

SAMPLE CONTENT



MHT-CET

TRIUMPH

BIOLOGY

BASED ON STD. XI & XII SYLLABUS OF MHT-CET

MULTIPLE CHOICE QUESTIONS

Archaeopteryx is the connecting link between birds and reptiles. This transitional fossil provides palaeontological evidence that birds evolved from reptiles.



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Written in accordance with the latest MHT-CET Paper Pattern which includes topics based on Std. XII Sc. and relevant chapters of Std. XI Sc. (Maharashtra State Board)

MHT-CET TRIUMPH BIOLOGY MULTIPLE CHOICE QUESTIONS

Based on Std. XI & XII Syllabus of MHT-CET

Salient Features

- ☞ Includes chapters of Std. XII and relevant chapters of Std. XI as per latest MHT-CET Syllabus.
- ☞ Exhaustive subtopic wise coverage of MCQs.
- ☞ Quick review provided for each chapter.
- ☞ Various competitive exam questions updated till the latest year.
- ☞ Includes MCQs from NEET 2016, 2017 and 2018.
- ☞ Includes MCQs upto MHT-CET 2018.
- ☞ Includes MHT-CET 2019 Question Paper (6th May, Afternoon) along with Answer key.
- ☞ Evaluation test provided at the end of each chapter.
- ☞ Two Model Question Papers with answers provided at the end of the book.

Scan the adjacent QR code or visit www.targetpublications.org/tp12741 to download Hints for relevant questions, Evaluation Test and MHT-CET 2019 Question Paper in PDF format.



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PREFACE

“**Triumph Biology**” is a complete and thorough guide to prepare students for MHT-CET examination.

This book is based on the MHT-CET syllabus which includes topics based on Std. XII Sc. and relevant chapters of Std. XI Sc. (Maharashtra State Board)

MCQs in each chapter are divided into three sections:

- 🌀 **Classical Thinking:** consists of straight forward questions including knowledge based questions.
- 🌀 **Critical Thinking:** consists of questions that require deeper understanding of the concept.
- 🧠 **Competitive Thinking:** consists of questions from various competitive examinations like AIIMS, NEET, MHT-CET, KCET, CPMT, GUJ CET, AP EAMCET (Medical), TS EAMCET (Medical), BCECE, etc.

An **Evaluation Test** has been provided at the end of each chapter to assess the level of preparation of the student at a competitive level.

Quick Review in the form of charts are provided at the beginning of every chapter.

An additional feature of **pictorial representation** of a topic is added to give the student a glimpse of various interesting biological concepts.

MHT-CET 2019 Question Paper (6th May, Afternoon) along with Answer key have been included.

Hints have been provided in downloadable format to relevant MCQs, evaluation test and MHT-CET 2019 Question Paper.

The journey to create a complete book is strewn with triumphs, failures and near misses. If you think we’ve nearly missed something or want to applaud us for our triumphs, we’d love to hear from you.

Please write to us on : mail@targetpublications.org

Best of luck to all the aspirants!

Yours faithfully

Authors

Edition: First

Disclaimer

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This work is purely inspired upon the course work as prescribed by the Maharashtra State Board of Secondary and Higher Secondary Education, Pune. Every care has been taken in the publication of this reference book by the Authors while creating the contents. The Authors and the Publishers shall not be responsible for any loss or damages caused to any person on account of errors or omissions which might have crept in or disagreement of any third party on the point of view expressed in the reference book.

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MHT-CET PAPER PATTERN

- There will be three papers of Multiple Choice Questions (MCQs) in ‘Mathematics’, ‘Physics and Chemistry’ and ‘Biology’ of 100 marks each.
- Duration of each paper will be 90 minutes.
- Questions will be based on the syllabus prescribed by Maharashtra State Board of Secondary and Higher Secondary Education with approximately 20% weightage given to Std. XI and 80% weightage will be given to Std. XII curriculum.
- Difficulty level of questions will be at par with JEE (Main) for Mathematics, Physics, Chemistry and at par with NEET for Biology.
- There will be no negative marking.
- Questions will be mainly application based.
- Details of the papers are as given below:

Paper	Subject	Approximate No. of Multiple Choice Questions (MCQs) based on		Mark(s) Per Question	Total Marks
		Std. XI	Std. XII		
Paper I	Mathematics	10	40	2	100
Paper II	Physics	10	40	1	100
	Chemistry	10	40		
Paper III	Biology (Botany)	10	40	1	100
	Biology (Zoology)	10	40		

- Questions will be set on
 - i. the entire syllabus of Physics, Chemistry, Mathematics and Biology subjects of Std. XII, and
 - ii. chapters / units from Std. XI curriculum as mentioned below:

Sr. No.	Subject	Chapters / Units of Std. XI
1	Physics	Measurements, Scalars and Vectors, Force, Friction in solids and liquids, Refraction of Light, Ray optics, Magnetic effect of electric current, Magnetism.
2	Chemistry	Some basic concepts of chemistry, States of matter: Gases and liquids, Redox reactions, Surface chemistry, Nature of chemical bond, Hydrogen, s-Block elements (Alkali and alkaline earth metals), Basic principles and techniques in organic chemistry, Alkanes.
3	Mathematics	Trigonometric functions, Trigonometric functions of Compound Angles, Factorization Formulae, Straight Line, Circle and Conics, Sets, Relations and Functions, Probability, Sequences and series.
4	Biology	
	Section I – Botany	Diversity in organisms, Biochemistry of cell, Plant Water Relations and Mineral Nutrition, Plant Growth and Development.
	Section II – Zoology	Organization of Cell, Animal tissues, Human Nutrition, Human Respiration.

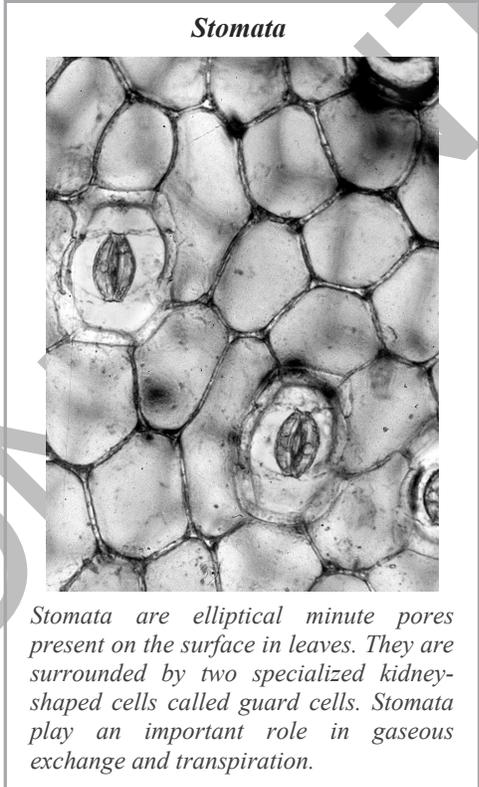
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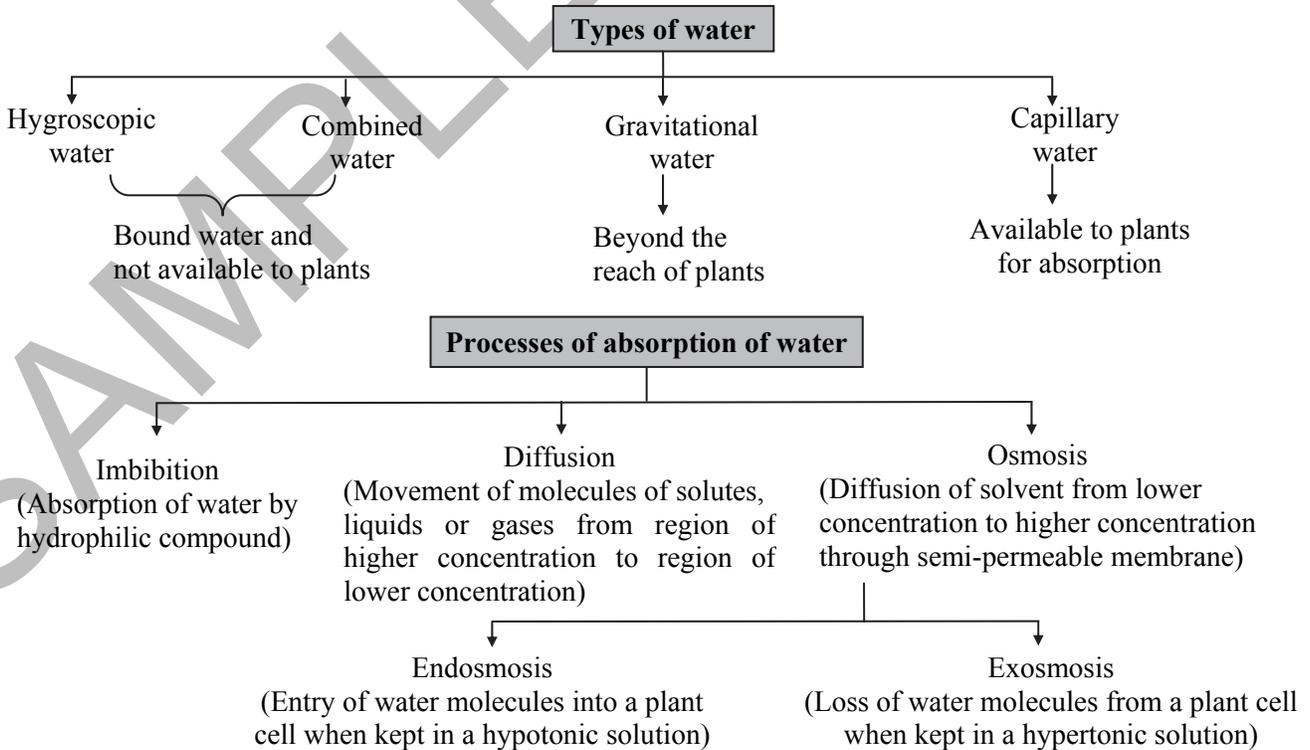
Note: Questions of standard XI are indicated by ‘**’ in each Model Question Paper.

