of the lake freezes into ice because
 (a) they can breathe in ice
 (b) they have enough of accumulated oxygen inside them
 (c) their body structure is such that they can survive without oxygen.
 (d) water has highest density of 4°C so underneath the top layer of ice there is layer of water
19. Which one of the following is NOT correct?
 (a) Theory of evolution was propounded by Charles Darwin.
 (b) The breaking apart of the nucleus of an atom is called fusion.
 (c) Dry ice is nothing but solid carbon dioxide.
 (d) Telephone was invented by Graham Bell.
20. Consider the following statements:
Assertion (A): LPG is a pollution free vehicular fuel.
Reason (R): Plying of CNG fuelled-buses is recommended for metropolitan cities in India.
- Codes:**
- (a) Both A and R are true, and R is the correct explanation of A.
 - (b) Both A and R are true, but R is not the correct explanation of A.
 - (c) A is true, but R is false.
 - (d) A is false, but R is true.
21. Consider the following statements:
 Hard water is not suitable for
 1. Drinking
 2. Washing clothes with soap
 3. Use in boilers
 4. Irrigating crops
 Which of these statements are correct?
 (a) 1 and 3 (b) 2 and 3
 (c) 1, 2 and 4 (d) 1, 2, 3 and 4
22. Domestic cooking gas consists of mostly
 (a) Methane and ethane
 (b) Liquified butane and isobutane
 (c) Ethylene and carbon monoxide
 (d) Hydrogen and acetylene

23. Match List-I with List-II and select the correct answer from the codes given below:

List-I	List-II
A. CNG	1. Carbon monoxide, hydrogen
B. Coal gas	2. Butane, propane
C. LPG	3. Butane, ethane
D. Water gas	4. Hydrogen, methane, CO

Codes:

	A	B	C	D
(a)	2	1	3	4
(b)	3	4	2	1
(c)	2	4	3	1
(d)	3	1	2	4

24. Consider the following statements regarding diamond:

1. It is an allotrope of silicon.
2. It is a bad conductor of electricity.
3. It is the hardest substance.
4. It burns to produce carbon dioxide.

Which of the statements given above are correct?

- (a) 1, 2, 3 and 4 (b) 2, 3, and 4
 (c) 1 and 2 (d) 1, 3 and 4

25. Which of the following statements about diamond are correct?

1. It is used as a gem in jewellery because of its ability to reflect light.
2. It is good conductor of electricity.
3. It is used for cutting glass, marble stones and other hard materials.
4. It is used for drilling of rocks.

Select the correct answer using the codes given below :

- (a) 1, 3 and 4 (b) 2, 3 and 4
 (c) 1, 2 and 3 (d) 2 and 4

26. Consider the following statements :

1. Diamond is hard and graphite is soft.
2. Diamond is soft and graphite is hard.
3. Diamond is a bad conductor but graphite is a good conductor of electricity.
4. Diamond is a good conductor but graphite is a bad conductor.

Which of the statements given above is/are correct ?

- (a) 1 and 3 (b) 1 only
 (c) 2 and 3 (d) 1 and 4

27. When iron is left exposed in open air, it gets rusted. Which constituent(s) of air is /are responsible for rusting iron?

1. Oxygen gas present in air
2. Moisture present in air
3. Carbon dioxide gas present in air

Select the correct answer using the codes given below :

- (a) 1 only (b) 2 only
 (c) 1 and 2 (d) 2 and 3

28. Which of the statements given below is/are correct?

Permanent hardness of water is due to the presence of soluble.

1. chloride of calcium
2. bicarbonate of calcium
3. sulphate of magnesium
4. bicarbonate of magnesium

Select the correct answer using the codes given below.

37. Given : [UP-PCS 2008]
 1. Blood cells
 2. Bone cells
 3. Hair strands
 4. Saliva
 Samples taken for DNA testing in criminal investigation can be
 (a) 1, 2 and 3 only (b) 1 and 4 only
 (c) 2 and 3 only (d) 1, 2, 3 and 4 only

38. If the doors of a refrigerator are left open for few hours, the room temperature [UP-PCS 2008]
 (a) will decrease
 (b) will increase
 (c) will remain the same
 (d) will decreases only in the area in the vicinity of the refrigerator

39. In which of the following conditions wet clothes will dry earliest? [UP-PCS 2008]
 (a) 100% RH, 60°C temperature
 (b) 100% RH, 20°C temperature
 (c) 20% RH, 20°C temperature
 (d) 20% RH, 60°C temperature

40. Given below are two statements : [UP-PCS 2009]
Assertion (A) : Lighting a candle in space does not produce a flame.
Reason (R) : A flame exists due to the pulls of gravity.
 In the context of the above, which one of the following is correct?
 (a) Both (A) and (R) are true, and (R) is the correct explanation of (A)
 (b) Both (A) and (R) are true, but (R) is not the correct explanation of (A)
 (c) (A) is true, but (R) is false.
 (d) (A) is false, but (R) is true.

41. While lifting a bucket of water from a well, we feel that the bucket [UP-PCS 2009]
 (a) becomes heavier above the surface of water.
 (b) becomes lighter above the surface of water.
 (c) loses stability on coming out of water.
 (d) has gained mass on coming out of water.

42. When soggy biscuits are kept inside the fridge for sometime they become crisp because [UP-PCS 2009]
 (a) cooling releases extra moisture.
 (b) humidity inside the fridge is low and extra moisture is absorbed.
 (c) humidity inside the fridge is high and extra moisture is absorbed.
 (d) pressure inside the fridge is high and helps in releasing extra moisture.

43. Which one of the following pairs is not correctly matched? [UP-PCS 2009]
 (a) Y2K — Computer
 (b) Arthritis — Uric Acid
 (c) Noise pollution — Decibel
 (d) Param 10,000 — Land to land missile

44. The leaning tower of Pisa does not fall because [UP-PCS 2009]
 (a) it is tapered at the top
 (b) it covers a large base area

