



BIOLOGY

BOOKS - SANTRA BIOLOGY (BENGALI ENGLISH)

TRANSPORT IN PLANTS

Problems

1. Osmotic pressure (OP) of a cell is 3 bar and diffusion pressure deficit (DPD) is 2.1 bar.

Calculate the turgor pressure (TP) of that cell.



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2. When a cell becomes unable to absorb water ?



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3. Water potential of a cell is 0.244 Mpa and pressure potential is 0.402 MPA. Calculate the osmotic potential of that cell.



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A Multiple Choice Questions Mcq

1. Plants loss water by guttation when

A. Rate of transpiration

B. Soil is wet and atmosphere is dry

C. Soil is dry and atmosphere is dry

D. Soil is dry and atmosphere is wet

Answer: B



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2. which of the following leaves would dry up last ?

- A. Both surface greased
- B. Upper surface greased
- C. Both surface ungreased
- D. Lower surface greased

Answer: A



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3. Stewart's theory of stomata opening and closure states the presence of enzyme in guard cell

A. Phosphorylase and phosphatase

B. Hexokinase and phosphoglucomutase

C. Hexokinase and phosphoglucomutase,
phosphatase and hexokinase

D. Phosphorylase and phosphoglumutase

Answer: C



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4. Cohesion theory of Ascent of sap was proposed by

A. Dixon

B. Bose

C. Priestly

D. Atkins

Answer: A



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5. Transpiration is very low during storms due to

- A. Presence of moisture in wind
- B. Low temperature during storm
- C. High velocity of winds

D. None of these

Answer: C



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6. Spraying of phenyl mercuric acetate results in

A. Reduced transpiration

B. Increased photosynthesis

C. Increased respiration

D. Increased transpiration

Answer: A



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7. Guard cells in monocot leaves are

A. Dumb-bell shaped

B. Kidney shaped

C. Isodiametric

D. None of these

Answer: A



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8. Potassium ion exchange hypothesis of opening and closing of stomata was proposed by

A. Stewart

B. Sayre

C. Levitt

D. Bose

Answer: C



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9. In plants water rises upward through

A. Phloem

B. Cambium

C. Cortex

D. Xylem

Answer: D



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10. Ascent of sap takes place through

A. Phloem

B. Cambium

C. Cortex

D. Xylem

Answer: D



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11. Source of turgor pressure in plant cell is

A. Air

B. Water

C. Hormone

D. All of these

Answer: B



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12. If there is no net movement of water into a cell from outside medium , the medium is known as

A. Hypertonic

B. Hypotonic

C. Isotonic

D. Non-ionic

Answer: C



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13. The diffusion of water through a semipermeable membrane is known as

A. Osmosis

B. Imbibition

C. Guttation

D. Transpiration

Answer: A



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14. A membrane which permits selective movement of molecules through it , it called

- A. Permeable membrane
- B. Unit membrane
- C. Semipermeable membrane
- D. Impermeable membrane

Answer: C



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15. DPD is equal to

A. $TP - OP$

B. $OP - TP$

C. $OP + TP$

D. $OP \times TP$

Answer: B



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16. Water will be absorbed by root hairs when

A. conc. of solutes in the cell sap is high

B. conc. of solutes in the cell sap is low

C. Semipermeable membrane

D. Impermeable membrane

Answer: A



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17. The percentage of water left in the soil when the plant wilt is called

- A. Wilting co-efficient
- B. Filled capacity
- C. Turgidity
- D. Water holding capacity

Answer: A



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18. If a cell 'X' has $OP = 6$ and $TP = 5$ and is surrounded by the cell with $OP = 4$ and $TP = 2$, then what will be the direction of water movement

A. From other cell to cell 'X'

B. From cell 'X' to other cell

C. Water absorption is not affected by temperature

D. Water will move freely

Answer: B



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19. When the temperature of the soil is zero then

A. Water absorption increase

B. Water absorption decrease

C. Water absorption is not affected by temperature

D. The soil will loose all capillary water

Answer: B



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20. When a plant wilts , the sequence of events will be as follows

A. Exosmosis , plasmolysis deplasmolysis ,
temporary wilting

B. Exosmosis , deplasmolysis , plasmolysis ,
temporary and permanent wilting

C. Exosmosis , plasmolysis, temporary and
permanent wilting

D. None of these

Answer: C



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21. The selectivity of differentially permeable membrane allows the passage of

A. Water only

B. Solvent only

C. Solute only

D. Selected solute and solvent

Answer: D



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22. Germination of seed is accomplished by