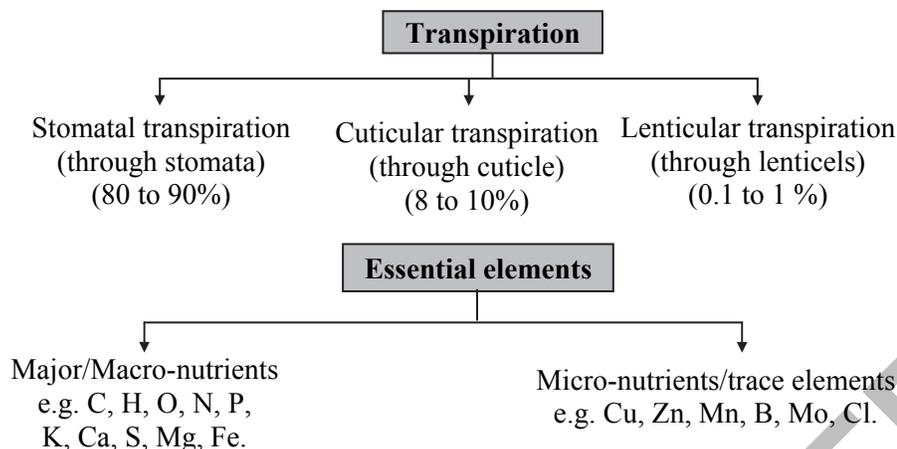
Syllabus

- 6.1 Source of Water for Plants
- 6.2 Absorption and Movement of Water
- 6.3 Ascent of Sap
- 6.4 Transpiration
- 6.5 Role of Water
- 6.6 Translocation of Food: Through Phloem
- 6.7 Mineral Nutrition



Quick Review





Classical Thinking



6.1 Source of Water for Plants

- _____ is the main source of water for plants.
(A) Soil (B) Atmosphere
(C) Air (D) Humus
- Which type of water is available to the plants?
(A) Hygroscopic water
(B) Gravitational water
(C) Combined water
(D) Capillary water
- Water present in the form of hydrated oxides of silicon, aluminium, etc. is called
(A) Hygroscopic water
(B) Capillary water
(C) Combined water
(D) Chemical water
- Various physical processes involved in absorption of water are
(A) Imbibition (B) Diffusion
(C) Osmosis (D) All of these
- The initial stage or first step of water absorption by root cells is
(A) imbibition (B) adsorption
(C) osmosis (D) desorption
- Dry seeds when placed in water swell due to
(A) imbibition (B) absorption
(C) diffusion (D) adsorption
- Wooden doors swell up and get stuck during the rainy season. This is due to the phenomenon of
(A) imbibition (B) exosmosis
(C) capillarity (D) deplasmolysis
- Which of the following is/are hydrophilic substances?
(A) Cellulose
(B) Pectic compounds
(C) Lipids
(D) Both (A) and (B)
- The movement of solute particles from a region of higher concentration to a region of lower concentration is termed as
(A) osmosis (B) diffusion
(C) plasmolysis (D) imbibition
- Special proteins required for facilitated diffusion are called
(A) porins (B) sporins
(C) ribosomal protein (D) peptidoglycan
- Transport of two types of molecules in the same direction is called
(A) antiport (B) uniport
(C) symport (D) biport
- Molecules move independent of each other in _____ transport.
(A) symport (B) local
(C) antiport (D) uniport
- Phenomenon of plasmolysis occurs when
(A) cells are kept in hypertonic solution
(B) cells are kept in hypotonic solution
(C) cells are kept in isotonic solution
(D) none of these
- In plants, the semipermeable membrane allows the diffusion of
(A) solvent
(B) solute
(C) inorganic particles
(D) both (A) and (B)



15. A plant cell becomes turgid due to
 (A) plasmolysis (B) exosmosis
 (C) endosmosis (D) electrolysis
16. If a cell is reduced in size when placed in a solution, the solution is
 (A) hypertonic (B) hypotonic
 (C) weak (D) saturated
17. Osmosis involves diffusion of
 (A) suspended particles from higher to lower concentration
 (B) suspended particles from lower to higher concentration
 (C) water from more to less concentrated side
 (D) water from less to more concentrated side
18. In a plant cell, the shrinking of protoplasm is called
 (A) turgidity (B) flaccidity
 (C) deplasmolysis (D) plasmolysis
19. To initiate plasmolysis in plant cells, the salt solution used is
 (A) hypertonic (B) hypotonic
 (C) isotonic (D) atonic
20. Due to plasmolysis, the plant cell
 (A) becomes turgid (B) becomes flaccid
 (C) bursts (D) swells up
21. The restoration of turgidity in a plasmolyzed cell, when placed in a hypotonic solution is caused by
 (A) hydration (B) electrolysis
 (C) plasmolysis (D) deplasmolysis
22. Water enters root hairs due to
 (A) elastic pressure
 (B) atmospheric pressure
 (C) osmotic pressure
 (D) turgor pressure
23. Turgidity of the cell is maintained by
 (A) osmotic pressure
 (B) cell size
 (C) turgor pressure
 (D) diffusion pressure
24. DPD stands for
 (A) Diffusion Pressure Deficit
 (B) Diffusion Pressure Demand
 (C) Daily Photosynthetic Depression
 (D) Daily Phosphorus Demand
25. The osmotic parameter determining the flow of water from one cell to another is
 (A) osmotic pressure
 (B) turgor pressure
 (C) diffusion pressure deficit
 (D) hydrostatic pressure
26. The diffusion pressure of pure water is theoretically
 (A) 1236 atm (B) 1326 atm
 (C) 4000 atm (D) 700 atm
27. The chemical potential of water is known as
 (A) solute potential
 (B) water potential
 (C) Diffusion pressure
 (D) DPD
28. Which one is a unit of measurement of water potential?
 (A) Watt (B) Joule
 (C) Pascal (D) Litre
29. Which of the following about Diffusion pressure deficit (DPD) is CORRECT?
 (A) $DPD = OP - WP$
 (B) $DPD = OP + WP$
 (C) $DPD = WP - OP$
 (D) $DPD = TP + OP$
30. In plants, water moves from
 (A) less negative to more negative water potential
 (B) more negative to less negative water potential
 (C) same water potential
 (D) none of these
31. The water potential and osmotic potential of pure water is _____ respectively.
 (A) 100 and 100 (B) 100 and 0
 (C) 0 and 0 (D) 0 and 100
32. Symbol of solute potential is
 (A) Ψ_s (B) Ψ_s
 (C) P_t (D) P_w
33. Parchment paper is an example of
 (A) selectively permeable membrane
 (B) semi permeable membrane
 (C) freely permeable membrane
 (D) impermeable membrane
34. Cell wall of plant cell is
 (A) differentially permeable
 (B) impermeable
 (C) semi permeable
 (D) freely permeable



35. An example of selectively permeable membrane is
(A) cell wall
(B) parchment paper
(C) tonoplast
(D) suberised walls of cork cell

 **6.2 Absorption and Movement of Water**

36. How many regions are there in a typical root?
(A) Four (B) Three
(C) Five (D) Six
37. Root hair occurs in the zone of
(A) cell division (B) cell elongation
(C) cell maturation (D) none of these
38. In plants, maximum absorption of water takes place in the zone of
(A) root apex
(B) root cap
(C) root hair
(D) meristematic phase
39. Cell wall of root hair is formed by which components?
(A) Proteins
(B) Pectic compounds and cellulose
(C) Acidic compounds
(D) Starch
40. Which property of cellulose and pectic compounds help root hairs to absorb water?
(A) They are hydrophilic.
(B) They are hydrophobic.
(C) They are hygroscopic.
(D) They are porous.
41. In apoplast pathway, how does the movement of water take place?
(A) Through cell walls and intercellular spaces
(B) Through cytoplasmic bridges
(C) Through nucleus
(D) Through plasma
42. Cytoplasm of adjacent cells are interconnected by
(A) cortex
(B) hydrostatic pressure
(C) adhesive force
(D) plasmodesmata
43. Casparian strips present in endodermal cells are made up of wax like substance called
(A) Solwax (B) Suberin
(C) Porin (D) Latex

44. In symplast pathway, water travels through
(A) intercellular space
(B) intracellular space
(C) cytoplasmic bridges
(D) nucleus
45. The phenomenon of uptake of water at the expense of energy by the cell and usually against the osmotic gradient is known as
(A) osmosis
(B) active absorption
(C) passive absorption
(D) imbibition
46. The active transport of substances across the plasma membrane is done with the help of
(A) diffusion
(B) osmosis
(C) metabolic energy
(D) electrochemical gradient
47. For active absorption, _____ is needed.
(A) ATP (B) food
(C) oxygen (D) all the three
48. _____ plays important role in passive absorption of water.
(A) ATP (B) Transpiration
(C) Light (D) Temperature

 **6.3 Ascent of Sap**

49. Water in plants is transported by
(A) cambium
(B) phloem
(C) xylem or xylem vessel elements
(D) epidermis
50. Ascent of sap refers to the movement of water from
(A) root hairs to root xylem
(B) root hairs to soil
(C) roots to the aerial parts
(D) soil through root hairs to the aerial parts and into the atmosphere
51. The upward movement of water (sap) from roots to aerial parts against the force of gravity is called
(A) transpiration
(B) translocation of water
(C) ascent of sap
(D) both (B) and (C)



52. The continuation of excretion of watery liquid for sometime from the stem of a well watered plant, after cutting off the shoot slightly above the base, is due to
 (A) root pressure
 (B) transpiration pull
 (C) cohesive force of water
 (D) all of these
53. Root pressure can be measured by means of
 (A) porometer (B) potometer
 (C) auxanometer (D) manometer
54. Water rises in the stem due to
 (A) cohesion and transpiration pull
 (B) turgor pressure
 (C) osmotic pressure
 (D) none of these
55. Sap in xylem flows out through cut end of well watered stem of plant, this phenomenon is called
 (A) guttation (B) exudation
 (C) transpiration (D) exocytosis
56. The phenomenon of removal of water in liquid phase through intact plant part is called
 (A) bleeding (B) exudation
 (C) transpiration pull (D) guttation
57. Guttation occurs when atmosphere is _____ and transpiration is _____.
 (A) dry, low (B) humid, low
 (C) humid, more (D) dry, more
58. Hydathodes are also called as
 (A) chalk glands
 (B) guttae
 (C) glands
 (D) stomata Excretory
59. Water exuded from hydathodes
 (A) is pure
 (B) often contains salts
 (C) is in the form of gel
 (D) is in the form of ice
60. Dixon and Jolly are associated with
 (A) light reactions of photosynthesis
 (B) anaerobic respiration
 (C) cohesion theory of ascent of sap
 (D) apical dominance
61. Cohesion theory is related to
 (A) ascent of sap (B) photosynthesis
 (C) transpiration (D) respiration
62. Cohesion Tension theory is based upon the principle of
 (A) Cohesion of water
 (B) Adhesion of water
 (C) Transpiration pull
 (D) All of these
63. The cohesive property of water is
 (A) attraction between the water molecules
 (B) detachment between the water molecules
 (C) viscosity between the water molecules
 (D) splitting (breaking) of water molecules
64. Attraction force of cell walls for water molecules is termed as
 (A) cohesion (B) plasmolysis
 (C) adhesion (D) osmosis
65. In physical demonstration of Cohesion-Tension theory, rise in level of _____ demonstrates the tension.
 (A) Water (B) Air bubble
 (C) Mercury (D) Cell Sap

