

PG and Research Department of Botany

PLANT PHYSIOLOGY- MCQ questions

1. Water potential is equal to

- (a) $T_s + O.P$ (b) = T.P. (c) $\sum p + Y$ (d) **Zero**

2. Transpiration is least in

- (a) good soil moisture (b) high wind velocity (c) dry environment (d) **high atmospheric humidity.**

3. Phenyl mercuric acetate (PMA) results in

- (a) reduced photosynthesis (b) **reduced transpiration** (c) reduced respiration (d) killing of plants.

4. Stomata open and close due to

- (a) circadian rhythm (b) genetic clock (c) pressure of gases inside the leaves (d) **turgor pressure of guard cells.**

5. Movement of leaves of sensitive plant, Mimosa pudica are due to

- (a) thermonasty (b) **seismonasty** (c) hydrotropism (d) chemonasty

6. Phytochrome is involved in

- (a) phototropism (b) photorespiration (c) **photoperiodism** (d) geotropism

7. Gibberellins promote

- (a) **seed germination** (b) seed dormancy (c) leaf fall (d) root elongation

8. Cut or excised leaves remain green for long if induced to root or dipped in

- (a) gibberellins (b) **cytokinins** (c) auxins (d) ethylene.

9. Hormone primarily connected with cell division is

- (a) IAA (b) NAA (c) **cytokinin/zeatin** (d) gibberellic acid

10. Carbon dioxide joins the photosynthetic pathway in

- (a) PS I (b) PS II (c) light reaction (d) **dark reaction.**

11. $NADP^+$ is reduced to NADPH in

- (a) PS I (b) PS II (c) Calvin cycle (d) **noncyclic photophosphorylation.**

12. Minerals absorbed by root move to the leaf through

- (a) **xylem** (b) phloem (c) sieve tubes (d) none of the above

13. Phosphorous and nitrogen ions generally get depleted in soil because they usually occur as

- (a) neutral ions (b) **negatively charged ions** (c) positively charged ions (d) both positively and negatively charged but disproportionate mixture.

(a) Zn (b) Mn (c) **K** (d) Mg

(a) uptake of minerals (b) uptake of water (c) **elongation of internodes** (d) ascent of sap.

(a) abscisic acid (b) auxins (c) florigen (d) **cytokinins**

(a) auxin (b) cytokinin (c) **gibberellins** (d) ethylene.

(a) head 15 x 15 A, tail 25 A (b) head 20 x 20 A, tail 25 A

(c) **head 15 x 15 A, tail 20 A** (d) **head 10 x 12 A, tail 25 A.**

(a) phosphoglyceric acid (b) **glycolate** (b) serine (d) glycine

(a) **stroma of bundle sheath chloroplasts** (b) grana of bundle sheath chloroplasts

(c) grana of mesophyll chloroplasts (d) stroma of mesophyll chloroplasts.

(a) crop plants (b) forests (c) plants of the land area (d) **phytoplankton of oceans.**

22. A very efficient converter of solar energy with net productivity of 204 kg/m² or more is the crop

(a) wheat (b) **sugarcane** (c) rice (d) baira

23. A bottle filled with previously moistened mustard seeds and water was screw capped tightly and kept in a corner. It blew up suddenly after about half an hour. The phenomenon involved is

(a) diffusion (b) **imbibitions** (c) osmosis (d) D.P.D.

24. The principal pathway of water translocation in angiosperms is

(a) sieve cells (b) sieve tube elements (c) **xylem vessel system** (d) xylem and phloem.

25. Which of the following movement is not related to auxin level?

(a) bending of shoot towards light (b) movement of root towards soil
(c) **nyctinastic leaf movements** (d) movement of sunflower head tracking the sun.

26. Phototropic and geotropic movements are linked to

(a) gibberellins (b) enzymes (c) **auxin** (d) cytokinins.

27. Abscissic acid controls

(a) cell division
(b) **leaf fall and dormancy**
(c) shoot elongation
(d) cell elongation and wall formation.

28. Phytohormones are

- (a) chemical regulation flowering (b) chemical regulation secondary growth
(c) hormones regulating growth from seed to adulthood
(d) **regulators synthesised by plants and influencing physiological processes.**

29. Highest auxin concentration occurs

- (a) **in growing tips** (b) in leaves (c) at base of plant organs (d) in xylem and phloem.

30. Kranz anatomy is typical of

- (a) **C₄ plants** (b) C₃ plants (c) C₂ plants (d) CAM plants

31. The first carbon dioxide acceptor in C₄-plants is

- (a) **phosphoenol-pyruvate** (b) ribulose 1, 5-diphosphate
(c) oxalo-acetic acid (d) phosphoglyceric acid

32. In soil, the water available for root absorption is

- (a) gravitational water (b) **capillary water** (c) hygroscopic water (d) combined water

33. The most widely accepted theory for ascent of sap in trees is

- (a) capillarity (b) role of atmospheric pressure (c) pulsating action of living cell
(d) **transpiration pull and cohesion theory of Dixon and Jolly.**

34. Twining of tendrils is due to

- (a) **thigmotropism** (b) seismonasty (c) heliotropism (d) diageotropism.

35. A chemical believed to be involved in flowering is

- (a) gibberellins (b) kinetin (c) **florigen** (d) IBA.

36. The hormone responsible for apical dominance is

- (a) **IAA** (b) GA (c) ABA (d) Florigen

37. