



Karanjia Auto College, Karanjia, Mayurbhanj

CC-XII: Plant physiology

Unit-1

Q1. Fill in the blanks (1 mark each)

- a) The Soil water available for root is _____
- b) Jamming of wooden doors and windows during rainy season is due to _____
- c) Wilting of differ from epidermal cells in having _____
- d) Loss of water in liquid form is _____
- e) Water potential and solute potential of pure water is _____ & _____
- f) Upward transport of water is achieved due to _____
- g) The movement of water across root endodermis is _____

Q2. Short Answer type : Within 2 to 3 sentences

- a) Name the solution of lower concentration than the one under consideration
- b) Who discovered aquaporins?
- c) What is Turgor pressure?
- d) What is the sign & unit of water potential?
- e) What is Imbibition pressure?
- f) What is Exo- osmosis?
- g) What is DPD?
- h) What is Osmotic pressure?

Q3. Short Answer type : (Within 75 words) a)

Guttation

- b) Root pressure Theory
- c) Osmosis

- d) Diffusion
- e) Plasmolysis
- f) Solute / osmotic potential
- g) Imbibition
- h) Transpiration pull theory

Q4. Long Answer type : (With 500 words)

- a) Water is the solvent of life; Justify?
- b) Describe the important physical properties of water?
- c) What is Transpiration? Describe its various components?
- d) Transpiration is a necessary evil, Discuss?
- e) Give an account of guttation and how it is different from transpiration
- f) What is water potential? Describe its various components?
- g) Narrate in brief different hypothesis of stomatal opening & closing
- h) Describe various factors affecting transpiration.

Unit-1

Answer the following questions:(1×8)

- (1)The osmotic potential of a cell is -10 bar and it's pressure potential is 5 bars,its water potential would be_____.
- (2)In a fully turgid cell,_____ equal to zero.
- (3)The difference in the diffusion pressure of a solution and a pure solvent at same atmospheric pressure is known as_____.
- (4)_____water is available to the plant in maximum amount.
- (5)Apoplastic movement of water occurs through _____ and_____.
- (6)Ascent of sap is due to _____ and _____ properties of water molecules?
- (7)In many thin leaved mesophytes ,stomata open during day and close at night,this comes under_____type stomata.
- (8)In old trees or woody plants transpiration occurs through_____.

(9)_____ ion helps in opening of stomata. **2**

.Answer the following questions:(1.5×8)

- (1) Explain briefly Plasmolysis?
- (2)What conditions are necessary for inhibition?
- (3)What is the significance of osmosis for plants?
- (4)Define apoplast?
- (5)Define Capillary water?
- (6)Define root pressure theory?
- (7)Name the process in which Hydathodes are helpful?
- (8)Why grass leaves roll up during hot and dry season?
- (9)What is wilting?

3.Answer the following questions:(2×8)

- (1) Differentiate between transpiration and Guttation?
- (2)What are antitranspirant?How do they work?
- (3)Define cohesion-tension theory?
- (4) Differentiate between symplastic and Apoplastic movement of water?
- (5)How active absorption of water is different from passive absorption?
- (6) Explain why the waterlogged soil is said to be physiologically dry?
- (7)Name the important source of water available to the plant?
- (8) Explain how $DPD=OP-TP$?
- (9)what is aquaporins?

4. Answer the following questions:(6×4)

- (1)What do you understand by water potential?Give parameters involved in its determination and it's significance?

(2) Explain the process of the absorption of water and factors affecting the rate of absorption?

(3) Define transpiration? Explain how stomatal movements are regulated?

(4) Comment upon the statement that 'transpiration is necessary evil'?

(5) Describe the process which explain both photoactive and scotoactive stomatal opening?

(6) What is ascent of sap? Demonstrate the path of ascent of sap by using any two appropriate experiments?

(7) Describe Dixon's theory of ascent of sap in plants?

Unit-2

1. Answer the following questions:(1×8)

(1) Carrier proteins take part in_____.

(2) The resting potential membrane potential is mainly determined by_____.

(3) Na⁺ glucose transporter is an example of _____.

(4) _____ transport is energy independent.

(5) HCO₃⁻-Cl⁻ transporter is an example of _____.

(6) _____ transports only one kind of substrate.

(7) _____ is concerned with photolysis of water.

(8) The maximum nutrient deficiency in plants is due to ___ and _____.

2. Answer the following questions:(1.5×8)

(1) Name four trace or micronutrients required by plants?

(2) Deficiency of which element causes die back disease?

(3) Which mineral element is common in cytochrome and ferredoxin?

(4) Define symport and antiport?

(5) Define Facilitated diffusion?

(6) Write short note on trace element and tracer elements?

(7) Role of K in plants

(8) Symptoms of Zn deficiency

3. Answer the following questions

(1) Describe symptoms of N, P, K deficiency?

(2) Distinguish between macronutrient and micronutrient?

(3) Distinguish between active and passive absorption?

(4) Define electrochemical gradient?

(5) Define carriers and pumps?

(6) What is ABC transporter?

(7) Write note on Donnan's equilibrium?

