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**EXERCISE - 1**

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1. Rate of diffusion is found in order of
    - (a) Gas < Liquid < Solid
    - (b) Liquid < Solid < Gas
    - (c) Gas > Liquid > Solid
    - (d) Gas < Solid > Liquid
  2. The uniformly sweet taste of coffee or tea is due to
    - (a) Spreading
    - (b) Permeability
    - (c) Distribution
    - (d) Diffusion
  3. In osmosis, water moves from
    - (a) Higher conc. to lower conc. of solvent
    - (b) Lower conc. to higher conc. of solute
    - (c) Higher water potential to lower water potential
    - (d) All of the above
  4. Small distance transport in plants occurs by
    - a. Diffusion
    - b. Cytoplasmic streaming
    - c. Active transport
    - d. Translocation
    - (a) a, b, d
    - (b) b, c, d
    - (c) a, c, d
    - (d) a, b, c
  5. Which of the following is passive, occurs over short distance, in which molecules move in a random fashion, net result being substances moving from regions of higher concentration of regions of lower concentration and is not dependent on a 'living system'?
    - (a) Osmosis & active transport
    - (b) Active transport
    - (c) Diffusion & facilitated diffusion
    - (d) Diffusion
  6. Which of incorrect?
    - (a) Diffusion is movement of particles from low electrochemical potential to high electrochemical potential
    - (b) Diffusion rate is affected by temperature
    - (c) Both a and b
    - (d) Example of diffusion is opening of a bottle of a scent in one corner
  7. Diffusion pressure is directly proportional to
    - (a) Concentration of molecules diffusing
    - (b) Kinetic energy of diffusing molecule
    - (c) Concentration gradient
    - (d) All of the above
  8. If the cell is placed in hypertonic solution, what will happen?
    - (a) Endosmosis
    - (b) Exosmosis
    - (c) Deplasmolysis
    - (d) No change
  9. Which is the only means for gaseous movement within the plant body?
    - (a) Imbibition
    - (b) Osmosis
    - (c) Active transport
    - (d) Diffusion
  10. Which type of molecules diffuse faster through the membrane?
    - (a) Hydrophilic molecules
    - (b) Lipophilic molecules
    - (c) Both diffuse at same rate
    - (d) None of the above
  11. In the plant body which is not a barrier to movement of water and substance in solution?
    - a. Cell membrane
    - b. Cell wall
    - c. Tonoplast
    - (a) a only
    - (b) a and b only
    - (c) b and c only
    - (d) b only
  12. The difference between protein carriers involved in facilitated diffusion and active transport is
    - (a) The carriers involved in active transport use energy for moving molecules against the concentration diffusion do not use energy as they move molecules along the concentration gradient
    - (b) The Carriers involved in active transport are sensitive to inhibitions whereas those involved in facilitated diffusion are not
    - (c) Transport rate by active transport carriers shows saturation kinetics whereas this does not occur in facilitated diffusion
    - (d) All the above are correct
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13. Which of the following transport mechanism doesn't require special membrane proteins, is not selective, is not an uphill task, does not require energy and does not show saturation effect?
- Carrier mediated transport
  - Active transport
  - Facilitated diffusion
  - Simple diffusion
14. The main difference between active and passive transport across cell membrane is that
- Active transport is more rapid than passive
  - Passive transport is non – selective
  - Passive transport is due to the concentration gradient across the cell membrane whereas active transport is due to metabolic energy
  - Passive transport is confined to anions, whereas active transport is confined to cations only
15. Carrier proteins in active transport are
- Highly specific
  - Sensitive to inhibitors
  - Both a & b
  - Do not require energy
16. In terms of permeability, the cell wall and Plasmalemma are
- Permeable and differentially permeable
  - Both semipermeable
  - Semipermeable and differentially permeable
  - Both differentially permeable
17. DPD means
- Diffusion pressure demand
  - Daily phosphorus demand
  - Daily photoperiodic duration
  - Diffusion pressure deficit
18. Suction pressure of cell is
- Wall pressure
  - Turgor pressure
  - DPD
  - Osmotic pressure
19. DPD
- $OP \times TP$
  - $OP + TP$
  - $OP - WP$
  - $TP - WP$
20. What will be zero in a fully turgid cell?
- TP
  - WP
  - SP or DPD
  - OP
21. In a flaccid cell, what will be zero?
- SP
  - OP
  - DP
  - TP
22. Water potential of pure water and a solution are
- 0 and 1
  - 0 and 0
  - 0 and more than 0
  - 0 and less than 0
23. Cell A with  $OP = 6$  and  $WP = 5$  is surrounded by the cells with  $OP = 3$  and  $TP = 2$ , what will be direction of water movement?
- From A to other cells
  - From other cells to A
  - No net movement
  - Water will move up
24. When a cell is kept in 0.5 M solution of sucrose, its volume does not change. If the same cell is placed in 0.5 M solution of NaCl, the volume of protoplast will
- Increase
  - Decrease
  - Cell will be plasmolysed
  - No change
25. Cell A has osmotic pot = - 15 bars and pressure pot, = 8 bars and cell B has osmotic pot, = - 12 bars and wall pressure 2 bars, what is direction of water flow?
- $A \rightarrow B$
  - $B \rightarrow A$
  - No movement
  - $A \leftrightarrow B$
26. Water potential in the leaf tissue is comparatively high during
- Excessive transpiration
  - Low absorption
  - Low transpiration
  - Guttation
27. Cell A has osmotic potential of - 20 bars and pressure potential of + 6 bars. What will be its water potential?
- 14 bars
  - + 14 bars
  - 20 bars
  - + 20 bars

28. Water potential of a cell is lowered by  
(a) Addition of solutes  
(b) Increasing temperature  
(c) Addition of water  
(d) Decreasing the temperature
29. If the pressure greater than atmospheric pressure is applied to pure water or a solution, its water potential  
(a) Increases  
(b) Decreases  
(c) Doesnot change  
(d) First decreases then increases
30. If two systems containing water are in contact, random movement of water molecules occurs from system with \_\_\_\_\_ water potential  
(a) More positive to less positive  
(b) More negative to less negative  
(c) Lower to higher  
(d) Higher to lower
31. Bacteria cannot survive in a highly salted pickle because  
(a) Salt inhibits reproduction of bacteria  
(b) Enough light is unavailable for photosynthesis  
(c) They become plasmolysed and killed  
(d) Nutrients in the pickle medium cannot support life
32. Imbibition process involves  
(a) Diffusion  
(b) Capillary action  
(c) Both a and b  
(d) None of the above
33. How can grass be removed from a field without digging?  
(a) By spraying grass with auxins  
(b) By applying NaCl or any chemical manure in excess  
(c) By use of cytokinins  
(d) Not possible without digging
34. Rate of imbibition is more in  
(a) Proteins  
(b) Carbohydrates  
(c) Cellulose  
(d) None of these
35. Seeds when placed in water swell because of  
(a) Osmosis  
(b) Root pressure  
(c) Imbibition  
(d) Diffusion
36. Why plants die when over fertilized?  
(a) As a result of exosmosis  
(b) Due to damage of walls to root hairs  
(c) Due to blockage of nitrogenous ions  
(d) Due to upsets in soil environment by poisonous soil bacteria
37. What occupies the space between the cell wall and the shrunken protoplast in the plasmolysed cell?  
(a) Hypotonic solution  
(b)  $H_2O$  only  
(c) Hypertonic solution  
(d) Isotonic solution only
38. The main force for passive absorption is  
(a) Root pressure  
(b) Transpirational pull  
(c) Imbibitional pressure  
(d) All the above
39. Absorption of water by roots is increased when  
(a) Transpiration rate is less  
(b) Salt absorption is increased  
(c) Transpiration rate increases  
(d) Photosynthetic rate increases
40. Water absorbed by the roots has to move upwards to the stem against the force of gravity. Its movement is  
(a) Generally active and due to root pressure  
(b) Generally passive and due to root pressure  
(c) Generally active & due to the transpiration pull  
(d) Generally passive and due to the Transpirational pull
41. Long distance transport of water cannot occur by  
(a) Active transport  
(b) Diffusion  
(c) Facilitated diffusion  
(d) All the above
42. To move substances across long distances and at faster rate there is requirement of  
(a) Mass flow system  
(b) Bulk flow system  
(c) Both a and b  
(d) Active transport

