Nayagarh autonomous college, Nayagarh

GE-IIA : Plant physiology and metabolism

Unit-1(I)

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(I)

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 symplastc 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 potoactive and scotoactive stomatal opening?

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

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

Unit-(3)

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 ferrodoxin?

(4)Define symport and antiport?

(5)Define Facilitated diffusion?

(6)Write short note on tarace 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,pottasium 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

1.Objective Questions (1 mark)

1. _____ is the photosynthetic unit.

2. _____ is he photosynthetic apparatus.

3._____ is the universal photosynthetic Pigment.

4._____ $6CO_2$ + _____ $\xrightarrow[\text{Chlorophylls}]{\text{Sunlight}}$ $C_6H_{12}O_6$ + _____ + $6H_2O$.

5. Is photosynthesis _____ is Oxidised into _____ and _____ is reduced into _____

6. Oxygenated carotenoids are called _____.

7. _____ is present at the centre of the chlorophyll molecule.

8. Phycobillins are _____ soluble Pigments.

9. _____ is the reaction centre in PS-I and _____ PS-II.

10. Photolysis of water takes place in the presence of _____ & _____ ion.

11. Photolysis of water takes place near _____

12. All other Pigments except Chlorophyll-a are called _____.

13. The amount of light absorbed when plotted as a function of wavelength is called _____.

14. The amount of photon required to yield one molecule of oxygen is called _____.

15. When one molecule of photon is given then the number of O_2 produced is called _____.

16. The immediate accepter of electron from PS-II is _____.

17. In Noncyclic ETS _____ ATP & _____ $NADPH_2$ are formed.

18. In Cyclic ETS only _____ are produced.

19. _____ & _____ are called Assimilatory Power.

20. The 1st Product of photosynthesis is _____.

21. For the production of one molecule of Glucose _____ ATP & _____ $NADPH_2$ molecules are wed through C_3 cycle.

22. In C_3 Plants CO_2 is fixed in the presence of enzyme _____.

23. Kranz anatomy is found in _____ plants.

24. In C_4 plants the CO_2 fixed from the atmosphere in the presence of enzyme _____.

25. In Sugarcane the 1st product of photosynthesis is _____.

26. In sugar came for the production of molecule of Glucose _____ A TP & _____ $NADPH_2$ are required.

27. Agranal chloroplast is found in _____.

28. In C_4 plants C_3 cycle occur in _____ cell

29. In CAM plants stomata shows _____ movement.

30. In CAM plants CO_2 fixation occur during _____.

31. In CAM plants Acidification occur during _____ in which malic acid is stored n _____ of Mesophytes cell.

32. C_4 cycle is also called as _____ path way.

33. Calvin Cycle is also called as _____ cycle.

34. _____ is also called as Primary photo chemical reaction.

35. _____ is also called as E-MP path ways.

36. Kreb's cycle also called as TCA cycle or _____ cycle.

37. Glycolysis occur in _____ of the cell.

38. In photosynthesis Light reaction occur in _____ and Dark reaction occur in _____.

39. In Glycolysis 1 molecule Glucose is converted into 2 molecules of _____.

40. In Glycolysis the net gain of ATP is _____.

41. In Anaerobic respiration the net gain of ATP is _____.

42. In Glycolysis the number of ATP produced through substrate levels phosphorylation is _____.

43. _____ is the connecting link between Glycolysis & Kreb's cycle .

44. The reaction that links Glycolysis and Kreb's cycle is catalysed by the enzyme _____ .

45. The no. of ATP moleculs produced in Kreb's cycle is _____.

46. The no. of ATP molecules produced through ETS during Aerobic respiration is _____.

47. Kreb's cycle occur in _____ of mitochondria.

48. Oxidative phosphorylation occur in _____ of mitochondria.

49. Complex- IV is also called as _____.

50. ____ is the final election accepter in oxidative phosphorylation.

51. During ETS in Proton Graient is formed across _____ of mitochondria.

52. _____ is the only membrane bound enzyme of the Kreb's cycle.

Answer in 1 to 2 sentence (1.5 marks)

1. What is Quantasome?

2. What is Absorption spectrum?

3. What is Action Spectrum?

4. What is Quantum yield?

5. What is Quantum requirement?

6. Write the equation of photosynthesis?

7. What is Oxidative decarboxylation?

8. What is Oxidative photophosphorylation?

9. What is the name of complex I & II?

10. What is the name of complex III x complex-IV.

Answer in 75 words (2 marks)

1. Write a note on Photosynthetic Pigment.

2. Write a note on chlorophyll.

3. Write a note on Photolysis of water.

4. Briefly describe chemiosmotic mechanism.

5. Make a Brief note on Anaerobic respiration.

6. Briefly describe CAM pathway.

7. Write a note on PS-I & PS-II.

8. What are antenna molecules?

Answer in 500 words (6 marks)

1. Describe the Z-scheme of photosynthesis

2. Describe C_3 cycle of photosynthesis

3. Describe Hatch & Slack pathway & photosynthesis.

4. Describe the Process of Light reaction

5. Describe Glycolysis & it's Significance.

6. Describe Mitochondrial electron transport chain with the chemiosmotic mechanism of ATP synthesis.

7. Discuss TCA cycle with it's energy Budget.

Unit-3

1.Answer the following questions (1×8)

(1)____ trace elements is associated with posthetic group of nitrite reductase.

(2) Prosthetic groups of nitrite reductase are_____.

(3)Reddish pigment in functional root nodules of Leguminosae is____.

(4)The enzyme nitrogenase is extremely sensitive to_____.

(5)Ammonia is oxidised into nitrite by _____ bacteria.

(6)Nitrogen is absorbed by the plants_____.

(7)_____molecules of ATP are required to fix one molecule of nitrogen.

(8) Conversion of ammonia to nitrite and then to nitrates is called____.

(9)The reaction of glutamate and ammonium ion to yield glutamine is catalyzed by enzyme_____.

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

(1) Nitrogen cycle(2)Ammonification

(3)Bacteroids(4)Laghaemoglobin

(5)nif gene(6)Nitrite reductase

(7)Transamination(8) Rhizobium

(9) Denitrification

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

(1) Describe the various stages of nitrogen cycle?

(2)Give an account of biological nitrogen fixation?

(3)What is nitrogen assimilation? Describe nitrate and ammonia assimilation in plants?

(4)Describe the bochemistry of nitrogen fixation?

(5)Give a general catalytic mechanism of nitrogen fixation by nitrogenase enzyme complex?

Unit-4

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. Dermancy 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.Answaer in two or three sentences [1.5marks each]

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

3.Answer in 75 words [2 marks each]

1 Discovery of photoperiodism
2 Perception of photoperiodic stimulus
3 Discovery of phytochrome
4 Structure of phytochrome
5 Red and far red light response
16 Rapid action phytochrome
17 Slow action phytochrome
18 Primary action phytochrome
19 Molecular hypothesis
20 Gene activation hypothesis
21 Inhibition of gene expression

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
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

4. Answer the following in 500 words [6marks 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 vermalin 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 hotoperiodism.
12 Describe the role of phytochrome in photomorphogenesis.
13 Give an account of phytochrome action.
14 Enumerate various responses types of phytochrome.