

INSTRUCTIONS

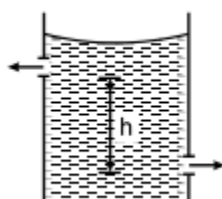
1. This test will be a 3 hour Test.
2. This test consists of Physics, Chemistry, Botany and Zoology questions with equal weightage of 180 marks.
3. Each question is of 4 marks.
4. There are four parts in the question paper, consisting Part-I Physics (Q.no.1 to 50), Part-II Chemistry (Q.no.51 to 100), Part-III Botany (Q. no. 101 to 150) and Part-IV Zoology (Q no 151 to 200). Each part is divided into two Sections, Section A consists of 35 multiple choice questions & Section-B contains 15 Multiple choice questions, out of these 15 questions candidates can choose to attempt any 10 questions
5. There will be only one correct choice in the given four choices for each question. For each question 4 marks will be awarded for correct choice, 1 mark will be deducted for incorrect choice and zero mark will be awarded for unattempted question.
6. Any textual, printed or written material, mobile phones, calculator etc, is not allowed for the student appearing for the test.
7. All calculations/written work should be done in the rough sheet provided,

SYLLABUS

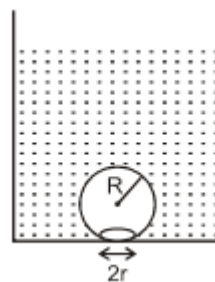
- Physics** : **Waves, Properties of Matter and Fluid Mechanics.**
- Chemistry** : **Organic Chemistry - Some Basic Principles and Techniques, Hydrocarbons.**
- Biology** : **Plant Physiology Unit.**

Physics Section-A

1. The displacement of an elastic wave is given by the function $y = 3 \sin \omega t + 4 \cos \omega t$. Where y is in cm and t is in second. Calculate the resultant amplitude
 (a) 5 cm (b) 2.5 cm
 (c) 3 cm (d) 4.5 cm
2. A solid of density D is floating in a liquid of density d . If v is the volume of solid submerged in the liquid and V is the total volume of the solid, then $\frac{v}{V}$ is equal to
 (a) $\frac{d}{V}$ (b) $\frac{D}{d}$
 (c) $\frac{D}{(D+d)}$ (d) $\frac{D+d}{D}$
3. There are two identical small holes on the opposite sides of a tank containing a liquid. The tank is open at the top. The difference in height of the two holes is h as shown in the figure. As the liquid comes out of the two holes, the tank will experience a net horizontal force proportional to:
 (a) $h^{1/2}$
 (b) h
 (c) $h^{3/2}$
 (d) h^2



4. On heating water, bubbles being formed at the bottom of the vessel detach and rise. Take the bubbles to be spheres of radius R and make a circular contact of radius r with the bottom of the vessel. If $r \ll R$, and the surface tension of water is T , value of r just before bubbles detach is : (density of water is w)



- (a) $R^2 \sqrt{\frac{2\rho_w g}{3T}}$ (b) $R^2 \sqrt{\frac{\rho_w g}{6T}}$
- (c) $R^2 \sqrt{\frac{\rho_w g}{T}}$ (d) $R^2 \sqrt{\frac{3\rho_w g}{T}}$

5. The work done to get n smaller equal size spherical drops from a bigger size spherical drop of water is proportional to :

- (a) $\left(\frac{1}{n^{2/3}}\right) - 1$ (b) $\left(\frac{1}{n^{1/3}}\right) - 1$
 (c) $n^{1/3} - 1$ (d) $n^{4/3} - 1$

6. A cylinder is filled with non viscous liquid of density d to a height h_0 and a hole is made at a height h_1 from the bottom of the cylinder. The velocity of liquid issuing out of the hole is -

- (a) $\sqrt{2gh_0}$ (b) $\sqrt{2g(h_0 - h_1)}$
 (c) $\sqrt{dgh_1}$ (d) $\sqrt{dgh_0}$

7. A metal block is experiencing an atmospheric pressure of $1 \times 10^5 \text{ N/m}^2$, when the same block is placed in a vacuum chamber, the fractional change in its volume is (the bulk modulus of metal is $1.25 \times 10^{11} \text{ N/m}^2$)

- (a) 4×10^{-7} (b) 2×10^{-7}
 (c) 8×10^{-7} (d) 1×10^{-7}

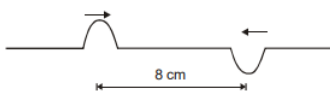
8. A transverse wave is described by the equation $y = y_0 \sin 2\pi(f t - x / \lambda)$. The maximum particle velocity is equal to four times the wave velocity if -

- (a) $\lambda = \pi y_0 / 4$ (b) $\lambda = \pi y_0 / 2$
 (c) $\lambda = \pi y_0$ (d) $\lambda = 2\pi y_0$

9. A wave in a string has an amplitude of 2cm. The wave travels in the +ve direction of the x-axis with a speed of 128 m/sec and it is noted that 5 complete waves fit in 4m length of the string. The equation describing the wave is-

- (a) $y = (0.02)\text{m} \sin(7.85x - 1005t)$
 (b) $y = (0.02)\text{m} \sin(7.85x + 1005t)$
 (c) $y = (0.02)\text{m} \sin(15.7x - 2010t)$
 (d) $y = (0.02)\text{m} \sin(15.7x + 2010t)$

10. Two symmetrical and identical pulses in a stretched string, whose centers are initially 8 cm apart, are moving towards each other as shown in the figure. The speed of each pulse is 2 cm/s. After 2 seconds, the total energy of the pulses will be :



- (a) zero
 (b) purely kinetic
 (c) purely potential
 (d) partly kinetic and partly potential

11. A copper wire of length 2.2 m and a steel wire of length 1.6 m both of diameter 3.0 mm, are connected end to end. When stretched by a load, the net elongation is found to be 0.70 mm. Obtain the load applied

- (a) $1.8 \times 10^2 \text{ N}$ (b) $0.8 \times 10^2 \text{ N}$
 (c) $2.4 \times 10^2 \text{ N}$ (d) $1.4 \times 10^2 \text{ N}$

12. What is the density of water at a depth where pressure is 80.0 atm, given that its density at the surface is $1.03 \times 10^3 \text{ kg m}^{-3}$?

- (B = $45.8 \times 10^{11} \text{ Pa}^{-1}$)
 (a) $2.068 \times 10^3 \text{ kg/m}^3$
 (b) $1.068 \times 10^3 \text{ kg/m}^3$
 (c) $1.034 \times 10^3 \text{ kg/m}^3$
 (d) $2.034 \times 10^3 \text{ kg/m}^3$

13. A fully loaded Boeing aircraft has a mass of $3.3 \times 10^5 \text{ kg}$. Its total wing area is 500 m^2 . It is in level flight with a speed of 960 km/h. Estimate the pressure difference between the lower and upper surface of the wings.

- (a) $3.8 \times 10^3 \text{ Nm}^{-2}$
 (b) $3.5 \times 10^3 \text{ Nm}^{-2}$
 (c) $6.5 \times 10^3 \text{ Nm}^{-2}$
 (d) $6.8 \times 10^3 \text{ Nm}^{-2}$

14. The cylindrical tube of a spray pump has a cross section of 8.0 cm^2 one end of which has 40 fine holes each of 1.0 mm diameter. If the liquid flow inside the tube is 1.5 m min^{-1} . What is the speed of ejection of the liquid through the holes?

- (a) 0.64 ms⁻¹
 (b) 0.32 ms⁻¹
 (c) 0.24 ms⁻¹
 (d) 0.40 ms⁻¹

15. A plane is in level flight at constant speed and each of its two wings has an area of 25 m^2 . If the speed of the air is 180 km/h over the lower wing and 234 km/h over the upper wing surface. determine the plane's mass. (Take air density to be 1 kg m^{-3})

- (a) 4400 kg (b) 2200 kg
 (c) 2600 kg (d) 4200 kg

16. A rocket is moving at a speed of 200 ms^{-1} towards a stationary target. While moving, it emits a wave of frequency 1000 Hz . Some of the sound reaching the target gets reflected back to the rocket as an echo. Calculate the frequency of the echo as detected by the rocket
 (a) 2020 H (b) 4080 H
 (c) 2040 H (d) 3040 H

17. Earthquakes generate sound waves inside the earth. Unlike a gas, the earth can experience both transverse (S) and longitudinal (P) sound waves. Typically the speed of S waves is about 4 km s^{-1} and that of P waves is 8 km s^{-1} seismographs record P and S waves from an earthquake. The first P wave arrives 4 min before the first S wave. Assuming the waves travel in a straight line, at what distance does the earthquake occur?
 (a) 1570 km (b) 960 km
 (c) 1490 km (d) 1920 km

18. A body floats in a liquid contained in a beaker. The whole system is shown in fig. falling under gravity. The upthrust on the body due to liquid is -



- (a) Zero
 (b) Equal to weight of liquid displaced
 (c) Equal to weight of the body in air
 (d) Equal to the weight of the immersed body.
19. A steel rod ($Y = 2.0 \times 10^{11} \text{ Nm}^{-2}$; and $\alpha = 10^{-5.0} \text{ C}^{-1}$) of length 1 m and area of cross section 1 cm^2 is heated from 0° C to 200° C , without being allowed to extend or bend. What is the tension produced in the rod
 (a) 4×10^4 (b) 3×10^4
 (c) 1×10^4 (d) 2×10^4
20. Equation of a plane progressive wave is given by $y = 0.6 \sin 2\pi \left(t + \frac{x}{2} \right)$. On reflection from a denser medium its amplitude becomes $\frac{2}{3}$ of the amplitude of the incident wave. The equation of the reflected wave is

- (a) $y = 0.6 \sin 2\pi \left(t + \frac{x}{2} \right)$.
 (b) $y = -0.4 \sin 2\pi \left(t + \frac{x}{2} \right)$.
 (c) $y = 0.4 \sin 2\pi \left(t + \frac{x}{2} \right)$.
 (d) $y = -0.4 \sin 2\pi \left(t - \frac{x}{2} \right)$.