43. Active absorption of water by roots from soil is mainly affected by
- (a) Osmotic concentration of cell sap
  - (b) Tension of cell sap due to transpiration
  - (c) Sucking power of the root hairs
  - (d) Typical tissue organization
44. ATP is required during
- (a) Transpiration pull
  - (b) Active absorption
  - (c) Passive absorption
  - (d) Cohesion and adhesion
45. Movement of water through Plasmodesmata is called
- (a) Apoplast pathway
  - (b) Symplast pathway
  - (c) Transmembrane pathway
  - (d) Osmosis
46. The rate of absorption of water is slow at a temperature near freezing point because
- (a) It is mainly a metabolic process
  - (b) Cell membrane becomes more permeable
  - (c) Growth of cells stop
  - (d) Transpiration is retarded
47. Apoplast movement of water in plant occurs through
- (a) Casparian strips
  - (b) Plasma membrane
  - (c) Intercellular spaces
  - (d) Plasmodesmata
48. When water has to move in the plant body, which pathway may be responsible for its slower movement?
- (a) Apoplastic pathway
  - (b) Symplastic pathway
  - (c) Both pathway transport water at same rate
  - (d) Casparian strips reduce movement rate of water in Apoplastic pathways
49. Which statement about the Symplastic pathway is not correct?
- a. It is a system of interconnected protoplasts and neighbouring cells are connected through cytoplasmic strands that extend through Plasmodesmata
  - b. Water has to enter the cells through the cell membrane hence the movement is relatively slower
  - c. Symplastic movement is down a potential gradient
  - d. It may be aided by cytoplasmic streaming
- e. Movement of water into the cortex is mainly Symplastic before water enters the vascular cylinder
- (a) a, b, c & d
  - (b) c & d
  - (c) d & e
  - (d) e
50. Once water is absorbed by the root hairs, it can move deeper into root layers by two distinct pathways i.e. Apoplast pathway and Symplast pathways. Out of these, which is continuous through out the plant, except at the Casparian strips of the endodermis and occurs exclusively through the inter cellular spaces and the wall of the cells.
- (a) Apoplast pathway
  - (b) Symplast pathway
  - (c) Both a & b
  - (d) Movement of water occurs due to a turgor pressure gradient only.
51. Some plants have additional structures such as fungal association with them which help in water absorption. Such association is called
- (a) Rhizosphere association
  - (b) Associative symbiosis
  - (c) Mycorrhiza
  - (d) Allelopathy
52. The pressure developed in Tracheary elements of xylem due to metabolic activity of roots is called
- (a) OP
  - (b) TP
  - (c) Root pressure
  - (d) Atmospheric pressure
53. Root pressure is maximum when
- (a) Transpiration is high and absorption is low
  - (b) Transpiration is very low and absorption is high
  - (c) Both are very high
  - (d) Both are very low
54. Which of the following contributes most transport of water from the ground to the leaves of a tall tree?
- (a) Break down of ATP
  - (b) Root pressure
  - (c) Capillary rise of water in xylem
  - (d) Cohesion of water and transpiration pull

55. The cohesive force of water  
(a) S – bonds  
(b) O – bonds  
(c) H – bonds  
(d) OH – bonds
56. The transpiration driven ascent of xylem sap depends on following physical properties of water.  
(a) Cohesion, water potential gradient and low capillary  
(b) High capillarity, low tensile strength & adhesion  
(c) Cohesion, surface tension and low capillarity is aided by  
(d) Cohesion, adhesion & surface tension
57. high tensile strength due to cohesion and high capillarity help in ascent of xylem sap. Capillarity is aided by  
(a) Large diameter of xylem vessels & tracheids  
(b) Large diameter of vessels but small of tracheids  
(c) Small diameter of vessels but large of tracheids  
(d) Small diameter of Tracheary elements tracheids and vessels
58. In the cell wall of the guard cells, cellulosic Microfibrills are oriented  
(a) Radially  
(b) Transversely  
(c) Tangentially  
(d) Obliquely
59. Transpiration facilitates  
(a) Absorption of water by roots  
(b) Excretion of minerals  
(c) Electrolytic balance  
(d) Opening of stomata
60. Which of the following is not a purpose of transpiration?  
(a) Supplies water for photosynthesis  
(b) Helps in translocation of sugars from source to sink  
(c) Maintains shape and structure of plants  
(d) Cools leaf surface
61. Which leaf type generally has greater number of stomata on lower surface as compared to upper?  
(a) Often Dicot, isobilateral leaf  
(b) Often Monocot, isobilateral leaf  
(c) Often Dicot, Dorsiventral leaf  
(d) Often Monocot, Dorsiventral leaf
62. Stomata help in  
(a) Gaseous exchange  
(b) Transpiration  
(c) Both a and b  
(d) Conduction
63. Dumbell shaped guard cells are a feature of  
(a) Monocot leaf  
(b) Dicot leaf  
(c) Dorsiventral leaf  
(d) Both b and c
64. Which walls of the guard cells are thickened?  
(a) Outer walls  
(b) Inner walls  
(c) Both a and b  
(d) None of the above
65. In transpiration water is lost by diffusion  
(a) As droplets alongwith some solute  
(b) As water vapour  
(c) As pure water droplets  
(d) Both b and c
66. The stomatal apparatus comprises of  
a. Stomatal pore  
b. Guard cell  
c. Subsidiary/accessory cells  
(a) a & b  
(b) a & c  
(c) b & c  
(d) a, b, c
67. How many statements is/are wrong about root pressure?  
i. When water enters the xylem of the root along its potential gradient a positive pressure develops inside the roots & is called root pressure.  
ii. Root pressure can be observed in a small soft stemmed plant, when there is plenty of atmospheric moisture and the stem is cut horizontally near the base with a sharp blade.  
iii. It can be observed early in the morning and at night when rate of evaporation is low  
iv. Root pressure can, at best, only provide a modiest push in the overall process of water transport push in the overall process of water transport and

- hence accounts for the majority of water transport in most plants
- (a) 3  
(b) 1  
(c) 2  
(d) 4
68. how many statements are FALSE from those given below?
- Succulent plants and crassulacean plants close their stomata during day time and open it during night time (Scotoactive) e.g. Opuntia.
  - The main theory to explain stomatal movement is malate or  $K^+$  ion pump hypothesis.
  - Higher concentration of organic salts (potassium malate) in guard cells result in endosmosis from adjoining cells.
  - Loss of  $K^+$  ions decrease osmotic concentration of guard cells as compared to adjacent cells. This causes exosmosis and hence guard cells become flaccid and stomatal pore closes.
- (a) Two  
(b) One  
(c) Zero  
(d) Four
69. Stomata opens when
- Guard cells swell up by endosmosis due to efflux of  $K^+$  ions
  - Guard cells swell up due to decrease in osmotic potential
  - Guard cells swell up due to increase in their pressure potential
  - Guard cells swell up due to endosmosis as a result of influx of  $H^+$  ions or protons
70. Instrument used for measuring rate of transpiration is
- Potometer
  - Porometer
  - Photometer
  - Lactometer
71. Stomata of succulent plants
- Are always open
  - Open during night and close during day
  - Open during day and close in night
  - Never open
72. Select the correct statement/events leading in opening of stomata
- Increase in solute in guard cells
  - Lowering of osmotic concentration of guard cells
  - Rise in osmotic potential level in the guard cells
  - Movement of water from neighbouring cells into guard cells
  - Guard cells becoming flaccid
- (a) a and e only  
(b) b, c and d only  
(c) a and d only  
(d) b, d and e only
73. Instrument used for measuring size of stomatal aperture is
- Potometer
  - Porometer
  - Atomometer
  - Manometer
74. Maximum transpiration occurs through
- Cuticle
  - Stomata
  - Lenticels
  - Bark
75. The main features of the theory to explain stomatal movement were given by
- Darwin
  - Haeckel
  - Miescher
  - Levit
76. To bring about stomatal opening, the pH of the guard cell can rise due to
- Active  $H^+$  uptake by chloroplast and mitochondria of guard cell
  - $CO_2$  assimilation by guard cell
  - Both a and b
  - Sugars changing to starch
77. Which of the following best theory explains the opening and closing of stomata?
- Munch theory
  - Starch  $\leftrightarrow$  Glucose theory
  - Active  $K^+$  transport theory
  - None of these
78. Some statement about the stomata are given. How many statements are false?
- Stomata help in transpiration and also in exchange of oxygen and carbon dioxide in leaf
  - Generally stomata are open during day time and close during night