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- (c) its centre of gravity remains at the lowest position
 (d) the vertical line through the centre of gravity of the tower falls within the base
45. The 'blue moon' phenomenon occurs [UP-PCS 2009]
 (a) when two full moons occur in the same month.
 (b) when four full moons appear in two consecutive months of the same calendar year.
 (c) when two full moons appear in the same month thrice in a calendar year
 (d) none of the above
46. Of the two bulbs in a house, one glows brighter than the other. Which of the following statements is correct? [UP-PCS 2009]
 (a) The brightness does not depend on resistance
 (b) Both the bulbs have the same resistance
 (c) The brighter bulb has larger resistance
 (d) The dimmer bulb has larger resistance
47. Match List-I with List-II and select the correct answer by using the codes given below the lists : [UP-PCS 2009]
- | List-I | List-II |
|---------------|--|
| A. LED | 1. 'Bubble boy' Syndrome |
| B. LCD | 2. Bird disease |
| C. SARS | 3. Cost - effective light source |
| D. SCID | 4. Popular and effective mobile screen |
- Codes :**
- | A | B | C | D |
|-------|---|---|---|
| (a) 2 | 3 | 1 | 4 |
| (b) 4 | 3 | 2 | 1 |
| (c) 1 | 2 | 4 | 3 |
| (d) 3 | 4 | 2 | 1 |
48. Which one of the following is NOT properly matched? [UP-PCS 2010]
- | | |
|--|-----------------------|
| (a) Gene splicing and recombinant DNA Technology | - Genetic Engineering |
| (b) A diagnostic test to detect the presence or absence of genetic disorders in unborn child | - Amniocentesis |
| (c) A process by which living organisms break down complex matter into simpler constituents | - Biodegradation |
| (d) An inbuilt time keeping system in all organisms | - Bio - mass |
49. Consider the following statements : [UP-PCS 2010]
- Assertion (A)** : If Ice collects on the freezer the cooling in the refrigerator is affected adversely.
- Reason (R)** : Ice is poor conductor.
- Select the correct answer using the codes given below :
- Codes :**
- (a) Both (A) and (R) are true, but (R) is the correct explanation of (A).
 (b) Both (A) and (R) are true, but (R) is not the correct explanation of (A).
50. (c) (A) is true, but (R) is false.
 (d) (A) is false, but (R) is true.
- Retina of the eye is comparable to which of the following parts of a traditional camera? [UP-PCS 2011]
- (a) Film (b) Lens
 (c) Shutter (d) Cover
51. Amniocentesis is a method used to determine the [UP-PCS 2011]
 (a) foetal sex
 (b) kind of Amino acids
 (c) sequence of Amino acids in protein
 (d) Type of hormones
- Refrigeration helps in food preservation by [UP-PCS 2011]
 (a) killing the germs
 (b) reducing the rate of biochemical reactions
 (c) destroying enzyme action
 (d) sealing the food with a layer of ice
53. In an earthen pitcher, the water remains cold due to the process of [UP-PCS 2012]
 (a) Condensation
 (b) Evaporation
 (c) Sublimation
 (d) None of the above
54. Pendulum clock become slow in summer because [UP-PCS 2012]
 (a) days in summer are large.
 (b) of the friction in the coil.
 (c) the length of the pendulum increases.
 (d) the weight of the pendulum changes.
55. When ice melts, then the [UP-PCS 2012]
 (a) volume increases
 (b) volume decreases
 (c) mass increases
 (d) mass decreases
56. White colour of milk is due to the presence of [UP-PCS 2012]
 (a) lactose (b) albumins
 (c) carotenes (d) caseins
57. **Assertion (A)** : Deserts can be potential source for generating sustainable energy.
- Reason (R)** : Deserts receive more energy from the Sun in six hours than mankind consumes in a year. [UP-PCS 2013]
- Select the correct answer from the codes given below :
- Codes :**
- (a) Both (A) and (R) are true, and (R) is the correct explanation of (A).
 (b) Both (A) and (R) are true, but (R) is not the correct explanation of (A).
 (c) (A) is true, but (R) is false.
 (d) (A) is false, but (R) is true.
58. Which one of the following gases is used for the purification of drinking water? [UP-PCS 2013]
 (a) Sulphur dioxide (b) Chlorine
 (c) Fluorine (d) Carbon dioxide

59. Some marine animals and insects emit light from their body in darkness. This phenomenon is known as [UP-PCS 2014]

- (a) Phosphorescence (b) Bioluminescence
 (c) Both (a) and (b) (d) None of these

60. Match List-I with List-II and select the correct answer from the codes given below : [UP-PCS 2014]

List-I	List-II
A. Vitamin B ₁₂	1. Magnesium
B. Haemoglobin	2. Cobalt
C. Chlorophyll	3. Copper
D. Brass	4. Iron

Code :

- | | | | |
|-------|---|---|---|
| A | B | C | D |
| (a) 2 | 4 | 1 | 3 |
| (b) 2 | 1 | 3 | 4 |
| (c) 4 | 1 | 2 | 3 |
| (d) 3 | 4 | 2 | 1 |

61. In a pressure cooker food is cooked in shorter time because [UP-PCS 2015]

- (a) the boiling point of water increases.
 (b) the boiling point of water decreases.
 (c) the food takes less heat.
 (d) None of the above.

62. Pheromones are generally produced by [UP-PCS 2015]

- (a) Snakes (b) Birds
 (c) Bats (d) Insects

63. Match List -I with List – II and select the correct answer by using the codes given below the lists : [UP-PCS 2015]

List – I	List – II
A. Minerals	1. Rainfall
B. Solar energy	2. Methane and Carbon dioxide
C. Bio gas	3. Exhaustible
D. Deforestation	4. Inexhaustible

Codes :

- | | | | |
|-------|---|---|---|
| A | B | C | D |
| (a) 3 | 4 | 2 | 1 |
| (b) 3 | 4 | 1 | 2 |
| (c) 2 | 1 | 3 | 4 |
| (d) 1 | 2 | 3 | 4 |

64. Which one of the following can provide both power and manures? [UP-PCS 2015]

- (a) Nuclear plants (b) Thermal Plants
 (c) Biogas Plants (d) Hydroelectric Plants

65. Which one of the following pairs is correctly matched? [UP-PCS 2015]

- | | | |
|-----------------------|---|-----------------------|
| (a) Mountain | — | Most stable ecosystem |
| (b) Abiotic Component | — | Bacteria |
| (c) Green Plants | — | Ecosystem |
| (d) Rainfall | — | Global Warming |

66. Which one of the following pairs is not correctly matched? [UP-PCS 2015]

- | | | |
|---------------|---|------------------------|
| (a) Wool | — | A protein |
| (b) Rayon | — | Modified starch |
| (c) Rubber | — | A natural polymer |
| (d) Fullerene | — | An allotrope of carbon |

67. Setting sun and rising sun appear red due to –

- (a) Scattering of light
 (b) Dispersion of light

- (c) Reflection of light
 (d) Convection of light

- Which of the following is also used as a lubricant?

[IMP-PSC 2017]

- (a) Cuprite (b) Graphite
 (c) Haematite (d) Cryolite

- The laughing is – [IMP-PSC 2017]

- (a) hydrogen peroxide
 (b) nitrous oxide
 (c) carbon monoxide
 (d) sulphur dioxide

70. Lightning can even burn a tree because it contains tremendous amount of – [IMP-PSC 2017]

- (a) heat energy (b) electric energy
 (c) chemical energy (d) nuclear energy

71. Which of the following is not a micro nutrient for a plant?

- (a) Iron (b) Magnesium
 (c) Molybdenum (d) Manganese

72. The time period of revolution of a geo-stationary satellite is – [UK-PSC 2016]

- (a) 12 hrs. (b) 24 hrs.
 (c) 48 hrs. (d) 6 hrs.

73. Consider the following statements : [UP-RO 2016]

- Assertion (A)** : Light coloured clothes are preferred in summer.
Reason (R) : Light colours are poor absorbers of heat.