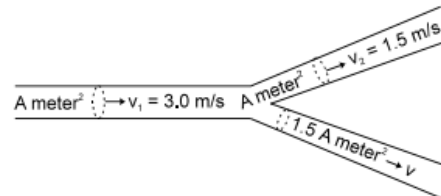
21. The intensity level of two sounds are 100 dB and 50 dB . What is the ratio of their intensities
 (a) 10^1 (b) 10^3
 (c) 10^5 (d) 10^{10}

22. Forty-one forks are so arranged that each produces 5 beat/s when sounded with its nearby fork. If the frequency of last fork is octave of frequency of first fork, then the frequencies of the first and last fork, respectively are
 (a) $200, 400$ (b) $205, 410$
 (c) $195, 390$ (d) $100, 200$

23. The equation of a wave is given by $y = 0.5 \sin (100 t + 25 x)$
 The ratio of maximum particle velocity to wave velocity is :
 (a) 12.5 (b) 25
 (c) 4 (d) $1/8$

24. The reading of a spring balance when a block is suspended from it in air is 60 newton . This reading is changed to 40 newton when the block is submerged in water. The specific gravity of the block must be therefore :
 (a) 3 (b) 2
 (c) 6 (d) $3/2$

25. An incompressible liquid flows through a horizontal tube as shown in the figure. Then the velocity 'v' of the fluid is :



- (a) 3.0 m/s (b) 1.5 m/s
 (c) 1.0 m/s (d) 2.25 m/s

26. A tuning fork of frequency 512 Hz makes 4 beats per second with the vibrating string of a piano. The beat frequency decreases to 2 beats per second when the tension in the piano string is slightly increased. The frequency of the piano string before increasing the tension was :

- (a) 508 Hz (b) 510 Hz
 (c) 514 Hz (d) 516 Hz

27. A metal cube is placed in an empty vessel. When water is filled in the vessel so that the cube is completely immersed in the water, the force on the bottom of the vessel in contact with the cube -

- (a) will increase
 (b) will decrease
 (c) will remain the same
 (d) will become zero

28. **Assertion** : Young's modulus for a perfectly plastic body is zero.

Reason : For a perfectly plastic body, restoring force is zero.

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

29. A metal wire of length L , area of cross section A and Young's modulus Y behaves as a spring constant k -

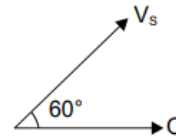
- (a) $k = YA/L$ (b) $k = 2YA/L$
 (c) $k = YA/2L$ (d) $k = YL/A$

30. W is the work done in forming a bubble of radius r , the work done in forming a bubble of radius $2r$ will be -

- (a) $4W$ (b) $3W$
 (c) $2W$ (d) W

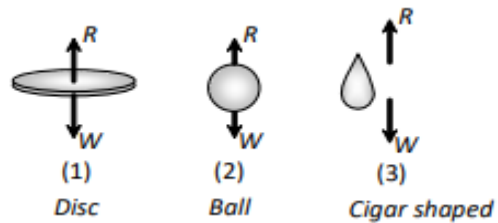
31. A source of sound S emitting waves of frequency 100 Hz and an observer O are located at some distance from each other. The source is moving with a speed of 19.4 ms^{-1} at an angle of 60° with the source-observer line as shown in the figure. The observer is at rest. The apparent frequency

observed by the observer (velocity of sound in air 330 ms^{-1}) is



- (a) 97 Hz (b) 100 Hz
 (c) 103 Hz (d) 106 Hz

32. When a body falls in air, the resistance of air depends to a great extent on the shape of the body, 3 different shapes are given. Identify the combination of air resistances which truly represents the physical situation. (The cross sectional areas are the same).

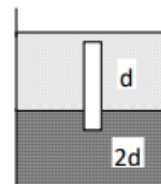


- (a) $1 < 2 < 3$ (b) $2 < 3 < 1$
 (c) $3 < 2 < 1$ (d) $3 < 1 < 2$

33. The diameter of a brass rod is 4 mm and Young's modulus of brass is $9 \times 10^{10} \text{ N/m}^2$. The force required to stretch by 0.1% of its length is-

- (a) $360\pi \text{ N}$ (b) 36 N
 (c) $144\pi \times 10^3 \text{ N}$ (d) $36 \times 10^5 \text{ N}$

34. A homogeneous solid cylinder of length L ($L < H/2$) and cross-sectional area $A/5$ is immersed such that it floats with its axis vertical at the liquid-liquid interface with length $L/4$ in the denser liquid as shown in the figure. The lower density liquid is open to the atmosphere having pressure P_0 . Then, density D of solid is given by

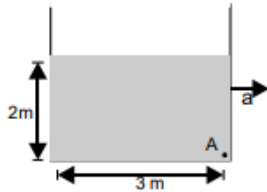


- (a) $\frac{5}{4}d$ (b) $\frac{4}{5}d$
 (c) $4d$ (d) $\frac{d}{4}$

35. A 20 cm long capillary tube is dipped in water. The water rises up to 8 cm. If the entire arrangement is put in a freely falling elevator, the length of water column in the capillary tube will be
- (a) 8 cm (b) 6 cm
 (c) 10 cm (d) 20 cm

Section B

36. The engine of a train sounds a whistle at frequency v . The frequency heard by a passenger is
- (a) $>v$ (b) $<v$
 (c) $\frac{1}{v}$ (d) v
37. The minimum horizontal acceleration of the container so that the pressure at point A of the container becomes atmospheric is (the tank is of sufficient height)



- (a) $\frac{3}{2}g$ (b) $\frac{4}{3}g$
 (c) $\frac{4}{2}g$ (d) $\frac{3}{4}g$
38. A transverse wave of amplitude 0.50m, wavelength 1m and frequency 2 Hz is propagating on a string in the negative x-direction. The expression form of the wave is
- (a) $y(x,t) = 0.5 \sin(2\pi x - 4\pi t)$
 (b) $y(x,t) = 0.5 \cos(2\pi x + 4\pi t)$
 (c) $y(x,t) = 0.5 \sin(\pi x - 2\pi t)$
 (d) $y(x,t) = 0.5 \cos(2\pi x - 2\pi t)$
39. The relation between the particles velocity and wave velocity is -
- (a) $u = -v \frac{dy}{dx}$ (b) $u = \frac{v}{\left(\frac{dy}{dx}\right)}$
 (c) $u = v$ (d) $u = v + \frac{dy}{dx}$
40. A tuning fork of frequency 380 Hz is moving towards a wall with a velocity of 4 m/s. Then the number of beats heard by a stationary listener (standing between wall and the source) by direct and reflected sounds will be (velocity of sound in air is 340 m/s)
- (a) 0 (b) 5
 (c) 7 (d) 10

41. A table is revolving on its axis at 5 revolutions per second. A second source of frequency 1000 Hz is fixed on the table at 70 cm from the axis. The minimum frequency heard by a listener standing at a distance from the table will be (speed of sound = 352 m/s)
- (a) 1000 Hz (b) 1066 Hz
 (c) 941 Hz (d) 352 Hz
42. For a constant hydraulic stress on an object, the fractional change in the object's volume $\left(\frac{\Delta V}{V}\right)$ and its bulk modulus (B) are related as -
- (a) $\frac{\Delta V}{V} \propto B$ (b) $\frac{\Delta V}{V} \propto \frac{1}{B}$
 (c) $\frac{\Delta V}{V} \propto B^2$ (d) $\frac{\Delta V}{V} \propto B^{-2}$
43. Surface tension of mercury at temperature 20°C is $4.65 \times 10^{-1} \text{ Nm}^{-1}$. The atmospheric pressure is $1.01 \times 10^5 \text{ Pa}$. The pressure inside a drop of mercury of radius 3.00 mm at room temperature will be
- (a) $1.01 \times 10^5 \text{ Pa}$ (b) $1.32 \times 10^5 \text{ Pa}$
 (c) $1.00 \times 10^5 \text{ Pa}$ (d) $1.51 \times 10^5 \text{ Pa}$
44. The Young's modulus of a rubber string 8 cm long and density 1.5 kg/m^3 is $5 \times 10^8 \text{ N/m}^2$, is suspended on the ceiling in a room. The increase in length due to its down weight will be -
- (a) $9.6 \times 10^{-5} \text{ m}$ (b) $9.6 \times 10^{-11} \text{ m}$
 (c) $9.6 \times 10^{-3} \text{ m}$ (d) 9.6 m
45. Sound waves of wavelength travelling in a medium with a speed of $v \text{ m/s}$ enter into another medium where its speed is $2v \text{ m/s}$. Wavelength of sound waves in the second medium is
- (a) λ (b) $\frac{\lambda}{2}$
 (c) 2λ (d) 4λ
46. The dimensional formula for Young's modulus-
- (a) $M^{-1}LT^2$ (b) $ML^{-1}T^{-2}$
 (c) $ML^{-1}T^{-1}$ (d) $ML^{-2}T^{-1}$