6.4 Transpiration

66. The ultimate cause for the movement of water against gravity in a tree is
 (A) photosynthesis (B) osmosis
 (C) transpiration (D) imbibition
67. Maximum transpiration takes place from
 (A) stem
 (B) leaves
 (C) roots
 (D) flowers and fruits
68. Transpiration occurs from
 (A) fruits (B) stem
 (C) all aerial parts (D) roots
69. The percentage of water loss occurring through cuticular transpiration is about
 (A) 80 to 90% (B) 0.1 to 1%
 (C) 8 to 10% (D) 5 to 7%
70. Rate of cuticular transpiration is _____ to the thickness of cuticle.
 (A) equal
 (B) inversely proportional
 (C) directly proportional
 (D) not related
71. Fine pores present on older parts of plant and help in transpiration are
 (A) pallisade (B) lenticels
 (C) cuticle (D) plasmodesmata



72. Main function of lenticel is
(A) transpiration (B) guttation
(C) bleeding (D) gaseous exchange
73. What percentage of water absorbed by herbaceous plants is lost in transpiration?
(A) 80% (B) 60%
(C) 98% (D) 40%
74. Guard cells help in
(A) transpiration
(B) guttation
(C) protection against grazing animals
(D) respiration
75. Transpiration is very important for plants because it helps in
(A) absorption of water from the soil
(B) cooling of the plant
(C) the movement of water and minerals absorbed by roots to various parts of the plants
(D) all of these
76. In plants, the process of transpiration helps in
(A) absorption of O_2
(B) absorption of CO_2
(C) opening of stomata
(D) upward translocation of water
77. _____ conducts water absorbed by roots to the leaves.
(A) Xylem (B) Stomata
(C) Palisade (D) lenticels
78. The chlorophyllous cells which are fewer in number, unique in shape with thicker inner walls are known as
(A) guard cells (B) passage cells
(C) subsidiary cells (D) bulliform cells
79. Guard cells are _____ shaped in dicot and _____ shaped in monocot.
(A) dumb-bell, round
(B) kidney, irregular
(C) kidney, dumb-bell
(D) dumb-bell, kidney
80. _____ are the specialized epidermal cells surrounding guard cells.
(A) subsidiary cells
(B) accessory cells
(C) bundle sheath cells
(D) both (A) and (B)
81. Guard cells differ from epidermal cells as they have
(A) mitochondria (B) vacuoles
(C) cell wall (D) chloroplasts
82. Stomatal opening is under the control of
(A) epidermal cells
(B) palisade cells
(C) spongy parenchyma cells
(D) guard cells
83. Stomata opens when guard cells are
(A) turgid (B) flaccid
(C) large (D) small
84. Guard cells, become turgid due to
(A) endosmosis (B) exosmosis
(C) entry of water (D) both (A) and (C)
85. Guard cells mainly regulate
(A) photosynthesis
(B) intensity of light entering leaves
(C) change in green colour
(D) closing and opening of stomata
86. Stomata closes due to _____ in guard cells.
(A) increased O.C (B) exosmosis
(C) deplasmolysis (D) none of these
87. For photoactive opening of stomata, the proton transport concept was given by
(A) Levitt
(B) Milborrow
(C) Ziegler
(D) None of the above
88. Opening and closing of stomata is controlled by
(A) K^+ (B) Mg^{2+}
(C) Ca^{2+} (D) N
89. During day time, malic acid dissociates into _____ and malate ions.
(A) Cl^- ions (B) CO_2
(C) H^+ ion (D) K^+ ion
90. During day time, starch is converted into _____.
(A) malic acid (B) sulphuric acid
(C) citric acid (D) abscisic acid
91. Stomatal opening and closing is due to
(A) change in the turgidity of guard cells.
(B) the inner walls of each guard cell being thick and elastic.
(C) cellulose microfibrils of guard cells being oriented radially.
(D) both (A) and (B)
92. Absorption of water by root is increased with the
(A) increase in transpiration
(B) increase in rate of photosynthesis
(C) decrease in transpiration
(D) decrease in salt uptake



93. Transpiration is high in
 (A) rainy season
 (B) winter
 (C) high temperature
 (D) low wind velocity
94. Water lost through transpiration is
 (A) pure water
 (B) rich in organic solutes
 (C) rich in dissolved salts
 (D) all of these
95. Beneficial effect of transpiration is that
 (A) large amount of water absorbed is lost
 (B) it is energy sapping process.
 (C) causes water deficit.
 (D) it gives cooling effect to plant
96. Wilting appears due to excessive
 (A) respiration (B) photosynthesis
 (C) absorption (D) transpiration
97. "Transpiration is a necessary evil", this sentence was given by
 (A) Steward (B) Fungino
 (C) Levitt (D) Curtis

6.5 Role of Water

98. _____ is the chief constituent of protoplasm.
 (A) Water (B) Salt
 (C) Proteins (D) Carbohydrates
99. Water acts as a _____ in cell.
 (A) pressure stabilizer
 (B) temperature stabilizer
 (C) pressure inhibitor
 (D) temperature inhibitor
100. Which property of water makes it a temperature stabilizer?
 (A) High specific heat
 (B) High heat of fusion
 (C) High heat of vaporization
 (D) All of these
101. Water plays important role in
 (A) opening and closing of stomata
 (B) movement of gametes
 (C) dehiscence of fruits
 (D) all of these

6.6 Translocation of Food: Through Phloem

102. In vascular tissue, which is the main conducting element?
 (A) Palisade tissue
 (B) Epithelial tissue

- (C) Xylem and phloem
 (D) Mesophyll

103. Translocation of food takes place through
 (A) meristem (B) xylem
 (C) phloem (D) all cells
104. Which one of the following structures between two adjacent cells is acting as an effective transport pathway?
 (A) Plasmalemma
 (B) Plastoquinones
 (C) Endoplasmic reticulum
 (D) Plasmodesmata
105. Carbohydrates are stored in plants in the form of
 (A) starch (B) cellulose
 (C) maltose (D) glucose
106. In plants, food migrates from _____ to _____.
 (A) sink end to supply end
 (B) upper end to lower end
 (C) supply end to sink end
 (D) underground part to aerial part.
107. Food is synthesized in
 (A) fruit (B) leaves
 (C) stem (D) root
108. Sink end is nothing but
 (A) consumption end
 (B) region of lower concentration
 (C) growing regions
 (D) All of these
109. Translocation of organic solutes from cells of pith to cortex is
 (A) upward (B) downward
 (C) radial (D) not possible
110. In young seedling, _____ acts as a sink end.
 (A) seed coat (B) plumule
 (C) cotyledons (D) fruit
111. _____ are considered as supply points.
 (A) Storage organs
 (B) Leaves
 (C) Cotyledons in young seedling
 (D) All of these
112. Mechanism of translocation of food was proposed by
 (A) Priestley (B) Munch
 (C) Steward (D) Curtis



113. According to Munch hypothesis, _____ exists between the supply end and consumption end.
(A) turgor pressure gradient
(B) gravitational pressure
(C) growth hormones
(D) none of these

 **6.7 Mineral Nutrition**

114. The utilization of various kinds of absorbed minerals by a plant for growth and development is
(A) essential growth (B) translocation
(C) absorption (D) mineral nutrition
115. Non-mineral elements are
(A) carbon, hydrogen, oxygen
(B) nitrogen, boron, oxygen
(C) phosphorus, sulphur, boron
(D) nitrogen, sulphur, boron
116. How many elements are essential elements?
(A) 10 (B) 16 (C) 12 (D) 18
117. Generally, chemical analysis of plant shows the presence of _____ different elements.
(A) 10 – 20 (B) 15 – 25
(C) 30 – 40 (D) 45 – 55
118. Which of the following are critical elements for agricultural crops?
(A) C, H and O (B) N, P, and K
(C) Ca, K and S (D) N, P and O
119. Hydroponics is the process of growing plants in
(A) laboratory
(B) sand
(C) liquid culture medium
(D) solid culture medium
120. Plants can be grown to maturity in nutrient medium, without soil was demonstrated by
(A) Julius van Sachs
(B) Munch
(C) Levitt
(D) Skoog and Miller
121. Macronutrients are the nutrients required in
(A) small amount (B) large amount
(C) in traces (D) minute quantity
122. Minor elements are
(A) non essential for growth
(B) activators or co-factors for enzymes
(C) required in traces
(D) both (B) and (C)

123. Which of the following is NOT a micronutrient?
(A) Molybdenum (B) Magnesium
(C) Zinc (D) Boron
124. By which two methods does absorption of mineral ions take place?
(A) Passive and active absorption
(B) Direct and indirect absorption
(C) Vascular and non-vascular absorption
(D) All of these
125. _____ is the constituent of all amino acids.
(A) Sulphur (B) Nitrogen
(C) Zinc (D) Copper
126. Petioles and veins of leaves turn purple due to production of anthocyanin. This is due to deficiency of _____.
(A) nitrogen (B) sulphur
(C) calcium (D) phosphorus
127. _____ are important constituent of chlorophyll molecules and cytochrome enzymes.
(A) Alkaloids
(B) Sulphahydril groups
(C) Phospholipids
(D) Porphyrins
128. Plants require sulphur for
(A) ATP synthesis
(B) protein synthesis
(C) glucose synthesis
(D) DNA replication
129. Sulphur is absorbed by plants as
(A) pure form (B) sulphate ions
(C) sulphite ions (D) All the above
130. Which of the following amino acids contain sulphur?
(A) Asparagine (B) Serine
(C) Proline (D) Methionine
131. _____ is essential for the synthesis of vitamins like biotin, thiamin and coenzyme A.
(A) Chlorine (B) Phosphorus
(C) Sulphur (D) Zinc
132. In sulphur deficient plant, the parts which get affected first are
(A) younger leaves (B) fruits
(C) old stems (D) flower petals
133. Phosphorus is absorbed from the soil in the form of
(A) silicates (B) phosphates
(C) sulphates (D) calcium