- c. Opening & closing of stomata is due to a change in the turgidity of the guard cells
- d. Increase in turgidity in the two guard cells flanking the stomata causes the thin outer walls to bulge out and force the inner walls into a crescent shape
- e. The inner wall of each guard cell towards to pore is thick and elastic
- f. When guard cell lose turgor due to water loss or stress, the elastic inner wall regain their original shape, guard cell become flaccid and the stoma closes
- g. The opening of the stoma is also aided due to the longitudinal orientation of cellulose Microfibrils in the cell walls of guard cells.
- (a) All statements are correct
- (b) Only two statements are false
- (c) Only one statement is false
- (d) Only three statement are false
79. Closure of stomata is due to water stress. This is controlled by following hormone?
- (a) Cytokinin
- (b) Auxins
- (c) ABA
- (d) Vernalin
80. Which group of factors does not affect transpiration?
- (a) Wind speed, temperature, light, humidity canopy structure
- (b) Humidity, temperature, number of stomata, number of open stomata
- (c) Temperature, light, distribution of stomata, water status of plant, number of stomata
- (d) Osmotic pressure, turgor pressure
81. Rate of transpiration shows an increase with increase in
- (a) Temperature
- (b) Relative humidity
- (c) Atmospheric pressure
- (d) All the above
82. A gentle breeze around the plant will
- (a) Increase transpiration
- (b) Decrease transpiration
- (c) First increase, then decrease
- (d) Have no effect
83. Transferring a plant to high altitude (hills) will
- (a) Increase transpiration
- (b) Decrease transpiration
- (c) First increase, then decrease
- (d) Will not bring about much change
84. Stomatal opening is maximum in
- (a) Blue light
- (b) Green light
- (c) Red light
- (d) White light
85. Desert plants have waxy cuticle, spines and thorns to
- (a) Reduce transpiration
- (b) Increase transpiration
- (c) Reduce photosynthesis
- (d) Increase water absorption
86. A plant shows signs of wilting on a hot, windy day. This is due to
- (a) Higher transpiration
- (b) Lower absorption
- (c) Both a and b
- (d) Lower transpiration
87. Dorsiventral leaves have fewer stomata on upper side to
- (a) Reduce transpiration
- (b) Increase transpiration
- (c) Reduce photosynthesis
- (d) Increase water absorption
88. One of the following is not an internal factor affecting transpiration
- (a) Canopy strcutre
- (b) Leaf size
- (c) Leaf anatomy
- (d) Wind velocity
89. 'Exudation' is due to
- (a) OP
- (b) root pressure
- (c) Diffusion pressure
- (d) Transpiration pull
90. Water lost during guttation contains
- (a) Only water
- (b) Water and minerals only
- (c) Water, minerals and sugars
- (d) None of the above
91. Guttation is caused by
- (a) Transpiration
- (b) High root pressure
- (c) Closure of stomata
- (d) Bleeding

92. Hydathodes helps in  
(a) Transpiration  
(b) High root pressure  
(c) Closure of stomata  
(d) Bleeding
93. Which of the following is not a purpose of transpiration?  
(a) To create a transpiration pull for absorption and transport of plants  
(b) Supplies water for photosynthesis and transports minerals from the soil to all parts of the plant  
(c) Cools leaf surface by about 20 - 30°C by evaporative cooling  
(d) Maintains the shape and structure of the plants
94. Nature antitranspirant is  
(a) ABA  
(b) IAA  
(c) GA<sub>3</sub>  
(d) CK
95. One of the following is a synthetic metabolic antitranspirant  
(a) ABA  
(b) PMA  
(c) Silicon emulsion  
(d) Low viscosity wax.
96. Bleeding occur in  
(a) Agave  
(b) Acer  
(c) Vitis  
(d) All
97. Loss of sap from a cut end of a stem is called  
(a) Guttation  
(b) Bleeding  
(c) Both a and b  
(d) Transpiration
98. Hydathodes are found in  
(a) Guttation  
(b) Bleeding  
(c) Both a and b  
(d) Transpiration
99. Hydathodes are found  
(a) On lower surface of leaves  
(b) On upper surface of leaves  
(c) On leaf margins at vein endings  
(d) All the above
100. Which of the following is a sink for the mineral elements?  
(a) Growing regions i.e. meristems, fruits & seeds  
(b) Growing regions and storage organs  
(c) Storage organs, developing flowers, fruits & seeds, growing regions & young leaves  
(d) All of these
101. Which layer of the root has the ability to actively transport ions in one direction only?  
(a) The epidermis  
(b) The outer cortex  
(c) The endodermis  
(d) The pericycle
102. Why can't all minerals be passively absorbed by the roots?  
a. Minerals are present in the soil as charged particles which cannot move across cell membranes  
b. They are bound tightly to the soil particles and energy is required to pull them away  
c. Their concentration is usually higher in the soil than in the root cells  
d. Their concentration in roots is usually higher than that in the soil  
(a) Both a & b  
(b) a, b & d  
(c) a & d  
(d) a, b & c
103. Xylem sap consists of  
(a) Water  
(b) Traces of all minerals  
(c) Some minerals in organic form  
(d) All of these
104. Mineral ions are frequently remobilized from older senescing parts to younger ones or before leaf fall in deciduous plants. Elements which are readily mobilized are  
(a) Ca, Mg, P, S  
(b) Ca, S, N, P  
(c) N, P, Ca  
(d) N, P, K, S
105. Which of the following statements is/are true?  
(a) Small amounts of P & S are carried in the xylem in organic form  
(b) Some of the nitrogen travels in inorganic form though much is carried in the organic form as amino – acids and related compounds.  
(c) Small amount of exchange of materials takes place between xylem & phloem  
(d) All statements are true



106. A girdled tree (upto bast) may survive for some time but it will eventually die because
- (a) Water will not move upwards
  - (b) Water will not move downwards
  - (c) Sugars and other organic materials will not move downwards
  - (d) Sugars and other organic materials will not move upwards
107. Movements of solutes in the phloem from leaves is mainly
- (a) Acropetal
  - (b) Lateral
  - (c) Basipetal
  - (d) Lateral/acropetal
108. Food is transported in plants mostly as
- (a) Glucose
  - (b) Fructose
  - (c) Sucrose
  - (d) Starch
109. Loading of phloem is related to
- (a) Increase of sugar in phloem
  - (b) Elongation of phloem cell
  - (c) Separation of phloem parenchyma
  - (d) Strengthening of phloem fibre
110. What does phloem sap contain?
- a. Water & sucrose
  - b. Other sugars (eg. raffinose, stachyose)
  - c. Large number of elements & gases
  - d. Some hormones & amino acids
- (a) a, b & d
  - (b) a, b & c
  - (c) a, c & d
  - (d) a, b, c, & d
111. What passes through the long columns of phloem sieve tube cells through holes in their end walls (called sieve plates) forming continuous filaments?
- (a) Organic nutrients & water
  - (b) Organic nutrients, hormones & amino acids
  - (c) Cytoplasmic strands
  - (d) None of the above
112. Which simple experiment was used to identify the tissues through which food is transported?
- (a) Hollow – hearting a tree trunk
  - (b) Girdling a tree trunk
  - (c) Ringing a tree trunk
  - (d) Both b and c
113. Girdling experiments show that
- (a) Xylem is tissue through which translocation of food occurs and that transport takes place in one direction i.e. towards roots
  - (b) Phloem is the tissue through which translocation of food occurs and that transport takes place in all directions
  - (c) Phloem is the tissue through which translocation of food occurs and that transport takes place in both direction i.e. towards roots and/or forwards stem
  - (d) Phloem is the tissue through which translocation of food occurs and that transport takes place in one direction i.e. towards roots
114. Which one factor facilitates the mass movement of food in the phloem?
- (a) A pressure potential gradient
  - (b) A concentration gradient
  - (c) A solute potential gradient
  - (d) A water potential gradient