Select correct answer from the code given below –

- (a) Both (A) and (R) are correct and (R) correctly explains (A)
 (b) Both (A) and (R) are correct but (R) does not correctly explain (A)
 (c) (A) is true, but (R) is false
 (d) (A) is false, but (R) is true

74. Which one of the following is used for manufacturing safety matches? [UP-RO 2016]

- (a) Di - phosphorus (b) Black phosphorus
 (c) Red phosphorus (d) Scarlet phosphorus

75. Which one of the following is not correctly matched? [UP-RO 2016]

- (a) Yeast — Fermentation
 (b) Casein — Milk protein
 (c) Aloe Vera — Angiosperm
 (d) Nepenthes — Parasitic angiosperm

76. The synthetic rubber has replaced natural rubber for domestic and industrial purposes. Which one of the following is the main reason behind that? [CDS 2016-I]

- (a) Natural rubber is unable to meet the growing demand of different industries
 (b) Natural rubber is grown in tropical countries only
 (c) Raw material for synthetic rubber is easily available
 (d) Natural rubber is not durable

77. After hot sunny day, people sprinkle water on the roof-top because : [CDS 2016-I]

- (a) water helps air around the roof - top to absorb the heat instantly
 (b) water has lower specific heat capacity
 (c) water is easily available
 (d) water has large latent heat of vaporisation

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78. Why is it difficult to see through fog? [NDA 2008 -II]
 (a) Rays of light suffer total internal reflection from the fog droplets
 (b) Rays of light are scattered by the fog droplets
 (c) Fog droplets absorb light
 (d) The refractive index of fog is extremely high
79. The density of water varies with temperature which helps the aquatic animals to live in cold water. At what temperature is the density of water maximum? [NDA 2008 -II]
 (a) 1°C (b) 2°C
 (c) 3°C (d) 4°C
80. What would be the best choice for window material to keep the outside heat away? [NDA 2008 -II]
 (a) Single-pane glass
 (b) Double-pane glass without a gap in between
 (c) Double-pane glass with water filled in between
 (d) Double-pane glass with air in between
81. Assertion (A): In a pressure cooker food is cooked above boiling point. Reason (R): Boiling point of water increases as the pressure increases.
 (a) Both A and R are true and R is the correct explanation of A
 (b) Both A and R are true, but R is not the correct explanation of A
 (c) A is true, but R is false
 (d) A is false, but R is true
82. Earthquake (shock) waves are [NDA 2009 -II]
 (a) infrasonic waves (b) ultrasonic waves
 (c) seismic (d) infrared waves
83. Fat can be separated from milk in a cream separation because of [NDA 2009 -II]
 (a) cohesive force (b) gravitational force
 (c) centrifugal force (d) centripetal force
84. Raw mangoes shrivel when pickled in brine. The phenomenon is associated with [NDA 2010 -II]
 (a) osmosis
 (b) reverse osmosis
 (c) increase of surface tension of fluid
 (d) decrease of surface tension of fluid
85. Half portion of a rectangular piece of ice is wrapped with a white piece of cloth while the other half with a black one. In this context, which one among the following statements is correct? [NDA 2011 -I]
 (a) Ice melts more easily under black wrap
 (b) Ice melts more easily under white wrap
 (c) No ice melts at all under the black wrap
 (d) No ice melts at all under the white wrap
86. Mr X was advised by an architect to make outer walls of his house with hollow bricks. The correct reason is that such walls [NDA 2011 -I]
 (a) make the building stronger
 (b) help keeping inside cooler in summer and warmer in winter
 (c) prevent seepage of moisture from outside
 (d) protect the building from lightning
87. If a ship moves from freshwater into seawater, it will [NDA 2011 -I]
 (a) sink completely
 (b) sink a little bit
 (c) rise a little higher
 (d) remain unaffected
88. The cat can survive fall from a height much more than human or any other animal. It is because the cat [NDA 2011 -II]
 (a) can immediately adjust itself to land on all four paws and bend the legs to absorb the impact of falling
 (b) has elastic bones
 (c) has thick and elastic skin
 (d) also gets injury equally with other animals, but has tremendous endurance, resistance and speedy recovery
89. Fire fly gives us cold light by virtue of the phenomenon of [NDA 2011 -II]
 (a) fluorescence (b) phosphorescence
 (c) chemiluminescence (d) effervescence
90. Before X-ray examination (coloured X-ray) of the stomach, patients are given suitable salt of barium because [NDA 2013 -II]
 (a) barium salts are white in colour and this helps stomach to appear clearly
 (b) barium is a good absorber of X-rays and helps stomach to appear clearly
 (c) barium salts are easily available
 (d) barium allows X-rays to pass through the stomach
91. The best colours for a sun umbrella will be [NDA 2013 -II]
 (a) black on top and red on inside
 (b) black on top and white on inside
 (c) red on top and black on inside
 (d) white on top and black on inside
92. When ice melts, its [NDA 2013 -II]
 (a) volume decreases
 (b) volume increases
 (c) volume and mass both decrease
 (d) volume decreases while mass increases
93. When deep sea fishes are brought to the surface of the sea, their bodies burst. This is because the blood in their bodies flows at very [NDA 2013 -II]
 (a) high speed (b) high pressure
 (c) low speed (d) low pressure
94. By what mechanism does scent spread all over the room if the lid is opened? [NDA 2013 -II]
 (a) Pressure in the bottle
 (b) Compression from the bottle
 (c) Diffusion
 (d) Osmosis
95. Dirty cloths containing grease and oil stains are cleaned by adding detergents to water. Stains are removed because detergent [NDA 2013 -II]
 (a) reduces drastically the surface tension between water and oil
 (b) increases the surface tension between water and oil
 (c) increases the viscosity of water and oil
 (d) decreases the viscosity in detergent mixed water
96. When an incandescent electric bulb glows [NDA 2014 - I]
 (a) the electric energy is completely converted into light
 (b) the electric energy is partly converted into light energy and partly into heat energy
 (c) the light energy is converted into electric energy
 (d) the electric energy is converted into magnetic energy

97. In cricket match, while catching a fast moving ball, a fielder in the ground gradually pulls his hands backwards with the moving ball to reduce the velocity to zero. The act represents [NDA 2014 - I]
- Newton's first law of motion
 - Newton's second law of motion
 - Newton's third law of motion
 - Law of conservation of energy
98. Two layers of a cloth of equal thickness provide warmer covering than a single layer of cloth with double the thickness. Why? [NDA 2014 - I]
- Because of the air encapsulated between two layers
 - Since effective thickness of two layers is more
 - Fabric of the cloth plays the role
 - Weaving of the cloth plays the role
99. Inactive Nitrogen and Argon gases are usually used in electric bulbs in order to [NDA 2014-II]
- increase the intensity of light emitted
 - increase the life of the filament
 - make the emitted light coloured
 - make the production of bulb economical
100. What is the purpose of adding baking soda to dough? [NDA 2007 - II]
- To generate moisture
 - To give a good flavour
 - To give good colour
 - To generate carbon dioxide
101. Match List I with List II and select the correct answer using the codes given below the Lists. [2010 - I]
- | | List I | | List II |
|----|---------------|---|-----------------------------------|
| | (Mineral) | | Industries in which largely used) |
| A. | Limestone | 1 | Cement |
| B. | Copper | 2 | Electrical goods |
| C. | Bauxite | 3 | Manufacture of aeroplanes |
| D. | Manganese | 4 | Steel |
- Codes**
- | | A | B | C | D |
|-----|---|---|---|---|
| (a) | 1 | 2 | 3 | 4 |
| (b) | 4 | 2 | 3 | 1 |
| (c) | 1 | 3 | 2 | 4 |
| (d) | 4 | 3 | 2 | 1 |
102. A woman desires to clean the surface of her gold ornaments by a chemical approach. For this she requires to use [NDA 2010 - II]
- aqua-regia
 - concentrated H_2SO_4
 - concentrated $NaOH$
 - sodium thiosulphate solution
103. Which one of the following is not needed in a nuclear fission reactor? [NDA 2010 - II]
- Moderator
 - Coolant
 - Accelerator
 - Control device
104. When items or jewellery made of metals such as copper or nickel are placed in a solution having a salt of gold, a thin film of gold is deposited by [NDA 2011 - I]
- cooling to below $0^\circ C$
 - heating above $100^\circ C$

