TRANSPORT IN PLANTS

Exercise-1

✍ **Marked Questions are for Revision Questions.**

ONLY ONE OPTION CORRECT TYPE

SECTION # (A) Diffusion, Facilitated diffusion, osmosis, Active transport, DPD, Water potential plasmolysis, imbibition

1. A plant cell absorbs salts in
(1) Ionic form (2) Molecular form (3) Atomic form (4) Mixed colloidal form

2.✍ Osmotic pressure is maximum in
(1) Hydrophytes (2) Mesophytes (3) Xerophytes (4) Halophytes

3. O.P. of solution can be measured by
(1) Photometer (2) Osmometer (3) Calorimeter (4) Plasmolysis

4.✍ When a cell is placed in 0.25 M concentrated sugar solution, there is no changed in it. So the external solution is called
(1) Hypertonic (2) Isotonic (3) Hypotonic (4) None of the above

5. A cell increases in volume if the external medium is -
(1) Hypotonic (2) Hypertonic (3) Isotonic (4) None

6.✍ Plasmolysis occur due to
(1) Absorption (2) Osmosis (3) Endosmosis (4) Exosmosis

7. With increase in turgidity of a cell surrounded by water the wall pressure will
(1) Increase (2) Decrease (3) Fluctuate (4) Remain unchanged

8. The water potential and osmotic potential of pure water are
(1) 100 & 0 (2) 0 & 0 (3) 100 & 100 (4) 0 & 100

9.✍ The common material used in demonstrating plasmolysis in the laboratory is
(1) Garden Nasturtium (2) Balsam (3) Banyan (4) Tradescantia

10. The pressure exerted by wall of the cell on the protoplast is
(1) W.P (2) T.P (3) D.P (4) O.P

11. A cell with fully elastic wall is placed in hypertonic solution. What will not happen?
(1) Change in cell size and shape
(2) The whole cell will shrink
(3) Cytoplam shrinks from the cell wall and undergoes plasmolysis
(4) Decrease in cell size

12. D.P.D. stands for
(1) Diffusion pressure deficit (2) Diffusion pressure demand
(3) Daily photosynthetic depression (4) Daily phosphorus demand

13.✍ The osmotic parameter determining the flow of water from one cell to another is

(1) Osmotic pressure (2) Turgor pressure
(3) Diffusion pressure deficit (4) Hydrostatic pressure

14. Gum swells up in water due to
(1) Imbibition (2) Diffusion (3) Endosmosis (4) Turgidity

15. The initial stage or first step of water absorption by root cells is
(1) Imbibition (2) Adsorption (3) Osmosis (4) Deamination

16. An innovative professor who wanted to give a live demonstration of a physiological process, filled a glass bottle with previously moistened mustard seed and water. He screw-capped the bottle and kept it away in a corner and resumed his lecture. Towards the end of his lecture, there was sudden explosion with glass pieces of the bottle thrown around. Which of the following phenomenon did the professor want to demonstrate?
(1) Diffusion (2) Imbibition (3) Osmosis (4) Anaerobic respiration

17. Diffusion pressure deficit is the amount by which two solution differ in their
(1) T.P. (2) O.P. (3) D.P. (4) W.P.

18. The pressure exerted by the swelling protoplast on the walls of the cells is
(1) Wall pressure (2) Osmotic pressure (3) Suction pressure (4) Turgor pressure

19. If a plant cell is immersed in water, the water continues to enter the cell until the
(1) Concentration of the salt is the same inside the cell as outside
(2) Cell bursts
(3) Diffusion pressure is the same inside cell as outside
(4) Concentration of water is the same inside the cell as outside

20. The external solution having more concentration than the cell sap is called
(1) Hypertonic solution (2) Isotonic solution (3) Hypotonic solution (4) None of the above

21. The selectively permeable membrane of the cell is
(1) Plasmalemma (2) Cytoplasm (3) Cell wall (4) None of the above

22. When chemical fertilisers are given to plants, the soil is to be thoroughly watered otherwise the plants get killed because of
(1) Toxic effects of chemical (fertilisers) compounds
(2) Plasmolysis due to high concentration of fertilisers
(3) Failure of physiological process like photosynthesis and respiration
(4) None of the above

23. Water potential can be determined by
(1) OP + TP or ($\Psi S + \Psi P$) (2) OP-TP
(3) Ψ + WP (4) Ψ + TP

24. At low temperature the rate of water absorption decreases due to
(1) Decreased viscosity of water (2) Increased permeability
(3) reduced rate of diffusion (4) Increased root growth

25. Force causing the entry of water into root hairs is
(1) Osmotic pressure (2) Atmospheric pressure

(3) Turgor pressure (4) Suction pressure

26. Which of the following is a rapid type of absorption
(1) Passive absorption (2) Active absorption
(3) Salt absorption (4) Root absorption

27. The phenomenon of uptake of water at the expense of energy by the cell and usually against the osmotic gradient is known as
(1) Osmosis (2) Active absorption (3) Passive absorption (4) Imbibition

28. Which of the following one function as primary osmotic substance in opening and closing of stomata
(1) Water (2) Starch (3) Sugar (4) K - malate

29. The correct equation is
(1) $\psi_W = \psi_S + \psi_P + \psi_m$ (2) $\psi_S = \psi_W + \psi_P + \psi_m$ (3) $\psi_P = \psi_S + \psi_W + \psi_m$ (4) None of the above

SECTION # (B) Absorption of water by plants

1. Root cap has no role in water absorption because
(1) It has no direct connection with the vascular system
(2) It has loosely arranged cells
(3) It has not cells containing chloroplasts
(4) It has no root hairs

2. Movement of water from outside to the inside in cortex of root due to
(1) Gradient of water potential (2) Gradient of chemical potential
(3) Accumulation of organic solutes (4) Accumulation of inorganic salts.

3. The movement of water from one cell of the cortex to the adjacent one in roots is due to
(1) Water potential gradient
(2) Accumulation of inorganic salts in the cells
(3) Accumulation of organic compounds in the cell
(4) Chemical gradient

4. In soil the water which is available to roots is or which type of water is normally absorbed by plants.
(1) Gravitational water (2) Capillary water (3) Hygroscopic water (4) Surface water

5. Root hairs occur in the zone of root of-
(1) Cell division (2) Cell elongation (3) Cell maturation (4) None of above

6. Active absorption is influenced by
(1) Osmotic concentration (2) Adjacent tissue structure
(3) Transpiration (4) Suction pressure of root hairs

SECTION # (C) Transpiration, Guttation, Bleeding

1. Shape of stomata in cyandon leaf is
(1) Chordate (2) Raniform (3) Ovate (4) Dumb - bell shaped

2. The following percentage of water absorbed by herbaceous plants is lost in transpiration
(1) 80 (2) 60 (3) 99 (4) 40

3. Due to low atmospheric pressure the rate of transpiration will
(1) Remain unaffected (2) Increase (3) Decrease slowly (4) Decrease rapidly

4. The loss of water through cuticle may reach upto
(1) 5% (2) 20% (3) 10% (4) 40%

5. In a terrestrial habitat which of the following factors affect the temperature and rainfall conditions.
(1) Translocation (2) Transpiration (3) Transformation (4) Thermodenaturation

6. Stomata open at night and closed during day time in
(1) Xerophytes (2) Mesophytes (3) succulents (4) Hydrophytes

7. Hydathodes are found in
(1) Stem (2) Leaves (3) Roots (4) All the above

8. Guttation is
(1) Due to dew drops (2) Loss of water droplets from leaf surface
(3) Increase in root pressure (4) Increase in transpiration