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**EXERCISE - 2**

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1. Primary cell wall is developed
    - (a) Inner to plasma membrane
    - (b) Inner to middle lamellae
    - (c) Outer side of plasma membrane
    - (d) Both b and c
  2. In higher plants cells wall is composed of
    - (a) Cellulose, galactans, N – acetyl glucosamine
    - (b) Chitin, cellulose, calcium carbonate, NAG
    - (c) Hemicellulose, muramic acid, proteins
    - (d) Cellulose, hemicellulose, pectins, proteins
  3. Cell wall is
    - (a) Living and impermeable
    - (b) Permeable, dead with pits
    - (c) Dead permeable without pits
    - (d) Living semipermeable with pits
  4. In plants, direction of transport of water and organic compounds respectively is
    - (a) Bidirectional and unidirectional
    - (b) Unidirectional and bidirectional
    - (c) Both unidirectional
    - (d) Both bidirectional
  5. Proteins that form large sized pores in the outer membranes of the plastids, mitochondria and some bacteria are known as
    - (a) Porins
    - (b) Contractile proteins
    - (c) Carrier proteins
    - (d) Both b and c
  6. Facilitated diffusion
    - (a) Require energy
    - (b) Can occur against concentration gradient
    - (c) Both a and b
    - (d) Requires special proteins to move across the membrane
  7. When tow types of molecules move across the membrane in the same direction it is known as
    - (a) Uniport
    - (b) Symport
    - (c) Antiport
    - (d) Non of these
  8. Pumps are the proteins that
    - (a) Require energy
    - (b) Transport substances from low concentration to high concentration
    - (c) Are very specific in what they carry
    - (d) All of these
  9. The membrane that allows some of solute molecules to pass through it and prevent others is called
    - (a) Permeable membrane
    - (b) Semipermeable membrane
    - (c) Selectively or differentially
    - (d) Permeable membrane
  10. The force that determines passage of water from one cell to another is
    - (a) D.P.D.
    - (b) O.P.
    - (c) T.P.
    - (d) W.P.
  11. Osmosis is flow of solution from higher concentration to solution of lower concentration through semipermeable membrane which is incorrect in the statement?
    - (a) Exact conc. of a solution is not given
    - (b) Character of semi permeable membrane is not given
    - (c) Flow of solution is not possible through SPM
    - (d) all the above
  12. Reverse osmosis occurs when
    - (a) Membrane is permeable
    - (b) Hypertonic solution is separated from pure water
    - (c) Pressure more than osmotic pressure is applied on solution
    - (d) All of these
  13. A 10% solution of which of the following substance shall have maximum O.P.
    - (a) Glucose
    - (b) Sucrose
    - (c) NaCl
    - (d) Fructose
  14. Value of the osmotic pressure of the cell sap in different types of plants is in the order of
    - (a) Shurbs > herbs > trees
    - (b) Herbs > shrubs > trees
    - (c) trees > shrubs > herbs
    - (d) herbs > trees > shrubs
  15. The osmotic pressure of a cell is measured by
    - (a) Plasmolysis
    - (b) Deplasmolysis
-

- (c) Osmosis  
(d) Diffusion
16. A cell will become turgid on being placed in  
(a) Isotonic solution  
(b) Hypotonic solution  
(c) Hypertonic solution  
(d) Both a and b
17. If a cell A with O.P. 10 bars and TP 4 bars is connected to cells B, C, D having OP and TP respectively 4 and 4, 10 and 5 and 7 and 3 bars, the flow of water will be  
(a) C to A, B & D  
(b) B to A, C & D  
(c) A to D, B & C  
(d) A to B, C & D
18. In a flaccid cell  
(a)  $DPD = OP$   
(b)  $DPD = TP$   
(c)  $TP = OP$   
(d)  $OP = O$
19. DPD of a fully turgid cell is  
(a)  $DPD = 0$ ,  $OP = 8$ ,  $TP = 8$   
(b)  $DPD = 0$ ,  $OP = 5$ ,  $TP = 6$   
(c)  $DPD = 15$ ,  $OP = 30$ ,  $TP = 15$   
(d)  $DPD = 30$ ,  $OP = 60$ ,  $TP = 30$
20. Which of the following is incorrectly matched?  
a. Use of excessive fertilizers – Plasmolysis kill plant due to  
b. Jamming of wooden doors – Imbibition  
c. c. Swelling of resins in water – Exosmosis  
(a) a, b, c  
(b) b, c  
(c) a, c  
(d) only c
21. Water potential and osmotic potential of pure water is  
(a) Zero and 100  
(b) 100 and 100  
(c) Zero and zero  
(d) 100 and zero
22. In plants water moves from  
(a) Less negative to more negative gradient  
(b) More negative to less negative gradient  
(c) Similar gradient  
(d) Zero gradient
23. The cell A an osmotic potential of  $-20$  bars and a pressure potential of  $+6$  bars. What will be its water potential?  
(a)  $-14$  bars  
(b)  $+14$  bars  
(c)  $-20$  bars  
(d)  $+20$  bars
24. Osmosis is the movement of solvent through semipermeable membrane from  
(a)  $-4$  mega pascal  $\Psi_w \rightarrow -7$  mp  $\Psi_w$   
(b)  $-7$  mp  $\Psi_w \rightarrow 4$  mp  $\Psi_w$   
(c)  $DPD\ 10\ atm \rightarrow 7\ atm$   
(d) All of these
25. If  $0.1M$  sucrose solution has an osmotic potential which is  
(a)  $4.5$  bars  
(b)  $2.3$  bars  
(c)  $-4.5$  bars  
(d)  $-2.3$  bars
26. During osmosis, water passes through a semipermeable membrane
- |                               |                          |
|-------------------------------|--------------------------|
| From                          | To                       |
| (a) low $\Psi_w$              | High $\Psi_w$            |
| (b) High solute concentration | low solute concentration |
| (c) Low $\Psi_s$              | high $\Psi_s$            |
| (d) Hypotonic solution        | Hypertonic solution      |
27. The water potential can be calculated by  
(a)  $WP + TP$   
(b)  $DPD + WP$   
(c)  $\Psi_w + \Psi_p$   
(d)  $\Psi + WP$
28. The components of water potential are  
(a) Pressure potential and osmotic potential  
(b) Osmotic potential and matric potential  
(c) Matric potential and pressure potential  
(d) All of the above
29. The decrease in the magnitude of chemical potential by the addition of solutes is known  
(a) Solute potential  
(b) Water potential  
(c) Osmotic potential  
(d) Both a and c
30. With addition of solutes the solutes potential of a solution  
(a) Decreases  
(b) Increase  
(c) Becomes more negative  
(d) Both a and c
31. Where does water occur in a plant cell  
(a) Cytoplasm  
(b) Vacuole

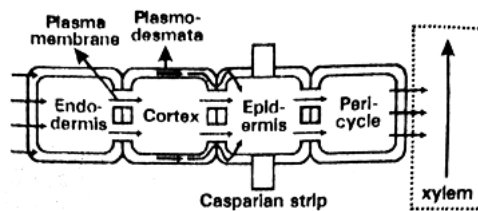
- (c) Nucleus  
(d) Cell wall
32. Water is absorbed from outside solution only when it is  
(a) Isotonic  
(b) Hypotonic  
(c) Hypertonic  
(d) None of these
33. On plasmolysis, a plant cell  
(a) Swells up  
(b) Bursts  
(c) Will shrink  
(d) Becomes turgid
34. Turgor pressure of the plant cell is generally  
(a) + ve  
(b) - ve  
(c) Zero  
(d) Both (b) & (c)
35. The shrinkage of the protoplast of a cell from its cell wall under the influence of a hypertonic solution, is known as  
(a) Endosmosis  
(b) Exomosis  
(c) Plasmolysis  
(d) Deplasmolysis
36. The plant imbinants are made up of  
(a) Hydrophobic colloids  
(b) Hydrophilic colloids  
(c) Cellulose and pectin  
(d) Lignin like compounds
37. At the time of seed germination, when water is absorbed by the seeds due to imbibition, the seed coat breaks as it swells to a lesser degree than the kernel because  
(a) The kernel is made up of proteins, lipids and starch while seed coat is formed of cellulose  
(b) The kernel is made up of cellulose while the seed coat is made up of proteins, lipids and starch  
(c) Both kernel and seed coat are made up same constituents, it depends on the nature of medium  
(d) None of these
38. Imbibition is always accompanied by swelling or increase in the volume of the imbinants. However, the increase in the volume of the imbibant is  
(a) More than the volume of water imbibed  
(b) Same as the volume of the water imbibed  
(c) Less than the volume of the water imbibed  
(d) It depends upon the type of imbibant
39. Rapid water absorption takes place by  
(a) Passive absorption  
(b) Active absorption  
(c) Expenditure of energy  
(d) Osmosis
40. The term Apoplast signifies  
(a) Cell wall, intercellular space and water filled channels  
(b) Protoplasts inter connected by Plasmodesmata  
(c) Cell wall, cytoplasm and central vacuole  
(d) None of the above
41. Path of water movement from soil to xylem is  
(a) Metaxylem → Protoxylem → cortex → soil → root hair  
(b) Cortex → root hair → endodermis → pericycle → Protoxylem → metaxylem  
(c) Soil → root hair → cortex → endodermis → pericycle → Protoxylem → Metaxylem  
(d) pericycle → soil → root hair → cortex → endodermis → Protoxylem → Metaxylem
42. Which plants do not generate root pressure?  
(a) Monocot grasses  
(b) Perennial shrubs  
(c) Conifer trees  
(d) Seasonal herbs
43. As per Dixon and Jolly's theory, the upward pull of water is transmitted to other water molecules by cohesion. The cohesion is the result of  
(a) Hydrogen bonding  
(b) Hydrophilic cell walls  
(c) Turgor pressure  
(d) Osmosis
44. Cohesion transpiration pull theory operates only in  
(a) Passive water absorption  
(b) Active water absorption  
(c) Conditions not favoring transpiration  
(d) Conditions restricting transpiration
45. Which one of against the theory of ascent of sap by 'Dixon and Jolly'?  
(a) Pores in Tracheary elements  
(b) Cohesion force of water molecules  
(c) Adhesion force of water molecules  
(d) Requirement of ATP