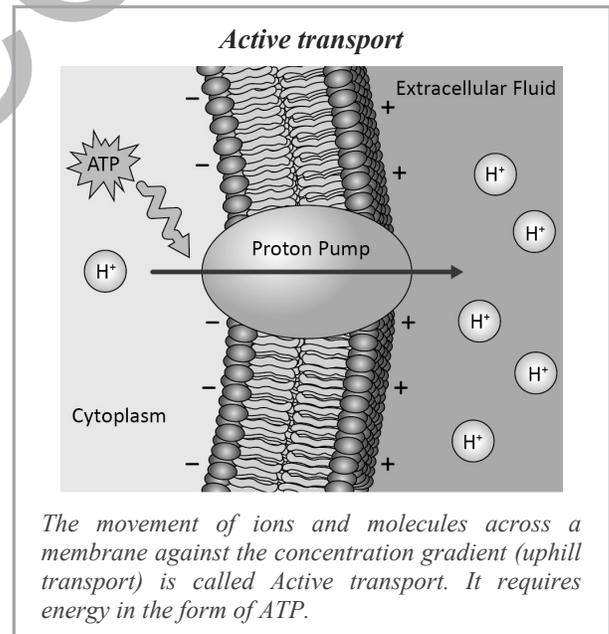


134. Premature leaf fall is caused due to the deficiency of
 (A) Molybdenum (B) Sulphur
 (C) Sodium (D) Phosphorus
135. Which coenzymes are required in photosynthesis?
 (A) Acetyl co-A (B) Acetoacetate
 (C) NAD and NADP (D) Oxidoreductase
136. _____ is the chief source of energy.
 (A) Calcium (B) ATP
 (C) Iron (D) Sulphur
137. Deficiency of calcium causes
 (A) bolting of leaves
 (B) growing new buds
 (C) malformation of younger leaves
 (D) development of nodes
138. Calcium is present in plants in the form of
 (A) calcium phosphate
 (B) calcium sulphate
 (C) calcium pectate
 (D) calcium permanganate
139. Calcium helps to
 (A) stabilize the structure of chromosomes
 (B) arrange the structure of chlorophyll
 (C) support stomata
 (D) maintain osmotic balance
140. Which of the following is present in middle lamella?
 (A) Ca (B) Mg (C) H (D) K
141. Cell wall becomes _____ due to the lack of calcium.
 (A) soft (B) spongy
 (C) brittle (D) permeable
142. _____ is the major constituent of chlorophyll molecule.
 (A) Chlorine (B) Magnesium
 (C) Sulphur (D) Zinc
143. _____ acts as an activator for many enzymes in phosphate transfer reactions particularly in carbohydrate metabolism and nucleic acid synthesis.
 (A) Calcium (B) ATP
 (C) Magnesium (D) Sulphur
144. Deficiency of potassium inhibits _____.
 (A) chlorosis
 (B) protein synthesis
 (C) death of shoot tips
 (D) flower formation
145. Manganese is required in
 (A) nucleic acid synthesis
 (B) plant cell wall formation
 (C) evolution of O₂ during photosynthesis
 (D) chlorophyll synthesis
146. Important constituent of ferredoxin, flavoprotein and cytochromes is
 (A) phosphorus (B) Manganese
 (C) Iron (D) Copper
147. Dieback of citrus is caused due to deficiency of
 (A) Zinc (B) Copper
 (C) Chlorine (D) Molybdenum
148. Which mineral deficiency causes stunted growth?
 (A) Copper (B) Boron
 (C) Zinc (D) Manganese
149. Mottle leaf disease of apple is caused due to deficiency of
 (A) Mo (B) Cl (C) Zn (D) B
150. Which of the following mineral nutrient plays an important role in nitrogen metabolism?
 (A) Zinc (B) Iron
 (C) Molybdenum (D) Magnesium
151. _____ acts as an activator for enzyme nitrate reductase.
 (A) Zinc (B) Chlorine
 (C) Molybdenum (D) Copper
152. Whiptail disease in cauliflower occurs due to the deficiency of
 (A) Cu (B) Zn (C) Mo (D) Cl
153. Chlorine is involved in _____.
 (A) synthesis of growth hormones
 (B) transfer of electrons to PSII during non cyclic photophosphorylation
 (C) translocation of sugars
 (D) protein synthesis
154. The reduction of dry weight of tissues by about 10% by any mineral is termed as
 (A) hydroponics
 (B) mineral toxicity
 (C) mineral metabolism
 (D) deficiency symptom
155. Active ion uptake means
 (A) ions move passively
 (B) ions move freely
 (C) there is expenditure of energy
 (D) ions are active



156. Active and passive transport across cell membrane differ as
(A) passive transport is non selective
(B) passive transport is along the concentration gradient, while active transport is due to metabolic energy
(C) active transport is more rapid
(D) passive transport is confined to anions, while active transport is confined to cations.
157. Active transport occurs
(A) against concentration gradient and requires ATP
(B) against concentration gradient but does not require ATP
(C) along concentration gradient but requires ATP
(D) along concentration gradient but does not require ATP
158. Respiratory inhibitor _____ the rate of mineral absorption.
(A) increases (B) reduces
(C) enhances (D) doubles
159. The movement of nitrogen between atmosphere, biosphere and geosphere in different forms is described as
(A) Nitrogen cycle
(B) Nitrogen translocation
(C) Nitrification
(D) Denitrification
160. Major nitrogen fixation is carried out by
(A) lightning
(B) chemical industries
(C) symbiotic bacteria
(D) leaching
161. _____ is the site for nitrogen fixation in cyanobacteria.
(A) Leghaemoglobin (B) Cell wall
(C) Nucleus (D) Heterocyst
162. Nitrogen fixing enzyme found in root nodules is
(A) nitrogen esterase (B) nitrogenase
(C) nitrase (D) *Nitrosomonas*
163. The pigment protein present in nodulated roots inhabited by *Rhizobium* is
(A) Nitrate reductase (B) Hydrogenase
(C) Leghaemoglobin (D) Plastocyanin

164. Function of leghaemoglobin during biological nitrogen fixation in root nodules of legumes is to
(A) convert N_2 to NH_3
(B) convert ammonia to nitrite
(C) transport oxygen for nitrogenase activity
(D) protect nitrogenase from oxygen
165. Main processes involved in nitrogen cycle are
(A) Nitrogen fixation and uptake
(B) Ammonification
(C) nitrification and denitrification
(D) All of these
166. Denitrification is done by
(A) heterocyst
(B) *Pseudomonas denitrificans*
(C) *Nitrosomonas*
(D) Nitrifying bacteria
167. The process/es by which minerals are absorbed is/are
(A) active absorption (B) passive absorption
(C) Both (A) and (B) (D) none of the above



Critical Thinking



6.1 Source of Water for Plants

1. The movement of water from higher water potential to lower water potential through a semi-permeable membrane is called
(A) osmosis (B) diffusion
(C) plasmolysis (D) imbibition



2. Selective permeability identifies the process of
(A) diffusion (B) osmosis
(C) imbibition (D) plasmolysis
3. Uniformly sweet taste of a cup of tea is due to
(A) sublimation (B) osmosis
(C) permeability (D) diffusion
4. When a bottle of perfume is placed at one corner of a room and the lid is opened, the scent spreads all over the room after some time. This happens by the process of
(A) transpiration (B) endosmosis
(C) plasmolysis (D) diffusion
5. Dry wooden pieces, if driven into a small crack in a rock and then soaked, can develop enough pressure to split the rock. Such a pressure is developed due to
(A) osmosis (B) imbibition
(C) turgor pressure (D) plasmolysis
6. Molecules move inside and outside living cells by
(A) osmosis only
(B) diffusion only
(C) osmosis and diffusion
(D) none of these
7. What will be the nature of sugar solution if the cells of an epidermal peel of *Rhoeo discolor* shows plasmolysis?
(A) Hydrophobic (B) Hypertonic
(C) Isotonic (D) Hypotonic
8. Osmotic pressure of a solution is
(A) greater than pure solvent
(B) less than pure solvent
(C) equal to pure solvent
(D) more or less than the pure solvent
9. Purple cabbage leaves do not lose their colour in cold water but do so in boiling water because
(A) the plasma membrane gets killed in boiling water
(B) hot water can enter the cells readily
(C) the pigment is not soluble in cold water
(D) the cell wall is killed in boiling water
10. When beet root cylinders are washed and placed in cold water, anthocyanin does not come out. This indicates that plasma membrane most likely is
(A) permeable to anthocyanin
(B) impermeable to anthocyanin
(C) differentially permeable to anthocyanin
(D) a dead structure
11. If a fish of marine water is kept in fresh water then it will die due to
(A) Endosmosis (B) Exosmosis
(C) Imbibition (D) Isotonic solution
12. Freshly cut potato slice is put into strong solution of sugar, later its cells are found to be
(A) Flaccid (B) Turgid
(C) Longer (D) More full of starch
13. A plasmolyzed cell can be deplasmolyzed by placing it in
(A) saturated solution
(B) pure water or hypotonic solution
(C) isotonic solution
(D) hypertonic solution
14. In a fully turgid cell, if the value of wall pressure increases the value of turgor pressure
(A) increases
(B) decreases
(C) fluctuates
(D) remain unchanged
15. If a plant cell is immersed in water, the water continues to enter the cell until the
(A) concentration of the salt is the same inside the cell as outside
(B) cell bursts
(C) diffusion pressure is the same inside the cell as outside
(D) concentration of water is more inside the cell than outside
16. Plant cells with deposition of suberin on cell wall do not burst in distilled water because the cell wall
(A) becomes impermeable
(B) is living
(C) is the outermost layer in plant cell
(D) becomes freely permeable
17. Plant cell kept in saline drop will
(A) remain unchanged
(B) decrease in size
(C) increase in size
(D) burst out
18. A red blood cell was kept in certain solution for a few minutes and it burst. The said solution was
(A) hypotonic
(B) hypertonic
(C) isotonic
(D) none of these



19. When a cell is fully turgid, which of the following will be zero?
(A) Turgor pressure
(B) Wall pressure
(C) DPD or water potential
(D) Osmotic pressure
20. If a cell 'A' having osmotic pressure (OP) 10 atm and turgor pressure (TP) 5 atm is separated from a cell B by a semipermeable membrane which has OP of 15 atm and TP of 12 atm, then the flow of water would be
(A) no flow (B) from A to B
(C) from B to A (D) equal flow
21. If a cell A with DPD 4 bars is connected to cells B, C, D whose OP and TP are 4 and 4, 10 and 5 and 9 and 3 bars respectively, the flow of water will be from
(A) C to A, B to D (B) A to D, B to C
(C) A to B, C to D (D) B to A, C to D
22. During absorption of water by roots, the water potential of cell sap is lower than that of
(A) pure water and soil solution
(B) neither pure water nor soil solution
(C) pure water but higher than that of soil solution
(D) soil solution but higher than that of pure water
23. The movement of water from one cell of the cortex to the adjacent one in roots is due to
(A) water potential gradient
(B) accumulation of inorganic salts in the cells
(C) accumulation of organic compounds in the cell
(D) chemical gradient
24. Water potential of an actively absorbing cell is
(A) always +ve (B) always -ve
(C) always 0 (D) always > 1

6.2 Absorption and Movement of Water

25. Many transplanted seedlings may not survive because
(A) most of the root hairs are lost during transplantation
(B) the leaves get damaged during the transfer
(C) they do not get the required mineral salts
(D) they do not like the new soil