9. Abscisic acid treatment result in
(1) Leaf expansion (2) Stem elongation (3) Stomata closure (4) Root elongation

10. True statement about lenticels and hydathodes is
(1) Opening and closing are not regulated (2) Helping exchange of respiratory gases
(3) Found all over the plant surface (4) Both occur on the same plant sturcture

11. The metal ion involved in stomatal regulations is
(1) Fe (2) Mg (3) Zn (4) K

12. The result of higher concentration of CO_2 inside leaf will be
(1) Opening of stomata (2) Closing of stomata
(3) No effect on stomata (4) Destruction of stomata

13. Excessive transpiration is due to
(1) Excessive amount of water present in soil (2) Environment is dry and temperature is high
(3) Environment saturate through moist (4) Wind does not move

14. Cuticular transpiration is approx
(1) 50% in herbs and Ferns (2) 97% in most of the plants
(3) 1% of total transpiration (4) 50% in most of the plants

15. High amount of malate in guard cell during stomatal opening is due to
(1) Import from subsidiary cell (2) Hydrolysis of starch
(3) Photosynthesis in guard cell (4) Hydrolysis of proteins

16. What is the action spectrum of transpiration
(1) Green and ultraviolet (2) Orange and red
(3) Blue and far red (4) Blue and red

17. Which one is not related to transpiration?
(1) Regulation of plant body temperature (2) Absorption and distribution of mineral salts
(3) Circulation of water (4) Bleeding

18. The basis of stomatal opening
(1) Exo-osmosis (2) Decreased cell sap concentration
(3) Potassium efflux (4) Increased turgor pressure

19. Which one of the following plant hormone is known as a stress hormone
(1) Gibberellin (2) Kinetin (3) Auxin (4) Abscisic acid

20. Liberation of water through hydathodes is
(1) Guttation (2) Hydrolysis (3) Transpiration (4) Excretion

21. In guttation, water is lost in the form of
(1) Water vapours (2) Dilute solution of sugars
(3) Pure liquid water (4) Dilute solution of salts and organic substances

22. The ultimate cause for the movement of water against gravity in a tree is
(1) Photosynthesis (2) Osmosis (3) Transpiration (4) Imbibition

23. Rate of transpiration is related to
(1) Light and temperature
(2) Light, temperature, atmospheric humidity and wind
(3) Light, temperature and wind
(4) Soil and temperature

SECTION # (D) Ascent of sap, Mineral salt absorption, Translocation of organic solutes.

1. Root pressure is maximum when
(1) Transpiration is high and absorption in very low
(2) Transpiration is very low and absorption is high
(3) Transpiration is very high and absorption is also high
(4) Transpiration and absorption both are slow

2. Translocation of photosynthates occur in the form of
(1) Starch (2) Glucose (3) Sucrose (4) 3 PGA

3. Transpiration-cohesion-tension theory operates in-
(1) Active absorption (2) Passive absorption
(3) Both active ans passive (4) None

4. Girdling experiment can not be performed in sugarcane, because -
(1) Vascular bundles are arranged in ring (2) Vascular bundles are scattered
(3) Phloem situated internal to xylem (3) Sugarcane plants are too delicate

5. Water in plants is transported by (Ascent of sap takes place through)
(1) Cambium (2) Phloem
(3) Xylem or xylem vessel elements (4) Epidermis

6. Dixon and Jolly are associated with-
(1) Light reaction of photosynthesis (2) Anaerobic respiration
(3) Cohesion theory of ascent of Sap (4) Apical dominance

MISCELLANEOUS QUESTIONS

1. Active absorption occurs through
(1) Transpiration pull (2) Imbibition
(3) Osmotic concentration of cell (4) Osmotic pressure

2. What will be zero in fully turgid cell
(1) TP (2) OP (3) DPD (4) WP

3. Leaf which bear stomata on both surfaces
(1) Non -stomatic (2) Epistomatic (3) Hypostomatic (4) Amphistomatic

4. Which factor is helpful in closing of stomata
(1) Auxin (2) Cytokinins (3) ABA (4) MH

5. Which of the following process initiates the entrance of water in plant cell
(1) Osmosis (2) Diffusion
(3) Osmosis & Imbibition (4) Imbibition

6. Rate of transpiration is high in
(1) C_3 plants (2) C_4 plants (3) CAM plants (4) Both C_3 and C_4 plants

7. Which is the most important factor in regulation of transpiration
(1) Light (2) Temperature (3) Humidity (4) Wind.

8. Epithem is associated with
(1) Respiration (2) Guttation (3) Transpiration (4) Photosynthesis

9. Choose the correct sequence of events during wilting
(1) Exosmosis, deplasmolysis, temporary wilting, permanent wilting
(2) Exosmosis, plasmolysis, temporary wilting, permanent wilting.
(3) Endosmosis, plasmolysis, temporary wilting, permanent wilting.
(4) Exosmosis, deplasmolysis, plasmolysis, temporary wilting, permanent wilting.

10. A plasmolysed cell placed in hypotonic solution then the water enter in it, the force which is responsible for it is
(1) DPD (2) OP (3) WP (4) none of the above

11. The cell become shrink, when it is placed in
(1) Hypotonic (2) Hypertonic (3) Isotonic (4) None of the above

12. Amount by which water potential is reduced due to presence of solute is called
(1) Pressure potential (2) Solute potential
(3) Matric potential (4) None of the above

13. Osmotic pressure of a solution is
(1) More than that of pure solvent (2) Less than that of pure solvent
(3) Variable depending upon concentration (4) Equal to that of pure solvent

14. Which is Zero in Turgid cell

(1) OP (2) TP (3) DPD (4) DP

15. Which of the following statement is correct for absorption of water from root hairs
(1) Concentration of outer environment is more than cell sap
(2) Concentration of cell sap is more than outer environment
(3) Concentration of outer environment is equal to the cell sap
(4) Concentration of cell sap is less than outer environment

16. Water potential is maximum in case of
(1) Pure water (2) 2% glucose (3) 10% glucose (4) 10% NaCl

17. Wilting occurs when there is
(1) Transpiration higher than absorption (2) Absorption higher than transpiration
(3) Higher relative humidity of atmosphere (4) Excess root pressure.

18. Guttation occurs through
(1) Hydathodes (2) Lenticels (3) Cuticle (4) None of these.

19. Stomata generally operate in response to
(1) Atmospheric humidity (2) Soil temperature
(3) Atmospheric temperature (4) Light

20. Match the columns and find out the correct combination

	I		II
(a)	Bulliform cells	(i)	Lenticels
(b)	Subsidiary cells	(ii)	Isobilateral leaf
(c)	Epithem	(iii)	Stomata
(d)	Cork cells	(iv)	Phellem

(1) (a) – (ii), (2) – (iii), (3) – (i), (4) – (iv) (2) (a) – (i), (2) – (ii), (3) – (iv), (4) – (iii)
(3) (a) – (iii), (2) – (ii), (3) – (iv), (4) – (i) (4) (a) – (iii), (2) – (iv), (3) – (ii), (4) – (i)

21. Passive absorption occurs due to
(1) Tension in root (2) Tension in xylem sap
(3) ATP (4) None of the above

22. The cell becomes turgid in solution which is
(1) Hypertonic (2) Isotonic (3) Hypotonic (4) None of the above.

23. Transpiration is mainly a process of
(1) Imbibition (2) Respiration (3) Osmotic pressure (4) Diffusion

24. A cell when dipped in 0·5 M sucrose solution has no effect but when the same cell is dipped in 0·5 M NaCl solution, it will
(1) Increase in size (2) Decrease in size (3) Becomes turgid (4) Gets plasmolysed.