46. Water in plants is transported by  
(a) Cambium  
(b) Phloem  
(c) Xylem or xylem vessel elements  
(d) Epidermis
47. Root pressure is maximum when  
(a) Transpiration is high, absorption is low  
(b) Transpiration is low, absorption is high  
(c) Both transpiration and absorption are high  
(d) Both transpiration and absorption are high
48. The greatest contribution of root pressure is  
(a) Ascent of sap  
(b) Guttation  
(c) Re – establishing continuity of water column in xylem, in case it is broken  
(d) Bleeding
49. When a plant wilts, what will be sequence of events?  
(a) Endosmosis, plasmolysis, temporary and permanent wilting  
(b) Exosmosis, plasmolysis, temporary and permanent wilting  
(c) Exosmosis, Deplasmolysis, temporary and permanent wilting  
(d) Exosmosis, plasmolysis, Deplasmolysis temporary and permanent wilting
50. Wilting of the plant occurs when  
(a) Phloem is blocked  
(b) Xylem is blocked  
(c) Both xylem and phloem are blocked  
(d) A few roots are removed
51. In succulent plants, the stomata open during the night and close by the day. Which of the following would be the best hypothesis to explain the mechanism of stomatal opening at night only?  
(a) Absorption of  $\text{CO}_2$  and its conversion to organic acids results in the increased uptake of potassium ions and water  
(b)  $\text{CO}_2$  accumulates, reduces pH and stimulates enzymes resulting in the accumulation of sugar  
(c)  $\text{CO}_2$  is used up and increased pH results in the accumulation of organic acid  
(d)  $\text{CO}_2$  is used up and increased pH results in the accumulation of sugars
52. The stomata are widely open in –  
(a) Red light  
(b) Blue light  
(c) Green light  
(d) Yellow light
53. Stomata can also open at night in  
(a) Xerophyte  
(b) Gametophyte  
(c) Hydrophyte  
(d) None of these
54. A dicotyledonous plant has a leaf 'A' veined on its upper side and another leaf 'B' on the lower side. What will be the response on their relative wilting?  
(a) 'B' wilts faster than 'A'  
(b) 'A' and 'B' wilt equally  
(c) 'A' wilts faster than 'B'  
(d) Neither 'A' or 'B' shows wilting
55. In herbaceous plants having thin soft leaves, the rate of cuticular transpiration is found to be  
(a) 10% of the total transpiration  
(b) 30% of the total transpiration  
(c) 50% of the total transpiration  
(d) 70% of the total transpiration
56. Which of the following is a correct match?  
(a) Porometer – stomatal frequency  
(b) Atmometer – pull due to evaporation  
(c) Porometer – transpiration  
(d) All the above
57. In plants, direction of transport of water and organic compounds respectively is  
(a) Bidirectional and unidirectional  
(b) Unidirectional and bidirectional  
(c) Both unidirectional  
(d) Both bidirectional
58. If a plant is pruned, transpiration rate per unit leaf area shall  
(a) Decrease  
(b) Increase  
(c) Remain the same  
(d) Plant shall wilt
59. Which one of the following chemical serves as an antitranspirant in plants?  
(a) Cobalt chloride  
(b) Mercury  
(c) Potassium  
(d) Phenyl mercuric acetate
60. Water lost by transpiration is  
(a) Rich in solutes  
(b) Rich in dissolved minerals  
(c) Rich in dissolved salts  
(d) Pure water

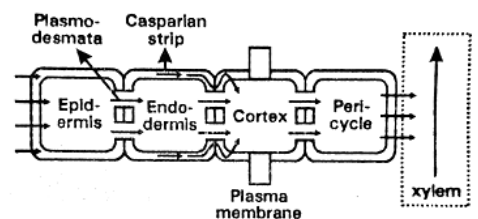
61. Which of the following plant hormones reduces transpiration rate by inducing stomatal closure?  
(a) ABA  
(b) ethylene  
(c) Cytokinin  
(d) Gibberellin
62. A small Mesophytic twig with green leaves is dipped into water in a beaker under sunlight. It demonstrates  
(a) Photosynthesis  
(b) Respiration  
(c) Transpiration  
(d) None of these
63. Maximum root pressure is observed where  
(a) Transpiration & absorption very low  
(b) Transpiration & absorption very high  
(c) Transpiration high; absorption low  
(d) Transpiration low; absorption high
64. Which of the following conditions help in opening of stomata?  
(a) Darkness, pH 5, high  $\text{CO}_2$  concentration  
(b) Ph 7, low  $\text{CO}_2$  conc. and light  
(c) pH 5, low  $\text{CO}_2$  conc. and light  
(d) High  $\text{CO}_2$  conc. low  $\text{K}^+$  ion conc. is guard cells
65. Potometer works on the principle of  
(a) Amount of water absorbed is equal to the amount transpired  
(b) Osmotic pressure  
(c) Root pressure  
(d) Potential difference between the tip of the tube and that of the plant
66. Main function of lenticel is  
(a) Transpiration  
(b) Guttation  
(c) Gaseous exchange  
(d) Translation
67. Enzyme connected with opening and closing of stomata is  
(a)  $\alpha$  amylase  
(b) Pyruvic kinase  
(c) PEP carboxylase  
(d) RuDP carboxylase
68. Transpiration pull will be maximum under which of the following conditions?  
(a) Open stomata, high humidity and well irrigated soil  
(b) Open stomata, dry atmospheric and moist cell  
(c) Open stomata, high humid atmosphere and dry soil  
(d) Closed stomata, low light intensity and humid atmosphere
69. What is not true for guard cells of dicot stomata?  
(a) Radical micellation  
(b) Presence of chloroplast  
(c) Kidney shape  
(d) Lignified walls
70. Transpiration is advantageous for plants as it helps in  
(a) Elimination of extra water and salts  
(b) Absorption and transportation of water and minerals  
(c) Cooling leaf surfaces by  $10 - 15^\circ\text{C}$   
(d) Both (b) and (c)
71. The process of the escape of liquid from the tip of uninjured leaf is called  
(a) Evaporation  
(b) Transpiration  
(c) Guttation  
(d) Evapo – transpiration
72. The hydathodes  
(a) Remain closed at night  
(b) Remain closed in the day  
(c) Remain always open  
(d) Show specificity in opening and closing
- In the following questions, a statement of assertion (A) is followed by a statement of reason (R).  
(A) of both Assertion and Reason are true and the reason is the correct explanation of the assertion, then mark 1.  
(B) If both Assertion and Reason are true by the reason is not the correct explanation of the assertion, then mark 2.  
(C) If Assertion is true statement are false, then mark 4.  
(D) If both Assertion and Reason are false, then mark 4.
73. A: DPD of a cell may be zero.  
R: Water potential of distilled water is negative.
74. A: Osmotic potential is decrease in chemical potential of water by addition of solutes.  
R: Osmotic potential causes osmotic entry of water into a solution.
75. A: Pure water comes out in reverse osmosis.  
R: Hypertonic solution causes reverse osmosis.