26. 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
27. Hydrophilic nature, freely permeable and selectively permeable are the characteristics of _____ respectively.
(A) cellulose, plasma membrane and cell wall
(B) cell wall, plasma membrane and pectin
(C) cellulose, cell wall and plasma membrane
(D) plasma membrane, cell wall and pectin
28. Absorption of water by a root is increased by
(A) increase in transpiration
(B) increase in the rate of photosynthesis
(C) decrease in transpiration
(D) decrease in salt uptake
29. Water will be absorbed by root hairs when
(A) water level in soil increases
(B) they are separated from soil by semipermeable membrane
(C) concentration of salts in the soil is high
(D) concentration of solutes in the cell sap is high
30. A plant absorbs water from the soil on a sunny day by
(A) Active absorption
(B) Passive absorption
(C) Osmosis
(D) Capillary force

6.3 Ascent of Sap

31. Ascent of sap in plants explains
(A) diffusion of water
(B) loss of water from leaves
(C) the vertical rise of water in stem against the force of gravity
(D) building up of organic food
32. If cohesion-tension transpiration theory is correct, then break in water column in xylem vessels should
(A) cause the mesophyll cells to become flaccid and result in the wilting of leaves
(B) increase the water content of the leaves



- (C) have no effect at all
(D) increase the rate of photosynthesis
33. Guttation may be defined as a process in which plants can
(A) synthesize carbohydrates
(B) excrete the salt
(C) get rid of excess water in liquid form
(D) compensate the loss of water
34. Guttation is found mostly in
(A) herbaceous plant (B) shrubs
(C) wood plants (D) none of these
35. Which of the following is more during the night?
(A) Root pressure (B) Absorption
(C) Evaporation (D) Transpiration
36. The cohesive force existing between molecules of water is contributing to
(A) Plasmolysis (B) Translocation
(C) Ascent of sap (D) Osmosis
37. The cohesive force of water is due to
(A) O bonds (B) H bonds
(C) OH bonds (D) S bonds
38. Which of the process is responsible for loss of sugars and salts from plants?
(A) Transpiration (B) Guttation
(C) Both (A) and (B) (D) None of the above



6.4 Transpiration

39. Of the processes which occur in leaves, the one which may lower their temperature (cooling effect) is
(A) respiration (B) photosynthesis
(C) transpiration (D) hydrolysis
40. Which of the following is NOT a purpose of transpiration?
(A) Supplying water for photosynthesis
(B) Helping in translocation of sugars from source to sink
(C) Cooling leaf surface
(D) Transporting minerals from the soil to all parts of the plant
41. Transpiration pull will be maximum under which of the following conditions?
(A) Open stomata, high humidity and well irrigated soil
(B) Open stomata, dry atmosphere and moist soil
(C) Open stomata, high humid atmosphere and dry soil
(D) Closed stomata, low light intensity and humid atmosphere

42. Transpiration occurs when the outer atmosphere
(A) is wet
(B) has more moisture content than the sub-stomatal cavities
(C) has less moisture than sub-stomatal cavities
(D) possesses same moisture content as in sub-stomatal cavities
43. The common characteristic between guard cells and mesophyll cells is
(A) dumb-bell shaped
(B) differentially thick walls
(C) presence of chloroplasts
(D) uniformly thin cell wall
44. Stomata opens due to
(A) influx of calcium ions.
(B) influx of potassium ions.
(C) efflux of potassium ions.
(D) influx of hydrogen ions.
45. What is true about transpiration?
(A) It is loss of water from underground plant parts.
(B) It occurs during night time.
(C) It occurs when stomata are open.
(D) It occurs when guard cells are flaccid.



6.6 Translocation of Food: Through Phloem

46. The direction of movement of food in phloem is
(A) bidirectional
(B) unidirectional
(C) according to the requirement of plant
(D) none of these
47. The flow of organic solutes in plants is in
(A) upward direction
(B) downward direction
(C) lateral
(D) all the above
48. Munch's mass flow hypothesis explains
(A) Transcription (B) Translocation
(C) Transpiration (D) Translation



6.7 Mineral Nutrition

49. Hydroponics is the best method to grow commercially important plants because
(A) it gives clean working environment.
(B) off season production is possible.
(C) no need of watering.
(D) all of the above



50. Diffusion is a type of
(A) active absorption
(B) passive absorption
(C) irregular absorption
(D) indefinite absorption
51. If oxygen content in the medium is less, then the rate of mineral absorption
(A) remains the same (B) doubles
(C) decreases (D) increases
52. Minerals are absorbed in the form of
(A) cations and anions
(B) soil solution
(C) protoplasm
(D) water molecule
53. Symbiotic microorganism is
(A) *Clostridium* (B) *Azotobacter*
(C) *Rhizobium* (D) *Chromatium*
54. Nitrates are converted to nitrogen by
(A) Nitrogen fixing bacteria
(B) Ammonification bacteria
(C) Denitrifying bacteria
(D) Nitrifying bacteria
55. The conversion of ammonia into nitrites and nitrates is called
(A) Ammonification (B) Nitrification
(C) Denitrification (D) All of these

Hydroponics



Hydroponics is soil-less culture of plants in which the rooting medium is exclusively water, fortified with dissolved nutrients. In 1936, W.E. Gericke grew a wide variety of crops in water supplemented with nutrients.



Competitive Thinking



6.1 Source of Water for Plants

1. A thin film of water, held by the soil particles under the influence of internal attractive force, is called which of the following water?
[Pb. PMT 2000; MH CET 2003]
(A) Capillary (B) Combined
(C) Hygroscopic (D) Gravitational
2. The process of osmosis involves
[CPMT 1990]
(A) movement of solute through semipermeable membrane
(B) movement of solvent through a semipermeable membrane
(C) movement of solution through a semipermeable membrane
(D) none of the above
3. Plasma membrane controls
[RPMT 1985; AFMC 1986]
(A) passage of water
(B) passage of water and some solutes in and out of the cell
(C) passage of water and solutes into the cell
(D) movements of the cell contents out of the cell
4. A cell placed in strong solution will shrink because [JIPMER 1986; AFMC 1975, 78]
(A) cytoplasm will decompose
(B) mineral salt will break the cell wall
(C) salt water enter the cell
(D) water comes out by exosmosis
5. A cell increases in volume if the external medium is
[AFMC 1975; Haryana PMT 2005]
(A) Hypotonic (B) Hypertonic
(C) Isotonic (D) None of these
6. If water enters a cell, the pressure exerted by its swollen protoplast is [AFMC 2004]
(A) Turgor pressure (B) DPD
(C) Osmotic pressure (D) Imbibition
7. The adsorption of water by hydrophilic compounds like cellulose and pectin in root hair cell wall is called _____.
[MHT CET 2018]
(A) diffusion (B) imbibition
(C) guttation (D) osmosis



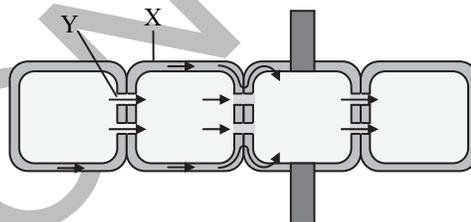
8. In a plant cell, the Diffusion Pressure Deficit is zero when it is _____. [MH CET 2014]
 (A) plasmolysed (B) turgid
 (C) flaccid (D) incipient
9. Flaccid cell means _____. [GUJ CET 2014]
 (A) Plasmolysed cell
 (B) Cell with turgidity
 (C) The cell in which water flows in and out of cell are in equilibrium
 (D) The cell kept in hypotonic solution
10. The cell is fully turgid when [Bihar MDAT 1992; J&K CET 2002]
 (A) $DPD = TP$ (B) $OP = DPD$
 (C) $DPD = SP$ (D) $DPD = \text{zero}$
11. Addition of a solute to pure water causes [MP PMT 2001]
 (A) negative water potential
 (B) more negative water potential
 (C) positive water potential
 (D) more positive water potential
12. The membrane which allows passage of certain substances more readily than others is termed as [BVP 2003]
 (A) impermeable
 (B) semisolid
 (C) permeable
 (D) selectively permeable
13. In a fully turgid cells, the values of DPD, OP and TP will show the tendency [MP PMT 1987]
 (A) $DPD = 10 \text{ atm}$, $OP = 15 \text{ atm}$, $TP = 5 \text{ atm}$
 (B) $DPD = 5 \text{ atm}$, $OP = 12 \text{ atm}$, $TP = 7 \text{ atm}$
 (C) $DPD = 2 \text{ atm}$, $OP = 7 \text{ atm}$, $TP = 5 \text{ atm}$
 (D) $DPD = 0 \text{ atm}$, $OP = 15 \text{ atm}$, $TP = 15 \text{ atm}$
14. The water potential of pure water is [NEET (UG) 2017]
 (A) Zero
 (B) Less than zero
 (C) More than zero but less than one
 (D) More than one
15. **Assertion(A):** Sodium chloride is dissolved in water and this solution will have a lower water potential than pure water.
Reason(R): The Ψ_s is always positive in comparison with pure water.
 Which of the following is true?
 [TS EAMCET 2018]

- (A) Both (A) and (R) are true and (R) is the correct explanation of (A).
 (B) Both (A) and (R) are true, but (R) is not the correct explanation of (A).
 (C) (A) is true, but (R) is false.
 (D) (A) is false, but (R) is true.



6.2 Absorption and Movement of Water

16. Root system in a plant is well developed [CBSE PMT 1990]
 (A) due to deficiency of auxin
 (B) due to deficiency of cytokinins
 (C) due to deficiency of minerals
 (D) for increased absorption of water
17. What indicates X, Y in the given diagram?