A. Absorption of heat

B. Starch synthesis

C. Fat synthesis

D. Evolution of heat

Answer: D



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23. Active K^+ exchange mechanism of opening and closing of stomata was given by

A. Khorana

B. Scarth

C. Levitt

D. Darwin

Answer: C



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24. The lowest water potential is found in the xylem channels of

A. Stem

B. Root

C. Root hair zone

D. Leaves

Answer: D



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25. Root hairs absorb water when

- A. They respire rapidly
- B. Soil solution is isotonic
- C. Salt concentration of cell sap is high
- D. Salt concentration of soil is high

Answer: C



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26. In floating leaves like *Nymphaea* and *Nelumbo* leaves are

- A. Epistomatic
- B. Amphistomatic
- C. Hypostomatic
- D. Astomatic

Answer: A



27. Apple mulberry types of leaves are

- A. Epistomatic
- B. Hypostomatic
- C. Amphistomatic
- D. Astomatic

Answer: B



28. Due to low atmospheric pressure , the rate of rate of transpiration

- A. Decreases slowly
- B. Decreases rapidly
- C. Increases
- D. Remain unaffected

Answer: C



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29. In guard cells when sugar is converted into starch , the stomatal pore

- A. Opens partially
- B. Opens completely
- C. Close completely
- D. Remain unchanged

Answer: C



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30. Dumb - bell shaped guard cells are found in

A. Wheat

B. Bean

C. Sunflower

D. Ground nut

Answer: A



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31. Plant - cooling occurs due to

A. Assimilation

B. Guttation

C. Photorespiration

D. Transpiration

Answer: D



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32. With increase in turgidity of a cell surrounded by water the wall pressure will ?

A. Increase

B. Decreases

C. Fluctuate

D. Remain unchanged

Answer: A



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33. The rate of absorption of water is slow at temperature near freezing point

- A. It is mainly a metabolic process
- B. Cell membrane becomes more viscous
- C. Growth of cell stop
- D. Transpiration is retarded

Answer: B,D



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34. If cohesion tension transpiration theory is correct then a break in water column in xylem vessels

A. Should cause the mesophyll cell to become flaccid and result in wilting of leaves

B. Should increase the water contents of leaves

C. Should have no effect at all

D. Should increase the rate of photosynthesis

Answer: A



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35. When a bottle of perfume is placed at one corner of room and the lid is opened , the scent spreads all over the room after sometimes . This happens by the process of

A. Plasmolysis

B. diffusion

C. Endosmosis

D. Transpiration

Answer: B



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36. What will be the nature of sugar nature of sugar solution if the cell of an epidermal peel of Rhoeco shows plasmolysis

A. Hydrophoric

B. Hypertonic

C. Isotonic

D. Hypotonic

Answer: B



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37. Endosmosis of water occurs when in compared with outer solution, the water potential of cell sap is

A. Higher

B. Lower

C. Equal

D. None of these

Answer: B



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38. If alcohol treated cell is kept in Hypertonic solution

A. Burst

B. plasmolysed

C. Remains same

D. None

Answer: C



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39. The osmotic potential of a solution is denoted by the symbol

A. Ψ_x

B. Δ_{Ψ}

C. Ψ_p

D. Ψ_s

Answer: D



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40. In the process of osmosis

- A. Both protoplasm and cell wall act as single layer
- B. Only protoplast act as a single layer
- C. Only cell membrane act as single layer
- D. None of these

Answer: B



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41. For the same amount of CO_2 fixed, a C_4 plant as compared to C_3 plant loses only

- A. half amount of water
- B. double amount of water
- C. equal amount of water
- D. none of the above

Answer: A



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42. In cell wall of guard cells, cellulose microfibrils are arranged

A. transversely

B. osmosis

C. radially

D. obliquely

Answer: C



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43. Graham's law is connected with

A. diffusion

B. osmosis

C. osmoregulation

D. absorption

Answer: A



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44. Water potential of pure water and its solution are

A. 0 and 1

B. 0 and 0

C. 0 and more than one

D. 0 and less than one

Answer: D



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45. Bacteria cannot survive in highly salted pickle because

A. Salt inhibits reproduction of bacteria

B. they become plasmolysed and die

C. Nutrients in it cannot support life

D. enough light is not available for
photosynthesis

Answer: B



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46. What happens when concentration of solutes decrease in guard cells?

A. Water potential decreases

B. Water potential increase

C. Osmotic pressure increase

D. none of the above

Answer: B



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47. Force of cohesion develops due to

- A. attraction between similar molecules
- B. attraction between similar molecules
- C. Surface tension at the interface
- D. all of the above

Answer: A



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48. Major loss of water in transpiration occurs through

A. cuticle

B. bark

C. hydathodes

D. stomata

Answer: D



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49. Who proposed Mass flow hypothesis ?