76. A: In osmosis, semipermeable membrane is a must.  
R: Cell wall is semipermeable
77. A: The driving force for passive absorption is non metabolic in origin.  
R: The driving force for active absorption is energy derived from the metabolic processes.
78. A: Ringing of girdling experiment provides an evidence in favour of xylem as path of ascent of sap.  
R: Ringing experiment cannot be performed in monocots.
79. A: Stomata open when guard cell are turgid and close when guard cells are flaccid.  
R: Stomatal movements are governed by change in turgidity of guard cells.
80. A: Guttation is non regulated phenomenon.  
R: Hydathodes remain always open.
81. Which of the following is incorrect with respect to movement by diffusion?  
(a) Substances move from regions of higher concentration to regions of lower concentration  
(b) There is always an expenditure of energy  
(c) It is not dependent on a living system  
(d) It is the only means for gaseous movement with in the plant body
82. Diffusion rates are affected by  
(a) Gradient of concentration  
(b) Permeability of membranes separating them  
(c) Temperature and pressure  
(d) All of these
83. Which is incorrect w.r.t. facilitated diffusion?  
(a) Special proteins help to move substances across membranes without expenditure of ATP energy  
(b) Transport rates reaches a maximum when all fo the protein transporters are being used  
(c) It does not allow cell to select substances for uptake  
(d) It is sensitive to inhibitors which react with protein side chains
84. The Porins are proteins that form huge pores, allowing molecules upto the size of small proteins to pass through, in the outer membranes of the  
(a) Plastids  
(b) Mitochondria  
(c) Some bacteria  
(d) All of these
85. Match the transport mechanism in column I with their properties in column II
- | Column I                 | Column II              |
|--------------------------|------------------------|
| a. Facilitated transport | p. requires ATP energy |
| b. Active transport      | q. Transport saturates |
|                          | r. highly selective    |
|                          | s. uphill transport    |
- (a) a – p, r; b – q, r, s  
(b) a – q, r ; b – p, q, r, s  
(c) a – p, q, r, s ; b – q, r  
(d) a – q, s ; b – p, r
86. Which is incorrect w.r.t. plant – water relations?  
(a) Watermelon has over 92% water  
(b) A mustard plant absorbs water equal to its own weight in about 5 hours  
(c) Most herbaceous plants have about 85% of its fresh weight as dry matter  
(d) A mature corn plant absorbs almost three litres of water in a day
87. For a solution at atmospheric pressure, water potential ( $\Psi_w$ ) and solute potential ( $\Psi_s$ ) are related to each other as  
(a)  $\Psi_w < \Psi_s$   
(b)  $\Psi_w > \Psi_s$   
(c)  $\Psi_w = \Psi_s = 0$   
(d)  $\Psi_w = \Psi_s$
88. Water potential of a cell is affected by  
(a) Solute  
(b) Pressure potential  
(c) Both solute and pressure potential  
(d) Neither solute nor pressure potential
89. Net direction and rate of osmosis depends on  
(a) Pressure gradient  
(b) Concentration gradient  
(c) Both pressure and concentration gradients  
(d) Neither pressure gradient nor concentration gradient
90. Plasmolysis occurs when  
(a) Water moves out of the cell  
(b) Cell membrane shrinks away from tis cell wall  
(c) Cell is placed in a solution that is hypertonic to the protoplasm  
(d) All of these

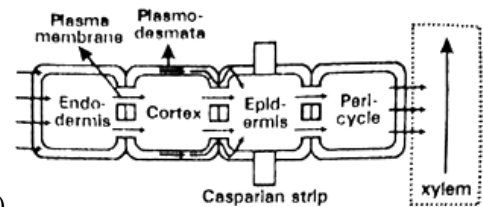
91. Turgor pressure responsible for  
 (a) Extension growth of cell  
 (b) Enlargement of cells  
 (c) Both enlargement & extension growth of cell  
 (d) Neither enlargement nor extension growth of cell
92. Which is incorrect with respect to imbibition?  
 (a) Classical example of imbibition is absorption of water by seeds and dry wood  
 (b) Swelling of wood had been used to split rocks  
 (c) It is a special type of diffusion  
 (d) Water potential gradient between absorbent and the liquid imbibed is not essential for it
93. Xylem is associated with translocation, from roots to the aerial of the plants, of mainly  
 a. Water  
 b. Proteins  
 c. Some organic nitrogen  
 d. Mineral salts  
 (a) Both a & b  
 (b) a, b & c  
 (c) a, c & d  
 (d) a, b, c, & d
94. Which of the following is incorrect about stomata?  
 (a) Transpiration occurs mainly through the stomata in the leaves  
 (b) Stomata are generally closed at day time  
 (c) Exchange of oxygen and carbon  
 (d) Stomata
95. Which of the following is correct of water movement in the root?



(a)



(b)



(c)

(d) None of these

96. Plant factors that affect transpiration are  
 (a) Number and distribution of stomata  
 (b) Canopy structure  
 (c) Water status of the plant  
 (d) All of these
97. Transpiration driven ascent of xylem sap depends mainly on which physical property of water?  
 a. Cohesion  
 b. Adhesion  
 c. Surface tension  
 (a) a, b & c  
 (b) both a & c  
 (c) b only  
 (d) a only
98. Which of the following is not a function of transpiration?  
 (a) It creates transpiration pull  
 (b) It supplies water for photosynthesis  
 (c) It cools leaf surfaces, sometimes 1 to 5 degrees, by evaporative cooling  
 (d) It transports minerals from the soil to all parts of the plant
99. Transport proteins of endodermal cells are control points, where a plant adjust the  
 (a) Quantity of solutes that reaches the xylem  
 (b) Types of solutes that reaches the xylem  
 (c) Quantity & type of solutes that reaches xylem  
 (d) Quality of solutes that reaches the xylem
100. Which of the following is not a chief sink for the mineral elements?  
 (a) Apical and lateral meristems  
 (b) Young leaves  
 (c) Fully developed flowers  
 (d) Fruits, seeds and the storage organs
101. "Phloem tissue is composed of sieve tube cells, which form \_\_\_\_\_ column with holes in their end walls called sieve plates. \_\_\_\_\_ strands pass through the holes in the sieve plates. \_\_\_\_\_ strands pass through the holes in the sieve plates, so forming continuous filaments. As



hydrostatic pressure in the phloem sieve tube \_\_\_\_\_, pressure flow begins and the sap moves through the \_\_\_\_\_.”

Which of the following is correct fill – up of the above paragraph in sequence?

- (a) Long, Cytoplasmic, increases, phloem
- (b) Short, Cytoplasmic, decreases, sieve plates
- (c) Long, Protoplasmic, decreases, sieve plates
- (d) Short, Cytoplasmic, increases, phloem

102. Which is false w.r.t. phloem?

- (a) It is responsible for transport of food from source to sink
- (b) Translocation in it is bi – directional
- (c) Source – sink relationship is non – variable
- (d) Translocation in it is explained by the pressure – flow hypothesis

103. Match the carriers in column I with the movement of molecules in column II

Column I	Column II
a. Symport	p. a molecule moves independent of the other molecule
b. Antiport	q. both molecules cross the membrane in same direction
c. Uniport	r. both molecules move in the opposite direction

- (a) a – r, b – p, c – q
- (b) a – p, b – r, c – q
- (c) a – q, b – p, c – r
- (d) a – q, b – r, c – p

104. In plant cells, which are important determinants of movement of molecules in or out of the cell?

- (a) Cell membrane
- (b) Membrane of the vacuole
- (c) Tonoplast
- (d) All of these

105. “The process of plasmolysis is usually \_\_\_\_\_. When the cells are placed in a \_\_\_\_\_ solution, water diffuses into the cell causing the \_\_\_\_\_ to build up a pressure against the wall, that is called turgor pressure. The pressure exerted by the \_\_\_\_\_ due to entry of water against the rigid walls is called pressure potential. Because of \_\_\_\_\_ of cell wall, the cell does not rupture.” Which of the following is correct fill – up of the above paragraph in sequence?

- (a) Reversible, hypotonic, cytoplasm, protoplasts, rigidity

- (b) Reversible, hypertonic, protoplasm, protoplasts, flexibility
- (c) Irreversible, hypotonic, cytoplasm, protoplasts, flexibility
- (d) Irreversible, hypotonic, protoplasm, protoplasts, rigidity

106. Which is incorrect w.r.t. additional structures associated with some of the plants that help in water and mineral absorption?

- (a) A mycorrhiza is a symbiotic association of a fungus with a plant root system
- (b) Hyphae absorb mineral ions and water from the soil from a much larger volume of soil
- (c) The fungus provides sugars and N – containing compounds to the roots indirectly
- (d) All of these

In the following questions (from 61 to 90), a statement of assertion (A) is followed by a statement of reason (R).

