

SOLVED AIIMS 2016 PAPER

(Memory Based)

PHYSICS

MULTIPLE CHOICE TYPE QUESTIONS

- A car is moving along a straight horizontal road with a speed v_0 . If the coefficient of friction between the tyres and the road is μ , the shortest distance in which the car can be stopped is

a) $\frac{v_0^2}{2\mu g}$ b) $\frac{v_0}{\mu g}$ c) $\left(\frac{v_0}{\mu g}\right)^2$ d) $\frac{v_0}{\mu}$
- Steel and copper wires of same length are stretched by the same weight one after the other. Young's modulus of steel and copper are $2 \times 10^{11} \text{ N/m}^2$ and $1.2 \times 10^{11} \text{ N/m}^2$. The ratio of increase in length is

a) $\frac{2}{5}$ b) $\frac{3}{5}$ c) $\frac{5}{4}$ d) $\frac{5}{2}$
- The radius of a soap bubble is increased from $\frac{1}{\sqrt{\pi}}$ cm to $\frac{2}{\sqrt{\pi}}$ cm. If the surface tension of water is 30 dynes per cm, then the work done will be

a) 180 ergs b) 360 ergs c) 720 ergs d) 960 ergs
- The fraction of a floating object of volume V_0 and density d_0 above the surface of a liquid of density d will be

a) $\frac{d_0}{d}$ b) $\frac{dd_0}{d + d_0}$ c) $\frac{d - d_0}{d}$ d) $\frac{dd_0}{d - d_0}$
- A system is provided with 20 cal of heat and the work done by the system on the surrounding is 40 J. Then its internal energy

a) increases by 600 J b) decreases by 800 J
c) increases by 800 J d) decreases by 50 J
- The coefficients of thermal conductivity of copper, mercury and glass are respectively K_c , K_m and K_g such that $K_c > K_m > K_g$. If the same quantity of heat is to flow per second per unit area of each and corresponding temperature gradients are X_c , X_m and X_g , then

a) $X_c = X_m = X_g$ b) $X_c < X_m > X_g$
c) $X_c < X_m < X_g$ d) $X_m < X_c < X_g$
- The amplitude of a particle executing SHM is 4 cm. At the mean position, the speed of the particle is 16 cm/sec. The distance of the particle from the mean position at which the speed of the particle becomes $8\sqrt{3}$ cm/s will be

a) $2\sqrt{3}$ cm b) $\sqrt{3}$ cm c) 1 cm d) 2 cm
- The velocity of sound waves in air is 330 m/sec. For a particular sound in air, a path difference of 40 cm is equivalent to a phase difference of 1.6π . The frequency of this wave is

a) 165 Hz b) 150 Hz c) 660 Hz d) 330 Hz

9. Between the plates of a parallel plate condenser, a plate of thickness t_1 and dielectric constant k_1 is placed. In the rest of the space, there is another plate of thickness t_2 and dielectric constant k_2 . The potential difference across the condenser will be

- a) $\frac{Q}{A\epsilon_0} \left(\frac{t_1}{k_1} + \frac{t_2}{k_2} \right)$ b) $\frac{\epsilon_0 Q}{A} \left(\frac{t_1}{k_1} + \frac{t_2}{k_2} \right)$ c) $\frac{Q}{A\epsilon_0} \left(\frac{k_1}{t_1} + \frac{k_2}{t_2} \right)$ d) $\frac{\epsilon_0 Q}{A} (k_1 t_1 + k_2 t_2)$

10. Two charges each equal to ηq ($\eta^{-1} < \sqrt{3}$) are placed at the corners of an equilateral triangle of side a . The electric field at the third corner is E_3 where ($E_0 = q/4\pi\epsilon_0 a^2$)

- a) $E_3 = E_0$ b) $E_3 < E_0$ c) $E_3 > E_0$ d) $E_3 \geq E_0$

11. Five very long, straight wires are bound together to form a small cable. Currents carried by the wires are $I_1 = 20A$, $I_2 = -6A$, $I_3 = 12A$, $I_4 = -7A$, $I_5 = 18A$. The magnetic induction at a distance of 10 cm from the cable is

- a) $34 \mu T$ b) $74 mT$ c) $34 mT$ d) $74 \mu T$

12. How much work must be done to pull apart the electron and the proton that make up the Hydrogen atom, if the atom is initially in the state with $n = 2$?

- a) $13.6 \times 1.6 \times 10^{-19} J$ b) $3.4 \times 1.6 \times 10^{-19} J$
 c) $1.51 \times 1.6 \times 10^{-19} J$ d) $0 J$

13. A conducting rod PQ of length $L = 1.0 m$ is moving with a uniform speed $v = 2 m/s$ in a uniform magnetic field $B = 4.0 T$ directed into the paper. A capacitor of capacity $C = 10 mF$ is connected as shown in the figure below. Then

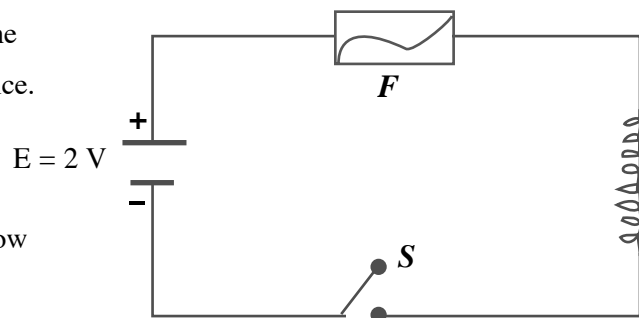


- a) $q_A = +80 \mu C$ and $q_B = -80 \mu C$
 b) $q_A = -80 \mu C$ and $q_B = +80 \mu C$
 c) $q_A = 0 = q_B$
 d) Charge stored in the capacitor increases exponentially with time

14. In the circuit shown below, the cell is ideal. The coil has an inductance of 4 H and zero resistance.

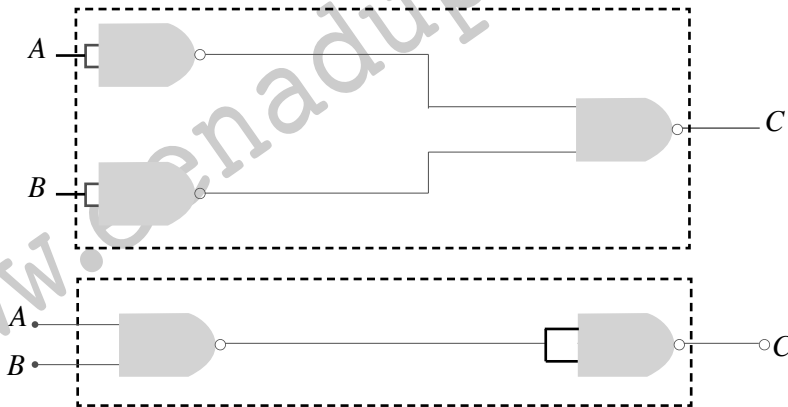
F is a fuse of zero resistance and will blow when the current through it reaches 5A.