25. Wilting of plants occurs due to
(1) Blockage of xylem (2) Blockage of phloem

(3) Increased transpiration (4) Both 1 and 2

26. Which is incorrect

(1) $\Psi w = \Psi\pi + \Psi p$ (2) $\Psi w = \Psi m + \Psi\pi + \Psi p$

(3) $\Psi w = \Psi s + \Psi p$ (4) $\Psi w = \Psi m - \Psi\pi + \Psi p$

27. Rate of transpiration will increase if

(1) RH increases (2) RH decreases

(3) RH remains unchanged (4) Water potential gradient remains unchanged

28. Enzyme connected with stomatal opening is

(1) Pyruvic kinase (2) Cytochrome oxidase (3) PEP carboxylase (4) RuBISCO

29. Movement of ions or molecules against electrochemical gradient is called

(1) Pinocytosis (2) Diffusion (3) Active transport (4) Brownian movement.

30. Opening of stomata is not affected by

(1) N_2 (2) K^+ ions (3) Starch (4) None of these.

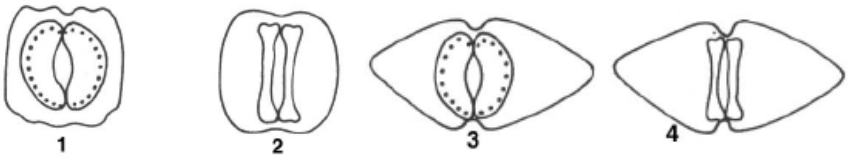
Exercise-2

1. Which of the following will have a value of zero in a fully turgid cell? **(3rd NSEB)**

(1) Osmotic pressure (2) Suction pressure

(3) Diffusion pressure deficit (4) Both (2) and (3)

2.# Of the figures 1, 2, 3, 4 the stomatal apparatus belong to jowar is : **(2nd NSEB)**



(1) 1 (2) 2 (3) 3 (4) 4

3. Purple cabbage leaves do not lose their colour in cold water but do so in boiling water because:

(NSEB 2009-2010)

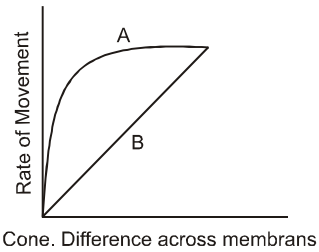
(1) The pigment is not soluble in water at low temperature.

(2) The cell wall becomes porous in hot water

(3) The cell membrane is disorganised at high temperature

(4) The pigment breaks down at higher temperature

4.# The accompanying figure depicts movement of a solute across a membrane without consumption of energy. 'A' and 'B' would be: **(NSEB 2009-2010)**



(1) facilitated diffusion and passive diffusion (2) passive diffusion and active transport
(3) passive diffusion and facilitated diffusion (4) facilitated diffusion and active transport

5. If paraffin is injected in the roots of plants what is likely to happen **(NSEB 2010-2011)**
(1) Cells will die and there will not be any transport of water
(2) Apoplast route of transport of water will operate but symplast and transmembrane route will be blocked
(3) Apoplast and transmembrane routes will operate but symplast route will be blocked
(4) Symplast and transmembrane routes will operate but apoplast route will be blocked

6. During the opening of stomata, the organic malate ions are produced in the guard cells for maintaining the: **(NSEB 2011-2012)**
(1) negative voltage to take in potassium ions (2) photosynthetic products in active osmotic form
(3) calcium ions in lesser concentration (4) respiratory pathway in aerobic mode

7. Stomata on the surface of a plant leaf open when water flows: **(1st-ABO)**
(1) out from the guard cells (2) into the guard cells
(3) from the xylem to palisade mesophyll cell (4) from the xylem to the leaf surface

8. Which of the following cannot be a strategy to overcome water stress in plants? **(4th-NSEB)**
(1) Reduction of surface area (2) Closing of stomata
(3) Increasing the rate of photosynthesis (4) Inhibition of growth

9. Grapes were put in a concentrated sugar solution. On examination after 12 hours, the grapes were shrunken. This is because: **(KVPY-2007)**
(1) Grapes become sweeter (2) Water evaporates from the solution
(3) Sugar induces disintegration of grapes (4) Loss of water from grapes by osmosis

10. In an experiment to monitor the ascent of sap, the following treatments were carried out to a twig dipped in water. In which case wilting will be observed? **(KVPY-2007)**
(1) Bark removed (2) Pith removed
(3) Twig cut into half (4) Glucose added to water

11. Root pressure on a tree is typically about 2-6 atm. This is sufficient to raise the water level upto a few feet. Tall trees get water at the top due to: **(KVPY-2007)**
(1) Capillary rise and suction
(2) A pump operating in the growing tree
(3) Fed by rain water
(4) Water content in the atmosphere

12. Osmosis takes place between two solutions separated by a semipermeable membrane because. **(KVPY-2008)**

(1) Water molecules move from the more dilute solution to the less dilute solution
(2) Solute molecules move from the less dilute solution to the more dilute solution
(3) Water molecules move from the less dilute solution to the more dilute solution
(4) Solute molecules move from the more dilute solution to the less dilute solution

13. Plasmolysis is not observed in boiled plant tissue because: **(KVPY-2008)**
(1) The cell wall becomes impermeable to water
(2) The cell membrane disintegrates
(3) The cell wall disintegrates
(4) The cell membrane becomes impermeable to water

14. A cell will experience the highest level of endosmosis when it is kept in **(KVPY-2012)**
(1) distilled water (2) sugar solution (3) salt solution (4) protein solution

Exercise-3

PART - I : NEET / AIPMT QUESTION (PREVIOUS YEARS)

1. Movement of water through semipermeable membrane produces **(AIPMT-2001)**
(1) Wall pressure (2) Suction pressure (3) Osmotic pressure (4) Turgor pressure

2. Main function of lenticel is **(AIPMT-2002)**
(1) Transpiration (2) Guttation (3) Bleeding (4) Gaseous exchange

3. Stomata of CAM plants **(AIPMT-2003)**
(1) Are always open (2) Open during the day and close at night
(3) Open during night and close during the day (4) Never open

4. Stomata of a plant open due to **(AIPMT-2003)**
(1) Influx of potassium ions (2) Efflux of potassium ions
(3) Influx of hydrogen ions (4) Influx of calcium ions

5. Potometer works on the principle of **(AIPMT-2005)**
(1) Osmotic pressure
(2) Amount of water absorbed equals the amount of water transpired
(3) Root pressure
(4) Potential difference between tip of tube and that of plant

6. A and B cells are contiguous. Cell A has OP = 10 atm. TP = 7 atm and DPD = 3 atm. Cell B has OP = 8 atm, TP = 3 atm and DPD = 5 atm. The result would be **(AIPMT-2007)**
(1) No movement of water (2) Equilibrium between the two
(3) Movement of water from A to B (4) Movement of water from B toA.