47. A fixed cylindrical vessel is filled with water up to height H . A hole is bored in the wall at a depth h from the free surface of water. For maximum horizontal range h is equal to :

- (a) H (b) $3H/4$
 (c) $H/2$ (d) $H/4$

48. Water is flowing in a non-viscous tube as shown in the diagram. The Area of cross section at point A and point B are A_1 and A_2 respectively. The pressure difference between points A and B are $(P_1 - P_2)$, then the rate of flow of liquid is:



$$(a) Q = A_1 A_2 \sqrt{\frac{2(P_2 - P_1)}{\rho(A_2^2 - A_1^2)}}$$

$$(b) Q = A_1 A_2 \sqrt{\frac{2(P_1 - P_2)}{\rho(A_1^2 - A_2^2)}}$$

$$(c) Q = A_1 A_2 \sqrt{\frac{2(P_2 - P_1)}{\rho(A_2^1 - A_1^1)}}$$

$$(d) Q = A_1 A_2 \sqrt{\frac{2(P_2 - P_1)}{\rho(A_2^2 - A_1^1)}}$$

49. A certain number of spherical drops of a liquid of radius ' r ' coalesce to form a single drop of radius ' R ' and volume ' V '. If ' T ' is the surface tension of the liquid, then :

- (a) $4VT\left(\frac{1}{r} - \frac{1}{R}\right)$ Energy is released
 (b) $3VT\left(\frac{1}{r} + \frac{1}{R}\right)$ Energy is absorbed
 (c) $3VT\left(\frac{1}{r} - \frac{1}{R}\right)$ Energy is released
 (d) Energy is neither released nor absorbed

50. Read the following statement carefully.

- (i) Two persons on the surface of moon cannot talk to each other. There is no atmosphere on the moon.
 (ii) Solids can support both longitudinal and transverse waves but only longitudinal waves can propagate in gases. For the propagation of transverse waves, medium must also necessarily have the property of rigidity.
 (iii) In the case of a stationary wave, a person hear a loud sound at the nodes as compared to the antinodes because in a

stationary wave all the particles of the medium vibrate in phase.

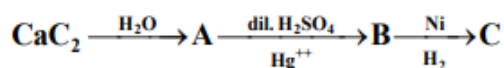
- (iv) The flash of lightning is seen before the the sound of thunder is heard. Speed of sound is greater than speed of light
 (v) Bulk modulus of elasticity (K) represents incompressibility of the material. Bulk modulus of elasticity is proportional to change in pressure.
 (vi) The stretching of a coil is determined by its shear modulus. Shear modulus change only shape of a body keeping its dimensions unchanged.
 (vii) Stress is the internal force per unit area of a body. Rubber is more elastic than steel.
 (viii) The blood pressure in humans is greater at the feet than at the brain. Pressure of liquid at any point is proportional to height, density of liquid and acceleration due to gravity.
 (ix) A man sitting in a boat which is floating on a pond. If the man drinks some water from the pond, the level of the water in the pond decreases. According to Archimedes principle the weight displaced by body is equal to the weight of the body.
 (x) A fluid flowing out of a small hole in a vessel apply a backward thrust on the vessel. According to equation of continuity, the product of area and velocity remain constant.
 From the above statements which of the following are incorrect
 (a) (i), (iii), (vii), (ix)
 (b) (iii), (iv), (vii), (ix)
 (c) (iv), (vi), (ix), (x)
 (d) (ii), (v), (vii), (ix)

Chemistry
Section A

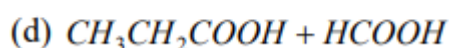
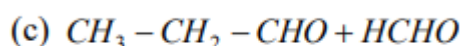
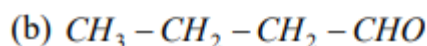
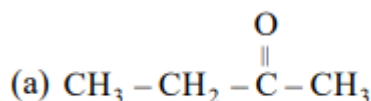
51. The compound having both sp and sp^2 hybridised carbon atom is
 (a) Propene (b) Propyne
 (c) Propadiene (d) None of these

52. Ozonolysis of 2-methyl butene-2 yields
 (a) Only aldehyde
 (b) Only ketone
 (c) Both aldehyde and ketone
 (d) None of these

53. What is the end product of the following sequences of operations?



- (a) Methyl alcohol (b) Acetaldehyde
 (c) $\text{C}_2\text{H}_5\text{OH}$ (d) C_2H_4
54. The product(s) obtained via oxymercuration ($\text{HgSO}_4 + \text{H}_2\text{SO}_4$) of 1-butyne would be

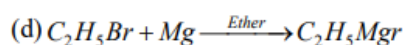
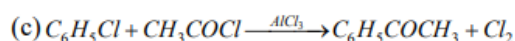
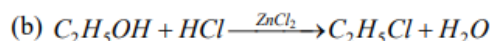


55. Which of the following statements are correct for nucleophile -
 (a) All negatively charged species are nucleophile
 (b) Nucleophiles are Lewis bases
 (c) Alkenes, alkynes, benzene and pyrrole are nucleophiles
 (d) All are correct

56. Benzene reacts with CH_3COCl in the presence of AlCl_3 to give
 (a) $\text{C}_6\text{H}_5\text{Cl}$
 (b) $\text{C}_6\text{H}_5\text{COCl}$
 (c) $\text{C}_6\text{H}_5\text{CH}_3$
 (d) $\text{C}_6\text{H}_5\text{COCH}_3$

57. The number of σ and π bonds in a molecule of benzene is
 (a) 6σ and 9π
 (b) 9σ and 3π
 (c) 12σ and 3π
 (d) 6σ and 6π

58. Which equation represents an example of Friedel-Craft's reaction



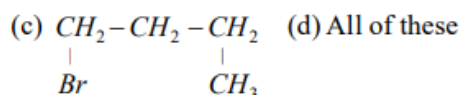
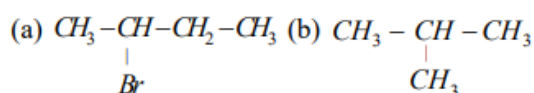
59. The compound that is most reactive towards electrophilic nitration is

- (a) Toluene (b) Benzene
 (c) Benzoic acid (d) Nitrobenzene

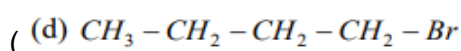
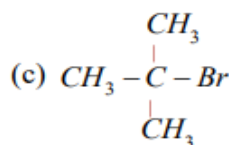
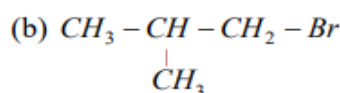
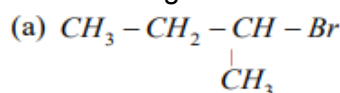
60. Amongst the following the most basic compound is

- (a) Benzylamine (b) Aniline
 (c) Acetanilide (d) p-nitroaniline

61. $\text{CH}_3 - \text{CH}_2 - \text{CH}_2 - \text{CH}_3 \xrightarrow{\text{AlCl}_3} \text{Product}$. Product in above reaction is

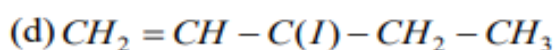
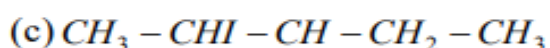
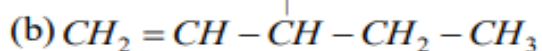
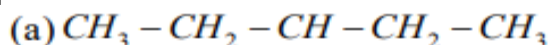


62. What is the chief product obtained when n-butane is treated with bromine in the presence of light at 130°C



63. Formation of alkane by the action of Zn on alkyl halide is called
 (a) Frankland's reaction
 (b) Wurtz reaction
 (c) Cannizzaro reaction
 (d) Kolbe's reaction

64. Sample of 2, 3-dibromo-3-methylpentane is heated with zinc dust. The resulting product is isolated and heated with HI in the presence of phosphorus. Indicate which is the structure that represent the final organic product formed in the reaction



65. Propane is obtained from propene by which method ?

- (a) Catalytic hydrogenation
 (b) Wurtz reaction
 (c) Dehydrogenation
 (d) Frankland reaction

66. In Wurtz reaction, the reagent used is

- (a) Na
 (b) Na/liquid NH_3
 (c) Na/dry ether
 (d) Na/dry alcohol

67. The final product formed when ethyl bromide is treated with excess of alcoholic KOH is

- (a) Ethylene
 (b) Ethane
 (c) Ethyne
 (d) Vinyl bromide

68. When 3, 3-dimethyl-2-butanol is heated with H_2SO_4 the major product obtained is

- (a) *cis* and *trans* isomers of 2, 3-dimethyl-2-butene
 (b) 3, 3-dimethyl-1-butene
 (c) 2, 3-dimethyl-2-butene
 (d) 2, 3-dimethyl-1-butene