The switch is closed at $t = 0$. The fuse will blow

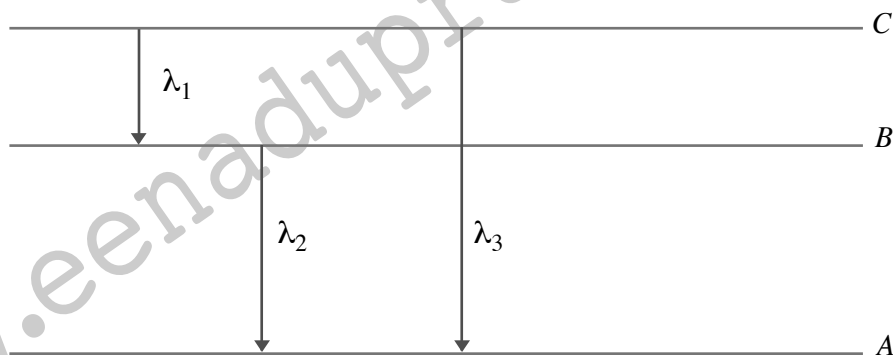


- a) almost at once b) after 2 sec c) after 5 sec d) after 10 sec

15. Highly energetic electrons are bombarded on a target of an element containing 30 neutrons. The ratio of radii of nucleus to that of Helium nucleus is $4\frac{1}{3}$. The atomic number of nucleus will be
 a) 25 b) 26 c) 56 d) 30
16. In C.G.S. system, the magnitude of the force is 100 dynes. In another system where the fundamental physical quantities are kilogram, metre and minute, the magnitude of the force is
 a) 0.036 b) 0.36 c) 3.6 d) 36
17. Two similar bar magnets P and Q, each of magnetic moment M, are taken. If P is cut along its axial line and Q is cut along its equatorial line, all the four pieces obtained have
 a) equal pole strength b) magnetic moment $\frac{M}{4}$
 c) magnetic moment $\frac{M}{2}$ d) magnetic moment M
18. The combination of 'NAND' gates shown below are equivalent to

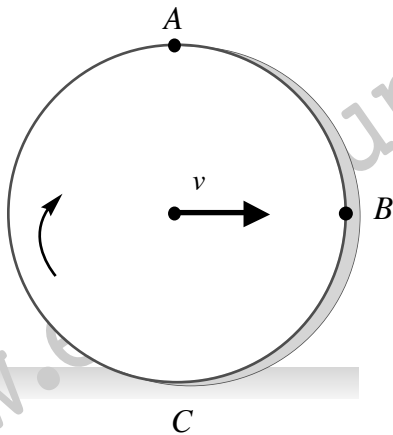


- a) an OR gate and an AND gate, respectively b) an AND gate and a NOT gate, respectively
 c) an AND gate and an OR gate, respectively d) an OR gate and a NOT gate, respectively
19. Energy levels A, B, C of a certain atom corresponding to increasing values of energy i.e. $E_A < E_B < E_C$. If $\lambda_1, \lambda_2, \lambda_3$ are the wavelengths of radiations corresponding to the transitions C to B, B to A and C to A, respectively, which of the following statements is correct?



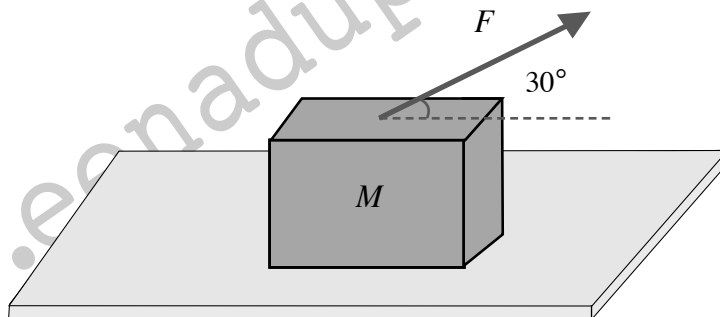
- a) $\lambda_3 = \lambda_1 + \lambda_2$ b) $\lambda_3 = \frac{\lambda_1 \lambda_2}{\lambda_1 + \lambda_2}$ c) $\lambda_1 + \lambda_2 + \lambda_3 = 0$ d) $\lambda_3^2 + \lambda_1^2 + \lambda_2^2$
20. A motorcycle is going on an overbridge of radius R. The driver maintains a constant speed. As the motorcycle is ascending on the overbridge, the normal force on it
 a) increases b) decreases c) remains the same d) fluctuates

21. A particle moves in a circular path with decreasing speed. Choose the correct statement.
- Angular momentum remains constant.
 - Acceleration (\vec{a}) is towards the centre.
 - Particle moves in a spiral path with decreasing radius.
 - The direction of angular momentum remains constant.
22. A solid disc rolls clockwise without slipping over a horizontal path with a constant speed v . Then the magnitude of the velocities of points A, B and C (see figure) with respect to a standing observer are, respectively,



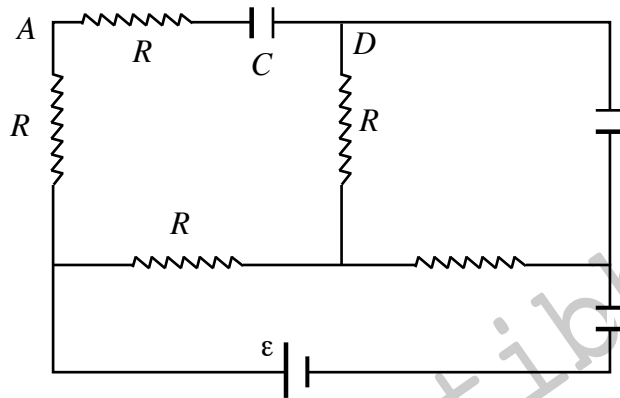
- v, v and v
- $2v, \sqrt{2}v$ and zero
- $2v, 2v$ and zero
- $2v, \sqrt{2}v$ and $\sqrt{2}v$

23. A ball is projected with velocity V_0 at an angle of elevation 30° . Mark the correct statement.
- Kinetic energy will be zero at the highest point of the trajectory.
 - Vertical component of momentum will be conserved.
 - Horizontal component of momentum will be conserved.
 - Gravitational potential energy will be minimum at the highest point of the trajectory
24. A block of mass $m = 5$ kg is resting on a rough horizontal surface for which the coefficient of friction is 0.2. When a force $F = 40$ N is applied, the acceleration of the block will be ($g = 10$ m/s²)

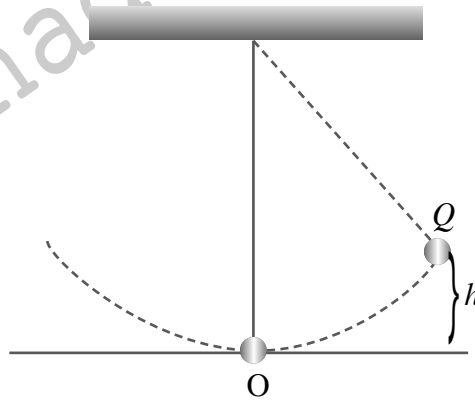


- 5.73 m/sec²
 - 8.0 m/sec²
 - 3.17 m/sec²
 - 10.0 m/sec²
25. The ratio of the K.E. required to be given to the satellite to escape earth's gravitational field to the K.E. required to be given so that the satellite moves in a circular orbit just above earth's atmosphere is
- 1
 - 2
 - $\frac{1}{2}$
 - ∞

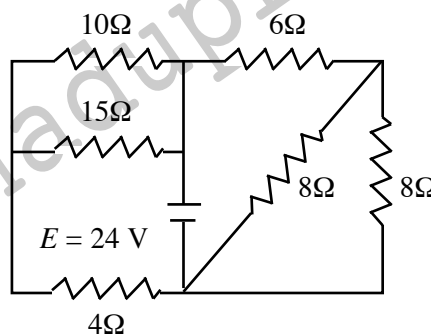
26. Consider the circuit shown in the figure below. Find the charge on capacitor C between A and D in steady state.