- (c) passing an electric current
(d) just keeping it for 10 min
105. Heavy water implies [NDA 2011 - I]
- water which is used in heavy industries such as thermal power plants
 - water which contains SO_4^{2-} and Cl^- of calcium and magnesium
 - deuterated water
 - water which has maximum density
106. Which one among the following is a sin smelling agent added to LPG cylinder to help the detection of gas leakage? [NDA 2011 - I]
- Ethanol
 - Thioethanol
 - Methane
 - Chloroform
107. Which one among the following metals is used for making boats because it does not corrode by sea water? [NDA 2011 - I]
- Tungsten
 - Nickel
 - Antimony
 - Titanium
108. A close bottle containing water at room temperature was taken to the Moon and then the lid is opened. The water will [NDA 2011 - I]
- freeze
 - boil
 - decompose into oxygen and hydrogen
 - not change at all
109. On the labels of the bottles, some soft drinks are claimed to be acidity regulators. They regulate acidity using [NDA 2012 - III]
- carbon dioxide
 - bicarbonate salts
 - Both (a) and (b)
 - carbon dioxide and lime
110. Which one among the following is responsible for the expansion of water in the ocean? [NDA 2013 - I]
- Carbon dioxide
 - Nitrogen dioxide
 - Carbon monoxide
 - Sulphur dioxide
111. Food cans are coated with tin but not with zinc because [NDA 2013 - I]
- zinc is costlier than tin
 - zinc has a higher melting point than tin
 - zinc is more reactive than tin
 - tin is more reactive than zinc
112. Date of manufacture of food items fried in oil should be checked before buying because oils become rancid due to [NDA 2014 - III]
- oxidation
 - reduction
 - hydrogenation
 - decrease in viscosity
113. A metallic plate sticks firmly on the mouth of a water vessel made from another metal. By way of heating, one can detach the plate from the vessel. This is because heat expands [NDA 2015-I]
- the vessel only
 - both the vessel and the plate equally
 - the vessel more than the plate
 - the vessel and contracts the plate
114. Which one among the following fuels is used in gas welding? [NDA 2015-I]
- L P G
 - Ethylene
 - Methane
 - Acetylene

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115. What does airbag, used in safety of car driver, contain?
[NDA 2008 - II]
(a) Sodium bicarbonate (b) Sodium azide
(c) Sodium nitrite (d) Sodium peroxide
116. Which one of the following is responsible for converting milk into curd?
[NDA 2008 - II]
(a) Fungi (b) Bacteria
(c) Virus (d) None of these
117. Sweating during exercise indicates operation of which one of the following processes in the human body?
[NDA 2008 - II]
(a) Enthalpy (b) Phagocytosis
(c) Homeostasis (d) Osmoregulation
118. The plant dye Henna imparts orange-red colour to skin and hairs due to its reaction with which of the following?
[NDA 2009 - I]
(a) Proteins and amino acids
(b) Lipids
(c) Carbohydrates
(d) Nucleic acids
119. Which one of the following is responsible for the stimulating effect of tea?
[NDA 2009 - III]
(a) Tannin (b) Steroid
(c) Alkaloid (d) Flavonoid
120. **Assertion (A):** The safety air bags fitted in some cars inflate during head-on impact of the car. [NDA 2009 - III]
Reason (R): The inflation is due to pumping of air into the balloon during the impact.
(a) Both A and R are true and R is the correct explanation of A
(b) Both A and R are true, but R is not the correct explanation of A
(c) A is true, but R is false
(d) A is false, but R is true
121. Which among the following oils has the maximum protein content?
[NDA 2009 - II]
(a) Castor oil (b) Sunflower oil
(c) Soyabean oil (d) Safflower oil
122. Golden fibre refers to
(a) hemp (b) cotton
(c) jute (d) nylon
123. Which one of the following is commonly used as a flavouring agent during the preparation of noodles?
[NDA 2009 - II]
(a) Saffron (b) Cinnamon
(c) Olive oil (d) Ajinomoto

Hints & Solutions

1. (c) Ventilators are meant to pass the hot air of inside a room to pass outwards. As hot air is lighter than cold air relatively, it goes up near ceiling and pass through ventilators. As the hot air pass through ventilators, relatively cold air finds its way from other paths to fill the room. Hence, this ensures a circulation of air inside a room.
2. (c) LPG or liquified Petroleum Gas consists of flammable hydrocarbon gases including propane, butane and mixture of these gases. It is liquified through pressurisation coming from natural gas processing and oil refining. It is used as heating, cooking and auto fuel.
3. (c) Water has a large latent heat of vaporisation. When it is sprinkled over a large area, its evaporation occurs which, in turn, causes cooling.
4. (d) Because of density. The density of the clouds is less than that of the air.
5. (d) Because the specific gravity of the needle is greater than that of water displaced by it.
- Specific gravity (or relative density)

$$= \frac{\text{Density of the substance}}{\text{Density of water at } 4^\circ\text{C}}$$
- The average density of iron needle is greater than water, therefore, it sinks.
6. (a) The cloudy nights are warmer because clouds prevent escape of radiation of heat from the ground and the air.
7. (b) Gay-Lussac's law gives the relationship between temperature and pressure, under conditions when the volume is kept constant mathematically, $P \propto T$. Thus, inside a pressure cooker water starts boiling at a higher temperature due to high pressure and the cooking of food is faster.
8. (a) The white clothes reflect heat falling on them in summer and they absorb the least from the sun.
9. (a) We don't feel the atmospheric pressure because our blood exerts a pressure slightly more than that of the atmosphere.
10. (b) Heat to electrical energy conversion occurs in solar cell. Electric to sound occurs in loud speaker. Mass to heat occurs in nuclear reactor. Chemical to heat and light occurs in fuel burning.
11. (b)
12. (c) When spoon is dropped gently, its tangential speed is equal to the speed of spaceship, and so it revolves like a satellite.
13. (a) Ethephon is used to promote pre-harvest ripening of fruits e.g., tomatoes, sugar beet, fodder beet, coffee and many other products. Atrazine, isoproturon and malathion are used as pesticides.
14. (c) A pungent smell often present near the urinals is due to ammonia.
15. (d) Coagulation is the process of accumulation and setting down of particles present in a colloid solution. Aluminium Sulphate, also known as Alum, when added to water reacts with the bicarbonate alkalinites present in water and forms a gelatinous precipitate. This floc attracts other fine particles and suspended material in water, and settles down at the bottom of the container.
16. (b) Lead is used in storage batteries. Lead-acid battery is a kind of storage battery where bed plates or grids are used as electrode and H_2SO_4 as electrolyte.