7. Guard cells help in **(AIPMT-2009)**
(1) Fighting against infection (2) Protection against grazing
(3) Transpiration (4) Guttation

8. In land plants, the guard cells differ from other epidermal cells in having: **(AIPMT Pre.-2011)**
(1) Cytoskeleton (2) Mitochondria
(3) Endoplasmic reticulum (4) Chloroplasts

9. Guttation is the result of: **(AIPMT Mains-2011)**
(1) Diffusion (2) Transpiration (3) Osmosis (4) Root pressure

10. Which one of the following elements in plants is not remobilised **(AIPMT Pre.-2011)**
(1) Phosphorus (2) Calcium (3) Potassium (4) Sulphur

11. Which of the following criteria does not pertain to facilitated transport? **(NEET-2013)**
(1) High selectivity (2) Transport saturation
(3) Uphill transport (4) Requirement of special membrane proteins

12. The osmotic expansion of a cell kept in water is chiefly regulated by: **(AIPMT-2014)**
(1) Mitochondria (2) Vacuoles (3) Plastids (4) Ribosomes

13. Water vapour comes out from the plant leaf through the stomatal opening. Through the same stomatal opening carbon. Dioxide diffuses into the plant during photosynthesis. Reason out the above statements using one of following options: **(NEET-I-2016)**
(1) One process occurs during day time, and the other at night.
(2) Both processes cannot happen simultaneously.
(3) Both processes can happen together because the diffusion coefficient ofwater and CO2 is different.
(4) The above processes happen only during nighttime.

14. A few drops of sap were collected by cutting across a plant stem by a suitable method. The sap was tested chemically. Which one of the following test results indicates that it is phloem sap? **(NEET-II-2016)**
(1) Absence of sugar (2) Acidic
(3) Alkaline (4) Low refractive index

15. The water potential of pure water is: **(NEET-2017)**
(1) Zero (2) Less than zero
(3) More than zero but less than one (4) More than one

16. Which of the following facilitates opening of stomatal aperture? **(NEET-2017)**
(1) Contraction of outer wall of guard cells
(2) Decrease in turgidity of Guard cells
(3) Radial orientation of cellulose microfibrils in the cell wall of guard cells
(4) Longitudinal orientation of cellulose microfibrils in the cell wall of guard cells

17. Stomatal movement is *not* affected by **(NEET-2018)**
(1) Temperature (2) CO_2 concentration
(3) O_2 concentration (4) Light

18. Xylem translocates : **(NEET-1-2019)**
(1) Water, mineral salts, some organic nitrogen and hormones
(2) Water only
(3) Water and mineral salts only
(4) Water, mineral salts· and Some organic nitrogen only

19. What is the direction of movement of sugars in phloem? **(NEET-1-2019)**

(1) Bi-directional (2) Non-multidirectional
(3) Upward (4) Downward

20. The main difference between active and passive transport across cell membrane is : **(NEET-2-2019)**
(1) passive transport is non-selective whereas active transport is selective.
(2) passive transport requires a concentration gradient across a biological membrane whereas active transport requires energy to move solutes.
(3) passive transport is confined to anionic carrier proteins whereas active transport is confined to cationic channel proteins.
(4) active transport occurs more rapidly than passive transport.

21. Which of the following is not a feature of active transport of solutes in plants? **(NEET-2-2019)**
(1) Occurs against concentration gradient (2) Non-selective
(3) Occurs through membranes (4) Requires ATP

22. What will be the direction of flow of water when a plant cell is placed in a Hypotonic solution? **(NEET-2-2019)**
(1) Water will flow in both directions. (2) Water will flow out of the cell.
(3) Water will flow into the cell. (4) No flow of water in any direction.

PART - II : AIIMS QUESTION (PREVIOUS YEARS)

1. Enzyme connected with opening and closing of stomata is **(AIIMS-1999)**
(1) α- amylase (2) Pyruvic kinase (3) PEP carboxylase (4) RuDP carboxylase

2. Rate of transpiration is measured by **(AIIMS-2000)**
(1) Ganong's potometer (2) Porometer (3) Auxanometer (4) Respirometer

3. Wooden doors swell up during rainy season due to **(AIIMS-2001)**
(1) Endosmosis (2) Imbibition (3) Capillarity (4) Exosmosis

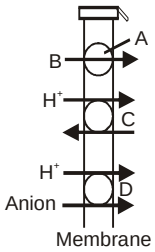
4. In plants water moves from **(AIIMS-2001)**
(1) Less negative to more negative gradient (2) More negative to less negative gradient
(3) Similar gradient (4) Zero gradient.

5. If turgor pressure becomes equal to osmotic pressure **(AIIMS-2002)**
(1) Water leaves the cells (2) Water enters the cells
(3) No exchange of water takes place (4) solute pass out of the cell.

6. Which of the following helps in ascent of sap? **(AIIMS-2006)**
(1) root pressure (2) transpiration (3) capillarity (4) all of these

7. In succulent plants the stomata open in night and close in day. Which among the following would be best hypothesis to explain the mechanism of stomatal action in night only? **(AIIMS-2008)**
(1) CO_2 accumulates, reduces pH, stimulate enzymes resulting in accumulation of sugars.
(2) Increase in CO_2 concentration, conversion of organic acids, resulting in K^+ transport.
(3) Low CO_2 concentration accumulates organic acids resulting in the increased concentration of cell sap.
(4) CO_2 used up, increase pH results in accumulation of sugars.

8.# What do A, B, C, and D represent in the following figure? **(AIIMS-2010)**



(1) A : carrier protein, B : symport, C : uniport, D : anti port
(2) A : carrier protein, B : uniport, C : antiport, D : symport
(3) A : carrier protein, B : antiport, C : symport, D : uniport
(4) A : carrier protein, B : uniport, C : symport, D: antiport

9. Excessive loss of water causes wilting of leaves, it can be prevented by: **(AIIMS-2012)**

(1) Keeping the plant in bright light (2) Spraying the plant with alcohol

(3) Applying vaseline on the leaf surface (4) Adding high amounts of fertilizers to the soil

10. If a stem is girdled **(AIIMS-2012)**

(1) Root dies first (2) Shoot dies first

(3) Both die together (4) None of the above would die

11. In which method of transport in plasma membrane does not require carrier molecule? **(AIIMS-2014)**

(1) Active transport (2) Facilitated diffusion (3) Simple diffusion (4) Na^+ - K^+ pump.

12. A botanist discovered a mutant plant that was unable to produce materials that form casparian strip. This plant would be **(AIIMS-2015)**

(1) Unable to transport water or solutes to the leaves.

(2) Unable to use its sugar as a sugar sink.

(3) Able to exert greater root pressure than the normal plant.

(4) Unable to control amounts of water and-solutes it absorbs

13. A boy is studying transport of a certain type of molecules into cell. He finds that transport slows down when the cells are poisoned with a chemical that inhibits energy production. Under normal circumstances the molecules studied by the boy is probably transported by **(AIIMS-2016)**

(1) simple diffusion (2) osmosis (3) active transport (4) facilitated diffusion

14. The modified equation for water potential is **(AIIMS-2017)**

(1) $\Psi_w = \Psi_s + \Psi_p$ (2) $\Psi_w = \Psi_s - \Psi_p$ (3) $\Psi_w = \Psi_s$ (4) $\Psi_w = \Psi_P - \Psi_p$

15. The desert grasses, often curls their leaf to minimise water loss due to presence of **(AIIMS-2017)**

(1) spines (2) palisade parenchyma

(3) bundle sheath cells (4) bulliform cells

Answers

EXERCISE - 1

SECTION (A)