- a) $C\epsilon$ b) $C\epsilon/2$ c) $C\epsilon/3$ d) zero
27. The bob of a simple pendulum is displaced from its equilibrium position O to a position Q which is at height h above O and the bob is then released. Assuming the mass of the bob to be m and time period of oscillations to be 2.0 sec, the tension in the string when the bob passes through O is

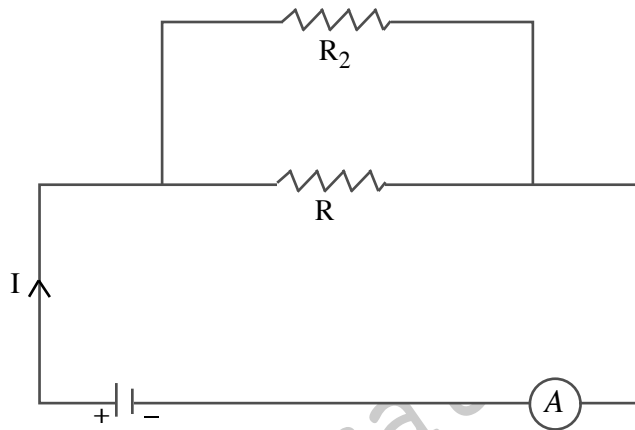


- a) $m(g + \pi \sqrt{2gh})$ b) $m(g + \sqrt{\pi^2 gh})$ c) $m\left(g + \sqrt{\frac{\pi^2}{2} gh}\right)$ d) $m\left(g + \sqrt{\frac{\pi^2}{3} gh}\right)$
28. A person carrying a whistle emitting continuously a note of 272 Hz is running towards a reflecting surface with a speed of 18 km/hour. The speed of sound in air is 345 ms^{-1} . The number of beats heard by him is
- a) 4 b) 6 c) 8 d) 3
29. The equivalent resistance across the terminals of source of e.m.f. 24 V for the circuit shown in the figure is



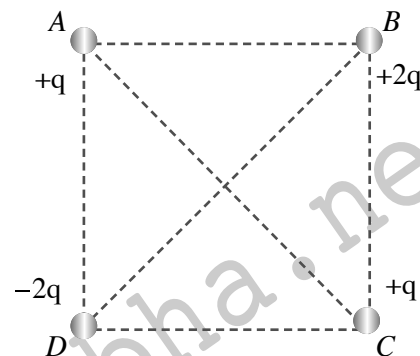
- a) 15Ω b) 10Ω c) 5Ω d) 4Ω

30. If a resistance R_2 is connected in parallel with the resistance R in the circuit shown, then the possible value of current through R and the possible value of R_2 will be



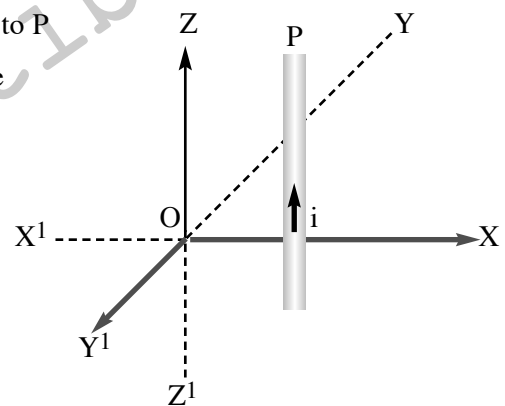
- a) $\frac{I}{3}$, R b) I , $2R$ c) $\frac{I}{3}$, $2R$ d) $\frac{I}{2}$, R
31. The capacity of a parallel plate condenser is $10 \mu\text{F}$ without dielectric. Dielectric of constant 2 is used to fill half the distance between the plates. The new capacitance in μF is

- a) 10 b) 20 c) 15 d) 13.33
32. Four charges are arranged at the corners of a square ABCD, as shown in the figure. The force on the charge kept at the centre O is

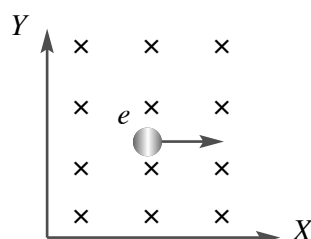


- a) zero
b) along the diagonal AC
c) along the diagonal BD
d) perpendicular to side AB

33. A vertical wire kept in Z - X plane carries a current from Q to P (see figure). The magnetic field due to current will have the direction at the origin O along

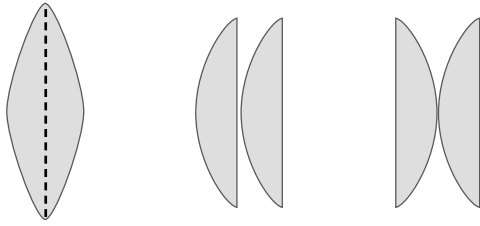


- a) OX b) OX' c) OY d) OY'
34. In the given figure, the electron enters in the magnetic field. It deflects in direction.



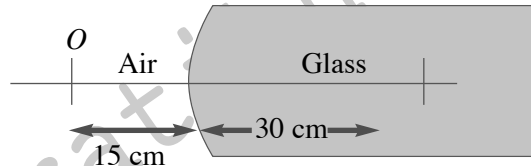
- a) +ve X direction b) -ve X direction c) +ve Y direction d) -ve Y direction

35. Two similar plano-convex lenses are combined together in three different ways as shown in the figure. The ratio of the focal lengths in three cases will be



- a) 2 : 2 : 1 b) 1 : 1 : 1 c) 1 : 2 : 2 d) 2 : 1 : 1

36. A point object O is placed in front of a glass rod having spherical end of radius of curvature 30 cm. The image would be formed at

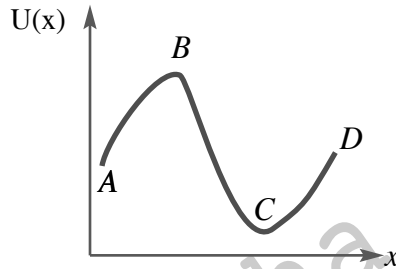


- a) 30 cm left b) Infinity c) 1 cm to the right d) 18 cm to the left

37. In Young's double slit experiment, the slits are 0.5 mm apart and interference pattern is observed on a screen placed at a distance of 1.0 m from the plane containing the slits. If wavelength of the incident light is 6000 \AA , then the separation between the third bright fringe and the central maxima is

- a) 4.0 mm b) 3.5 mm c) 3.0 mm d) 2.5 mm

38. The potential energy of a particle varies with distance x as shown in the graph.



The force acting on the particle is zero at

- a) C b) B
c) B and C d) A and D

39. A steel ball of radius 2 cm is at rest on a frictionless surface. Another ball of radius 4 cm moving at a velocity of 81 cm/sec collides elastically with first ball. After collision the smaller ball moves with a speed of

- a) 81 cm/sec b) 63 cm/sec c) 144 cm/sec d) None of the these

40. Two isolated objects A and B are charged either by friction, conduction or induction. Initially object A is charged and B is uncharged. If q_A and q_B are the magnitude of final charge on A and B, respectively, then match column I and column II.