A. Darwin

B. Munch

C. Llyod

D. Dixon and Jolly

Answer: B



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50. Auxanometer is used to measure

- A. the growth in length of a plant organ
- B. the growth in breadth of a plant organ
- C. population of the pests attacking a plant
- D. both a and b

Answer: A



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51. Exponential growth in plants can be expressed as

A. $L_t = L_0 + rt$

B. $L_e = L_t rt$

C. $W_1 = W_0 e^{rt}$

D. $W_1 = W_0 e^{rt}$

Answer: C



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52. Which one of the following is correctly matched ?

- A. potassium -readily immobilisation
- B. bakane of rice seedlings - F , Skoog
- C. Passive transport of nutrients - ATP
- D. apoplast - plasmodesmata

Answer: D



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53. In a fully turgid cell, which of the following parameters will be zero?

A. TP

B. OP

C. DPD

D. RP

Answer: C



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54. Which of the following criteria does not pertain to facilitated transport ?

A. requirement of special membrane proteins

B. transport saturation

C. uphill transport

D. high selectivity

Answer: C



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55. Trachieds differ from other tracheary elements in

A. having casparian strips

B. being inperforate

C. lacking nucleus

D. being lignified

Answer: B



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56. The osmotic expansion of a cell kept in water is chiefly regulated by

A. mitochondria

B. vacuoles

C. plastids

D. ribosomes

Answer: B



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57. In which one of the following , expenditure of energy is required ?

A. Osmosis

B. diffusion

C. active transport

D. passive transport

Answer: C



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58. In a plant cell the diffusion pressure deficit is zero when it is

A. turgid

B. plasmolysed

C. flaccid

D. incipient

Answer: A



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59. Guttation occurs through

A. roots

B. hydathode

C. trichome

D. stomata

Answer: B



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60. Fructose is absorbed into the blood through mucosa cells of intestine by the process called

- A. active transport
- B. facilitated transport
- C. simple diffusion
- D. Co -transport mechanism

Answer: B



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61. The apoplast is located

- A. outside the plasmamembrane
- B. in the entire cytosol
- C. on both sides of plasma membrane
- D. in the plastidial content

Answer: A



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62. ATP synthesis in cell requires

- A. H^+ - gradient across the membrane
- B. K^+ gradient across the membrane
- C. PO_4^{3-} gradient across the membrane
- D. Ca^{2+} gradient across the membrane

Answer: A



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63. Passage cells help in

A. transport of water towards pericycle

B. transport of water towards epiblema

C. absorption of water from soil

D. passage of CO_2 towards stomata

Answer: A



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64. Transpiration and root pressure cause water to rise in plants by

- A. pulling it upward
- B. pulling and pushing it , respectively
- C. pushing it upward
- D. pushing and pulling it, respectively

Answer: B



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65. Specialized epidermal epidermal cells surrounding the guard cells are called

- A. Subsidiary cells
- B. Bultiform cells
- C. Lenticels
- D. Complementary cells

Answer: A



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Exercise

1. What are the anti - transpirants ?

A. NAA

B. IAA

C. ABA

D. PMA

Answer: c,d



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2. Define ascent to sap



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3. What are the semi-permeable membranes ?

- A. Perchment paper
- B. rubber membrane
- C. lower membrane of egg's layer
- D. none of them

Answer: a,c



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4. Guttation is found in

A. Primula

B. Colocosia

C. Tomato

D. Ficus

Answer: a,b,c



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5. Transport of materials over short distance usually take place through

A. Facilitated diffusion

B. Active transport

C. Passive transport

D. Diffusion

Answer: a,b,d



6. Name the gas which are absorbed by the hydrophytes from water

A. O_2

B. CO_2

C. N_2

D. CO

Answer: a,b



7. What is plasmodesmata



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8. Porins form huge pores in the outer membrane of

A. Nucleus

B. Mitochondria

C. Golgi body

D. Plastids

Answer: b,d



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9. The impermeable membranes are

A. Suberised walls of plant cells

B. Filter paper

C. Parchment paper

D. Sheet of rubber

Answer: a,d



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10. Osmotic theory proposed by

A. Atkins

B. Thimann

C. Priestly

D. Bartlett

Answer: a,c



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C Fill In The Blanks

1. The pressure exerted by cell wall to balance turgor pressure is called



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2. In the thermodynamic terminology the osmotic pressure is equivalent to

Potential concept but opposite of its value.