- [GUJ CET 2017]
 (A) X–Cell surface membrane, Y–Plasmodesmata
 (B) X–Plasmodesmata, Y–Tonoplast
 (C) X–Cell surface membrane, Y– Cytoplasm
 (D) X–Plasmodesmata, Y–Cell surface membrane
18. Casparian strips occur in [NEET (UG) 2018]
 (A) Cortex (B) Pericycle
 (C) Epidermis (D) Endodermis
19. Root cap has no function in water absorption, because [DPMT 1985, 86]
 (A) its vascular system is not directly connected
 (B) its cells are loosely placed
 (C) it has cells without chloroplast
 (D) it has no root hair
20. Active absorption is affected by [RPMT 1999]
 (A) osmotic concentration
 (B) associate tissue structures
 (C) transpiration
 (D) sucking capacity of root hair



6.3 Ascent of Sap

21. Cohesion and adhesion theory is otherwise called [J & K CET 2009]
(A) Relay pump theory
(B) Pulsation theory
(C) Root pressure theory
(D) Transpiration pull theory
22. Continuous upward flow of water stream in tall trees is maintained due to _____. [MHT CET 2018]
(A) guttation and transpiration
(B) transpiration pull only
(C) cohesive force between molecules only
(D) cohesive force between molecules and transpiration pull
23. Most widely accepted explanation for the ascent of sap in tree is [CPMT 1976; NCERT 1977; MP PMT 1988; AIIMS 1984; JIPMER 1988; DPMT 1992; Pb. PMT 1999, 2000; CBSE PMT 2001; BHU 2001; J&K CET 2002]
(A) Capillarity
(B) Roll of atmospheric pressure
(C) Pulsating action of living cells
(D) Transpiration cohesion theory of Dixon
24. Transpiration and root pressure cause water to rise in plants by [AIPMT 2015]
(A) pulling and pushing it, respectively.
(B) pushing it upward.
(C) pushing and pulling it, respectively.
(D) pushing it upward.
25. The process of the escape of liquid from the tip of uninjured leaf is called [CPMT 1990; AIIMS 1998]
(A) evaporation
(B) transpiration
(C) guttation
(D) evapo-transpiration
26. Root pressure develops due to [AIPMT RETEST 2015]
(A) increase in transpiration
(B) active absorption
(C) low osmotic potential in soil
(D) passive absorption
27. Exudation of water is due to [RPMT 1995]
(A) passive absorption
(B) root pressure
(C) guttation
(D) presence of transpiration

28. Hydathodes are also called [MH CET 2004]
(A) Water stomata (B) Sunken stomata
(C) Guard cells (D) Subsidiary cells
29. Hydathodes perform the function of [MH CET 2002]
(A) Transpiration (B) Guttation
(C) Photosynthesis (D) Photorespiration
30. Guttation occurs through _____. [MH CET 2014]
(A) roots (B) hydathode
(C) trichome (D) stomata
31. Rupture and fractionation of water column present in trachery elements does not occur during ascent of sap due to [CBSE 2008]
(A) transpiration pull
(B) weak gravitational pull
(C) cohesion and adhesion
(D) lignified thick walls
32. 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 P-II 2016]
(A) Absence of sugar
(B) Acidic
(C) Alkaline
(D) Low refractive index

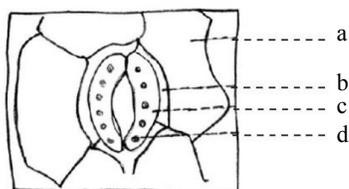


6.4 Transpiration

33. The basis of stomatal opening is [JIPMER 1994]
(A) exosmosis
(B) decreased cell sap concentration
(C) potassium efflux
(D) increased turgor
34. The metal ion involved in the stomatal regulation is
OR
Stomata will open, if there is accumulation of the following element in the guard cells [MP PMT 1990; CPMT 1989; JIPMER 1994]
(A) Iron (B) Magnesium
(C) Zinc (D) Potassium
35. Specialised epidermal cells surrounding the guard cells are called [NEET P-I 2016]
(A) Bulliform cells
(B) Lenticels
(C) Complementary cells
(D) Subsidiary cells



36. Study the diagram and the list given below:



- i. Chloroplast ii. Epidermal cell
 iii. Guard cell iv. Subsidiary cell
 v. Stomatal pore

The correct match is

[TS EAMCET 2018]

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

37. Clarification of mechanism of opening and closing of guard cells is based on which of the following theory? [MP PMT 1991]

- (A) Entry and exit of potassium in guard cell
 (B) Photosynthetic process taking place in guard cell
 (C) Starch–sugar conversion
 (D) Transpiration

38. Some leaves are removed from the stem cuttings planted for vegetative propagation. This is done [BHU 1994]

- (A) to increase water uptake
 (B) because it helps in rooting of cuttings
 (C) to reduce water loss
 (D) because the cuttings need less food

39. Lenticels and hydathodes are small pores with following common attributes [BHU 1994]

- (A) Their opening and closing is not regulated.
 (B) They allow exchange of gases.
 (C) They always remain closed.
 (D) They are found on the same organ of plants.

40. Dumb-bell shaped guard cells are found in [AFMC 2003]

- (A) Wheat (B) Bean
 (C) Groundnut (D) Sunflower

41. Stomata in grass leaf are [NEET (UG) 2018]

- (A) rectangular
 (B) kidney shaped
 (C) dumb-bell shaped
 (D) barrel shaped

42. Conversion of starch to organic acid is essential for [CBSE PMT 1992, 94]

- (A) stomatal closure (B) stomatal opening
 (C) stomatal initiation (D) stomatal growth

43. If CO₂ concentration suddenly increases around the leaf, one of the following events occurs [AFMC 2001]

- (A) stomata open gradually
 (B) stomata open suddenly
 (C) transpiration will not be affected
 (D) decrease in transpiration due to sudden closure of stomata

44. In guard cells, when sugar is converted into starch, the stomatal pore [CBSE PMT 1992]

- (A) opens fully
 (B) opens partially
 (C) closes completely
 (D) remains unchanged

45. In the mechanism of opening of stomata, the important factor is the [CPMT 1984]

- (A) shape of the guard cells
 (B) chlorophyll content of the cells
 (C) hormone content of the cells
 (D) protein content of the cells

46. Which of the following facilitates opening of stomatal aperture? [NEET (UG) 2017]

- (A) Contraction of outer wall of guard cells
 (B) Decrease in turgidity of guard cells
 (C) Radial orientation of cellulose microfibrils in the cell wall of guard cells
 (D) Longitudinal orientation of cellulose microfibrils in the cell wall of guard cell

47. Stomata open during day time because the guard cells [CPMT 1972, 73, 77, 84, 87, 93; MP PMT 1993]

- (A) photosynthesize and produce osmotically active sugars or organic acids
 (B) are thin-walled
 (C) are bean shaped
 (D) have to help in gaseous exchange



6.6 Translocation of Food: Through Phloem

48. Supply ends in transport of solute are [MP PMT 1997]

- (A) green leaves and storage organs
 (B) root and stem
 (C) xylem and phloem
 (D) hormones and enzymes



49. Much of the starch is deposited in banana fruit as it matures. Which of the following explains how the starch gets there? [BHU 1980]
- (A) Starch solution passes through cells such as companion cells to fruit
 - (B) Starch solution passes through cells of phloem to fruit
 - (C) A sugar solution passes through phloem cells to the fruit where it is changed to starch
 - (D) Starch grains passes through cells from xylem to fruit



6.7 Mineral Nutrition

50. Which group of element is NOT essential for a normal plant? [CPMT 1975, 77, 84; DPMT 1975, 84; AFMC 1984; JIPMER 1985]
- (A) Potassium, calcium, magnesium
 - (B) Iron, zinc, manganese, boron
 - (C) Lead, nickel, iodine, sodium
 - (D) Magnesium, iron, molybdenum
51. Minerals known to be required in large amounts for plant growth include [AIPMT 2015]
- (A) calcium, magnesium, manganese, copper
 - (B) potassium, phosphorus, selenium, boron
 - (C) magnesium, sulphur, iron, zinc
 - (D) phosphorus, potassium, sulphur, calcium
52. Which of the following is NOT caused by deficiency of mineral nutrition? [CBSE PMT 1997]
- (A) Necrosis
 - (B) Chlorosis
 - (C) Etiolation
 - (D) Shortening internode
53. In which of the following all three are macronutrients? [NEET P-I 2016]
- (A) Molybdenum, magnesium, manganese
 - (B) Nitrogen, nickel, phosphorus
 - (C) Boron, zinc, manganese
 - (D) Iron, copper, molybdenum
54. This is a macronutrient [BCECE (Stage 1) 2016]
- (A) Ca
 - (B) Zn
 - (C) B
 - (D) Mn
55. Deficiency symptoms of nitrogen and potassium are visible first in [AIPMT 2014]
- (A) Senescent leaves
 - (B) Young leaves
 - (C) Roots
 - (D) Buds

56. Necrosis (die-back) of the tip of young leaves is caused due to the deficiency of [WBJEEM 2015]
- (A) iron
 - (B) manganese
 - (C) zinc
 - (D) copper
57. Plants requiring two metallic compounds (minerals) for chlorophyll synthesis, are [MP PMT 1989, 90; AIIMS 1980, 86; CPMT 1977, 94; BHU 1979]
- (A) Fe and Ca
 - (B) Fe and Mg
 - (C) Cu and Ca
 - (D) Ca and K
58. If chlorophyll is burnt, what element will be left? [CPMT 1986, 87, 95]
- (A) Fe
 - (B) Na
 - (C) Mg
 - (D) Mn
59. Photosynthetic photolysis of water takes place in presence of [MP PMT 1997]
- (A) Mn
 - (B) Cl
 - (C) Both (A) and (B)
 - (D) None of the above
60. Boron in green plants assists in [CBSE PMT 2003]
- (A) Sugar transport
 - (B) Activation of enzymes
 - (C) Acting as enzyme cofactor
 - (D) Photosynthesis
61. Major role of minor essential elements is to act as [AIEEE 2004]
- (A) Co-factors of enzymes
 - (B) Building blocks of important amino acids
 - (C) Constituents of hormones
 - (D) Binders of cell structure
62. Ion uptake is called active because [MP PMT 1987, 88]
- (A) ions are active.
 - (B) energy is expended.
 - (C) ions move freely.
 - (D) ions move passively.
63. The first stable product of fixation of atmospheric nitrogen in leguminous plants is [NEET 2013]
- (A) NO_2^-
 - (B) Ammonia
 - (C) NO_3^-
 - (D) Glutamate
64. Excess of manganese inhibits the translocation of _____ to the shoot apex. [MH CET 2014]
- (A) Calcium
 - (B) Potassium
 - (C) Iron
 - (D) Magnesium



65. Which is essential for the growth of root tip?
[NEET P-II 2016]
(A) Mn (B) Zn
(C) Fe (D) Ca
66. In which of the following forms is iron absorbed by plants?
[NEET (UG) 2018]
(A) Free element
(B) Ferrous
(C) Ferric
(D) Both ferric and ferrous
67. Nodules with nitrogen fixing bacteria are present in
[AFMC 2001; CPMT 2003]
(A) Cotton (B) Gram
(C) Wheat (D) Mustard
68. Knot like bodies known as 'nodules' found in the roots of groundnut plant are produced by
[BHU 2003]
(A) *Azospirillum* (B) *Azotobacter*
(C) *Pseudomonas* (D) *Rhizobium*
69. Nitrogen fixation means [MH CET 2003]
(A) N_2 changes in NO_3^-
(B) N_2 changes in NH_3
(C) NO_2^- change into nitrates
(D) Both (A) and (B)
70. Nitrogenase enzyme is a [WBJEEM 2015]
(A) magnesium-iron protein
(B) molybdenum-iron protein
(C) iron-copper protein
(D) nickel-iron protein
71. Carefully read the following reactions carried out by nitrogen fixing bacteria. Identify the statement about these equations which is not true.
 $2NH_3 + 3O_2 \rightarrow 2NO_2^- + 2H^+ + 2H_2O \dots (i)$
 $2NO_2^- + O_2 \rightarrow 2NO_3^- \dots (ii)$
[KCET 2014]
(A) Step (i) is carried out by *Nitrosomonas* or *Nitrococcus*.
(B) Step (ii) is carried out by *Nitrobacter*.
(C) Both the steps (i) and (ii) can be called nitrification.
(D) Both the steps occur only in photoautotrophs.