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17. (b) Because the humidity inside the fridge is low and extra moisture is absorbed.
18. (d) In cold countries, when the temperature of fresh water reaches 4°C, the layers of water near the top in contact with cold air continue to lose heat energy and their temperature falls below 4°C. On cooling below 4°C, these layers do not sink but may rise up as fresh water has a maximum density at 4°C. Due to this, the layer of water at 4°C remains at the bottom and above this layers of water 3°C, 2°C, 1°C and 0°C are formed. Because ice is a poor conductor of heat, it does not absorb heat energy from the water beneath the layer of ice which prevents the water freezing. Thus, aquatic creatures survive in such places.
19. (b) Nuclear fusion is a nuclear reaction in which two or more atomic nuclei collide at a very high speed and join to form a new type of atomic nucleus.
20. (d) CNG is Compressed Natural Gas, which is mainly methane compressed at a pressure of 200 to 248 bars. LPG is Liquefied Petroleum Gas, a mixture of propane and butane liquefied at 15°C and a pressure of 1.7 – 7.5 bar. CNG is preferred compared to LPG as vehicular fuel because CNG is cleaner and cheaper. LPG has high calorific value and releases more CO₂ which is a greenhouse gas LPG, however is cleaner compared to gasoline.
21. (b) Hard water is the water that contains bicarbonate, chloride and sulphate salts of calcium and magnesium. Hard water is not suitable for washing clothes because soap solutions form a white precipitate (soap scum) instead of producing lather than Hg and co ions destroy the surfactant properties of the soap. Hard water also forms deposits that clog pipes these deposits are 'scum'. In boilers there deposits impair the flow of heat into water, reducing the heating efficiency, and as a result metal components of boiler also overheat.
22. (b) Domestic cooking gas is called liquefied petroleum gas (LPG). LPG is a mixture of hydrocarbons butane and isobutane LPG is gas at atmospheric pressure and normal ambient temperatures level it is in the liquid form under pressure in a steel container.
23. (b) CNG – Butane, ethane
Coal gas – Hydrogen, methane, CO
LPG– Butane, propane
Water gas– CO, hydrogen
24. (b) Diamond is an allotrope of carbon not silicon.
25. (a) Diamond, an allotrope of carbon, has very high refractive index because of which it is used as a gem in jewellery. It is used for cutting glass, marble stones and other hard materials and for drilling of rocks. It is a bad conductor of electricity. It is the hardest material known.
26. (a) Diamond is hard and a bad conductor of electricity but Graphite is soft and a good conductor of electricity.
27. (c) Both oxygen and moisture present in air cause rusting of iron.
28. (b) Chlorides and sulphates of calcium and magnesium are responsible for permanent hardness of water.
- Note:** Bicarbonates are responsible for temporary hardness of water.
29. (b) Dissociation of water is temperature dependent

$$\text{H}_2\text{O} \rightleftharpoons \text{H}^+ + \text{OH}^-$$
 Dissociation constant = $K_w = [\text{OH}^-][\text{H}^+]$
 Water at 100°C will have more of the molecules dissociated to ions than at 25°C i.e., K_w increase with increase in temperature.
 \therefore pH of water decreases on increasing temperature.
 At 100°C pH of water becomes 6.14.
30. (c) When a hard boiled egg after shelling is immersed in saturated brine, its size remains same. Due to coagulation of inner liquid there is no flow of solvent molecules across the membrane.
31. (b) Oxalic acid is used as a rust removal agent because it forms a stable water soluble salt with ferric iron i.e., ferrioxalate ion.
32. (d) Lead oxide deposit is harmful to engine life. Thus a small amount of ethylene dibromide is added to petrol for simultaneous removal of lead oxide.
33. (b) Sodium azide is used in airbag, used for safety of car driver. Under room temperature, sodium azide is a stable compound. However when heated by an impulse it disintegrates to produce sodium and nitrogen. It only takes about 50-100 grams sodium azide to produce enough nitrogen gas to fill a normal air bag for driver.
34. (b) Washing soda is sodium salt of carbonic acid. It occurs as a crystalline heptahydrate, which on heating loses its water to form a white powder monohydrate. This process is called efflorescence.

$$\text{NaCO}_3 \cdot 7\text{H}_2\text{O} \xrightarrow{\text{heat}} \text{Na}_2\text{CO}_3 \cdot \text{H}_2\text{O} + 6\text{H}_2\text{O}$$
35. (d) The normal body temperature of a human being is 37°C. Thus, in kelvin it is $273 + 37 = 310$ K.
36. (b) Carbon-14 is radioactive isotope of carbon, which can mutate the DNA by getting incorporated into it. X-rays are high energy and ionizing rays. These can cause mutation at genetic level though they generally damage the bio-molecules by altering their function. Coal miners have the risk to develop certain types of cancers. Dyes and paints contain hydrocarbons which may cause respiratory problems, but cannot alter the DNA of a cell.
37. (d) For DNA testing biological samples are required, this include all biological fluids, tissues which contain the undegraded genetic material.
38. (b) If the door of a refrigerator are left open for some time the temperature of the room will increase.
39. (d) Wet clothes will dry earlier when the humidity of the environment will be lowest and temperature will be the maximum.
40. (a)
41. (a)
42. (b) When soggy biscuits are kept inside the fridge for sometime they become crisp because the humidity inside the fridge is low and extra moisture from the biscuits is absorbed.
43. (d) Param 10,000 is a super computer prepared by the centre for development of advanced computing while rest options are correctly matched.
44. (d)