1.	(1)	**2.**	(4)	**3.**	(2)	**4.**	(2)	**5.**	(1)	**6.**	(4)	**7.**	(1)
8.	(2)	**9.**	(4)	**10.**	(1)	**11.**	(3)	**12.**	(1)	**13.**	(3)	**14.**	(1)
15.	(1)	**16.**	(2)	**17.**	(3)	**18.**	(4)	**19.**	(3)	**20.**	(1)	**21.**	(1)
22.	(2)	**23.**	(1)	**24.**	(3)	**25.**	(4)	**26.**	(1)	**27.**	(2)	**28.**	(4)
29.	(1)												

SECTION (B)

1.	(4)	**2.**	(1)	**3.**	(1)	**4.**	(2)	**5.**	(3)	**6.**	(1)

SECTION (C)

1.	(4)	**2.**	(3)	**3.**	(2)	**4.**	(3)	**5.**	(2)	**6.**	(3)	**7.**	(2)
8.	(2)	**9.**	(3)	**10.**	(1)	**11.**	(4)	**12.**	(2)	**13.**	(2)	**14.**	(1)
15.	(2)	**16.**	(4)	**17.**	(4)	**18.**	(4)	**19.**	(4)	**20.**	(1)	**21.**	(4)
22.	(3)	**23.**	(2)										

SECTION (D)

1.	(2)	**2.**	(3)	**3.**	(2)	**4.**	(2)	**5.**	(3)	**6.**	(3)

Miscellaneous Questions

1.	(3)	**2.**	(3)	**3.**	(4)	**4.**	(3)	**5.**	(3)	**6.**	(1)	**7.**	(3)
8.	(2)	**9.**	(2)	**10.**	(1)	**11.**	(2)	**12.**	(2)	**13.**	(1)	**14.**	(3)
15.	(2)	**16.**	(1)	**17.**	(1)	**18.**	(1)	**19.**	(4)	**20.**	(1)	**21.**	(2)
22.	(3)	**23.**	(4)	**24.**	(4)	**25.**	(3)	**26.**	(4)	**27.**	(2)	**28.**	(3)
29.	(3)	**30.**	(1)										

EXERCISE - 2

1.	(4)	**2.**	(4)	**3.**	(3)	**4.**	(1)	**5.**	(4)	**6.**	(2)	**7.**	(2)
8.	(3)	**9.**	(4)	**10.**	(4)	**11.**	(1)	**12.**	(1)	**13.**	(2)	**14.**	(1)

EXERCISE - 3

PART- I

1.	(4)	**2.**	(4)	**3.**	(3)	**4.**	(1)	**5.**	(2)	**6.**	(3)	**7.**	(3)
8.	(4)	**9.**	(4)	**10.**	(2)	**11.**	(3)	**12.**	(2)	**13.**	(3)	**14.**	(3)
15.	(1)	**16.**	(3)	**17.**	(3)	**18.**	(1)	**19.**	(1)	**20.**	(2)	**21.**	(2)
22.	(3)												

PART- II

1.	(3)	**2.**	(1)	**3.**	(2)	**4.**	(1)	**5.**	(3)	**6.**	(2)	**7.**	(2)
8.	(2)	**9.**	(3)	**10.**	(1)	**11.**	(3)	**12.**	(4)	**13.**	(3)	**14.**	(1)
15.	(4)												

MINERAL NUTRITION & NITROGEN FIXATION

Exercise-1

SECTION # (A) Methods to study mineral requirements of plants, Essential mineral elements, Role of macro and micronutrients, deficiency symptoms of essential elements, Toxicity of micronutrients

1. The most important use of potassium is that
(1) It provides red colour to the fruit
(2) It influences enzymatic activity which regulates many plant processes
(3) It aids photosynthesis
(4) It helps in the formation of cambium

2. The four elements that make up 99% of all elements found in a living system are
(1) C, H, O, S (2) C, H, O, P (3) C, N, O, P (4) H, O, C,N

3. Essential micronutrients are also known as
(1) Trace elements (2) Tracer element (3) Radioisotopes (4) Organic nurients

4. The technique of plants by keeping their roots in nutrient solution is called
(1) Geoponics (2) Aeroponics (3) Hydroponics (4) All the above

5. If chlorophyll is burnt, which element will be left
(1) Fe (2) Mn (3) Mg (4) Mo

6. The element which is required in largest quantites by plants
(1) Phosphorus (2) Nitrogen (3) Sulphur (4) Calcium

7. Phosphorus is structural element in
(1) Proteins (2) Cytochrome
(3) DNA Polynucleotide (4) Carbohydrates

8. Which one of the following element plays an important role in biological nitrogen fixation
(1) Zn (2) Cu (3) Mo (4) Mn

9. Excess of manganese may induce deficiences of
(1) Iron (2) Calcium (3) Magnesium (4) All of these

10. Which of these elements is obtained from both mineral and non-mineral sources
(1) C (2) N (3) O (4) H

11. Plants need one of the following for ATP formation
(1) N, P (2) C, Cu (3) N, Ca (4) K.

12. Which one is essential for root growth
(1) Zn (2) Ca (3) Mo (4) S.

13. The chief sinks for the mineral elements are

(1) Senescent leaves (2) Ripe fruits (3) Lateral meristems (4) Bark

14. The ion controlling stomatal movement is
(1) Na^+ (2) Ca^{2+} (3) Mg^{2+} (4) K^+

SECTION # (B) Mechanism of absorption of Elements, translocation of solutes.

1. By which method most mineral accumulation occurs
(1) By active method (2) By passive method (3) Both of the above (4) None of the above

2. The energy of metabolism is used in uptake of ions is determinated by
(1) Increased ion uptake in the presence of NADP
(2) Increased ion uptake in the presence of O_2
(3) Decreased ion uptake in the presence of ATP
(4) Increased ion uptake in the presence of ATP

SECTION # (C) Nitrogen Metabolism

1. Transported and storage form of nitrogen in plants are
(1) Amides (2) Polypeptides (3) Amino acids (4) α-Ketoglutaric acid

2. Which of the following is / are diazotrophs
(1) Rhizobium and Azotobacter (2) Frankia and Klebsiella
(3) Anabaena and Nostoc (4) All of these

3. Plants absorb nitrogen as
(1) Nitrate (2) Nitrite (3) Ammonia and Urea (4) All the above

4. Nitrogen fixing bacterium is
(1) Frankia (2) Nostoc (3) Mycoplasma (4) Chlamydia

5. Reaction of α-ketoglutaric acid with ammonia to form glutamic acid is
(1) Oxidative amination (2) Reductive amination
(3) Transamination (4) ammonification

6. An anaerobic bacterium capable of nitrogen fixation is -
(1) Chlorobium (2) Bacillus (3) Clostridium (4) Azotobacter

MISCELLANEOUS QUESTIONS

1. Khaira disease of rice is due to
(1) Zn deficiency (2) Mo deficiency (3) B deficiency (4) Fungus

2. Reservoir of Sulphur is
(1) Rocks (2) Oceans (3) Atmosphere (4) Lakes

3. Yield of Rice is enhanced by
(1) Azolla (2) Anabaena (3) Nostoc (4) Clostridium

4. In paddy fields biological nitrogen fixation is chiefly brought by
(1) Cyanobacteria (2) Green algae (3) Mycorrhiza (4) Rhizobium

Exercise-2

1. $2NH_3 + 3O_2 \rightarrow 2NHO_2 + 2H_2O$ + energy in this reaction nitrifying bacteria indicates that they are **(1St NSEB)**

(1) Photoautotrophic (2) chemoautotrophic (3) photoheterotrophic (4) chemoheterotrophic

2. The mineral element in chlorophyll and haemoglobin is respectively **(2nd NSEB)**

(1) Ca and Mg (2) Co and Fe (3) Mg and Fe (4) Cd and Fe

3. Insectivorous plants digest insects to get an essential nutrient. Other plants generally get this nutrient from the soil. What is this nutrient? **(KVPY-2010)**

(1) Oxygen (2) Nitrogen (3) Carbon dioxide (4) Phosphates

Exercise-3

PART - I : NEET/AIPMT QUESTION (PREVIOUS YEARS)

1. Magnesium is an important component of **(AIPMT-2000)**

(1) Haemoglobin (2) Florigen (3) Enzymes (4) Chlorophyll.