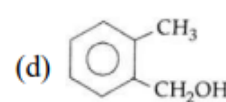
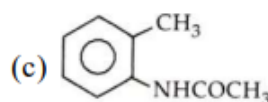
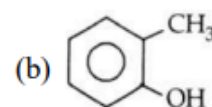
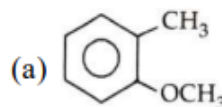
69. In which of the following, addition of HBr does not take place against Markownikoff's rule

- (a) Propene
 (b) But-1-ene
 (c) But-2-ene
 (d) Pent-2-ene

70. Which reactions are most common in alkenes

- (a) Electrophilic substitution reactions
 (b) Nucleophilic substitution reactions
 (c) Electrophilic addition reactions
 (d) Nucleophilic addition reactions

71. Which one of the following is most reactive towards electrophilic reagent?



72. Which of the following statements is invalid-

- (a) The more stable the carbocation the faster it is formed
 (b) Propyl cation changes to more stable isopropyl carbocation by 1,2 shift of a hydrogen
 (c) Isopropyl chloride reacts with sodium ethoxide to form 1-ethoxypropane
 (d) All the above

73. Which of the following statement is wrong -

- (a) All carbonyl compounds of the general structure $CH_3 - \overset{\overset{O}{||}}{C} - R$ give a



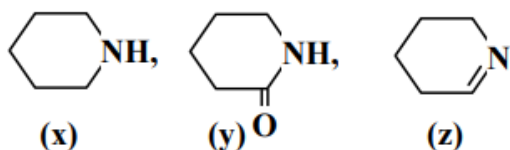
positive iodoform test

- (b) All secondary alcohols give iodoform reaction

- (c) Alkanols of the structure $CH_3CH(OH) - R$ (where $R = H$, alkyl or aryl) give iodoform reaction

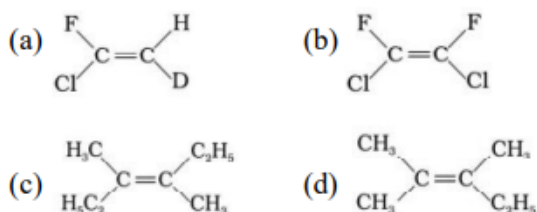
- (d) The only aldehyde giving iodoform reaction is acetaldehyde.

74.



The correct order of decreasing basic strengths of x, y and z is:

- (a) $x > y > z$ (b) $x > z > y$
 (c) $y > x > z$ (d) $y > z > x$
75. Which of the following will not show geometrical isomerism?

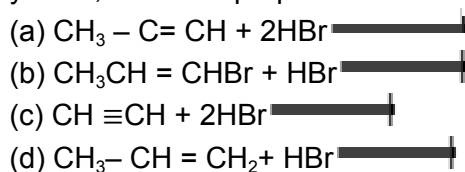


76. Which one of the following has a minimum boiling point?

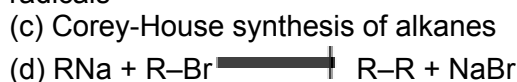
- (a) n-butane (b) 1-Butyne
 (c) 1-Butene (d) Isobutene
77. Reaction of one molecule of HBr with one molecule of 1, 3-butadiene at 40°C gives predominantly :
- (a) 1-Bromo-2-butene under kinetically controlled conditions
 (b) 3-Bromobutane under thermodynamically controlled conditions
 (c) 1-Bromo-2-butene under thermodynamically controlled conditions
 (d) 3-Bromobutene under kinetically controlled conditions
78. Acid catalyzed hydration of alkenes except ethene leads to the formation of
- (a) Mixture of secondary and tertiary alcohols
 (b) Mixture of primary and secondary alcohols
 (c) Secondary or tertiary alcohol
 (d) Primary alcohol

79. Reaction of trans 2-phenyl -1 - bromocyclopentane on reaction with alcoholic KOH produces
- (a) 2-phenylcyclopentene
 (b) 1-phenylcyclopentene
 (c) 3-phenylcyclopentene
 (d) 4-phenylcyclopentene

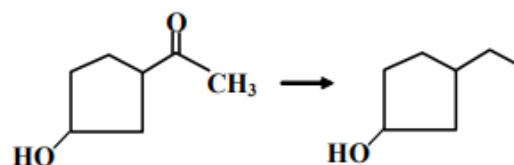
80. Which of the following reactions will yield 2,2-dibromopropane ?



81. Which of the following reactions does not involve a C—C bond formation –
- (a) Hydrolysis of a Grignard reagent
 (b) Combination of two alkyl free radicals
 (c) Corey-House synthesis of alkanes



82. The appropriate reagent for the transformation is –



- (a) Zn(Hg)/conc. HCl
 (b) $\text{NH}_2\text{NH}_2/\text{OH}$
 (c) H_2/Ni
 (d) NaBH_4

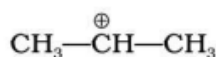
83. The empirical formula of a compound of molecular mass 120 is CH_2O . The molecular formula of the compound is :

- (a) $\text{C}_2\text{H}_4\text{O}_2$
 (b) $\text{C}_4\text{H}_8\text{O}_4$
 (c) $\text{C}_3\text{H}_6\text{O}_3$
 (d) all of these

84. The fragrance of flowers is due to the presence of some steam volatile organic compounds called essential oils. These are generally insoluble in water at room temperature but are miscible with water vapour in the vapour phase. A suitable method for the extraction of these oils from the flowers is:

- (a) Distillation
 (b) Crystallisation
 (c) Distillation under reduced pressure
 (d) Steam distillation

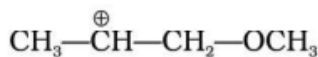
85. What is the correct order of decreasing stability of the following cations.



I.

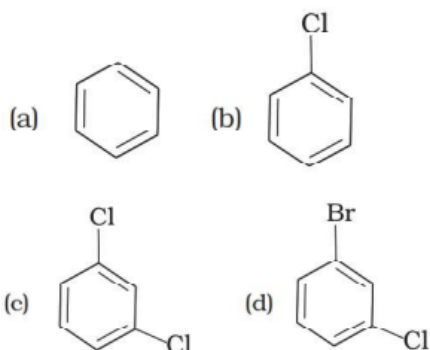


II.



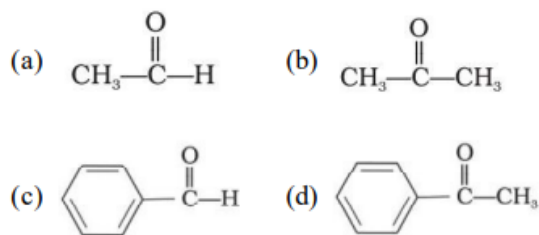
- (a) II > I > III (b) II > III > I
 (c) III > I > II (d) I > II > III

86. Arrange the following compounds in the increasing order of their densities.



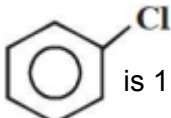
- (a) (a) < (b) < (c) < (d)
 (b) (a) < (c) < (d) < (b)
 (c) (d) < (c) < (b) < (a)
 (d) (b) < (d) < (c) < (a)

87. Which of the following compounds is most reactive towards nucleophilic addition reactions?

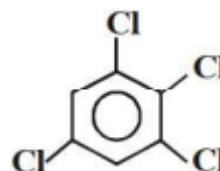


88. The inductive effect -

- (a) implies the atom's ability to cause bond polarization
 (b) increases with increase of distance
 (c) implies the transfer of lone pair of electrons from more electronegative atom to the lesser electronegative atom in a molecule
 (d) implies the transfer of lone pair of electrons from lesser electronegative atom to the more electronegative atom in a molecule

89. Dipole moment of  is 1.1 D

hence dipole moment of given compound will be



- (a) 1.1 D (b) 4.4 D
 (c) 3.3 D (d) 2.56 D

90. $\text{CH}_2=\text{CH}-\text{CH}=\text{CH}_2$

1 2 3 4

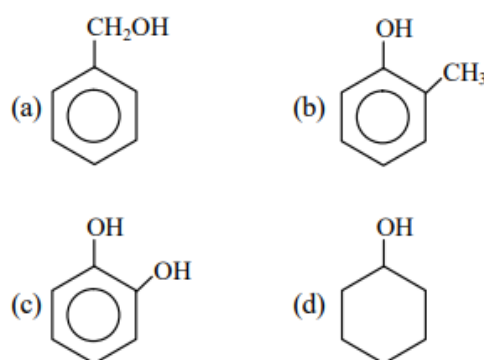
The bond between C₂ - C₃ is shorter than single bond because -

- (a) +I effect
 (b) -I effect
 (c) M effect
 (d) Hyper conjugative effect

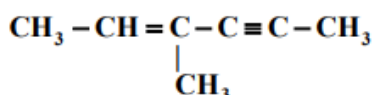
91. Condition for maximum yield of C₂H₅Cl is