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45. (a) The blue noon phenomenon occurs when two full moon occur in the same month. Such an incident had taken place in 1999 when two full moons had taken place in the January and February of the same years.
46. (d)
47. (d) List – I List – II
 A. L.E.D 3. Cost effective light source
 B. L.C.D 4. Popular and effective
 Mobile screen
 C. S.A.R.S 2. Bird Disease
 D. S.C.I.D 1. Bubble boy syndrome
48. (d) The word ‘Biomass’ is used to denote the product produced by the living being. The total biomass of the earth is found in the crust of earth called biosphere.
49. (a)
50. (a) Retina of the eye is comparable with the film of traditional Camera. Retina, converts knocking light rays into electrical signals which are send to brain by visible arteries.
51. (a) Amniocentesis is a method used in foetal sex. It is a Pre delivery test enabling us to knew birth defects such as Down Syndrome, heterogeneity of chromosomes and the sex of child.
52. (b) Refrigeration helps in food preservation by reducing. The rate of biochemical reactions.
53. (b) Continuous evaporation through minute pores on the surface of earthen pitcher causes evaporation and thus water inside it remains cool.
54. (c) During summer season the pendulum which is generally made up of metal, expands due to the rise in temperature. Increase in length causes increase in time period and pendulum takes more time to complete one oscillation and hence the clock becomes slower.
55. (b) Density of water is more than ice and thus volume decreases in this condition.
56. (d) Many factors influence colour of milk including presence of milk protein casein.
57. (a)
58. (b) Chlorination is the process of using chlorine for treatment of water making it suitable for drinking purposes. Amount of chlorine gas required for water treatment may vary depending upon water quality.
59. (c)
60. (a) Cobalt is a constituent of Vitamin B 12, Iron of haemoglobin, Magnesium in chlorophyll. Brass is a metallic alloy of copper and zinc
61. (a) Inside a pressure cooker the steam under pressure causes increase in the boiling point of water from 100°C to 121°C . This increase in higher temperature with penetrating steam inside food makes the cooking time shorter.
62. (d) Pheromones are substances which are secreted to the outside by an individual and received by a second individual of the same species. Although it is secreted by a range of organisms, its effect is more prominent in insects.
63. (a) 64. (c) 65. (c)
66. (b) Wool is mainly composed of proteins derived from animal sources, Rayon is an artificial textile material composed of regenerated and purified cellulose derived from plant sources, Natural Rubber obtained from natural sources and consists of polymers of organic compound isoprene and Fullerene is an allotrope of Carbon.
67. (a) The dust and other particles present in the atmosphere scatter colors differently. According to The Rayleigh law, scattering is inversely proportional to the fourth power of wavelength. This means light with longer wavelengths (red, orange and yellow) are scattered very less and hence reaches the observer, while Violet, indigo and blue are scattered most .This is the reason the rising and setting sun appears red.
68. (b) Graphite is a mineral made of loosely bonded sheets of carbon atoms, giving it a slippery texture that makes it a very effective lubricant.
69. (b) Nitrous oxide, commonly known as laughing gas or nitrous, is a chemical compound, an oxide of nitrogen with the formula N_2O . At room temperature it is colourless, odorless, non - inflammable gas, with a slightly sweet taste.
70. (b)
71. (b) Magnesium comes in secondary nutrients, not in micronutrient group.
72. (b) Geostationary satellite orbits the earth directly over the equator. At geosynchronous orbit, the orbital period of the satellite matches the orbit of the Earth that is 24 hours.
73. (a)
74. (c) In safety matches red phosphorus is used. In addition potassium chlorate, small quantity of powdered glass, binding agents and additive compounds like sulphur or antimony (III) sulfide is used.
75. (d) Nepenthes or Pitcher Plants are type of insectivorous/carnivorous plants.
76. (c) Natural rubber, coming from latex of *Hevea brasiliensis* containing traces of impurities like protein, dirt, etc. while synthetic rubber is made by the polymerization of a variety of petroleum-based precursors.
77. (d) When we sprinkle water on warm surface it provides coldness due to latent heat of water.
78. (b) The rays of light are scattered by the fog droplets due to which it become difficult to see through fog.
79. (d) Density of water is maximum at 4°C .
80. (d) To keep the outside heat away, windows of double-pane glass with air in between is the best choice because air is the bad conductor of heat.
81. (a) In a pressure cooker while cooking pressure increases due to which boiling point of water also increases as $P \propto T$.
82. (c) An Earthquake is the result of a sudden release of energy in the Earth's crust that creates seismic waves.
83. (c) Centrifugal force separates fat from milk.
84. (a) Raw mangoes shrivel when pickled in brine due to osmosis i.e. flow of water from higher concentration to lower concentration through a semi-permeable membrane.

85. (a) Ice under black wrap will melt easily because dark colour (black) absorbs the most of light energy falling on it.
86. (b) The hollow bricks provide thermal insulations; the air in hollow bricks, does not allow outside heat or cold in the house to go out or come in the house. So, it keeps house cool in summer and warm in winter.
87. (c) When a body is immersed in a fluid, the fluid exerts an upward force on it, called buoyant force.
As the density of sea water is higher than that of the fresh water.
So extra buoyant force and ship will rise a little higher.
88. (a) As the cat falls from a height, it bends the legs to absorb the impact of falling and immediately adjust itself.
89. (c) Fire fly gives us cold light due to chemiluminescence i.e. light produced by chemical reaction.
90. (b) Barium is a good absorber of X-rays and helps stomach to appear clearly.
91. (d) As white colour reflects all the components of white light and black colour absorbs all the components of white light. So, the best colours for a sun umbrella, white on top and black on inside.
92. (a) When ice melts its density increases i.e. its volume decreases. Mass is a invariant quantity.
93. (a) When deep sea fishes are brought to the surface of the sea, their bodies burst, this is because the blood in their bodies flows at very high speed.
94. (c) Diffusion refers to the process by which molecules intermingle as a result of their kinetic energy of random motion.
95. (a) One end of hairpin shaped detergents attracted to water and other to molecules of oil or grease that reduces drastically the surface tension between water and oil.
96. (b) When current flows through the filament of incandescent electric bulb, it gets heated up. Soon it becomes white hot and starts emitting light.
97. (b) We know from Newton's second law of motion
$$F_{ext} = \frac{dP}{dt}$$
 when dt is more F_{ext} will be less.
The greater the rate of change of momentum, the greater is the force and vice-versa.
98. (a) Two layers of a cloth are warmer because air trapped between the layers acts as thermal insulator restricting the heat transfer.
99. (b) The inert gas within the bulb prevents the filament from evaporating. Thus it increases the life of the filament.
100. (d) Baking soda has sodium bicarbonate as the chief constituent. It decomposes on heating giving carbon dioxide. This causes dough, cakes, biscuits etc. to expand and become light.
101. (b) **Alloy Constituent**
Solder Lead and tin
Brass Copper and zinc
Bronze Copper and tin
Steel Iron and carbon
102. (a) Aqua-regia is a mixture of concentrated nitric acid and concentrated hydrochloric acid in the ratio of 1 : 3. It is a very powerful oxidising mixture and hence, used to clean the surface of gold ornaments.
103. (c) Substances like graphite and heavy water are used as moderator to slow down the speed of neutrons. Cd or B are used as control rods to control rate of fission by absorbing neutrons.
Coolant like heavy water or molten sodium is used to carry away the heat.
104. (c) The process of depositing a thin layer of one metal over the surface of other metal by the process of electrolysis is known as electroplating. Hence, when items or jewellery made of metals such as copper or nickel are placed in a solution having a salt of gold, a thin film of gold is deposited by passing an electric current.
105. (c) Heavy water or deuterium oxide (D_2O) is an oxide of deuterium which is an isotope of hydrogen.
106. (b) Ethyl mercaptan or thioethanol (C_2H_5SH) is added during filling of LPG cylinders. It is a strong smelling compound and help in the detection of gas leakage.
107. (d) Titanium (Ti) metal is used for making boats because it does not corrode by the sea water.
108. (a) The water will freeze because on Moon the temperature is below the freezing point i.e., very low.
109. (b) In soft drinks bicarbonate salts acts as acidity regulators. Bicarbonate of soda is effective at regulating the pH levels of other substances; it ensures that the substance is neither too alkaline nor too acidic.
110. (a) Carbon dioxide is responsible for the expansion of water in the ocean, CO_2 causes global warming.
111. (c) Food cans are coated with tin instead of zinc because zinc is more reactive than tin. Tin is only reactive to powerful acids such as tri-sodium phosphate, while zinc is reactive towards acids.
112. (a) Oil become rancid due to oxidation oil contains fatty acid which react in presence of oxygen and become rancid. Rancid oil is a major source of destructive free radicals in our diet.
113. (c) Acetylene is the only commercial fuel gas that can be used for both cutting and welding applications.
114. (d) Airbag used for safety and protection of car driver possesses sodium azide.
115. (b) Curd is made due to the chemical reaction between lactic acid bacteria and casein.
116. (b) Homeostatic regulation includes sweating. It is the main process through which the body gets coolness.
117. (b) Henna (*Lawsonia intermis*) is a flowering plant. It is used to dye skin, hair, fingernails, leather and wood. Colouring feature of henna is due to lawsone, an organic compound that shows affinity for proteins and amino acids in animals.
118. (a) The stimulating nature of tea is due to alkaloid caffeine found in tea. Caffeine is bitter due to white crystalline xanthine alkaloid.
119. (c) Castor oil is a vegetable oil got from castor bean. Castor oil is colourless to pale yellow liquid having very high protein content souleff.
120. (b) Golden fibre denotes to jute because of its colour. Jute is grown as cash crop. Jute is used for green manure and has much higher CO_2 assimilation rate.
121. (a) Ajinomoto is Chinese salt used for preparing noodles. It is used as a flavouring agent.
122. (c)
123. (d)