2. Element present in middle lamella is **(AIPMT-2001)**

(1) Zn (2) Cu (3) Ca (4) K

3. Major role of minor elements inside living organisms is to act as **(AIPMT-2003)**

(1) Binder of cell structure (2) Constituent of hormones

(3) Building blocks of important amino acids (4) Cofactor of enzymes.

4. Plants deficient in zinc, show reduced biosynthesis of growth hormone **(AIPMT-2003)**

(1) Cytokinin (2) Auxin (3) Ethylene (4) Abscisic acid.

5. Nitrogen is not a constituent of **(AIPMT-2003)**

(1) Invertase (2) Pepsin (3) Bacteriochlorophyll (4) Idioblast.

6. Boron assists in **(AIPMT-2003)**

(1) Activation of enzymes (2) Photosynthesis

(3) Sugar transport (4) Acting as enzyme cofactor.

7. Grey spots of Oat are caused by deficiency of **(AIPMT-2003)**

(1) Cu (2) Zn (3) Mn (4) Fe.

8. All the nitrogenase enzyme has been inactivated by radiation. There will be no **(AIPMT-2004)**

(1) Fixation of atmospheric nitrogen (2) Fixation of nitrogen by legumes

(3) Conversion of nitrate to nitrite in legumes (4) Conversion of ammonia to nitrate in soil.

9. The most abundant element found in plants is **(AIPMT-2004)**

(1) Carbon (2) Nitrogen (3) Iron (4) Manganese.

10. Which group of three micronutrient elements affect both photosynthetic and mitochondrial electron transport **(AIPMT-2005)**
(1) Cu, Mn, Fe (2) Co, Ni, Mo (3) Ca, K, Na (4) Mn, Co, Ca.

11. Farmers of a particular region are concerned that premature yellowing of leaves of pulse crop might cause decrease in the yield. Which treatment could be beneficial to obtain maximum seed yield. **(AIPMT-2005)**
(1) Application of iron and magnesium to promote chlorophyll synthesis
(2) Frequent irrigation of crop
(3) Treatment of plants with cytokinins alongwith a small dose of nitrogen fertilizer
(4) Removal of all yellow leaves and spraying the remaining green leaves with 2, 4, 5-T.

12. Sulphur is an important nutrient for optimum growth and productivity in **(AIPMT-2005)**
(1) Oil seed crops (2) pulse crops (3) Cereals (4) Fibre crops.

13. Nitrite is changed to nitrate by **(AIPMT-2007)**
(1) Nitrobacter (2) Nitrosomonas (3) Pseudomonas (4) Clostridium

14. Which of the following is a symbiotic nitrogen fixer **(AIPMT-2009)**
(1) Azolla (2) Glomus (3) Azotobacter (4) Frankia

15. Which one of the following is not a micronutrient **(AIPMT-2010)**
(1) Magnesium (2) Zinc (3) Boron (4) Molybdenum

16. An element playing important role in nitrogen fixation is **(AIPMT-2010)**
(1) Copper (2) Manganese (3) Zinc (4) Molybdenum

17. The common nitrogen-fixer in paddy fields is **(AIPMT-2010)**
(1) Azospirillum (2) Oscillatoria (3) Frankia (4) Rhizobium

18. A prokaryotic autotrophic nitrogen fixing symbiont is found in: **(AIPMT Pre.-2011)**
(1) Alnus (2) Cycas (3) Cicer (4) Pisum

19. An organism used as a biofertilizer for raising soyabean crops is: **(AIPMT Pre.-2011)**
(1) Azotobacter (2) Azospirillum (3) Rhizobium (4) Nostoc

20. Nitrifying bacteria: **(AIPMT Pre.-2011)**
(1) Oxidize ammonia to nitrates (2) Convert free nitrogen to nitrogen compounds
(3) Convert proteins into ammonia (4) Reduce nitrates to free nitrogen

21. The function of leghaemoglobin in the root nodules of legumes is: **(AIPMT Pre.-2011)**
(I) inhibition of nitrogenase activity (2) oxygen removal
(3) nodule differentiation (4) expression of nif gene

22. Which one of the following is not an essential mineral element for plants while the remaining three are **(AIPMT Mains-2011)**
(1) Iron (2) Manganese (3) Cadmium (4) Phosphorus

23. Which one of the following is correctly matched? **(AIPMT-2012)**
(1) Passive transport of nutrients - ATP (2) Apoplast - Plasmodesmata
(3) Potassium - Readily mobilised (4) Bakanae of rice seedlings - F. Skoog

24. A nitrogen-fixing microbe associated with Azolla in rice fields is : **(AIPMT-2012)**
(1) Spirulina (2) Anabaena (3) Frankia (4) Tolypothrix

25. For its action, nitrogenase requires: **(AIPMT-2012)**
(1) High input of energy (2) Light
(3) Mn^{2+} (4) Super oxygen radicals

26. The first stable product of fixation of atmospheric nitrogen in leguminous plants is: **(NEET-2013)**
(1) Ammonia (2) NO_3^- (3) Glutamate (4) NO_2^-

27. The most abundant intracellular cation is : **(NEET-2013)**
(1) Ca^{++} (2) H^+ (3) K^+ (4) Na^+

28. Deficiency symptoms of nitrogen and potassium are visible first in: **(AIPMT-2014)**
(1) Senescent leaves (2) Young leaves (3) Roots (4) Buds

29. Which is essential for the growth of root tip? **(NEET-II-2016)**
(1) Mn (2) Zn (3) Fe (4) Ca

30. In which of the following forms is iron absorbed by plants? **(NEET-2018)**
(1) Ferric (2) Both ferric and ferrous
(3) Free element (4) Ferrous

31. Which of the following elements is responsible for maintaining turgor in cells? **(NEET-2018)**
(1) Magnesium (2) Calcium. (3) Potassium (4) Sodium

32. Thiobacillus is group of bacteria helpful in carrying out: **(NEET-1-2019)**
(1) Denitrification (2) Nitrogen fixation
(3) Chemoautot rophic fixation (4) Nitrification

33. Which of the following bacteria reduce nitrate in soil into nitrogen? **(NEET-2-2019)**
(1) Nitrobacter (2) Nitrococcus (3) Thiobacillus (4) Nitrosomonas

PART - II : AIIMS QUESTION (PREVIOUS YEARS)

1. The function of leghaemoglobin during biological nitrogen fixation in root nodules of legumes is to **(AIIMS-2006)**
(1) convert atmospheric N_2 to NH_3 (2) convert ammonia to nitrite
(3) transport oxygen for activity of nitrogenase (4) protect nitrogenase from oxygen

2. Which of the following is correct set of micronutrient for plants? **(AIIMS-2007)**
(1) Mg, Si, Fe, Cu, Ca (2) Cu, Fe, Zn, B. Mn (3) Mg, Fe, Zn, B, Mn (4) Mo, Zn, Cl, Mg, Ca