72. During biological nitrogen fixation, inactivation of nitrogenase by oxygen poisoning is prevented by

[AIPMT RETEST 2015]

- (A) Cytochrome (B) Leghaemoglobin
(C) Xanthophyll (D) Carotene

73. 'Mo' is a part of this enzyme

[BCECE 2015]

- (A) Reverse transcriptase
(B) Restriction endonuclease
(C) Hexokinase
(D) Nitrogenase

**Miscellaneous**

74. Which one of the following doesn't help in molecule transport?
[BHU 2003]
(A) Diffusion (B) Osmosis
(C) Surface tension (D) Active transport
75. Which of the following is not a function of water in cell?
[RPMT 2002]
(A) It provides energy for chemical reaction.
(B) It acts as a solvent.
(C) It provides a medium for chemical reaction.
(D) It releases hydrogen ions on ionization.
76. The plant undergoes wilting when
[CPMT 1993, 94, 02; AFMC 2005]
(A) xylem is blocked
(B) cambium is blocked
(C) phloem is blocked
(D) some roots are reduced in number
77. What shall be the sequence of events during wilting of a plant?
[Kerala CET 2002]
(A) Exosmosis, deplasmolysis, wilting
(B) Endosmosis, plasmolysis, wilting
(C) Exosmosis, plasmolysis, wilting
(D) Endosmosis, deplasmolysis, wilting
78. The presence of dew on the surface of leaves is due to
[AMU 1990]
(A) Transpiration
(B) Guttation
(C) Exudation of water
(D) Condensation of moisture
79. 'A' and 'B' are the two adjacent living cells. The cell 'A' has solute potential (ψ_s) of -9 bars and pressure potential (ψ_p) of 4 bars, whereas cell 'B' has solute potential (ψ_s) of



–8 bars and pressure potential (ψ_p) of 5 bars. What will be the direction of water movement between these cells? [KCET 2016]

- (A) Do not move in any direction
- (B) Cell A to Cell B
- (C) Moves in both the directions
- (D) Cell B to Cell A

80. Identify the wrong statement. [EAMCET 2016]

- (A) The degree of decrease of chemical potentials of water depends on concentration of solute.
- (B) Bacteria and fungal spores are killed when they enter into pickles and jams due to plasmolysis
- (C) Process of water exudation is called transpiration.
- (D) Reverse plasmolysis will occur when flaccid cells are placed in hypotonic solution.

81. Find out the correct pair of statements.

- i. In completely plasmolysed cell, pressure potential does not contribute to water potential.
- ii. If a cell is placed in hypotonic solution for longer time, the cell membrane shrinks away from its cell wall.
- iii. Apoplastic system comprises of interconnected protoplasts.
- iv. Polypeptides have more imbibing capacity than polysaccharides.

[EAMCET 2015]

- (A) i, ii
- (B) i, iv
- (C) iii, iv
- (D) ii, iv

82. During rainy season wooden doors and windows are not properly closed. Why?

[GUJ CET 2015]

- (A) Plasmolysis
- (B) Diffusion
- (C) Osmosis
- (D) Imbibition

83. A column of water within xylem vessels of tall trees does not break under its weight because of [AIPMT RETEST 2015]

- (A) Positive root pressure
- (B) Dissolved sugars in water
- (C) Tensile strength of water
- (D) Lignification of xylem vessels

84. Protein molecules that form huge pores in the membranes of the plastids, mitochondria and some bacteria are called as

[TS EAMCET 2017]

- (A) Stomata
- (B) Porins
- (C) Coherin
- (D) Suberins

85. Which of the following elements is responsible for maintaining turgor in cells?

[NEET (UG) 2018]

- (A) Potassium
- (B) Sodium
- (C) Magnesium
- (D) Calcium

86. Match the following lists.

	List - I		List - II
i.	Plasmolysis	a.	Movement of water occurs exclusively through the intercellular spaces and the walls of the cells
ii.	Translocation	b.	The bulk movement of substances through vascular tissues of plants.
iii.	Symplastic	c.	Water travels through the cells-their cytoplasm; intercellular movement is through plasmodesmata
iv.	Apoplastic	d.	Water moves out of the cell and the cell membrane of a plant cell shrinks away from its cell wall
		e.	Symbiotic association of a fungus with a root system. Fungus provides minerals and water to the roots.

[TS EAMCET 2017]

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

87. Stomatal movement is NOT affected by

[NEET (UG) 2018]

- (A) O₂ concentration
- (B) Light
- (C) Temperature
- (D) CO₂ concentration



Answer Key



Classical Thinking

1. (A) 2. (D) 3. (C) 4. (D) 5. (A) 6. (A) 7. (A) 8. (D) 9. (B) 10. (A)
 11. (C) 12. (D) 13. (A) 14. (A) 15. (C) 16. (A) 17. (D) 18. (D) 19. (A) 20. (B)
 21. (D) 22. (C) 23. (C) 24. (A) 25. (C) 26. (A) 27. (B) 28. (C) 29. (A) 30. (A)
 31. (C) 32. (B) 33. (B) 34. (D) 35. (C) 36. (A) 37. (D) 38. (C) 39. (B) 40. (A)
 41. (A) 42. (D) 43. (B) 44. (C) 45. (B) 46. (C) 47. (A) 48. (B) 49. (C) 50. (C)
 51. (D) 52. (A) 53. (D) 54. (A) 55. (B) 56. (D) 57. (B) 58. (A) 59. (B) 60. (C)
 61. (A) 62. (D) 63. (A) 64. (C) 65. (C) 66. (C) 67. (B) 68. (C) 69. (C) 70. (B)
 71. (B) 72. (D) 73. (C) 74. (A) 75. (D) 76. (D) 77. (A) 78. (A) 79. (C) 80. (D)
 81. (D) 82. (D) 83. (A) 84. (D) 85. (D) 86. (B) 87. (A) 88. (A) 89. (C) 90. (A)
 91. (D) 92. (A) 93. (C) 94. (A) 95. (D) 96. (D) 97. (D) 98. (A) 99. (B) 100. (D)
 101. (D) 102. (C) 103. (C) 104. (D) 105. (A) 106. (C) 107. (B) 108. (D) 109. (C) 110. (B)
 111. (D) 112. (B) 113. (A) 114. (D) 115. (A) 116. (B) 117. (C) 118. (B) 119. (C) 120. (A)
 121. (B) 122. (D) 123. (B) 124. (A) 125. (B) 126. (A) 127. (D) 128. (B) 129. (B) 130. (D)
 131. (C) 132. (A) 133. (B) 134. (D) 135. (C) 136. (B) 137. (B) 138. (C) 139. (A) 140. (A)
 141. (C) 142. (B) 143. (C) 144. (B) 145. (C) 146. (C) 147. (B) 148. (B) 149. (C) 150. (C)
 151. (C) 152. (C) 153. (B) 154. (B) 155. (C) 156. (B) 157. (A) 158. (B) 159. (A) 160. (C)
 161. (D) 162. (B) 163. (C) 164. (D) 165. (D) 166. (B) 167. (C)



Critical Thinking

1. (A) 2. (B) 3. (D) 4. (D) 5. (B) 6. (C) 7. (B) 8. (A) 9. (A) 10. (B)
 11. (A) 12. (A) 13. (B) 14. (A) 15. (C) 16. (A) 17. (B) 18. (A) 19. (C) 20. (C)
 21. (D) 22. (A) 23. (A) 24. (B) 25. (A) 26. (C) 27. (C) 28. (A) 29. (D) 30. (B)
 31. (C) 32. (A) 33. (C) 34. (A) 35. (A) 36. (C) 37. (B) 38. (B) 39. (C) 40. (B)
 41. (B) 42. (C) 43. (C) 44. (B) 45. (C) 46. (C) 47. (D) 48. (B) 49. (D) 50. (B)
 51. (C) 52. (A) 53. (C) 54. (C) 55. (B)



Competitive Thinking

1. (C) 2. (B) 3. (B) 4. (D) 5. (A) 6. (A) 7. (B) 8. (B) 9. (C) 10. (D)
 11. (A) 12. (D) 13. (D) 14. (A) 15. (C) 16. (D) 17. (A) 18. (D) 19. (D) 20. (A)
 21. (D) 22. (D) 23. (D) 24. (A) 25. (C) 26. (B) 27. (B) 28. (A) 29. (B) 30. (B)
 31. (C) 32. (C) 33. (D) 34. (D) 35. (D) 36. (A) 37. (A) 38. (C) 39. (A) 40. (A)
 41. (C) 42. (B) 43. (D) 44. (C) 45. (A) 46. (C) 47. (A) 48. (A) 49. (C) 50. (C)
 51. (D) 52. (C) 53. (*) 54. (A) 55. (A) 56. (D) 57. (B) 58. (C) 59. (C) 60. (A)
 61. (A) 62. (B) 63. (B) 64. (A) 65. (D) 66. (*) 67. (B) 68. (D) 69. (D) 70. (B)
 71. (D) 72. (B) 73. (D) 74. (C) 75. (A) 76. (A) 77. (C) 78. (D) 79. (D) 80. (C)
 81. (B) 82. (D) 83. (C) 84. (B) 85. (A) 86. (D) 87. (A)

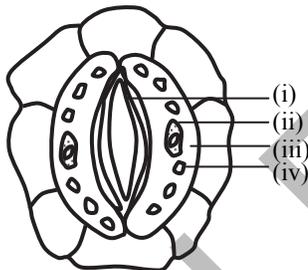
Note: 53. (*) None of the options are correct.

66. (*) The insoluble ferric (Fe^{3+}) form is reduced and is converted to ferrous form in the soil which is then absorbed by plants.



Evaluation Test

- What is the direction of the net movement of water between two cells X and Y, if the DPD of X is lower than Y ?
(A) X to Y (B) Y to Y
(C) Out of X (D) No net movement
- What will be the direction of movement water, when a solution A having water potential of -9 bars and another solution B of -4 bars is separated by a semipermeable membrane?
(A) B to A (B) A to B
(C) Both directions (D) None of these
- Cohesion theory of ascent of sap is based on
(A) diameter of vessels
(B) physical forces between water molecules
(C) surface tension
(D) pressure of water in roots
- The given figure shows the structure of kidney shaped stomata found in dicot plants. Identify the labels i, ii, iii, iv.