6

Chapter

Science & Tech./ IT/Computers

1. Computer virus is a [UP-PSC 2010]
 (a) fungus (b) bacgterium
 (c) IC 7344 (d) software program
2. In binary code, the number 7 is written as – [Bihar J. Service 2016]
 (a) 110 (b) 111
 (c) 101 (d) 100
3. With reference to ‘Geospatial Technology’, which of the following statements is/are correct?
 1. Geospatial Technology relating to the collection or processing of data that is associated with location”.
 2. Geospatial Technology involves GPS (global positioning systems), GIS (geographical information systems), and RS (remote sensing).
 Select the correct option from the codes given below:
 (a) Only 1 (b) Only 2
 (c) 1 and 2 (d) None of the above
4. With reference to ‘Optogenetics’ which of the following statements is / are correct?
 1. Optogenetics is a relatively new field of biotechnology.
 2. It gives researchers the ability to transform brain activity into light and light into brain activity.
 3. It will serve as an interface through which computers can become part of our brain, and through which our brains could directly interface with each other.
 4. It is the practice of stimulating biased inheritance of particular genes to alter entire populations.
 Which of the following statements is /are correct?
 (a) 1 and 2 only (b) 3 and 4 only
 (c) 1, 2 and 3 (d) All of the above
5. Who among the following gave the term ‘Nanotechnology’ and when? [UK-PSC 2016]
 (a) Richard Feynman, 1959
 (b) Noria Taniguchi, 1974
 (c) Eric Drexler, 1986
 (d) Sumiolima, 1991
6. Which of the following memories has the shortest access time? [NABARD 2016]
 (a) Cache Memory
 (b) Magnetic Bubble Memory
 (c) Magnetic Cone Memory
 (d) RAM
 (e) None of the above
7. What is the portion of RAM that a computer microprocessor can access more quickly than it can access regular RAM? [NABARD 2016]
 (a) Cache (b) Processor
 (c) Memory Pool (d) Data Pool
8. The ability to perform ‘what if?’ analysis is key feature of which type of software? [NABARD 2016]
 (a) Desktop publishing program
 (b) Spreadsheet
 (c) Presentation
 (d) Word processor
 (e) Email program
9. SQL stands for— [NABARD 2016]
 (a) Semi questioning language
 (b) Structured query language
 (c) Structured question language
 (d) Sequential question language
 (e) Sequential query language
10. VIRUS stands for— [NABARD 2016]
 (a) Vital information Resource Under Seizure
 (b) Vital Information Resource Under Siege
 (c) Vital Information Reason Under Siege
 (d) Vital Information Under System
 (e) Virus Information Recourse Under Siege
11. To move to the bottom of a document, press [NABARD 2016]
 (a) Home key (b) End key
 (c) Ctrl + End (d) Insert key
 (e) Shift key
12. Single-word reference to viruses, worms etc. is — [NABARD 2016]
 (a) killerware (b) harmware
 (c) phish (d) malware
 (e) virus
13. The process of writing computer instructions in a programming language is known as— [NABARD 2016]
 (a) File (b) Processing
 (c) Coding (d) Folder
 (e) Testing
14. If you copy and paste a file— [NABARD 2016]
 (a) The original file remains unchanged and a new file is created

- (b) The file gets scanned
(c) The original file is removed and a new file is not created
(d) The original file remains unchanged and a new file is not created
(e) The original file is deleted and a new file is created
15. What is the generation of the computers which are built with VLSI technology and microprocessor?
- [NABARD 2016]
- (a) First (b) Fourth
(c) Third (d) Second
(e) Other than those given as options
16. A function inside another function in excel is called—
- [NABARD 2016]
- (a) Round function (b) Sum function
(c) Nested function (d) Double function
(e) Test function
17. Which of the following best describes a private, company wide network, closed to public access? [NABARD 2016]
- (a) Intranet
(b) Internet
(c) Virtual Private Network
(d) Cloud Computing
(e) Extranet
18. Which one of the following would not be considered as a form of secondary storage? [NABARD 2016]
- (a) hard disk (b) RAM
(c) optical disk (d) floppy disk
(e) flash drive
19. In computing and electronic system, BCD is abbreviation of—
- [NABARD 2016]
- (a) Binary Coded Decimal (b) Bit Coded Digit
(c) Byte Coded Digit (d) Bit Coded Decimal
(e) Binary Coded Digit
20. HTTP refers to—
- [NABARD 2016]
- (a) Home Text Transaction Protocol
(b) Hyper Text tie Protocol
(c) Hyper Text Transmission Protocol
(d) Hyper Text Transfer Protocol
(e) Home Text Transmission Protocol
21. The term designates equipment that might be added to a computer to enhance its functionality.
- [NABARD 2016]
- (a) System device (b) Disk pack
(c) Operating device (d) Digital device
(e) Peripheral device
22. A computer program that converts assembly language to machine language is—
- [NABARD 2016]
- (a) Assembler (b) Intersection
(c) Comparator (d) Complicate
(e) Converter
23. Which of the following space agencies has launched the LISA Pathfinder? [Bihar Jservice 2016]
- (a) Japan Aerospace Exploration Agency
(b) NASA
(c) European Space Agency
(d) China National Space Administration
24. The software, which allows you to view the webpage, is called—
- [UK-PSC 2015]
- (a) Website (b) Web Browser
(c) Interpreter (d) Operating System
25. Which of the following is not an output device?
- [UK-PSC 2015]
- (a) Plotter (b) Printer
(c) Monitor (d) Scanner
26. The first commercial product produced through genetic engineering is—
- [UK-PSC 2015]
- (a) Paracetamol (b) Aspirin
(c) Insulin (d) None of these
27. With reference to IT Jargon ‘Daemon’, which of the following statements is/are correct?
1. In multitasking computer operating systems.
 2. A daemon is a computer program that runs as a background process, rather than being under the direct control of an interactive user.
 3. The term was coined by the programmers of MIT’s Project MAC.
- Which of the above sentence(s) is/are true?
- (a) 1 and 2 (b) 3 Only
(c) 2 and 3 (d) 1, 2 and 3
28. Consider the following sentences regarding modern Radio-frequency identification (RFID) Access Control System.
1. Mumbai Port is the first among all Major Ports to have successfully implemented the RFID Access Control System.
 2. The new RFID system is inherently accompanied with enhanced Maritime Security features.
 3. The implementation of the RFID system was done as per the directives of the Ministry of Shipping.
- Which of the above sentences(s) is/are true?
- (a) Only 1 (b) 2 and 3
(c) 1 and 2 (d) All of the above
29. Which of the following is not a means of communication?
- (a) Darknet (b) Internet
(c) Bluetooth (d) Snapdeal
30. Which of the following statements is correct about ‘Shanghai technique’?
- I. Shanghai Technique is to shape lesson so that it concentrates on a single concept.
 - II. UK has experimentally adopted this system.
 - III. It involves interactive teaching to an all-ability group in classroom.
 - IV. Subject covered in depth. Class does not move on till every student has performed well with the lesson.