3. On the basis of symptoms of chlorosis in leaves a student inferred that this was due to deficiency of nitrogen. The inference could be correct only if we assume that yellowing of leaves appeared first in **(AIIMS-2007)**
(1) Old leaves (2) Mature leaves followed by young leaves
(3) Young leaves (4) Young leaves followed by old leaves

4. Hydroponics is **(AIIMS-2007)**
(1) nutrient less culture (2) water less culture (3) soilless culture (4) none of these

5. Leghaemoglobin helps in **(AIIMS-2007)**
(1) nitrogen fixation (2) protecting nitrogenase from O_2
(3) destroys bacteria (4) transport of food in plants

6. Cut surfaces of fruit and vegetables often become dark because **(AIIMS-2008)**
(1) dirty knife makes it dark
(2) oxidation of tannic acid in the presence of trace of iron from the knife makes it dark
(3) dust of the air makes it dark
(4) none of the above

7. Which one of the following is not a micro element for plants? **(AIIMS-2009)**

(1) Cu (2) B (3) Zn (4) Cr

8. Which one of the following elements is not an essential micronutrient for plant growth? **(AIIMS-2012)**
(1) Ca (2) Mn (3) Zn (4) Cu

9. Which element plays an important role in nitrogen fixation? **(AIIMS-2012)**
(1) Mn (2) Mo (3) Zn (4) Cu

10. Which of the following is an INCORRECT match of essential element and function? **(AIIMS-2014)**
(1) Manganese - structural component of chlorophyll.
(2) Calcium - component of the middle lamella
(3) Zinc - enzyme activator.
(4) Iron - component of ferredoxin.

11. Which of the following is the mismatched pair? **(AIIMS-2016)**

Mineral elements	**Form that is absorbed by plant**
(1) Nitrogen	NO_3^-
(2) Phosphorus	$H_2PO_4^-$
(3) Sulphur	H_2SO_4
(4) Iron	Fe^{3+}

12. Which of the following is a group of micronutrients for plants? **(AIIMS-2016)**
(1) Fe, Mn, Cu, Mo, Zn (2) Fe, Mo, Cu, O, C
(3) Cu, B, Cl, Fe, C (4) Ca, Mg, Fe

13. Match the **Column-I** & **Column-II** **(AIIMS-2018-I)**

Column-I	**Column-II**
(i) MoO_2^{+2}	(A) Alcoholic dehydrogenase
(ii) Mg^{+2}	(B) Nitrogenase
(iii) Zn^{+2}	(C) Catalase
(iv) Fe^{+3}	(D) PEP carboxylase

(1) (i)–B, (ii)–D, (iii)–C, (iv)–A (2) (i)–B, (ii)–A, (iii)–D, (iv)–C
(3) (i)–D, (ii)–B, (iii)–A, (iv)–C (4) (i)–B, (ii)–D, (iii)–A, (iv)–C

14. Which of the following is nitrogen fixing algae **(AIIMS-2018-I)**
(1) Nostoc, Anabaena, Oscillatoria (2) Azolla, Anabaena, Azotobacter
(3) Oscillatoria, Anabaena, Azolla (4) Azolla, Nostoc, Oscillatoria

15. Free living N_2 fixation bacteria **(AIIMS-2018-III)**
(1) Anabaena, Azotobacter, Frankia (2) Rhizobium, Azotobacter, Rhodospirillum
(3) Beijernickia, Azotobacter, Clostridium (4) Nostoc, Frankia, Bacillus

16. Which of the following is correct **(AIIMS-2018-IV)**
(1) Cyanobacteria makes mycorrhiza which absorbs phosphate from soil
(2) Azotobacter is symbiotic nitrogen fixing bacteria
(3) In paddy field, cyanobacteria is used to decrease soil microbes
(4) Methanobacterium feed cellulose in anaerobic condition

17. Select the incorrect statement **(AIIMS-2018-IV)**
(1) Microelements involve N, P, Mn, Cu, Mo.
(2) The concentration of microelements is 10 m mole/kg.
(3) If the concentration is more than 10 m mole/kg, they become toxic
(4) The deficiency of microelements causes symptoms of disease

Answers

EXERCISE - 1

SECTION (A)

1.	(2)	**2.**	(4)	**3.**	(1)	**4.**	(3)	**5.**	(3)	**6.**	(2)	**7.**	(3)
8.	(3)	**9.**	(4)	**10.**	(2)	**11.**	(1)	**12.**	(2)	**13.**	(1)	**14.**	(4)

SECTION (B)

1.	(1)	**2.**	(4)

SECTION (C)

1.	(1)	**2.**	(4)	**3.**	(4)	**4.**	(1)	**5.**	(2)	**6.**	(3)

Miscellaneous Questions

1.	(1)	**2.**	(1)	**3.**	(1)	**4.**	(1)

EXERCISE - 2

1.	(2)	**2.**	(3)	**3.**	(2)

EXERCISE - 3

PART- I

1.	(4)	**2.**	(3)	**3.**	(4)	**4.**	(2)	**5.**	(4)	**6.**	(3)	**7.**	(3)
8.	(2)	**9.**	(1)	**10.**	(1)	**11.**	(1)	**12.**	(1)	**13.**	(1)	**14.**	(4)
15.	(1)	**16.**	(4)	**17.**	(1)	**18.**	(2)	**19.**	(3)	**20.**	(1)	**21.**	(2)
22.	(3)	**23.**	(3)	**24.**	(2)	**25.**	(1)	**26.**	(1)	**27.**	(3)	**28.**	(1)
29.	(4)	**30.**	(1)	**31.**	(3)	**32.**	(1)	**33.**	(3)				

PART- II

1.	(4)	**2.**	(2)	**3.**	(1)	**4.**	(3)	**5.**	(2)	**6.**	(2)	**7.**	(4)
8.	(1)	**9.**	(2)	**10.**	(1)	**11.**	(3)	**12.**	(1)	**13.**	(4)	**14.**	(1)
15.	(3)	**16.**	(4)	**17.**	(1)								

Self Practice Paper (SPP)

1. A cell is plasmolysed after being kept in a hypertonic solution. What will be present between cell wall and plasmalemma?

(1) Isotonic solution (2) Hypertonic solution (3) Air (4) Hypotonic solution

2. The process by which large molecules move out of the cell is called

(1) Plasmolysis (2) Deplasmolysis (3) Phagocytosis (4) Reverse phagocytosis

3. Dry wooden stakes, if driven into a small crack in a rock and then soaked, can develop enough pressure to split the rock. Such pressure is build up through the phenomenon of

(1) Imbibition (2) Deplasmolysis (3) Turgor pressure (4) Osmotic pressure

4. The actual pressure with which water enters into cell is called

(1) DPD (2) OP (3) WP (4) Diffusion

5. What will be the direction of movement of water, when a solution A having water potential of-9 bars and another solution B of-4 bars is separated by a semipermiable membrane

(1) B to A (2) A to B (3) Both directions (4) None of these

6. The path of water from soil upto secondary xylem is

(1) Soil → Root hair cell wall → Cortex → Endodermis → Pericycle → Protoxylem → Metaxylem

(2) Metaxylem → Protoxylem → Metaxylem → Cortex → Soil → Root hair

(3) Cortex → Root hair → Endodermis → Pericycle → Protoxylem → Metaxylem

(4) Pericycle → Soil → Root hair → Cortex → Endodermis → Protoxylem → Metaxylem

7. Which of the following statements is/are true

(1) The apoplastic movement of water occurs exclusively through the cell wall without crossing any membranes

(2) Solutes present in a cell (or in any solution) increases the free energy of water or water potential