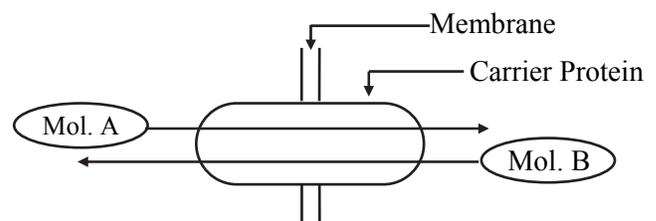


- i – Nucleus; ii – Stomatal pore; iii – Chloroplast; iv – Guard cell
 - i – Stomatal pore; ii – Nucleus; iii – Guard cell; iv – Chloroplast
 - i – Nucleus; ii – Guard cell; iii – Stomatal pore; iv – Chloroplast
 - i – Stomatal pore; ii – Nucleus; iii – Chloroplast; iv – Guard cell
- In both transpiration and evaporation, water is lost in the form of vapour yet they differ, because
(A) both transpiration and evaporation are similar but the rate of water loss differs
(B) frequency of water loss is different in both of them
(C) transpiration is a physical process and evaporation is a physiological process
(D) transpiration is a physiological process and evaporation is a physical process

- All mineral salts are absorbed in cells as
(A) ions (B) atoms
(C) molecules (D) all the above
- Choose the correct match given in Column I with their role given in Column II.

	Column I	Column II
(A)	Root hair	Wilting
(B)	Stomata	Guttation
(C)	Hydathode	Transpiration
(D)	Xylem Vessels	Ascent of sap

- Find out the wrong pair in terms of factors affecting transpiration.
(A) thick cuticle : less transpiration
(B) more temperature : less transpiration
(C) leaf modified into spine : more transpiration
(D) well developed root system : more transpiration
- The speed of water absorption will be greater if
(A) the difference between osmotic pressure of soil water and that of xylem vessels is always less
(B) the difference between osmotic pressure of soil water and that of xylem vessels is always more
(C) the osmotic pressure of soil water is always more than that of xylem vessels
(D) the osmotic pressure of soil water is always less than that of xylem vessels
- Look at the following diagram showing facilitated diffusion across the membrane. Identify its type.



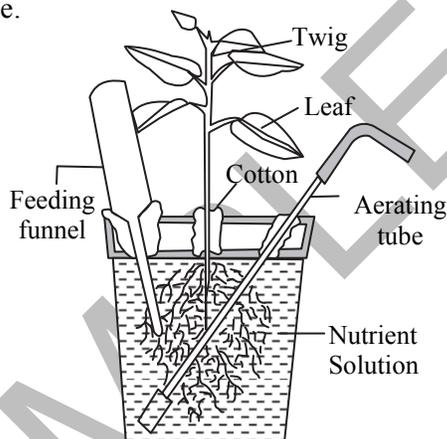
- Symport (B) Uniport
(C) Antiport (D) Multiport
- Find the odd man out.
(A) *Azotobacter* (B) *Dryopteris*
(C) *Nostoc* (D) *Rhizobium*



12. Which of the following pair of bacteria is involved in two step conversion of NH_3 into nitrate?
- (A) *Azotobacter* and *Nitrosomonas*
 (B) *Nitrosomonas* and *Nitrobacter*
 (C) *Azotobacter* and *Achromobacter*
 (D) *Pseudomonas* and *Nitrobacter*
13. Choose the correct pair of the element given in Column I with its associated role / function given in Column II.

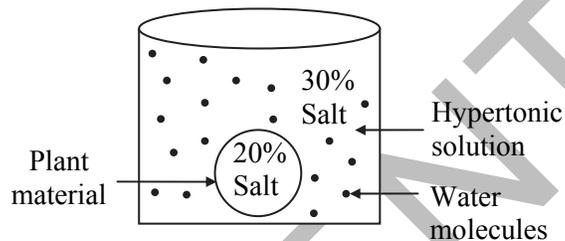
	Column I	Column II
(A)	Manganese	Structural component of chlorophyll
(B)	Magnesium	Needed for enzyme activity
(C)	Iodine	Prevents chlorophyll destruction
(D)	Calcium	Found in the middle lamella

14. Carefully observe the following figure and choose from the options given below the name of the technique demonstrated and the scientist who demonstrated it for the first time.



- (A) Hydroponics, Knop
 (B) Aeroponics, Julius Sachs
 (C) Hydroponics, Julius Sachs
 (D) Aeroponics, Arnon and Hoagland
15. Manganese toxicity
- (A) checks calcium transport to shoot apex
 (B) causes deficiency of iron, magnesium and calcium
 (C) causes brown spot surrounded by chlorotic vein
 (D) all of these

16. The following figure shows a plant cell placed in a hypertonic solution. Which of the following will take place?



- (A) Exosmosis
 (B) Endosmosis
 (C) Both (A) and (B)
 (D) No net movement of water
17. When a cell cannot absorb more water, the condition is called
- (A) endosmosis (B) plasmolysis
 (C) turgidity (D) exosmosis
18. Entry of water into root hair cell from soil is because
- (A) water potential of soil solution is more than root hair cell sap.
 (B) water potential of soil solution is less than root hair cell sap.
 (C) water potential both outside and inside root hair is equal.
 (D) water potential value in soil solution is negative.
19. A plant with well washed roots was placed in a beaker of water diluted with red ink. The red colour travelled up the stem and into the leaf veins. Which of the following is the explanation of the uptake of red ink into the roots ?
- (A) The red ink entered the root hairs by osmosis
 (B) The molecules of red ink diffuse into the root hairs
 (C) The membranes of the root hairs were destroyed and red ink could enter
 (D) The molecules of red ink passed from a region of low concentration to one of high concentration
20. Members of bean family are particularly important for rotation of crop, because they
- (A) add green manure
 (B) add nitrates to soil
 (C) make soil porous
 (D) add calcium to soil



21. Which of the following statement is CORRECT?
- (A) In dicots, the guard cells are dumb-bell shaped.
(B) Chloroplast is the site for nitrogen fixation.
(C) Capillary water is available to the plants for absorption.
(D) Phloem conducts water absorbed by roots to the leaves.
22. Frame work elements in plants are
- (A) Magnesium, copper and iron
(B) Copper, carbon and oxygen
(C) Manganese, calcium and nitrogen
(D) Carbon, hydrogen and oxygen
23. The deficiencies of micronutrients, not only affects growth of plants but also vital functions such as photosynthetic and mitochondrial electron flow. Among the list given below, which group of three elements shall affect most, both photosynthetic and mitochondrial electron transport?
- (A) Cu, Mn, Fe (B) Co, Ni, Mo
(C) Mn, Co, Ca (D) Ca, K, Na,
24. On the basis of symptoms of chlorosis in leaves, a student inferred that this was due to the deficiency of nitrogen. This inference could be correct only if yellowing of leaves appeared first in
- (A) young leaves
(B) old leaves
(C) young leaves followed by old leaves
(D) old leaves followed by young leaves
25. Select the CORRECT match of the terminologies given in Column I with the proper meaning in Column II.

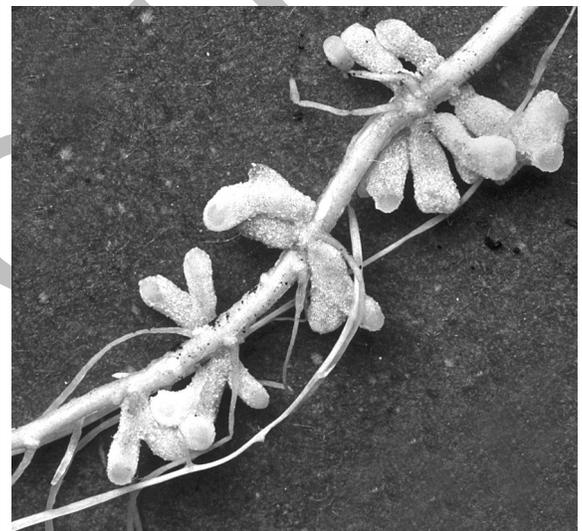
	Column I	Column II
(A)	Flaccid	No longer charged with water
(B)	Imbibant	Liquid substance (water)
(C)	Holard	Water not available for plant
(D)	Lenticels	Unicellular root hairs



Answers to Evaluation Test

1. (A) 2. (A) 3. (B) 4. (B)
5. (D) 6. (A) 7. (D) 8. (C)
9. (B) 10. (C) 11. (B) 12. (B)
13. (D) 14. (C) 15. (D) 16. (A)
17. (C) 18. (A) 19. (A) 20. (B)
21. (C) 22. (D) 23. (A) 24. (B)
25. (A)

Rhizobium in root nodules

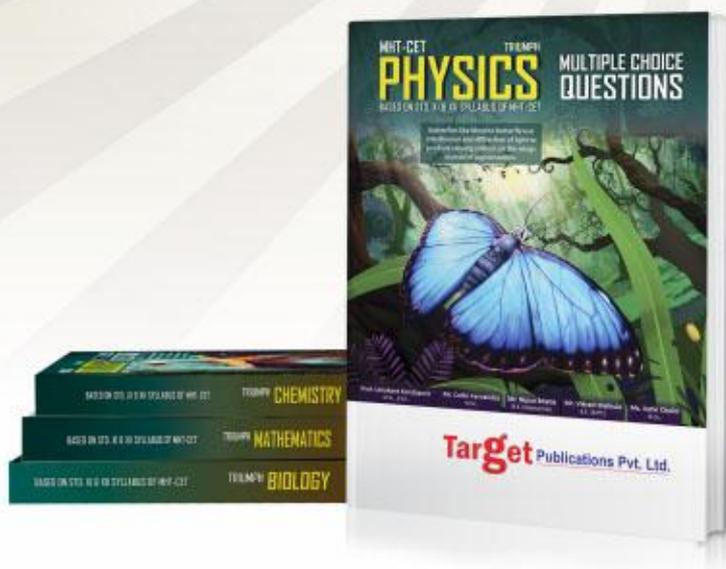


Rhizobium forms association with the roots of leguminous plants. They form tumour-like outgrowths called root nodules in the roots of leguminous plants. The nodules are pinkish in colour due to the presence of Leghaemoglobin pigment. Rhizobium is capable of fixing atmospheric nitrogen in the form of ammonia (NH_3) which is converted into amino acids and then enters the cell metabolism.



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- Exhaustive subtopic wise coverage of MCQs in accordance with the latest paper pattern
- Inclusion of solved MCQs from previous year's question papers
- Evaluation test provided at the end of each chapter
- Two Model Question Papers with Answer Key to assess the level of preparation

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