(8) Define proton -ATPase pumps?

4. Answer the following questions: (6×4)

(1) Describe principles involved in the mechanism of absorption of mineral salts by plants?

(2) Give concise account of the mechanism of ion uptake in plants?

(3) What do you understand by active salt absorption? Explain the mechanism of active absorption of salts by plants?

(4) What do you mean by macro and micro-nutrients? Describe the role of nitrogen, potassium and iron in plant nutrition?

(5) Write short note on mineral deficiency in plants?

(6) Describe the mechanism of absorption of mineral salts by plants? HOW does it differ from absorption of water?

(7) What are trace elements? Explain their role in plant nutrition?

Unit-2

Q1. Fill in the blanks (1 mark each)

- a) The common symptom of nitrogen deficiency is ___ in plants
- b) Excessive nitrogen supply to the plants reduces the ___ system.
- c) The mutual association between angiospermic root and some fungi is called ___
- d) The enzyme nitrogenase is sensitive to _____
- e) Oxygen scavenger in leguminous plant is ___
- f) The conversion of ammonia to nitrates is called ___
- g) The last element added to the essential list is ___
- h) Soil less culture is known as ___

Q2. Short Answer type : (Within 2 to 3 sentences) a)

What is mineral nutrition?

- b) What is necrosis?
- c) What is Leghaemoglobin?
- d) What are hunger signs in plants?
- e) Name the bacteria which oxidize nitrites to nitrates?
- f) What is premature abscission?
- g) What are the 3 common macro – elements used as fertilizers?
- h) Which part of the plant body normally absorbs mineral nutrients?

Q3. Short Answer type : (Within 75 words) a)

Macro – nutrients

- b) Criteria of essentiality of elements
- c) Passive Transport ion
- d) Uniport, Symport & antiport
- e) Phloem loading
- f) Electro – osmosis hypothesis
- g) Girdling experiment
- h) Bidirectional movement of phloem

Q4. Long Answer Type : (Within 500 words)

- a) Give an account of phloem loading and unloading?
- b) Narrate the various direction of phloem movement?

- c) Give an account of mechanism of phloem transport with special reference to pressure flow hypothesis?
- d) Describe the composition of phloem sap. How girdling expt. helps in proving the translocation of solute through phloem.
- e) What is mineral nutrition? Discuss the different types of essential elements and their roles?
- f) What are essential elements? Describe the macro & micro nutrients?
- g) How the ions are transported across cell membrane?
- h) Describe about the carriers, channels and pumps in relation to ion transport?

Unit-3

1. Answer the following questions:(1×8)

- (1)_____ is a growth inhibitor.
- (2)_____ is known to promote maleness in flowering plants.
- (3)Apical dominance is caused by_____ hormone.
- (4)Primary precursor of IAA is _____.
- (5)_____hormone induces cell division.
- (6) Gibberellins were first discovered in fungal genus_____.
- (7) Ethylene is a ___ hormone.
- (8)_____ and _____ hormone breaks dormancy in seeds?

2. Answer the following questions:(1.5×8) (1)

Describe the role of cytokinins in leaf senescence?

- (2)Auxins in apical dominance?
- (3)Write short note on Phytohormone?
- (4)Write short note on Ethylene?
- (5)Define the abbreviations IAA with their function?
- (6)What is bolting?

(7) write note on antigibberellin?

(8) What is Richmond-Lang effect?

3. Answer the following questions:(2×8)

(1) Describe commercial applications of Auxins?

(2) Describe the physiological role of jasmonic acid?

(3) Describe bioassay of Auxins?

(4) Describe role of Abscisic acid and its role in plants?

(5) Differentiate between cytokinin and kinetin?

(6) Describe physiological role of Brassinosteroids?

(7) Describe physiological role of Abscisic acid?

(8) Describe Gibberellins transport in plant?

4. Answer the following questions:(6×4)

(1) What are cytokinins. What are their major physiological roles? Describe their importance?

(2) What are growth regulators? Explain the biosynthesis and assay of Auxins?

(3) What are Gibberellins? How are they synthesized in plants?

(4) Describe physiological roles of Brassinosteroids and jasmonic acid?

Unit-4

1. Answer the following questions: (1x 8 =8)

i) ----- influences the process of flowering in plants.

ii) ----- is a photosensitive pigment involved in photoperiodism.

iii) The reversal of etiolation effected by light is called-----.

iv) A plant that requires not less than 10hrs of light is called-----.

- v) Which hormone promotes seed germination due to its effect on production of hydrolyzing enzymes?
- vi) Which hormone can induce seed dormancy?
- vii) The abscission layer of leaves is formed when the concentration of which hormone decreases?
- viii) Name one compound which is used to keep the leaves green and fresh for longer duration.

Group-B 2. Answer the following questions: (1.5x 8 =12)

i) What is short day plant? ii)

What is long day plant? iii)

What is day neutral plant? iv)

What are the dormancy

genes?

v) What is cellular senescence? vi)

What is polycarpic senescence?

vii) What is stratification?

viii) Define photoperiodism.