Column I	Column II
(i) $q_A = q_B$	(p) charges transfer by conduction
(ii) $q_A \geq q_B$	(q) charging by friction
(iii) $q_B = \frac{q_A}{2}$	(r) charging by induction

Now match the given columns and select the correct option from the codes given below.

- Codes: (i) (ii) (iii) (i) (ii) (iii)
 (a) (p) (r) (q) (b) (q) (p) (r)
 (c) (r) (q) (p) d) (r) (q) (p)

ASSERTION AND REASON TYPE QUESTIONS

Directions: In the following questions, a statement of Assertion is followed by a statement of Reason. Mark the correct choice as

- a) If both Assertion and Reason are True and Reason is the correct explanation of assertion
- b) If both Assertion and Reason are true but Reason is not the correct explanation of assertion
- c) If Assertion is true but Reason is false.
- d) If both Assertion is true but Reason are false

41. **Assertion:** For projection angle $\tan^{-1}(4)$, the horizontal range and the maximum height of a projectile are equal.

Reason: The maximum range of projectile is directly proportional to square of the velocity and inversely proportional to acceleration due to gravity.

42. **Assertion:** The trajectory of an object moving under the same acceleration due to gravity can be straight line or a parabola depending on the initial conditions.

Reason: The shape of the trajectory of the motion of an object is determined by the acceleration alone.

43. **Assertion:** There is no appreciable change in the position of the body during the action of the impulsive force.

Reason: In case of impulsive force the time of action of the force is very short.

44. **Assertion:** Work done by the force of friction in moving a body around a closed loop is zero.

Reason: work done does not depend upon the nature of force.

45. **Assertion:** In an elastic collision of two bodies, the momentum and energy of each body is conserved.

Reason: If two bodies stick to each other after colliding, the collision is said to be perfectly inelastic.

46. **Assertion:** The centre of gravity of a body coincides with its centre of mass only if the gravitational field does not vary from one part of the body to the other.

Reason: Centre of gravity is independent of the gravitational field.

47. **Assertion:** The velocity of a body at the bottom of an inclined plane of given height, is more when it slides down the plane, compared to, when it is rolling down the same plane.

Reason: In rolling down, a body acquires both, kinetic energy of translation and rotation.

48. **Assertion:** The speed of revolution of an artificial satellite revolving very near to the earth is 8 kms^{-1} .

Reason: The orbital velocity of a satellite became independent of height of near satellite.

49. **Assertion:** Bernoulli's equation holds for non-steady or turbulent flows.

Reason: In these situations, velocity and pressure are constant with time.

50. **Assertion:** Bulk modulus of elasticity B represents incompressibility of the material.

Reason: $B = \frac{\Delta P}{\Delta V/V}$, where symbols have their usual meaning.

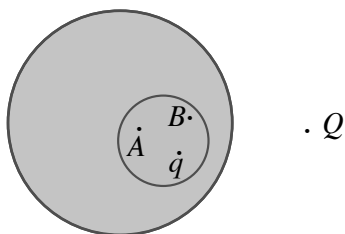
51. **Assertion:** A large soap bubbles expands while a small bubble shrinks, when they are connected to each other by a capillary tube.

Reason: The excess pressure inside bubble (or drop) is inversely proportional to the radius.

52. **Assertion:** Simple harmonic motion is not a uniform motion.

Reason: It is the projection of the uniform circular motion.

53. **Assertion:** It is not possible to have interference between the waves produced by two violins.
Reason: For interference of two waves the phase difference between the waves must remain constant.
54. **Assertion:** A point charge q is placed at the centre of spherical cavity inside a spherical conductor as shown. Another point charge Q is placed outside the conductor as shown. Now as the point charge Q is pushed away from conductor, the potential difference ($V_A - V_B$) between two points A and B within the cavity of sphere remains constant.



Reason: The electric field due to charges on the outer surface of conductor and outside the conductor is zero at all points inside the conductor.

55. **Assertion:** Bending a wire does not effect electrical resistance
Reason: The resistance of wire is proportional to the resistivity of material.
56. **Assertion:** A paramagnetic sample displays greater magnetisation (for the same magnetising field) when cooled.
Reason: The magnetisation does not depend on temperature.
57. **Assertion:** The alternating current lags behind the e.m.f. by a phase angle of $\pi/2$, when ac flows through an inductor.
Reason: The inductive reactance increases as the frequency of ac source decreases.
58. **Assertion:** Dispersion of light occurs because velocity of light in a material depends upon its colour.
Reason: The dispersive power depends only upon the material of the prism, not upon the refracting angle of the prism.
59. **Assertion (A):** In Young's double slit experiment, interference pattern disappears when one of the slits is closed.
Reason: Interference occurs due to superimposition of light waves from two coherent sources.
60. **Assertion (A):** Hydrogen atom consists of only one electron but its emission spectrum has many lines.
Reason: Only Lyman series is found in the absorption spectrum of hydrogen atom whereas in emission spectrum, all the series are found.

CHEMISTRY

MULTIPLE CHOICE TYPE QUESTIONS

1. In the Arrhenius equation for a certain reaction, the value of A and E_a (activation energy) are $4 \times 10^{13} \text{ sec}^{-1}$ and 98.6 kJ mol^{-1} , respectively. If the reaction is of first order, the temperature at which its half-life period is 10 minutes is
- a) 280 K b) 290 K c) 311.35 K d) 418.26 K
2. The edge length of a cube is 400 pm. Its body diagonal would be
- a) 600 pm b) 566 pm c) 693 pm d) 500 pm