- (a) C_2H_6 (excess) + Cl₂ $\xrightarrow{\text{UV Light}}$
 (b) C_2H_6 + Cl₂ $\xrightarrow[\text{Room temp.}]{\text{Dark}}$
 (c) C_2H_6 + Cl₂(excess) $\xrightarrow{\text{UV Light}}$
 (d) C_2H_6 + Cl₂ $\xrightarrow{\text{UV Light}}$

92. The homologue of phenol is -

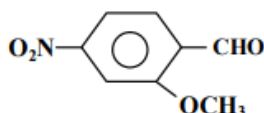


93. The IUPAC name of following compound is



- (a) 3-Methyl-4-hexynene-2
 (b) 3-Methyl-2-hexenyne-4
 (c) 4-Methyl-4-hexenyne-4
 (d) All are correct

94. The IUPAC name compound given below is

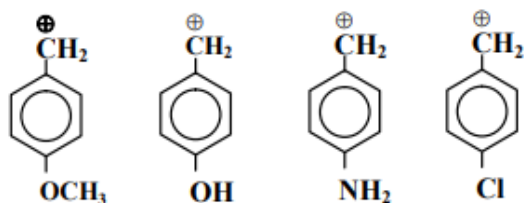


- (a) 2-Methoxy-4-nitro benzaldehyde
 (b) 4-Nitro -2-methoxy benzaldehyde
 (c) 3-Methoxy-4-formyl nitro benzene
 (d) 2-Formyl-4-nitro anisole

95.  are –

- (a) Tautomers (b) Functional
 (c) Position (d) All the above

96. Arrange stability of the given carbocations in decreasing order –

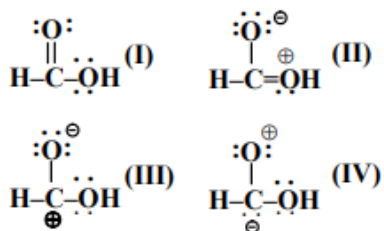


- I II III IV
 (a) I > II > III > IV (b) III > II > I > IV
 (c) IV > I > II > III (d) II > III > I > IV

97. Which of the following reaction intermediates are electrophilic in character-

- (1) Carbocation (2) Carbanion
 (3) Free radicals (4) Carbenes
 (a) Only 2 (b) 1 and 3
 (c) 1, 3 and 4 (d) 1, 2, 3 and 4

98.



Increasing order of stability is–

- (a) I < III < II < IV
 (b) IV < III < II < I
 (c) III < IV < II < I
 (d) II < IV < III < I

99. Electromeric effect -

- (a) comes into play at the demand of attacking reagent
 (b) involves displacement of electrons in a sigma bond
 (c) comes into play in the molecule when at least one atom has unshared pair of electrons
 (d) involves the distortion of the electron cloud

100. Mark the given statements True (T) or False (F).

- (i) Olefins have the general formula C_nH_{2n+1}
 (ii) Heterolytic fission involves the breaking of a covalent bond in such a way that both the electrons of the shared pair are carried away by one of the atoms.
 (iii) Heterolytic fission occurs readily in polar covalent bonds.
 (iv) Each carbon in ethylene molecule is sp^2 hybridised.
 (v) The H–C–H bond angle in ethylene molecules is 120° .
 (vi) Trans isomers are more stable than cis isomer.
 (vii) The I isomer is the one in which two similar groups are on the same side of double bond.
 (viii) CH_4 does not react with Cl_2 in dark.
 (ix) Isobutane on oxidation with $KMnO_4$ gives tert-butyl alcohol.
 (x) Corey-House reaction can be used to prepare both symmetrical and unsymmetrical alkanes.

- (i) (ii) (iii) (iv) (v) (vi) (vii) (viii) (ix) (x)
 (a) F F T T T T T F T T
 (b) T T T T T T F F T T
 (c) F T T T T T T F T T
 (d) F F T T T T T T F T

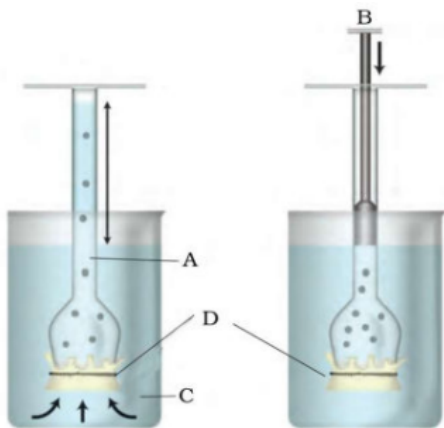
Biology Section A

101. **Assertion** : 2, 4-D, widely used to kill monocotyledonous weeds.

Reason : It not affects mature dicotyledonous plants.

- (a) Assertion and reason both are true and the reason is the correct explanation of the assertion.
- (b) Assertion and reason both are true but reason is not the correct explanation of assertion.
- (c) Assertion is true but reason is wrong.
- (d) Assertion and reason both are wrong.

102. Identify A–D in given figure



- (a) A – Pressure, B – Membrane, C – Water, D – Sucrose solution
- (b) A–Sucrose solution, B – Pressure, C – Water, D – Membrane
- (c) A – Membrane, B – Sucrose solution, C – Pressure, D – Water
- (d) A – Sucrose Solution, B – Membrane, C – Water, D – Pressure

103. (A) During the Complete oxidation of glucose by the stepwise removal of all the hydrogen atoms leave three molecules of CO₂.
- (B) In fermentation there is a net gain of two molecules of ATP and one NADPH₂ for each molecule of glucose.
- (C) The respiratory quotient depends upon the type of respiratory substrate used during respiration
- (D) Pure Protein and fats are used as respiratory substrate.

Choose the option which has all wrong statements:-

- (a) A, B, C
- (b) A, C
- (c) A, B, D
- (d) B, C

104. Enzyme nitrogenase is :

- (a) Mo– Fe protein
- (b) Mo – Mn protein
- (c) Mn – Fe protein
- (d) Cu – Fe protein

105 I. Component of chlorophyll

- II. Helps to maintain ribosome structure
- III. Activator for Rubisco and PEPcase
- IV. Activates the enzymes of respiration and photo-synthesis.

V. Involved in synthesis of nucleic acid

The above roles are played by

- (a) Ca⁺⁺
- (b) Mg⁺⁺
- (c) Mn⁺⁺
- (d) Cl⁻

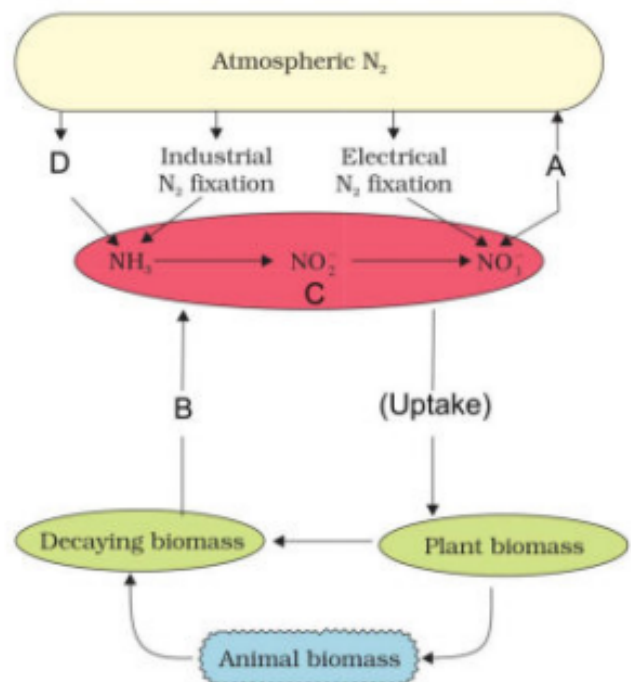
106. Water will move from the root hairs through cortex, if water potentials are :

- (a) Root hairs = 0; cortex = 0; xylem = 0
- (b) Root hairs = 0; cortex = -1; xylem = -2
- (c) Root hairs = 0; cortex = -1; xylem = 0
- (d) Root hairs = 0; cortex = +1; xylem = +2

107. Photoperiodism is

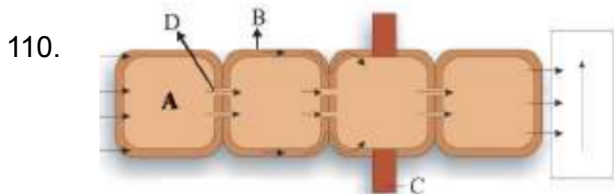
- (a) Growth curvature in response to light
- (b) Recurrence of day and night
- (c) Effect of day length on plant growth
- (d) Flowering plant

108. Identify likely processes A, B, C and D in to the N₂-cycle shown below :-



	A	B	C	D
(a)	Ammonification	Nitrification	Denitrification	Biological N ₂ fixation
(b)	Nitrification	Ammonification	Denitrification	Biological N ₂ fixation
(c)	Denitrification	Ammonification	Nitrification	Biological N ₂ fixation
(d)	Nitrification	Denitrification	Ammonification	Biological N ₂ fixation

109. "Single maize root apical meristem can give rise to more than 17,500 new cells per hour." What is the parameter for measuring growth in maize in a given statement ?
- (a) Dry weight (b) Length
 (c) Area (d) Cell number



Identify A–D in given figure :

- (a) A – Plasma membrane,
 B – Plasmodesmata
 C – Epidermis,
 D – Casparian strip
- (b) A – Casparian strip,
 B – Epidermis,
 C – Plasmodesmata,
 D – Plasma membrane
- (c) A – Plasmodesmata,
 B – Epidermis,
 C – Casparian strip,
 D – Plasma membrane
- (d) A – Epidermis,
 B – Plasma membrane,
 C – Casparian strip,
 D – Plasmodesmata
111. Which of the following statement is incorrect for Gibberellins?
- (a) They are used to increase the length of grapes stalks
 (b) GA₃ is used to speed up the malting process in brewing industry
 (c) It helps to produce new leaves, chloroplast in leaves, lateral shoot growth and adventitious shoot formation
 (d) Gibberellins promote bolting in beet, cabbages and many plants with rosette habit.