- (a) II and IV are correct (b) Only IV is correct
 (c) Only I is correct (d) All are correct
31. The service of the Internet that provides 'audio' and 'video' conversation, is called— [MP-PSC 2017]
 (a) chat (b) e-mail
 (c) video conferencing (d) video chat
32. Which of the following is not a Web browser? [MP-PSC 2017]
 (a) Opera (b) Google Apps
 (c) Vivaldi (d) Mozilla Firefox
33. In the context of computer security, crackers are also known as— [MP-PSC 2017]
 (a) black hat hackers (b) white hat hackers
 (c) elite hackers (d) script kiddie
34. DuckDuckGo is a— [MP-PSC 2017]
 (a) search engine (b) Web browser
 (c) virus (d) news Web site
35. Ethernet is an example of— [MP-PSC 2017]
 (a) MAN (b) LAN
 (c) WAN (d) Wi-Fi
36. A modem converts— [MP-PSC 2017]
 (a) analog signals into digital signals
 (b) digital signals into analog signals
- (c) Both (a) and (b)
 (d) None of the above
37. Which of the following is an Operating System? [UK-PSC 2016]
 (a) UNIX (b) JAVA
 (c) ORACLE (d) MS-Office
38. Which of the following is an extremely fast, small memory between CPU and main memory? [UK-PSC 2016]
 (a) Main RAM and ROM
 (b) Cache memory
 (c) Secondary memory
 (d) None of the above
39. The set of protocols, which defines all transmission exchanges across the internet is called— [UK-PSC 2016]
 (a) CSMA/CD (b) TCP/IP
 (c) FDDI (d) None of the above
40. Which of the following is not offered as an independent service layer in Cloud Computing? [UK-PSC 2016]
 (a) Hardware as a service
 (b) Platform as a service
 (c) Software as a service
 (d) Infrastructure as a service

Hints & Solutions

- (d) Computer virus is a software program and its objective is to destroy data or other programs by entering into to computer system. The viruses are built by man and they enter into computer system by making their duplicates. Now the anti virus programs has been made to prevent the entrance of virus in the computer system.
- (b) Binary $111 = (1 \times 2^2) + (1 \times 2^1) + (1 \times 2^0) = 4 + 2 + 1 = 7$
- (c)
- (c) Gene drive is the practice of stimulating biased inheritance of particular genes to alter entire populations.
- (b) The term "nano-technology" had been coined by Norio Taniguchi in 1974 to describe semiconductor processes involving control on the order of a nanometer (10^{-9} m).
- (a)
- (a) Cache memory, also called CPU memory, is random access memory (RAM) that a computer microprocessor can access more quickly than it can access regular RAM.
- (b) A **spreadsheet** is an interactive computer application for organization, analysis and storage of data in tabular form. Spreadsheets are developed as computerized simulations of paper accounting worksheets. The program operates on data entered in cells of a table.
- (b) **SQL (Structured Query Language)** is a special-purpose programming language designed for managing data held in a relational database management system (RDBMS), or for stream processing in a relational data stream management system (RDSMS).
- (b) Viral Information Resources Under Siege.
- (b)
- (d)
- (c)
- (a)
- (b) After 1971 the fourth generation computers were built. The fourth generation computers were the extension of third generation technology. The fourth generation computers emerged with development of the VLSI (Very Large Scale Integration). With the help of VLSI technology microprocessor came into existence.
- (c) In computer programming, a **nested function** is a function which is defined within another function, the enclosing function. Due to simple recursive scope rules, a nested function is itself invisible outside of its immediately enclosing function, but can see (access) all local objects (data, functions, types, etc) of its immediately enclosing function as well as of any function(s) which, in turn, encloses that function.

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GENERAL SCIENCE

17. (c) A **virtual private network** extends a private network across a public network or internet. It enables users to send and receive data across shared or public networks as if their computing devices were directly connected to the private network.
18. (b)
19. (a)
20. (d) The **Hypertext Transfer Protocol (HTTP)** is an application protocol for distributed, collaborative, hypermedia information systems. HTTP is the foundation of data communication for the World Wide Web.
21. (e)
22. (a)
23. (c) The European Space Agency is an intergovernmental organisation of 22 member states dedicated to the exploration of space.
24. (b)
25. (d)
26. (c)
27. (d)
28. (b) Paradip Port is the first among all Major Ports to have successfully implemented the RFID Access Control System.
29. (d)
30. (d)
31. (c) Video conferencing is the conduct of a video conference by a set of telecommunication technologies which allow two or more locations to communicate by simultaneous two way video and audio transmissions. It has also been called 'visual collaboration' and is a type of groupware.
32. (b)
33. (a) A black hat hacker is an individual with extensive computer knowledge whose purpose is to breach or bypass internet security. Black hat hackers are also known as crackers or dark-side hackers.
34. (a) DuckDuckGo is an internet search engine that emphasizes protecting searcher's privacy and avoiding the filter bubble of personalized search results. It was found in 2008 by Gabriel Weinberg.
35. (b) Ethernet is a network protocol that controls how data is transmitted over a LAN (Local Area Network). Technically it is referred to as the IEEE 802-3 protocol. The protocol has evolved and improved overtime and can now deliver at the speed of a gigabit per second.
36. (c) A **modem** (Modulator-demodulator) is a network hardware device that modulates one or more carrier wave signals to encode digital information for transmission and demodulated signals to decode the transmitted information.
37. (a) UNIX is a family of multitasking, multiuser computer operating systems. It has a graphical user interface Similar to Microsoft Windows.
38. (b) Cache Memory is an extremely fast, small memory between CPU and main memory.
39. (b) TCP/IP are the set of protocols, which defines all transmission exchanges across the internet.
40. (a) Cloud Computing is an information technology paradigm that enables ubiquitous access to shared pools of configurable system resources and higher level Services that can be rapidly provisioned with minimal management effort, over the internet. Hardware as a service is not offered as an independent Service layer in it.