12. Which reagent can be used to identify nickel ion?
 a) Resorcinol
 b) Dimethyl glyoxime [DMG]
 c) Diphenyl benzidine
 d) Potassium ferrocyanide
13. Bleaching action of SO_2 is due to its
 a) oxidising property
 b) acidic property
 c) basic property
 d) reducing property
14. Which one of the following complexes is an outer orbital complex?
 a) $[\text{Co}(\text{NH}_3)_6]^{3+}$
 b) $[\text{Mn}(\text{CN})_6]^{4-}$
 c) $[\text{Fe}(\text{CN})_6]^{4-}$
 d) $[\text{Ni}(\text{NH}_3)_6]^{2+}$
 Atomic nos: Mn = 25, Fe = 26, Co = 27, Ni = 28.
15. The odd decomposition of carbon chlorine bond forms
 a) two free ions
 b) two-carbanium ion
 c) two carbanion
 d) a cation and an anion
16. Because of resonance, the oxygen atom –OH group of phenol
 a) acquires positive charge
 b) acquires negative charge
 c) remains unaffected
 d) liberates
17. Aldehydes with α – H atom do not undergo disproportionation reaction because
 a) Bond energy of (C–H) bond is increases due to (–CHO) group
 b) Aldehyde is enolised in basic condition
 c) Both
 d) None
18. If the degree of ionization of water 1.8×10^{-9} at 298 K. Its ionization constant will be
 a) 1.8×10^{-16}
 b) 1×10^{-14}
 c) 1×10^{-16}
 d) 1.67×10^{-14}
19. The compound obtained by heating salicy acid with phenol in the presence of phosphorous oxychloride is
 a) Salol
 b) Aspirin
 c) Oil of wintergreen
 d) o-chlorobenzoyl chloride
20. Which of the following would help in distinction of HCOOH and CH_3COOH ?
 a) Treatment with Tollens reagent
 b) Treatment with NaOH
 c) Treatment with Na
 d) Formation of their respective amides
21. When a solution of benzoic acid was titrated with NaOH, the pH of the solution when half the acid neutralized was 4.2. Dissociated constant of the acid is
 a) 6.31×10^{-5}
 b) 3.2×10^{-5}
 c) 8.7×10^{-8}
 d) 6.42×10^{-4}
22. For H_3PO_3 and H_3PO_4 , the correct choice is
 a) H_3PO_3 is dibasic and reducing
 b) H_3PO_3 is dibasic and non-reducing
 c) H_3PO_4 is tribasic and reducing
 d) H_3PO_3 is tribasic and non-reducing
23. Polyphosphates are used as water-softening agents because they
 a) Form soluble complexes with anionic species
 b) Precipitate anionic species
 c) Form soluble complexes with cationic species
 d) Precipitate cationic species

24. Match List I With II and select the correct answer using the code given below the lists

List I	List II
a) Peroxide	1) C_3O_2
b) Superoxide	2) PbO_2
c) Dioxide	3) KO_2
d) Suboxide	4) H_2O_2

Codes:

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

25. The critical temperature of water is higher than that of O_2 because H_2O molecule has

- a) Fewer electrons than oxygen b) Two covalent bonds
 c) V-shape structure d) Dipole moment

26. Match List I with List II and select the correct answer using the codes given below the list

List I (Compound)	List II (Oxidation state of N)
a) NO_2	1) +5
b) HNO	2) -3
c) NH_2	3) +4
d) N_2O_5	4) +1

Codes:

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

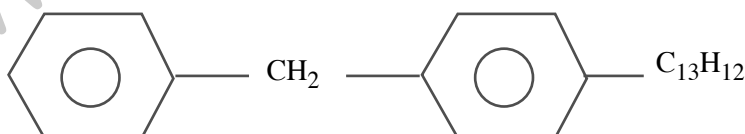
27. Concentrated aqueous sodium hydroxide can be a separate mixture of

- a) Al^{3+} and Sn^{2+} b) Al^{3+} and Fe^{3+} c) Al^{3+} and Zn^{2+} d) Zn^{2+} and Pb^{2+}

28. 116 gm of a compound on vaporisation in a Victor Meyer's apparatus displaces 44.8 ml of air measures at S.T.P. The molecular weight of the compounds is

- a) 116 b) 232 c) 58 d) 44.8

29. The molecular formula of diphenylmethane is



How many structural isomers are possible when one of the hydrogen is replaced by a chlorine atom?

- a) 8 b) 7 c) 6 d) 4

ASSERTION AND REASON TYPE QUESTIONS

Directions: These questions consist of two statements each stated as Assertion and Reason. While answering these questions you are required to choose any one of the following options:

- If both Assertions and Reason is the correct explanation of the Assertion.
- If both Assertion and Reason are true but reason is not the correct explanation of the Assertion.
- If Assertion is true but the Reason is false.
- If both Assertion and Reason are false.

41. **Assertion:** All the C atoms of but-2-ene lie in one plane.

Reason: Double-bond C atoms are sp^2 -hybridised.

42. **Assertion:** In sodium chloride crystal, Na^{\oplus} ions occupy OVs while Cl^{\ominus} ions occupy vertices of octahedron.

Reason: The radius of $Na^{\oplus} : Cl^{\ominus}$ lies between 0.4 and 0.7.

43. **Assertion:** Buta-1, 3-diene is the monomer of Gutta percha.

Reason: Gutta percha is formed through cationic addition polymerisation.

44. **Assertion:** Metamers can also be position or chain isomers.

Reason: Tautomerism was introduced by C.P.Laar to explain the chemical reactivity of a substance according to two possible structures.

45. **Assertion:** Iodine is more soluble in CCl_4 than in water.

Reason: Non-polar solutes are more soluble in non-polar solvents.

46. **Assertion:** $Me-\overset{\curvearrowright}{O}-\overset{\curvearrowright}{C}l$ reacts faster with H_2O than $Me-\overset{\curvearrowright}{O}-\overset{\curvearrowright}{C}l$.

Reason: The carbocation of $Me-\overset{\curvearrowright}{O}-\overset{\curvearrowright}{C}l$ is more stable than the carbocation of $Me-\overset{\curvearrowright}{O}-\overset{\curvearrowright}{C}l$.

47. **Assertion:** Chlorination of allylic hydrogen is difficult than vinylic hydrogen.

Reason: Allyl radical is stabilised by resonance.

48. **Assertion:** P-methyl benzyl carbocation (I) is more stable than benzyl carbocation (II)

Reason: Heterovalent or no bond resonance.

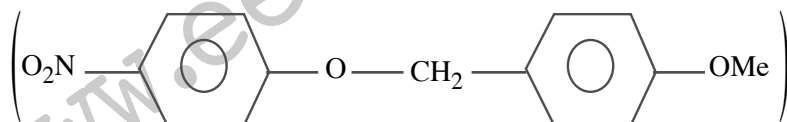
49. **Assertion:** Glucose and fructose both reduce Schiff's reagent.

Reason: Both have free carbonyl group.

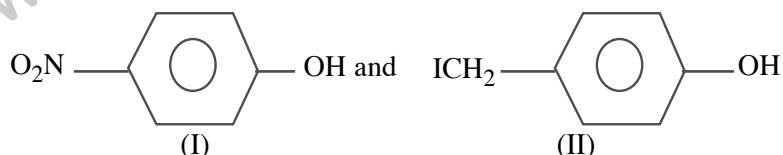
50. **Assertion:** 1 Faraday of electricity deposits 1 g equivalent of Ag, Cu or Al.

Reason: 1 mole of electrons are required to reduce 1 mole of Ag^{\oplus} of $\frac{1}{2}$ mole of Cu^{2+} or $\frac{1}{3}$ mole of Al^{3+} ions

51. **assertion:** The major products formed by heating



with HI are:



Reason: Benzyl carbocation is more stable.

52. **Assertion:** $\overset{\ominus}{\text{Me}}_3\text{C}$ is more stable than $\overset{\ominus}{\text{CH}}_3$.

Reason: The +I effect of the three Me groups in $\overset{\ominus}{\text{Me}}_3\text{C}$ tends to make it more stable than $\overset{\ominus}{\text{CH}}_3$.

53. **Assertion:** aniline hydrogen sulphate on heating forms a mixture of O- and P- amino sulphonic acid.

Reason: The sulphonic acid is \bar{e} withdrawing.

54. **Assertion:** In $\text{Cr}_2\text{O}_7^{2-}$ ion, all the Cr—O bond lengths are equal.