112. If cell is reduced in size on placing in a solution of sugar, the solution is : -
- (a) Hypertonic
 (b) Hypotonic
 (c) Isotonic
 (d) None of the above

113. Potato slices are immersed in a series of solutions of different osmotic concentrations. No change in volume or weight is observed with slices in a 0.3 M solution. The osmotic concentration of vacuolar sap, therefore : -
- (a) 0.3 M
 (b) Greater than 0.3M
 (c) Less than 0.3 M
 (d) Not related at all to the outside solution

114. Which of the following statements are concerned with photoperiodism?

- (1) Some plants which require the exposure to light for a period exceeding a well defined critical duration before the flowering is initiated in them are called long day plants
- (2) Only the duration of light period is important for flowering in plants
- (3) The sites of perception of light / dark duration are the leaves
- (4) The hormonal substance responsible for flowering migrates from shoot apices to leaves for inducing flowering
- (a) (1) & (2) are incorrect
 (b) (2) & (3) are incorrect
 (c) (2) & (4) are incorrect
 (d) (1) & (3) are incorrect

115. Root Pressure is maximum, when : -
- (a) Transpiration is high and absorption is very low
 (b) Transpiration is very low and absorption is high
 (c) Absorption is very high and transpiration is also very high
 (d) Absorption is low and transpiration is also very low

116. Nitrifying bacteria are able to :
- (a) Convert atmospheric nitrogen into soluble form
 (b) Convert ammonia to nitrate
 (c) Convert Ammonia to nitrogen
 (d) Convert Nitrate to nitrogen

117. Essential mineral nutrients are the element
(a) In the absence of which plants cannot complete their life cycle
(b) Which cannot be replaced by other element in its function
(c) The element which is directly associated with metabolism of the plant
(d) All of the above
118. Tropical plants like sugarcane show high efficiency of CO₂ fixation because of : -
(a) Calvin cycle
(b) Hatch-Slack cycle
(c) Cyclic photophosphorylation
(d) TCA Cycle
119. The link between Glycolysis and Krebs cycle is
(a) Citric acid (b) Malic acid
(c) Fumaric acid (d) Acetyl CoA
120. Chromatophores take part in
(a) Movement
(b) Respiration
(c) Photosynthesis
(d) Growth
121. **Assertion:** It is interesting to note that nitrogen fixing microbes live as aerobes under free-living conditions.
Reason: During nitrogen-fixing events, they become anaerobic thus protecting the nitrogenase enzyme.
(a) Assertion and reason both are true and the reason is the correct explanation of assertion.
(b) Assertion and reason both are true but the reason is not the correct explanation of the assertion.
(c) Assertion is true but reason is wrong.
(d) Assertion and reason both are wrong.
122. Where is the respiratory electron transport system (ETS) located in plants?
(a) Mitochondrial matrix
(b) Outer mitochondrial membrane
(c) Inner mitochondrial membrane
(d) Intermembrane space
123. Which of the following biomolecules is common to respiration – mediated breakdown of fats, carbohydrates and proteins?
(a) Glucose -6- phosphate
(b) Fructose 1, 6- bisphosphate
(c) Pyruvic acid
(d) Acetyl CoA
124. In mitochondria, protons accumulate in the
(a) Outer membrane
(b) Inner membrane
(c) Intermembrane space
(d) Matrix
125. It takes a very long time for pineapple plants to produce flowers. Which combination of hormones can be applied to artificially induce flowering in pineapple plants throughout the year to increase yield?
(a) Cytokinin and Abscisic acid
(b) Auxin and Ethylene
(c) Gibberellin and cytokinin
(d) Gibberellin and Abscisic acid
126. Fruit and leaf drop at early stages can be prevented by the application of
(a) Ethylene (b) Auxins
(c) Gibberellic acid (d) Cytokinesis
127. Typical growth curve in plants is
(a) Stair-steps shaped (b) Parabolic
(c) Sigmoid (d) Linear
128. Sugarcane, wheat, barley, maize, sorghum, rice, mustard, pea. How many plants from above are C₄ plants?
(a) Three (b) Two
(c) Four (d) Five
129. **Assertion:** Photosystem I (PS-I) and Photosystem II (PS-II) are part of light harvesting complexes (LHC).
Reason: Photosystem I (PS-I) and Photosystem II (PS-II) are named according to the sequence in which they function during light reaction.
(a) Assertion and reason both are true and the reason is the correct explanation of assertion.
(b) Assertion and reason both are true but reason is not the correct explanation of assertion.
(c) Assertion is true but reason is wrong.
(d) Assertion and reason both are wrong.

130. **Assertion:** ATP synthase has a channel that allows diffusion of protons back across the membrane.
Reason: This releases enough energy to activate ATPase enzyme that catalyses the formation of ATP.
 (a) Assertion and reason both are true and the reason is the correct explanation of assertion.
 (b) Assertion and reason both are true but reason is not the correct explanation of assertion.
 (c) Assertion is true but reason is wrong.
 (d) Assertion and reason both are wrong.
131. Major similarity between active transport and facilitated diffusion is that :-
 (a) Both consume ATP
 (b) Both are Passive
 (c) Both are non-selective
 (d) Both require membrane protein
132. A. F. Skoog and Miller identified cytokinin (kinetin)
 B. E. Kurosava is related to gibberellic acid.
 C. F.W. Went first isolated auxin from tips of coleoptiles of oat seedling.
 D. Charles Darwin first isolated auxin from tip of coleoptiles of oat seedlings
 In given Wrong Statement is.
 (a) A (b) B (c) C (d) D
133. **Statement I :** The reducing agent is NADH + H⁺ which is reoxidised to NAD⁺ in both lactic acid and alcohol fermentation processes. **Statement II :** In both lactic acid and alcohol fermentation not much energy is released.
 (a) Both statements are correct.
 (b) Statement I is correct & II is incorrect.
 (c) Statement I is incorrect & II is correct.
 (d) Both statements are incorrect.
134. Which of the following is the correct sequence of developmental processes in a plant cell?
 A. Mature cell B. Meristematic cell
 C. Senescence D. Differentiation
 E. Plasmatic growth
 Correct sequence is :
 (a) A→B→C→D→E (b) B→D→E→A→C
 (c) B→E→D→A→C (d) B→A→E→D→C
135. Choose the correct sequence of steps regarding root nodule formation by Rhizobium :
 (a) Attachment to epidermis→infection thread→ Root hair curl
 (b) Root hair curl→infection thread→ Root nodule
 (c) Infection thread→Root hair curl→Root nodule
 (d) Root nodule→Root hair curl→ Attachment to epidermis
136. Select the matched ones :
 a. *Nitrosomonas* – Nitrite to nitrate
 b. *Thiobacillus* – Denitrification
 c. *Nostoc* – free living nitrogen fixer
 (a) a and c (b) b and c
 (c) a and b (d) a,b and c
137. Root nodules of soybean have –
 (a) Ureides & *Frankia*
 (b) Nitrogenase & *Nostoc*
 (c) Leghaemoglobin & *Nitrobacter*
 (d) Ureides, Rhizobium & Leghaemoglobin
138. Select the correct option with set of correct statements :
 A–Solute potential of a solution is always negative
 B–Facilitated diffusion is a highly selective process
 C–Addition of solute increases water potential
 D–Entry of water in a cell decreases its pressure potential correct option is –
 (a) A & B (b) A & C
 (c) B & C (d) C & D
139. Phloem sap is mainly composed as:-
 (a) Water + Glucose
 (b) Water + Fructose
 (c) Water + Cellulose
 (d) Water + Sucrose
140. A – Induce rooting in a twig
 B – Quickly ripen a fruit
 C – Induce immediate stomatal closure in leaves. A, B and C PGRs are :-

	A	B	C
(a)	ABA	Cytokinin	Auxin
(b)	Auxin	Ethylene	ABA
(c)	Cytokinin	ABA	Ethylene
(d)	Ethylene	cytokinin	GA ₃