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3. When a cell is placed in a hypotonic solution, water moves into the cell , this flow is called



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4. The form and structure of growing cell are maintained because of



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5. A membrane allowing certain molecule to enter and preventing the other is called..... membrane.



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6. DPD in thermodynamics terminology is known as



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7. The value of water potential of pure water at normal temperature and pressure is



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8. The most acceptable theory of ascent of sap is



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9. The hydrostatic pressure developed in the root is called..... Pressure.



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10. The Pressure of the guard cell is responsible for the opening of stomata.



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D True Or False Statement Questions

1. Diffusion is a random movement of individual molecules from a region of lower concentration to a region of higher concentration.



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2. Water potential is the chemical energy of water.



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3. Grapes, placed in concentrated sugar solution shrink due to exosmosis.



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4. 0.9% NaCl causes plasmolysis of red blood corpuscles.



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5. Plasmodesmata is involved in symplastic movement of water.



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6. DPD increases with the increasement of transpiration.



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7. Water is lost from plants in vapour form by the process called guttation.



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8. K^+ plays important role in stomatal opening and closing.



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9. High CO_2 concentration causes opening stomata.



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10. DPD of pure water is zero.





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Very Short Answer Type Questions

1. Name the part of the root concerned mainly with absorption of water.



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2. What are forces involved in absorption of water from soil to the root hairs ?



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3. Is active absorption of water osmotic or non-osmotic ?



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4. What are the forces that maintain the continuity of water column during ascent of sap.



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5. Name the theory proposed by Dixon for ascent sap.



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6. What are the subsidiary cells ?



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7. Name three antitranspirants .



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8. Name the plant where sunken stomata are present .



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9. Explain DPD.



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10. What is water potential ?



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11. what is solute potential ?



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12. What is pressure potential ?



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13. Name the membrane which surrounds the vacuole in plant cell.



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14. What will happen if a cell is placed in a hypertonic solution.



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15. What is the chemical potential of pure water at normal temperature and pressure.



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16. Which fraction of water is available to plants for absorption by root?



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17. Give common measurement unit of water potential .



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18. What is the value of water potential of pure water ?



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Short Answer Type Questions

1. List any four mechanism that contributes the ascent of sap.



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2. What will happen if transpiration exceeds the amount of water absorbed ?



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3. What force are involved in the absorption of water from the soil by root hairs ?



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4. State the differences between Hydathode and Stomata.



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5. Name the various forms of water found in soil.



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6. Why is turgidity of cells essential for plant.



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7. Name the factors which effect water potential .



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8. What do you know by hygroscopic water and capillary water ?



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9. Mention any two uses of transpiration in plant.



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10. What is the role of K^+ ions during opening of stomata.



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11. What is membrane potential ?



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12. What are porins ? What role do they play in diffusion ?





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13. Explain how osmosis influence other components of cell water relations in plants .



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14. How k^+ ion opening and closing of stomata



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15. Write the difference between transpiration and guttation



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16. How to rise in temperature and increased wind velocity affect transpiration.



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17. What is membrane permeability?



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Differentiation

1. Guttation and Bleeding .



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2. Diffusion and Imbibition.



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3. Semipermeable membrane and Selectively permeable membrane.



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4. Flaccid cell and Turgid cell.



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Long Answer Type Questions

1. Define exosmosis



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2. Define imbibition. State its significance .



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3. What is hypertonic solution?



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4. Create a relationship between OP ,TP and
DPD



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5. Define isotonic solution.



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6. Write short notes on: (a) Plasmolysis , (b)
Imbibition,(c) Osmosis, (d) Root pressure.



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7. Transpiration in higher plants is considered as necessary but evil process, explain.



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Ncert Questions

1. What are the factors affecting the rate of diffusion.



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2. What is porins? What role do they play in diffusion?



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3. Describe the role played by protein pumps during active transport in plants.



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4. Explain why pure water has the maximum water potential.



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5. Differentiate between Diffusion and osmosis.



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6. Briefly describe water potential. What are the factors affecting it.



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7. What happens when a pressure greater than the atmospheric pressure is applied to pure water or a solution.



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8. Define imbibition



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9. Define hydroponics



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10. What role does root pressure play in water movement in plants?



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11. Describe transpiration pull model of water transport in plants. What are the factors

influencing Transpiration? How is it useful to plants?



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12. Define chlorosis



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13. What essential role do the root endodermis play during minerals absorption in plants?



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14. What is hydroponics?



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15. Explain pressure flow hypothesis of translocation of sugars in Plants.



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16. What causes the opening and closing of guard cells of stomata during transpiration?



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