Reason: In $\text{Cr}_2\text{O}_7^{2-}$ ions, all the O—Cr—O bond angles are equal.

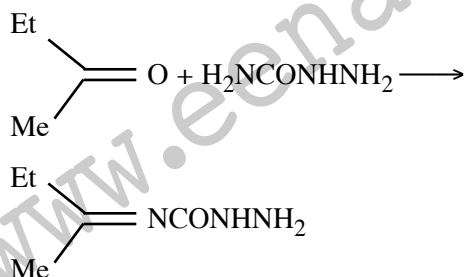
55. **Assertion:** According to the transition state theory, for the formation of an activated complex, one of the vibrational degree of freedom is converted into the transition degree of freedom.

Reason: The energy of the activated complex is higher than the energy of the reactant molecules.

56. **Assertion:** NF_3 is a weaker ligand than $\text{N}(\text{CH}_3)_3$.

Reason: NF_3 ionises to give F^\ominus ions in aqueous solution.

57. **Assertion:** The following reaction occurs.



Reason: The semicarbazone of (A) (pentan-2-one) exists in two geometrical isomers.

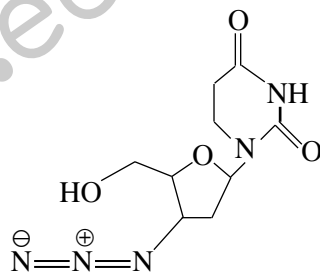
58. **Assertion:** During calcinations, the ore is heated well below its melting point in the limited supply of oxygen.

Reason: The process of calcinations is carried out for sulphide ores.

59. **Assertion:** Aqueous gold colloidal solution is red in colour.

Reason: The colour arises due to scattering of light by colloidal gold particles.

60. **Assertion:** AZT (azidothymine) is used to treat AIDS patients. It fights AIDS infection but does not cure it.



Reason: It shows acidic property.

BIOLOGY

MULTIPLE CHOICE TYPE QUESTIONS

1. Match the following.

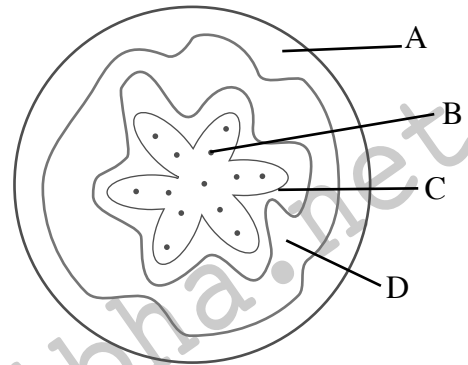
Column I	Column II
(i) Alkaloid	(I) vinblastin, curcumin
(ii) Essential oils	(II) Morphine, Codein
(iii) Toxins	(III) Lemon, Grass oil
(iv) Drugs	(IV) Abrin, Ricin

- a) (i)-(II), (ii)-(III), (iii)-(IV), (iv)-(I) b) (i)-(III), (ii)-(II), (iii)-(IV), (iv)-(I)
 c) (i)-(II), (ii)-(III), (iii)-(i), (iv)-(IV) d) (i)-(III), (ii)-(II), (iii)-(I), (iv)-(IV)

2. Excess atmospheric CO₂ increases green house effect as CO₂

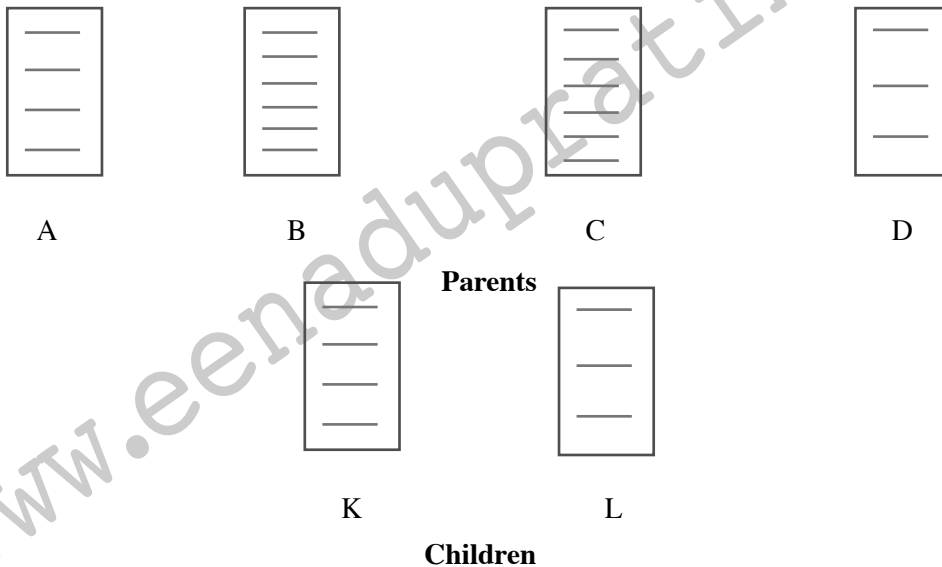
- a) precipitates dust in the atmosphere b) reduces atmosphere pressure
 c) is opaque to infrared rays d) is not opaque to infrared rays

3. Which of the following correctly represent the labelling of A, B, C, and D w.r.t given diagram.



- a) A-Thalamus, B-Seed, C-Endocarp, D-Mesocarp
 b) A-Seed, B-Thalamus, C-Endocarp, D-Mesocarp
 c) A-Endocarp, B-Mesocarp, C-Thalamus, D-Seed
 d) A-Thalamus, B-Seed, C-mesocarp, D-Endocarp

4.



On the basis of given DNA fingerprint, match the children's (K and L) with their respective parents (A, B, C, and D).

- a) K-A, L-A b) K-A, L-D c) K-A, L-C, d) K-B, L-A

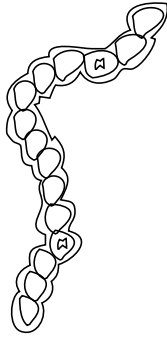
5. Calvin cycle takes place in
 a) Only C₃ plant
 b) Only C₄ plant
 c) Both C₃ and C₄
 d) Neither C₃ nor C₄ plant
6. The site of calvin cycle in C₃ – plants is
 a) Parenchymatous cell
 b) mesophyllcell
 c) bundle sheath cell
 d) grana
7. Amniocentesis is a process to
 a) determine any hereditary disease in the embryo
 b) determine any disease in heart
 c) know about the disease of brain
 d) all of the above
8. Which of the following set represents micronutrients?
 a) B, Ni, Mo, Mn, FE
 b) B, Ni, Mo, Mn, P
 c) S, Ca, B, Mo, Fe
 d) Ni, Mo, Mn, k
9. Match the column and select the correct option

Column I	Column II
(Hormone)	(Function)
(i) Cytokinin	(I) senescence
(ii) Ethylene	(II) Seed development
(iii) ABA	(III) Cell growth
(iv) Auxin	(IV) Help in shoot and formation