(3) The symplastic movement occurs from cell to cell through the plasmodesmata

(4) Membrane permeability depends on the membrane composition, as well as the chemical nature of the solute

(1) 1 and 2 only (2) 2 and 4 only (3) 1, 3 and 4 only (4) 1, 2 and 4 only

8. The metal ion involved in the stomatal regulation or Stomata will open, if there is accumulation of the following element in the guard cells

(1) Iron (2) Magnesium (3) Zinc (4) Potassium

9. The movement of materials through the vascular tissue of plants is called

(1) Transpiration (2) Translocation (3) Transcription (4) Transduction

10. Net movement of water is from

(1) Low DPD to high DPD (2) High DPD to low DPD

(3) DPD gradient plays no role (4) None of the above

11. None, as the plant survives
In a girdled plant, which of the following dies first
(1) Shoot (2) Root
(3) Both die simultaneously (4) None, as the plant survives

12. Translocation of sugar in flowering plants occurs in the form of
(1) Maltose (2) Glucose (3) Sucrose (4) Starch

13. Osmotic pressure of a solution is
(1) More than that of pure solvent (2) Less than that of pure solvent
(3) Variable depending upon concentration (4) Equal to that of pure solvent

14. The water potential and osmotic potential of pure water are
(1) 100 & 0 (2) 0 & 0 (3) 100 & 100 (4) 0 & 100

15. Substances that have a _____moiety, find it difficult to pass through the membrane.
(1) Hydrophilic (2) Hydrophobic (3) Neutral (4) Lipophilic

16. The external solution having same concentration as that of cell sap is called
(1) Hypertonic solution (2) Isotonic solution (3) Hypotonic solution (4) Ultrasonic solution

17. Water potential of plasmolysed cell will be
(1) $\psi_w = -\psi_s + \psi_p$ (2) $\psi_s + \psi_p$ (3) $\psi_w = 0$ (4) $\psi_w = -\psi_s - \psi_p$

18. If cell A with OP = 5 and TP = 4 is surrounded by the cells with OP = 3 and TP = 1 what will be direction of water movement
(1) From cell A to other cells (2) From other cells to cell A
(3) Water will not move (4) Water will move up

19. When a cell is fully turgid which of the following will be zero
(1) Turgor pressure (2) Wall pressure
(3) Suction pressure (D.P.D) or water potential (4) Osmotic pressure

20. To initiate cell plasmolysis, the salt solution should be
(1) Isotonic (2) Hypertonic (3) Hypotonic (4) None of the above

21. Absorption of water by a root is increased by
(1) Increase in transpiration (2) Increase in rate of photosynthesis
(3) Decrease in transpiration (4) Decrease is salt up take

22. Stomata are opened in night and closed in day in
(1) Simple succulent xerophytic plants (2) Aquatic plants
(3) Xerophytic plants (4) Mesophytic plants

23. Which is not true regarding stomata
(1) They are turgor operated valve
(2) Have differentially thickened wall in guard cell
(3) They open when OP of guard cell decreases
(4) Show scotoactive opening in CAM plants

24. Stomata open during day time because the guard cells
(1) Photosynthesize and produce osmotically active sugars (or Organic acids)
(2) Are thin walled
(3) Are bean shaped
(4) Have to help in gaseous exchange

25. Increase in CO_2 concentration slightly higher than 300 ppm around leaf results in
(1) Rapid opening of stomata (2) Partial closure of stomata
(3) Complete closure of stomata (4) There will be no effect on stomata opening

26. Guard cells differ from epidermal cells in having
(1) Mitochondria (2) Vacuoles (3) Cell wall (4) Chloroplasts

27. Wilting of a plant results from excessive
(1) Respiration (2) Photosynthesis (3) Absorption (4) Transpiration

28. The most widely accepted theory for ascent of sap in trees is
(1) Capillarity
(2) Role of atmospheric pressure
(3) Pulsating action of livings cells
(4) Transpiration pull and cohesion-tension theory of Dixon

29. Which of the following is found in coralloid roots of Cycas
(1) Frankia (2) Cyanobacteria (3) Rhodospirillum (4) Azotobacter

30. In hypertonic solution, water potential of a cell
(1) Increases (2) Decreases
(3) First increases and then decreases (4) No change occurs

31. A antitranspirant is
(1) Cobalt chloride (2) Potassium
(3) Phenyl mercuric acetate (4) Mercury

32. In which type stomata are exclusively present on the upper surface of leaf
(1) Oat type (2) Potato type (3) Barley type (4) water lily type

33. White bud condition in maize is produced due to the deficiency of
(1) Zinc (2) Boron (3) Molybdenum (4) Iron

34. Bidirectional translocation of minerals takes place through
(1) Xylem (2) Phloem (3) Parenchyma (4) Cambium

35. Which of these are cytoplasmic elements
(1) C, H, O (2) C, H, O, N (3) Ca, Mg, K (4) C, H, O, N, S, P

36. A trace element essential for plant growth and radioisotope, which is used in cancer therapy is

(1) Cobalt (2) Iron (3) Sodium (4) Calcium

37. Deficiency of Mo causes
(1) Yellowing of leaves (2) Mottling and necrosis of leaves
(3) Bending of leaf tip (4) Poor development of vasculature

38. Gold is found in the plant
(1) Chara (2) Equisetum (3) Nepenthes (4) All the above

39. Conversion of $NO_3 \rightarrow NO_2 \rightarrow NH_4$ is called and is catalysed by
(1) Nitrate assimilation, nitrate and nitrite reductase
(2) Nitrification, nitrate and nitrite reductase
(3) Ammonification, glutamate dehydrogenase
(4) Denitrification, transaminase

40. Copper deficiency leads to
(1) Exanthema (2) Whiptail of cauliflower
(3) Little leaf condition (4) Interveinal chlorosis

41. Characteristic of ion channels is / are
(1) They are transmembrane proteins functioning as selective pores
(2) Discovered by Neher and Sakman
(3) They are gated channels
(4) All of these

42. Most plants obtain N_2 in the form of
(1) N_2 (2) NO_3^- (3) NO_2^- (4) NH_4^+

43. Mineral which maintain cation - anion balance in cells are
(1) Cl, K (2) Fe, Cu (3) K, P (4) Ca, Fe

44. Permeability of cell membrane is increased by
(1) Divalent ions (2) Monovalent ions (3) Trivalent ions (4) All of the above

45. Of the following amino acid which one is sulpur containing
(1) Tryptophan (2) Methionine (3) Proline (4) Aspargine

SPP Answers

1.	(2)	**2.**	(4)	**3.**	(1)	**4.**	(1)	**5.**	(1)	**6.**	(1)	**7.**	(3)
8.	(4)	**9.**	(2)	**10.**	(1)	**11.**	(2)	**12.**	(3)	**13.**	(1)	**14.**	(2)
15.	(1)	**16.**	(2)	**17.**	(4)	**18.**	(1)	**19.**	(3)	**20.**	(2)	**21.**	(1)
22.	(1)	**23.**	(3)	**24.**	(1)	**25.**	(2)	**26.**	(4)	**27.**	(4)	**28.**	(4)
29.	(2)	**30.**	(2)	**31.**	(3)	**32.**	(4)	**33.**	(1)	**34.**	(2)	**35.**	(4)
36.	(1)	**37.**	(2)	**38.**	(2)	**39.**	(1)	**40.**	(1)	**41.**	(4)	**42.**	(2)
43.	(1)	**44.**	(2)	**45.**	(2)								