Group-C 3. Answer the following questions: (2x 8 =16)

i) Physiological alternations during senescence.

ii) What is the role of hormones during senescence? iii) What is physiological dormancy?

iv) Write the significance of seed dormancy.

v) What is photo inductive cycle?

vi) What is florigen? vii) What is vernalin?

Group-D 4. Answer the following questions: (6x4= 24)

- i) Give an account of photoperiodism and describe the different types of plants according to photoperiod? ii) Give an account of vernalisation?
- iii) What is seed dormancy? Describe different types of seed dormancy?
- iv) Describe different patterns of senescence?

Unit-4(a and b)

1. Answer the question in one word

[1 mark each]

- a. The response of plants to relative length & alternation of light and dark period with regard to the initiation of flowering is called -----
- b. Biochemically phytochrome is a protein with a-----
- c. Apoprotein and chromophore together make up the -----
- d. If a plant is exposed to high temperature after the vernalization treatment it does not flower. This reversal is referred to as -----
- e. Dormancy that is caused by an impermeable seed coat is known as ---

- f. Low temperature requirement given to the seeds to break dormancy is called -----
- g. Photoperiodism was discovered by -----
- h. Phytochrome was isolated by -----

2. Answer in two or three sentences

[1.5 marks each]

- | | |
|---------------------------|--------------------|
| a. LDP/Long day plants | i. Vernalin |
| b. SDP/short day plants | j. Devernalization |
| c. Day neutral plants | k. P1 |
| d. Dual day length plants | l. Pfr |
| e. Critical day length | m. Anthesin |
| f. Photoinductive cycle | n. Lysenkoism |
| g. Phytochrome | o. HIR |
| h. Florigen | p. VLFR |
| | q. LFR |

3. Answer in 75 words

- 1 Discovery of photoperiodism
- 2 Perception of photoperiodic stimulus
- 3 Discovery of phytochrome
- 4 Structure of phytochrome
- 5 Red and far red light response of plant
- 6 Discovery of vernalization
- 7 Response types of vernalization
- 8 Site of vernalization
- 9 Site of photoperiodic response
- 10 Application of vernalization
- 11 Phytochrome controlled morphogenetic responses
- 12 Xanthium plant
- 13 Biosynthesis of phytochrome

- 14 Phytochrome genes
- 15 Fluence and irradiation response

- 26 Role of calmodulin
- 27 Membrane hypothesis
- 28 Physical dormancy
- 29 Physiological dormancy
- 30 Endogenous dormancy
- 31 Exogenous dormancy
- 32 Secondary dormancy
- 33 Significance of seed dormancy
- 34 Thermodormancy
- 35 Dormancy genes
- 36 Distinction between sense and aging
- 37 Cellular and tissue sense
- 38 Organ sense

[2 marks each]

- 16 Rapid action phytochrome
- 17 Slow action phytochrome
- 18 Primary action phytochrome
- 19 Molecular hypothesis
- 20 Gene activation hypothesis
- 21 Inhibition of gene expression by phytochrome
- 22 Regulation of phytochrome gene expression
- 23 Role of phytochrome on gene expression
- 24 Role of phytochrome on membrane permeability
- 25 Induction of enzyme activity by phytochrome

- 39 Whole plant sense

- 40 Monocarpic sense
- 41 Polycarpic sense
- 42 Physiological alternation during sense
- 43 Role of hormone in sense
- 44 Death hormone concept
- 45 Genetic control of sense
- 46 Nutrient deficiency symptoms
- 47 Lipid peroxidation
- 48 Role of oxyradicals in sense
- 49 Hormonal shoot pruning theory
- 50 Hormonal root pruning theory

4. Answer the following in 500 words each]

[6 marks each]

- 1 What is photoperiodism. Describe the different type of plants in response to photoperiod?**
- 2 What is critical day length. Describe photoinductive cycle and perception of photoperiodic stimulus?**
- 3 Describe the discovery and structure of phytochrome.**
- 4 Give an account of red and far red light responses on photomorphogenesis.**
- 5 What is florigen concept. describe its role in stimulating flowering in different types of photoperiod sensitive plants?**
- 6 What is vernalization Describe the sites of vernalization. How plants can be devernalized?**
- 7 Give an account of vernalization.**
- 8 Describe the role of factors that regulate vernalization.**
- 9 What is vernalin Describe its role in the flowering of plants?**
- 10 Describe the mechanism of vernalization. Add a note on its applications.**
- 11 Describe the role of phytochrome in photoperiodism.**
- 12 Describe the role of phytochrome in photomorphogenesis.**
- 13 Give an account of phytochrome action.**
- 14 Enumerate various responses types of phytochrome.**
- 15 What is dormancy? Describe different types of seed dormancy.**
- 16 Give an account of causes of seed dormancy.**
- 17 Describe various methods of breaking seed dormancy.**
- 18 What do you mean by senescence. Describe different patterns of senescence?**
- 19 Give an account of physiological alternations during senescence?**
- 20 Describe the cause of plant senescence?**
- 21 Give an account of regulation of plant senescence. Enumerate the theory of hormonal induction of senescence?**