- a) (i)-(III), (ii)-(I), (iii)-(II), (iv)-(IV)
 b) (i)-(I), (ii)-(II), (iii)-(III), (iv)-(IV)
 c) (i)-(II), (ii)-(I), (iii)-(III), (iv)-(IV)
 d) (i)-(III), (ii)-(I), (iii)-(IV), (iv)-(II)
10. Which of the following sets contain natural hormone?
 a) 2, 4-D, IBA, Gibberellin
 b) Cytokinin, 2, 4-D, NAA
 c) IAA, Zeatin, ABA
 d) Ethylene, PAA, ABA
11. Match the Column and select the correct option.
 (i) Cisternae (I) Proteinaceous structure in Cytoplasm
 (ii) Thylakoid (II) Infolding of inner mitochondrial membrane
 (iii) Cristae (III) Flattened membranous sac
 (iv) Microtubule (IV) membranous structure in Golgi complex
- a) (i)-(IV), (ii)-(II), (iii)-(II), (iv)-(I)
 b) (i)-(II), (ii)-(IV), (iii)-(II), (iv)-(I)
 c) (i)-(I), (ii)-(II), (iii)-(IV), (iv)-(III)
 d) (i)-(IV), (ii)-(III), (iii)-(I), (iv)-(II)

12. Glycoprotein contains
- More than 200 amino acids and carbohydrates as its side chain
 - More than 20 amino acids and carbohydrates as its side chain
 - More than 200 amino acids and steroids as its side chain
 - More than 20 amino acids contain steroids as its side chain
13. Viral infection is usually absent in
- phloem cells
 - xylem cells
 - pith cells
 - apical meristem
14. What occurs in point mutation?
- Change in single base pair in DNA
 - Change in single base pair in RNA
 - Change in double base pair in DNA
 - Change in double base pair in RNA
15. Cockroaches are
- ureotelic
 - ureotelic or ammonotelic
 - uricotelic
 - ammonotelic
16. The common means of transmission of AIDS is
- sexual intercourse
 - blood transfusion
 - placental transfer
 - All of these
17. Which of the following does not lead to formation of new variety?
- Somatic hybridization
 - Genetic Engineering
 - Clonal propagation
 - UV-radiation
18. Match the column and select the correct option.
- | | |
|------------------|---------------------|
| (i) Brassica | (I) Pusa Swarnim |
| (ii) Cauliflower | (II) Pusa Sadabahar |
| (iii) Chilli | (III) Pusa Subhra |
| (iv) Flat bean | (IV) Pusa sem-III |
- (i)-(I), (ii)-(II), (iii)-(III), (iv)-(IV)
 - (i)-(I), (ii)-(III), (iii)-(II), (iv)-(IV)
 - (i)-(II), (ii)-(III), (iii)-(IV), (iv)-(I)
 - (i)-(I), (ii)-(IV), (iii)-(II), (iv)-(III)
19. Which of the following is not a genetically modified plant?
- Bt-Cotton
 - Flavr Savr tomato
 - Pusa Swarnim
 - Golden rice
20. In ornithine cycle, which of the following wastes are removed from the blood?
- Urea and urine
 - Ammonia and urea
 - CO₂ and ammonia
 - CO₂ and urea
21. Biological name of wheat is
- Triticum aestivum
 - Triticum tritiale
 - Triticum sativum
 - Oryza sativa

22. Choose the correct option w.r.t given diagram.



- a) Nostoc → Eubacteria, can fix N_2
- b) Spirillum → Gram-positive bacteria
- c) Anabaena → Archae bacteria, grow in polluted place
- d) Chara → Single cell structures

23. In gymnosperms, the ovule is naked because

- a) ovary wall is absent
- b) integuments are absent
- c) perianth is absent
- d) nucellus is absent

24. Match the column and choose the correct option.

Column I	Column II
(i) Walnut	(I) Cotyledon
(ii) Coconut	(II) Endosperm
(iii) Orange	(III) Endocarp
(iv) Strawberry	(IV) Thalamus

- a) (i)-(I), (ii)-(II), (iii)-(III), (iv)-(IV)
- b) (i)-(II), (ii)-(III), (iii)-(I), (iv)-(IV)
- c) (i)-(III), (ii)-(II), (iii)-(IV), (iv)-(I)
- d) (i)-(I), (ii)-(II), (iii)-(IV), (iv)-(III)

25. A female with underdeveloped feminine character possess

- a) 47 chromosomes
- b) $45 + XO$
- c) 49 chromosomes
- d) Trisomy of 21st chromosome

26. Match the column and choose the correct option.

- a) Mutualism (I) A kind of association in which one organism is benefitted and others are unaffected
- b) Parasitism (II) One organism have loss and no effect on another
- c) Commensalism (III) Both organisms are benefitted
- d) Ammensalim (IV) One organism is benefitted and other have loss.

- a) (i)-(III), (ii)-(IV), (iii)-(I), (iv)-(II)
- b) (i)-(I), (ii)-(IV), (iii)-(III), (iv)-(II)
- c) (i)-(IV), (ii)-(III), (iii)-(II), (iv)-(I)
- d) (i)-(I), (ii)-(III), (iii)-(II), (iv)-(IV)

27. Which of the following is homosporous?
a) Selaginella b) Salvinia c) Cycas d) Lycopodium
28. 36 ATPs can be obtained by?
a) Glycolysis-2, Citric acid cycle-6, ETS-28
b) Glycolysis-2, Citric acid cycle-2, ETS-32
c) Glycolysis-4, Citric acid cycle-2, ETS-30
d) Glycolysis-2, Citric acid cycle-4, ETS-30
29. The technique of obtaining large number of plantlets by tissue culture method is called?
a) plantlet culture b) organ culture
c) micropropagation d) Macropropagation
30. Most plant virus have genetic material in the form of?
a) DNA b) RNA c) ??? d) RNA + DNA
31. A parent having autosomal dominant disease then What will be the probability of diseased offspring irrespective of sex of the child?
a) 90% b) 10% c) 50% d) 100%
32. A man and a woman, who do not show any apparent of a certain inherited disease, have seven children (2 daughters and 5 sons). Three of the sons suffer from the given disease but none of the daughters are affected. Which of the following mode of inheritance do you suggest for this disease?
a) autosomal dominant b) sex-linked dominant
c) sex- limited recessive d) sex- linked recessive
33. Which of the following is a free-living biocontrol microbial agent for plant path?
a) Mucor b) Glomus c) Trichoderma d) Rhizobium
34. From the following statements, select the Wrong one.
a) Millipedes have two pairs of appendages in each segment of the body
b) Prawn has two pairs of antennae
c) Animals belonging to Phylum Porifera are exclusively marine
d) Nematocysts are characteristic of the Phylum Cnidaria
35. Spermatogenesis is under the regulatory influence of
a) ADH b) FSH c) TSH d) STH
36. Which of the following cell organelles is associated with photorespiration?
a) Mitochondria b) Peroxisome
c) Chloroplast d) All of these
37. Biological control agent is obtained from.
a) Bacillus thuringiensis b) E.coli
c) Agrobacterium tumefaciens d) Meloidogyne incognito
38. Linkage is broken by.
a) Meiosis b) Mitosis
c) Control formation d) DNA duplication

39. Oxysomes or $F_0 - F_1$ particles occur on.
- a) thylakoids
b) mitochondrial surface
c) inner mitochondrial membrane
d) chloroplast surface
40. Oxidative phosphorylation is the production of.
- a) ATP in photosynthesis
b) NADPH in photosynthesis
c) ATP in respiration
d) NADH in respiration

ASSERTION AND REASON TYPE QUESTIONS

Directions: These questions consist of two statements each, printed as Assertion and Reason. While answering these questions you are required to choose any one of the following four responses.