- (A) If both Assertion and Reason are true and the reason is the correct explanation of the assertion, then mark 1.
- (B) If both Assertion and Reason are true but the reason is not the correct explanation of the assertion, then mark 2.
- (C) If Assertion is true statement but Reason is false, then mark 3.
- (D) If Assertion is false, then mark 4.

107. A: Facilitated diffusion cannot cause net transport of molecules from a low to a higher concentration.

R: The greater the concentration of water in a system, the greater is its kinetic energy.

108. A: Pure water has the greatest water potential.

R: The greater the concentration of water in a system, the greater is its kinetic energy.

109. A: Most of the water flow in the roots occurs via the Symplast.

R: Cortical cells are loosely packed and hence offer no resistance to water movement.

110. A: There is lesser humidity in rain forest.

R: In forests, there is vast cycling of water from root to leaf to atmosphere and back to soil.

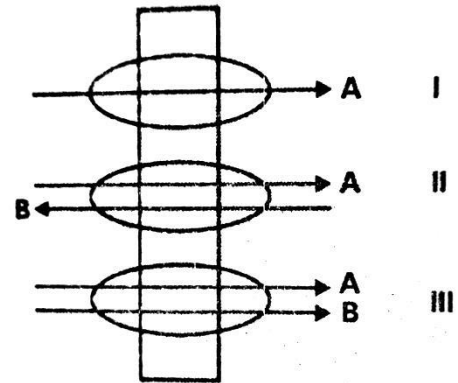
111. Which of the following features is common to prokaryotes & many eukaryotes?

- (a) Nucleus present
- (b) Cell wall present

- (c) Nuclear membrane present  
(d) Subcellular organelles present
112. Functions of cell wall is/are  
(a) Provides rigidity to cells  
(b) Prevents bursting of cells  
(c) Provides shape to plant cells  
(d) all
113. Which of the following is correctly for secondary wall?  
(a) Pits are present  
(b) Lignin is often present  
(c) Generally it is single layered  
(d) Both (a) & (b)
114. When a plant undergoes senescence, the nutrients may be  
(a) Exported  
(b) Withdrawn  
(c) Translocated  
(d) None of the above
115. Movement of hydrophilic substances are facilitated by certain transporters which are chemically  
(a) Fats  
(b) Liquids  
(c) Proteins  
(d) Carbohydrates
116. The plant cell cytoplasm is surrounded by both cell wall and cell membrane. The specificity of transport of substances are mostly across the cell membrane because  
(a) Cell wall is permeable and cell membrane is semi-permeable  
(b) Cell wall is impermeable and cell membrane is semi-permeable  
(c) Both are semi-permeable  
(d) Cell membrane is differentially permeable and cell wall is fully permeable
117. in a passive transport across a membrane, when two protein molecules move in opposite direction, it is called  
(a) Symport  
(b) Antiport  
(c) Uniport  
(d) Uphill transport
118. Movement of substances in xylem is unidirectional while in phloem it is \_\_\_\_\_  
(a) Only upwards  
(b) Only downwards  
(c) Multidirectional

(d) Unidirectional

119. Identify the process occurring in I, II and III



- (a) I – symport, II – Antiport, III – Uniport  
(b) I – Uniport, ii – Antiport, III – symport  
(c) I – symport, II – Uniport, III – Antiport  
(d) I and II – cotransport, III – Uniport

120. Identify a type of molecular movement which is highly selective and requires special membrane proteins, but does not require energy.

- (a) Simple diffusion  
(b) Uphill transport  
(c) Facilitated diffusion  
(d) Mass/bulk flow

121. Which of these is a semipermeable (S.P) and which is selectively permeable (S.L)?

- a. Animal Bladder  
b. Plasmalemma  
c. Tonoplast  
d. Parchment membrane  
e. Egg membrane

S.P                      S.L

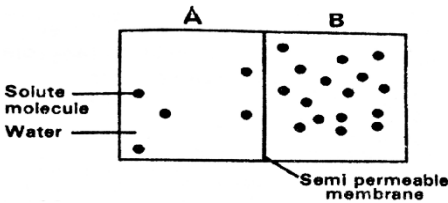
- (a) a, d, e                      b, c  
(b) b, c                      a, d, e  
(c) a, b, c                      d, e  
(d) a, d                      b, c, e

122. Choose the correct statement

- (a) Cells shrink in hypertonic solutions and swell in hypotonic solutions  
(b) Most of the water flow in the roots occurs via the Symplast  
(c) Imbibition is a special type of diffusion when water is absorbed by living cells  
(d) Plasmolysis occurs when water moves into the cell

123. An onion peel was taken and

- a. Placed in salt solution for five minutes.  
b. After that it was placed in distilled water.

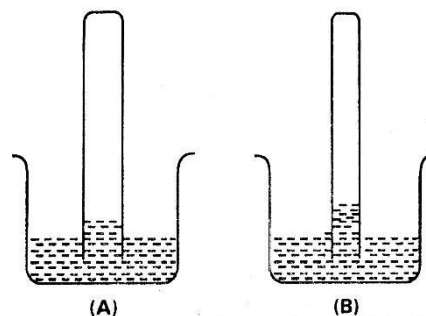
- When seen under the microscope what would be observed in a and b?
- (a) a – translocation, b – cytoplasmic streaming  
 (b) a – plasmolysis, b – Deplasmolysis  
 (c) a – endosmosis, b – Exosmosis  
 (d) a – transpiration, b – guttation
124. Which of the following statements does not apply to reverse osmosis?
- (a) It is used for water purification.  
 (b) In this technique, pressure greater than osmotic pressure is applied to the system  
 (c) It is a passive process  
 (d) It is an active process
125. What one of the following will not directly affect transpiration?
- (a) Temperature  
 (b) Light  
 (c) Wind speed  
 (d) Chlorophyll content of leaves
126. The lower surface of leaf will have more number of stomata in a
- (a) Dorsiventral leaf  
 (b) Isobilateral leaf  
 (c) Both a and b  
 (d) None of the above
127. The form of sugar transported through phloem is
- (a) Glucose  
 (b) Fructose  
 (c) Sucrose  
 (d) Ribose
128. The process of guttation takes place
- (a) When the root pressure is high and the rate of transpiration is low.  
 (b) When the root pressure is low and the rate of transpiration is high  
 (c) When the root pressure equals the rate of transpiration  
 (d) When the root pressure as well as rate of transpiration are high.
129. Which of the following is an example of imbibition?
- (a) Uptake of water by root hair  
 (b) Exchange of gases in stomata  
 (c) Swelling of seed when put in soil  
 (d) Opening of stomata
130. Water potential of pure water at standard temperature is equal to
- (a) 10  
 (b) 20  
 (c) Zero  
 (d) None of the above
131. 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 a pre – requisite for this process to occur.  
 (d) The direction and rate of osmosis depends on both the pressure gradient and concentration gradient.
132. Choose the correct option:  
 Mycorrhiza is a symbiotic association of fungus with root system which helps is
- a. Absorption of water  
 b. Mineral nutrition  
 c. Translocation  
 d. Gaseous exchange
- Options:  
 (a) Only A  
 (b) Only B  
 (c) Both A and B  
 (d) Both B and C
133. Match the followings and choose the correct option
- | Column – I          | Column – II                     |
|---------------------|---------------------------------|
| a. Leaves           | i. Anti – transpirant           |
| b. Seed             | ii. Transpiration               |
| c. Roots            | iii. Negative osmotic potential |
| d. PMA              | iv. Imbibition                  |
| e. Plasmolyzed cell | v. Absorption                   |
- Options:  
 (a) a – iii, b – iv, c – I, d – ii, e – v  
 (b) a – ii, b – iv, c – v, d – i, e – iii  
 (c) a – iii, b – ii, c – iv, d – I, e – v  
 (d) a – iii, b – ii, c – I, d – iv, e – v
134. The rate and direction of osmosis depends on
- (a) Only pressure gradient  
 (b) Only chemical potential

- (c) Both pressure gradient and concentration gradient  
(d) Only concentration gradient
135. Due to development of \_\_\_\_\_ seedlings emerge out of soil during seed germination  
(a) Plasmolytic shrinkage  
(b) Imbibition pressure  
(c) More negative solute potential  
(d) Mass flow
136. The most important physiological phenomenon which is responsible for upward movement of water (even to the tip of a tree of 20 m.ht.) is  
(a) Transpiration  
(b) Guttation  
(c) Root pressure  
(d) Active transport
137. A flowering plant is planted in an earthen pot and irrigated. Urea is added to make the plants grown faster, but after sometime the plant dies. This may be due to  
(a) Plasmolysis  
(b) Deplasmolysis  
(c) Osmosis  
(d) Reverse osmosis
138. Give below is a table. Fill in the gaps