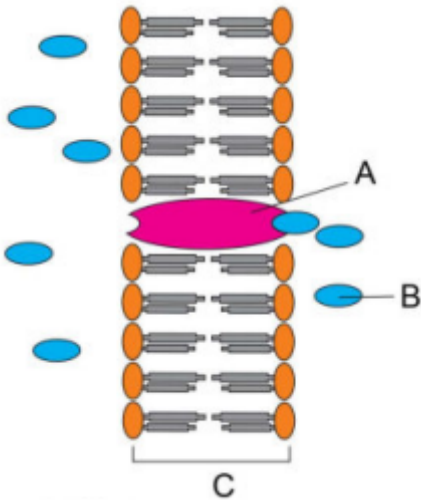
141. Essential element nitrogen is grouped under
(a) Energy related element
(b) Structural element
(c) Cation - Anion balance element
(d) Enzyme activator element
142. Light absorption, water splitting, oxygen release, ATP formation, NADPH formation, Glucose formation.
How many of the above processes are carried out in photochemical phase of photosynthesis
(a) 3 (b) 5
(c) 4 (d) 2
143. During photoperiodic inductions
(a) Hormonal substance migrates from leaves to shoot apices for flowering.
(b) Hormonal substance migrate from shoot apices to leaves for flowering
(c) Hormonal substances migrate from root to leaves for flowering.
(d) Hormonal substances migrate from root to shoot apices for flowering.
144. Methionine, thiamine and biotin contain which of the following elements ?
(a) Copper (b) Sulphur
(c) Calcium (d) Molybdenum
145. Select the correct statement:-
(a) The movement of electrons is downhill from excited PS-II to PS-I.
(b) The electrons can only be transferred to electron carriers not to H carriers.
(c) Electrons are always transferred to another acceptor molecule with low redox-potential.
(d) Non-Cyclic process only helps in ATP formation.
146. Which of the following is not true about the carrier molecules involved in the facilitated diffusion ?
(a) They facilitate the transport of hydrophilic substances
(b) They help in set up the concentration gradient
(c) They have specific binding sites for the molecules they transfer.
(d) They undergo conformational change upon binding of solutes.
147. The deficiency of Mo, Zn & Mn causes:-
(a) Necrosis
(b) Chlorosis
(c) Delay in flowering
(d) Inhibition of cell division
148. **Statement I** : Most minerals must enter the root by active absorption into the cytoplasm of epidermal cells.
Statement II : The active uptake of ions is partly responsible for the water potential gradient in roots, and therefore for the uptake of water by osmosis.
(a) Both statements are correct
(b) Statement I is correct & II is incorrect
(c) Statement I is incorrect & II is correct
(d) Both statements are incorrect
149. Which of the following play an important role in seed development, maturation & dormancy ?
(a) Ethylene (b) ABA
(c) Auxins (d) Cytokinins
- 150 **Statement I** : Some ions also move into the epidermal cells passively.
Statement II : Ions are absorbed from the soil by only passive transport.
(a) Both statements are correct
(b) Statement I is correct & II is incorrect
(c) Statement I is incorrect & II is correct
(d) Both statements are incorrect

Section B

151. **Statement I** : Specific proteins in the membranes of root hair cells passively pump ions from the soil into the cytoplasm of the epidermal cells.
Statement II : Transport proteins of endodermal cells are control points, where a plant adjusts the quantity and types of solutes that reach the xylem.
(a) Both statements are correct
(b) Statement I is correct & II is incorrect
(c) Statement I is incorrect & II is correct
(d) Both statements are incorrect

152. **Statement I** : Some plants have an obligate association with the mycorrhiza.
Statement II : *Pinus* seeds cannot germinate and establish without the presence of mycorrhiza.
 (a) Both statements are correct
 (b) Statement I is correct & II is incorrect
 (c) Statement I is incorrect & II is correct
 (d) Both statements are incorrect
153. The process, due to which water enters in seed coat when seed placed in water for germination, is :-
 (a) Diffusion (b) Osmosis
 (c) Guttation (d) Imbibition
154. *Pseudomonas* & *Thiobacillus* are :-
 (a) Nitrifying bacteria
 (b) Ammonifying bacteria
 (c) Denitrifying bacteria
 (d) N_2 - fixing bacteria
155. **Statement I** : Boron required for membrane functioning.
Statement II : Boron is a component of several enzymes, including nitrogenase and nitrate reductase both of which participate in nitrogen metabolism.
 (a) Both statements are correct.
 (b) Statement I is correct & II is incorrect.
 (c) Statement I is incorrect & II is correct.
 (d) Both statements are incorrect.
156. Environmental plasticity is shown by :-
 (a) Larkspur (b) Coriander
 (c) Cotton (d) Buttercup
157. Law of limiting factors was given by :
 (a) Von Sachs (b) Blackman
 (c) Engelmann (d) Van Niel
158. Continuity of apoplast is interrupted by water repellent suberin which is found in the _____ cells :-
 (a) Root epidermal
 (b) Stem epidermal
 (c) Root endodermal
 (d) Stem endodermal
159. "Only the green parts of the plants could release oxygen" was showed by :-
 (a) Joseph Priestly (b) Jan Ingenhousz
 (c) T.W. Engelmaan (d) Julius von Sachs
160. Vernalisation is done at
 (a) Lower temperature
 (b) Low light intensity
 (c) Higher temperature
 (d) High light intensity
161. Geometric Growth is expressed as :
 (a) $L_t = L_0 e^{rt}$ (b) $W_t = W_0 e^{rt}$
 (c) $L_t = L_0 + rt$ (d) $L_0 = L_t + rt$
162. Wasteful oxygenation reaction is catalysed by –
 (a) RuBisCO (b) PEPcase
 (c) Carboxylase (d) Thiokinase
163. During one Krebs cycle, number of CO_2 , NADH and $FADH_2$ molecules released, respectively are :-
 (a) 2, 3, 1 (b) 2, 3, 2
 (c) 3, 6, 2 (d) 6, 3, 1
164. In tissues micronutrient toxicity –
 (a) Decrease dry weight by 10%
 (b) Increase dry weight by 10%
 (c) Decrease dry weight by 90%
 (d) Increase dry weight by 90%
165. The form of sugar transported through phloem is
 (a) Glucose (b) Fructose
 (c) Sucrose (d) Ribose
166. Water potential of pure water at standard temperature is equal to
 (a) 10 (b) 20
 (c) Zero (d) None of these
167. Match the followings and choose the correct option
 A. Leaves (i) Anti-transpirant
 B. Seed (ii) Transpiration
 C. Roots (iii) Negative osmotic potential
 D. Aspirin (iv) Imbibition
 E. Plasmolyzed cell (v) Absorption
 (a) A-(ii), B-(iv), C-(v), D-(i), E-(iii)
 (b) A-(iii), B-(ii), C-(iv), D-(i), E-(v)
 (c) A-(i), B-(ii), C-(iii), D-(iv), E-(v)
 (d) A-(v), B-(iv), C-(iii), D-(ii), E-(i)

168. Identify A, B and C in given figure :



- (a) A – Transport molecule,
 B – Innerside of cell,
 C – Transport protein
- (b) A – Transport protein
 B – Transport molecule,
 C – membrane
- (c) A – Inner Side of cell,
 B – Membrane,
 C – Transport molecule
- (d) A – Membrane,
 B – Transport protein,
 C – Transported molecule
169. Which process does not directly depend on the presence of light but dependent on the product of light reaction
- (a) Biosynthetic phase
 (b) Photochemical phase only
 (c) Dark reaction
 (d) (a) and (c) both
170. The enzyme that is not found generally in a C_3 plant is
- (a) RuBP Carboxylase
 (b) PEP Carboxylase
 (c) NADP reductase
 (d) ATP synthase
171. When CO_2 is added to PEP, the first stable product synthesised is
- (a) Pyruvate
 (b) Glyceraldehyde-3-phosphate
 (c) Phosphoglycerate (PGA)
 (d) Oxaloacetate (OAA)
172. Nitrogen is not a component of:-
- (a) Protein (b) Chlorophyll
 (c) Nucleic acid (d) Glucose

 173. **Statement I** : ABA is also called the stress hormone.

Statement II : ABA stimulates the opening of stomata in the epidermis and decreases the tolerance of plants to various kinds of stresses.

- (a) Both statements are correct.
 (b) Statement I is correct & II is incorrect.
 (c) Statement I is incorrect & II is correct.
 (d) Both statements are incorrect.

 174. **Assertion** : On plotting the length of the organ against time, a linear curve is obtained in arithmetic growth.

Reason : In arithmetic growth, following mitotic cell division, only one daughter cell continues to divide while the other differentiates and matures.

- (a) Assertion and reason both are true and the reason is the correct explanation of assertion.
 (b) Assertion and reason both are true but reason is not the correct explanation of assertion.
 (c) Assertion is true but reason is wrong.
 (d) Assertion and reason both are wrong.