- a) If both Assertion and Reason are true and Reason is the correct explanation of Assertion.
b) If both Assertion and Reason are true but Reason is not the correct explanation of Assertion.
c) If Assertion is true but the Reason is false.
d) If both Assertion and Reason are false.

41. **Assertion:** Gap junctions perform cementing function to keep the neighbouring cells together.
Reason: Tight junction facilitate the cells to communicate With each other by connecting the cytoplasm of adjoining cells, for rapid transfer of ions, small and big molecules, etc.
42. **Assertion:** Hardy-Weinberg principle states that in the absence of large populations of sexually reproducing organisms do not change, Provided that matings occur at random.
Reason: The disturbing influences include mutation, gene flow, genetic drift, genetic recombination and natural selection.
43. **Assertion:** Endothecium layer of anther wall plays an important role in the dehiscence of anther.
Reason: The presence of fibrous bands and differential expansion of inner and outer tangential Walls of endothelial cells cause dehiscence of anther.
44. **Assertion:** Sphagnum is slowly carbonized, compressed and fossilized over thousands of years to produce a dark spongy mass called peat.
Reason: peat helps to keep soil porous and it also improves Water holding capacity of the soil.
45. **Assertion:** In Pleurobrachia, eight comb like ciliary plates called comb plates are present on the body that help in locomotion.
Reason: Pleurobrachia reproduces sexually and its life cycle includes cydippid larva.
46. **Assertion:** Foetal disorders can be diagnosed by chorionic villa sampling.
Reason: Kayuotyping can be done for mitotically dividing cells of chorionic villi.
47. **Assertion:** Consciousness is considered as the defining property of living organisms.
Reason: All organisms from the prokaryotes to the most complex eukaryotes can sense and respond to environmental stimuli.
48. **Assertion:** The technique of micropropagation has been used to introduce variations in the of spring.
Reason: It is not possible to generate virus free plants by micropropagation.
49. **Assertion:** IgM is a type of immunoglobulin which cannot cross the placenta.
Reason: IgM is pentamer immunoglobulin joined J-chain.
50. **Assertion:** Pili are tubular structures present in bacteria which help in conjugation.
Reason: Formation of pili is controlled by or fertility factor.

6. Land of White elephants is
a) Kenya b) Burma c) India d) Thailand
7. Jews were originally nomads from.
a) Palestine b) Sahara Desert c) Germany d) North Europe
8. Which of the following is the largest multipurpose project in India?
a) Hirakund b) Bhakra Nangal c) Beas d) Damoder Valley
9. 'Asian Drama' was written by
a) Gunnar Myrdal b) William Shakespeare
c) Jawaharlal Nehru d) Mulkh Raj Anand
10. Galileo was a scientist who belonged to
a) France b) Great Britain c) Germany d) Italy
11. Some Personalities and their countries are matched below. Which of these is Wrong?
a) Pablo Picasso Spain
b) Jesus Christ Bethlehem
c) Nicolas Copernicus Italy
d) Genghis Khan Mongolia
12. Skylab was launched into space by the U.S. in
a) 1975 b) 1974 c) 1973 d) 1979
13. Which European leader called the 'man of blood and iron'?
a) Hitler b) Mussolini
c) Napoleon Bonaparte d) Bismarck
14. Ludwig van Beethoven was a
a) Musician b) Painter c) Poet d) Sculptor
15. The highest dam in the world is
a) Bhakra b) Grande Dixence c) Ingurin d) Nurek
16. Which of the following languages is spoken by the largest number of people in the world?
a) English b) Arabic c) Spanish d) Chinese
17. Out of the following Indian States, which States does not have any maritime boundary?
a) Gujarat b) Goa c) Rajasthan d) Maharashtra
18. Dengue is a
a) Viral infection b) fungal infection
c) bacterial infection d) protozoan infection
19. Nalanda University was a great center of learning especially in?
a) Buddhism b) Jainism c) Vaishnavism d) Tantra
20. Acid rain is caused by the pollution environment by?
a) carbon dioxide b) carbon monoxide and carbon dioxide
c) ozone and carbon dioxide d) nitrous oxide and sulphur dioxide

ANSWER KEY

PHYSICS

Multiple choice Type Questions

1-a; 2-b; 3-c; 4-c; 5-c; 6-c; 7-d; 8-c; 9-a; 10-c; 11-d; 12-b; 13-a; 14-d; 15-b; 16-c; 17-c; 18-a; 19-b; 20-a; 21-d; 22-b; 23-c; 24-a; 25-b; 26-d; 27-a; 28-c; 29-c; 30-d; 31-d; 32-c; 33-d; 34-d; 35-b; 36-a; 37-b; 38-c; 39-c; 40-b.

Assertion and Reason Type Questions

41-b; 42-c; 43-a; 44-d; 45-d; 46-c; 47-a; 48-a; 49-d; 50-b; 51-a; 52-b; 53-a; 54-a; 55-a; 56-c; 57-c; 58-b; 59-a; 60-b.

CHEMISTRY

Multiple Choice Type Questions

1-c; 2-c; 3-b; 4-c; 5-a; 6-c; 7-c; 8-a; 9-b; 10-a; 11-a; 12-b; 13-d; 14-d; 15-d; 16-a; 17-b; 18-a; 19-a; 20-a; 21-a; 22-a; 23-c; 24-a; 25-d; 26-c; 27-b; 28-c; 29-d; 30-b; 31-b; 32-c; 33-b; 34-d; 35-a; 36-d; 37-a; 38-d; 39-a; 40-c.

Assertion and Reason Type Questions

41-a; 42-d; 43-d; 44-b; 45-a; 46-d; 47-d; 48-a; 49-d; 50-b; 51-a; 52-d; 53-b; 54-d; 55-b; 56-c; 57-d; 58-c; 59-a; 60-a.

BIOLOGY

Multiple Choice Type Questions

1-a; 2-c; 3-a; 4-b; 5-c; 6-c; 7-a; 8-a; 9-a; 10-c; 11-a; 12-a; 13-d; 14-a; 15-c; 16-d; 17-c; 18-b; 19-c; 20-c; 21-a; 22-a; 23-a; 24-a; 25-b; 26-a; 27-d; 28-b; 29-c; 30-b; 31-c; 32-d; 33-c; 34-b; 35-b; 36-d; 37-a; 38-a; 39-c; 40-c.

Assertion and Reason Type Questions

41-d; 42-b; 43-a; 44-b; 45-b; 46-a; 47-a; 48-d; 49-a; 50-b; 51-c; 52-c; 53-b; 54-c; 55-d; 56-c; 57-b; 58-d; 59-c; 60-b

GENERAL KNOWLEDGE

Multiple Choice Type Questions

1-c; 2-a; 3-c; 4-a; 5-b; 6-b; 7-a; 8-b; 9-a; 10-d; 11-c; 12-c; 13-d; 14-a; 15-d; 16-d; 17-c; 18-a; 19-a; 20-d.