Property	Simple diffusion	Facilitated transport	Active Transport
Highly selective	No	(a)	Yes
Uphill transport	No	No	(b)
Requires ATP	No	(c)	Yes

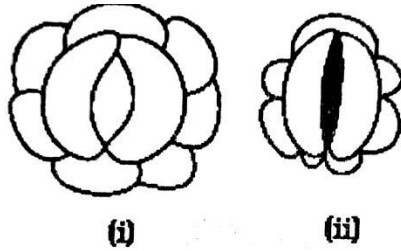
- (a) a – Yes, b – Yes, c – Yes  
(b) a – Yes, b – No, c – Yes  
(c) a – Yes, b – No, c – No  
(d) a – Yes, b – Yes, c – No
139. Which out of Apoplastic and Symplastic pathways of water transport, need active transport?  
(a) Both  
(b) None  
(c) Only Apoplastic  
(d) Only Symplastic
140. Identify the correct match  
(a) Water stoma - Transpiration  
(b) Casparian strips – Symplastic transport of water  
(c) Stomata in epidermis – Guttation

- (d) Cortical cells - Uphill transport of water
141. Cut pieces of beetroot do not leave colour in cold water but do so in both water. This is because  
(a) Heating makes cell membranes permeable  
(b) Heating makes cell walls permeable  
(c) Heating does not affect cell membranes  
(d) Heating makes cell walls lose their rigidity
142. How can plants be grown under limited water supply without compromising on metabolic activities?  
(a) By applying sugar over foliage  
(b) By applying salt over foliage  
(c) By applying N, P, K. mixture over foliage  
(d) By applying antitranspirant over foliage
143. Keep some freshly cut flowers in a solution of food colour. After sometime if a section of stem is cut and seen under microscope, what observation will you get?  
(a) Only phloem takes up colour  
(b) Only xylem takes up colour  
(c) Vascular rays take up colour  
(d) Full vascular bundles take up colour
144. If you are provided with two tubes (A and B), where one is narrow and the other is relatively wider and if both are immersed in a beaker containing water as shown in the figure given below



- (a) Force due to surface tension are higher in tube A but rise of water column is lesser  
(b) Force due to surface tension are higher in tube B rise of water column is more  
(c) Force due to surface tension are lower in tube A but rise of water column is more  
(d) Force due to surface tension are lower in tube B but rise of water column is lesser

145. Observe the diagram and answer the following:

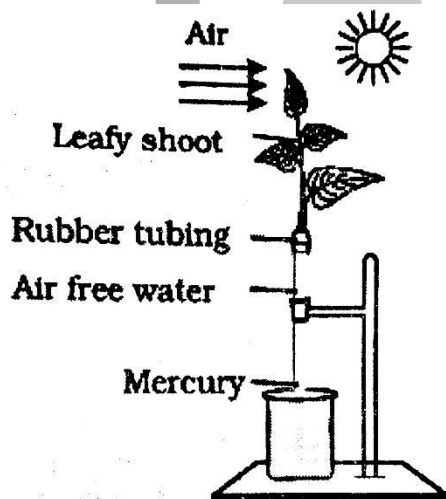


- Are these types of guard cells found in monocots or dicots?
- Which of these shows higher water content (i) or (ii)?
- Which element plays an important role in the opening and closing of stomata?

Options:

- a – dicots, b – (i), c – Ca
- a – monocots, b – (ii), c – K
- a – monocots, b – (ii), c – K
- a – dicots, b – (i), c – K

On the basis of following experimental setup choose the correct option of questions no. 146 – 147



146. What does the setup demonstrate?

- Bleeding
- Absorption of water
- Transpiration and ascent of sap
- Uniport

147. Will the mercury level fluctuate (go up / down) if phenyl mercuric acetate is sprayed on leaves?

- Mercury level will go up
- Mercury level will go down
- Mercury level will remain same
- Water column will move but mercury will remain same

# ANSWER KEY

## EXERCISE – 1

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

## EXERCISE – 2

Ques.	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.
Ans.	D	D	B	B	A	D	B	D	C	A
Ques.	11.	12.	13.	14.	15.	16.	17.	18.	19.	20.
Ans.	C	C	C	C	A	B	B	A	A	D
Ques.	21.	22.	23.	24.	25.	26.	27.	28.	29.	30.

<b>Ans.</b>	C	A	A	A	C	D	C	A	D	D
<b>Ques.</b>	<b>31.</b>	<b>32.</b>	<b>33.</b>	<b>34.</b>	<b>35.</b>	<b>36.</b>	<b>37.</b>	<b>38.</b>	<b>39.</b>	<b>40.</b>
<b>Ans.</b>	B	B	C	A	C	B	A	C	A	A
<b>Ques.</b>	<b>41.</b>	<b>42.</b>	<b>43.</b>	<b>44.</b>	<b>45.</b>	<b>46.</b>	<b>47.</b>	<b>48.</b>	<b>49.</b>	<b>50.</b>
<b>Ans.</b>	C	C	A	A	D	C	B	C	B	B
<b>Ques.</b>	<b>51.</b>	<b>52.</b>	<b>53.</b>	<b>54.</b>	<b>55.</b>	<b>56.</b>	<b>57.</b>	<b>58.</b>	<b>59.</b>	<b>60.</b>
<b>Ans.</b>	A	B	A	C	C	B	B	B	d	D
<b>Ques.</b>	<b>61.</b>	<b>62.</b>	<b>63.</b>	<b>64.</b>	<b>65.</b>	<b>66.</b>	<b>67.</b>	<b>68.</b>	<b>69.</b>	<b>70.</b>
<b>Ans.</b>	A	C	D	B	A	C	C	B	D	D
<b>Ques.</b>	<b>71.</b>	<b>72.</b>	<b>73.</b>	<b>74.</b>	<b>75.</b>	<b>76.</b>	<b>77.</b>	<b>78.</b>	<b>79.</b>	<b>80.</b>
<b>Ans.</b>	C	C	C	B	C	C	B	D	A	A
<b>Ques.</b>	<b>81.</b>	<b>82.</b>	<b>83.</b>	<b>84.</b>	<b>85.</b>	<b>86.</b>	<b>87.</b>	<b>88.</b>	<b>89.</b>	<b>90.</b>
<b>Ans.</b>	B	D	C	D	B	C	D	C	C	D
<b>Ques.</b>	<b>91.</b>	<b>92.</b>	<b>93.</b>	<b>94.</b>	<b>95.</b>	<b>96.</b>	<b>97.</b>	<b>98.</b>	<b>99.</b>	<b>100.</b>
<b>Ans.</b>	C	D	C	B	C	D	A	C	C	C
<b>Ques.</b>	<b>101.</b>	<b>102.</b>	<b>103.</b>	<b>104.</b>	<b>105.</b>	<b>106.</b>	<b>107.</b>	<b>108.</b>	<b>109.</b>	<b>110.</b>
<b>Ans.</b>	A	C	D	D	A	C	C	A	D	D
<b>Ques.</b>	<b>111.</b>	<b>112.</b>	<b>113.</b>	<b>114.</b>	<b>115.</b>	<b>116.</b>	<b>117.</b>	<b>118.</b>	<b>119.</b>	<b>120.</b>
<b>Ans.</b>	B	D	D	B	C	D	B	C	B	C
<b>Ques.</b>	<b>121.</b>	<b>122.</b>	<b>123.</b>	<b>124.</b>	<b>125.</b>	<b>126.</b>	<b>127.</b>	<b>128.</b>	<b>129.</b>	<b>130.</b>
<b>Ans.</b>	A	A	B	D	D	A	C	A	C	C
<b>Ques.</b>	<b>131.</b>	<b>132.</b>	<b>133.</b>	<b>134.</b>	<b>135.</b>	<b>136.</b>	<b>137.</b>	<b>138.</b>	<b>139.</b>	<b>140.</b>
<b>Ans.</b>	B	C	B	C	B	A	A	D	D	B
<b>Ques.</b>	<b>141.</b>	<b>142.</b>	<b>143.</b>	<b>144.</b>	<b>145.</b>	<b>146.</b>	<b>147.</b>			
<b>Ans.</b>	A	D	B	A	D	C	B			