175. Match the following:

- | | |
|---------------|------------------------|
| A. IAA | (i) Herring sperm DNA |
| B. ABA | (ii) Bolting |
| C. Ethylene | (iii) Stomatal closure |
| D. GA | (iv) Weed-free lawns |
| E. Cytokinins | (v) Ripening of fruits |
- (a) A-(iv), B-(iii), C-(v), D-(ii), E-(i)
 (b) A-(v), B-(iii), C-(iv), D-(ii), E-(i)
 (c) A-(iv), B-(i), C-(v), D-(iii), E-(ii)
 (d) A-(v), B-(iii), C-(ii), D-(i), E-(iv)

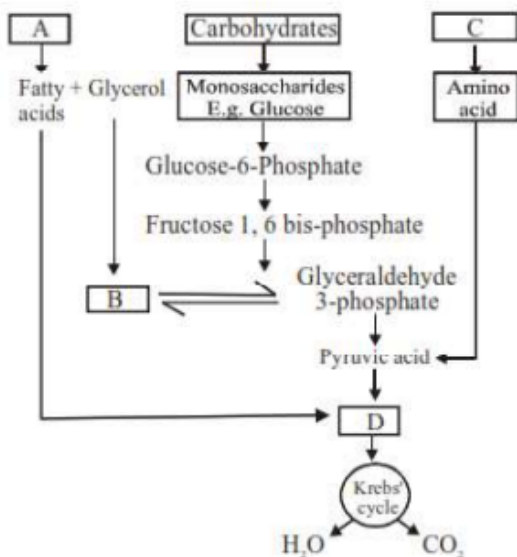
176. The Major limiting factor for photosynthesis:

- (a) CO_2 (b) H_2O
 (c) Light (d) Temperature

177. The term synergistic action of hormones refers to
 (a) When two hormones act together but bring about opposite effects.
 (b) When two hormones act together and contribute to the same function.
 (c) When one hormone affects more than one function.
 (d) When many hormones bring about any one function.

178. Plasticity in plant growth means that
 (a) Plant roots are extensible
 (b) Plant development is dependent on the environment
 (c) Stems can extend
 (d) Presence of any plastic material

179. The figure indicates the interrelationship among metabolic pathways. Now identify A to D



- | A | B | C | D |
|----------------|------------|---------|-------------|
| (a) Protein | Acetyl CoA | Fat | DHAP |
| (b) Fat | DHAP | Protein | Acetyl CoA |
| (c) Acetyl CoA | Fat | DHAP | Protein |
| (d) Fat | DHAP | Acetyl | Protein CoA |

180. Match the element with its associated functions/ role and choose the correct option among given below.

A. Boron	(i) Splitting of H_2O to liberate O_2 during photosynthesis
B. Manganese	(ii) Needed for synthesis of auxins
C. Molybdenum	(iii) Component of nitrogenase
D. Zinc	(iv) Pollen germination
E. Iron	(v) Component of ferredoxin

- (a) A-(i), B-(ii), C-(iii), D-(iv), E-(v)
 (b) A-(iv), B-(i), C-(iii), D-(ii), E-(v)
 (c) A-(iii), B-(ii), C-(iv), D-(v), E-(i)
 (d) A-(ii), B-(iii), C-(v), D-(i), E-(iv)

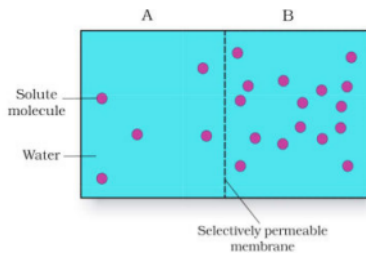
181. (i) Minerals are present in the soil as charged particles
 (ii) Concentration of minerals in soil is usually low as compared to root hair
 (iii) Minerals are present in the soil as neutral particles
 (iv) Concentration of minerals in soil is usually high as compared to root hair.
 Which of the above statements explains active absorption of minerals?
 (a) only (i) (b) (i), (ii)
 (c) only (iii) (d) (iii), (iv)

182. **Assertion:** Both *Rhizobium* and *Frankia* are free living in soil.

Reason: *Rhizobium* and *Frankia* as symbionts, can fix atmospheric nitrogen.

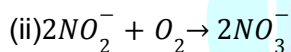
- (a) Assertion and reason both are true and the reason is the correct explanation of assertion.
 (b) Assertion and reason both are true but reason is not the correct explanation of assertion.
 (c) Assertion is true but reason is wrong.
 (d) Assertion and reason both are wrong.

183. Based on the figure given below which of the following statements is not correct?



- (a) Movement of solvent molecules will take place from chamber A to B
 (b) Movement of solute will take place from A to B
 (c) Presence of a semipermeable is necessary for this process to occur.
 (d) The direction and rate of osmosis depends on both the pressure gradient and concentration gradient.

184. Reactions carried out by N_2 fixing microbes include



Which of the following statements about these equations is not true?

- (a) Step (i) is carried out by Nitrosomonas or Nitrosococcus.
 (b) Step (ii) is carried out by Nitrobacter.
 (c) Both steps (i) and (ii) can be called nitrification
 (d) Bacteria carrying out these steps are usually photoautotrophs

185. With regard to the Biological Nitrogen Fixation by Rhizobium in association with soyabean, which one of the following statement/statements does not hold true?

- (a) Nitrogenase may require oxygen for its functioning
 (b) Nitrogenase is Mo-Fe protein
 (c) Leg-hemoglobin is a pink coloured pigment
 (d) Nitrogenase helps to convert N_2 gas into two molecules of ammonia

Section B

186. Dark reaction in photosynthesis is called so because

- (a) It can occur in dark also
 (b) It does not directly depend on light energy

- (c) It can not occur during daylight
 (d) It occurs more rapidly at night

187. The correct sequence of flow of electrons in the light reaction is

- (a) PS-II, plastoquinone, cytochromes, PS-I, ferredoxin
 (b) PS-I, plastoquinone, cytochromes, PS-II, ferredoxin
 (c) PS-I, ferredoxin, PS-II
 (d) PS-I, plastoquinone, cytochromes, PS-II, ferredoxin

188. In which of the following fermentation takes place under anaerobic condition?

- (a) In many prokaryotes
 (b) Unicellular eukaryotes
 (c) In germinating seeds
 (d) All of these

189. Which of the following plants are allowed to grow in a carbon dioxide enriched atmosphere that lead to higher yields?

- (a) Potato and sugarcane
 (b) Maize and Rice
 (c) Tomato and Bell pepper
 (d) Maize and Bell pepper

190. Coconut water contains

- (a) ABA (b) Auxin
 (c) Cytokinin (d) Gibberellin

191. The effect of apical dominance can be overcome by which of the following hormones?

- (a) IAA (b) Ethylene
 (c) Gibberellin (d) Cytokinin

192. Which of the following is not a feature of active transport of solute in plants?

- (a) Occurs against concentration gradient
 (b) Non-selective
 (c) Occurs through membranes
 (d) Requires ATP

193. Assertion : Excess of manganese may induce deficiencies of iron, magnesium and calcium. Reason : Manganese also inhibits calcium translocation in shoot apex.
 (a) Assertion and reason both are true and the reason is the correct explanation of assertion.
 (b) Assertion and reason both are true but reason is not the correct explanation of assertion.
 (c) Assertion is true but reason is wrong.
 (d) Assertion and reason both are wrong.
194. Root pressure develops due to
 (a) Passive absorption
 (b) Active absorption
 (c) Increase in transpiration
 (d) Low osmotic potential in soil.
195. Guard cells help in
 (a) Transpiration
 (b) Guttation
 (c) Fighting against infection
 (d) Protection against grazing.
196. Arithmetic Growth is expressed as :
 (a) $L_t = L_0 e^{rt}$
 (b) $W_t = W_0 e^{rt}$
 (c) $L_t = L_0 + rt$
 (d) $L_0 = L_t + rt$
197. With reference to factors affecting the rate of photosynthesis, which of the following statements is not correct?
 (a) Increasing atmospheric CO_2 concentration up to 0.05% can enhance CO_2 fixation rate.
 (b) C_3 plants respond to higher temperature with enhanced photosynthesis while C_4 plants have much lower temperature optimum.
 (c) Tomato is a greenhouse crop which can be grown in CO_2 - enriched atmosphere for higher yield.
 (d) Light saturation for CO_2 fixation occurs at 10% of full sunlight.
198. The process which makes major difference between C_3 and C_4 plants is
 (a) Glycolysis
 (b) Calvin cycle
 (c) Photorespiration
 (d) Respiration
199. A plant in your garden avoids photorespiratory losses, has improved water use efficiency, shows high rates of photosynthesis at high temperatures and has improved efficiency of nitrogen utilization. In which of the following physiological groups would you assign this plant?
 (a) CAM
 (b) Nitrogen fixer
 (c) C_3
 (d) C_4
200. Mark the given statements True (T) or False (F).
 (i) Transport over shorter distances proceeds through the vascular system which is called translocation.
 (ii) Transport in xylem is essentially unidirectional, however in phloem it is multidirectional.
 (iii) In diffusion, substances move from regions of higher concentration to regions of lower concentration.
 (iv) Joseph Priestley in 1770 performed a series of experiments that revealed the essential role of air in the growth of green plants.
 (v) O_2 evolved by the sulphur bacteria comes from H_2O .
 (vi) The mesophyll cells in the leaves have a large number of chloroplasts.
 (vii) The membrane system is responsible for trapping the light energy and also for the synthesis of ATP and NADPH in chloroplast.
 (viii) In dicotyledonous plants and gymnosperms, the lateral meristems, vascular cambium and cork-cambium appear later in life.
 (ix) Growth, at cellular level, is principally a consequence of increase in the amount of protoplasm.
 (a) F T T T F T T T T
 (b) F T T F F T T F T
 (c) T T F T T T F T F
 (d) F F T T F T T T T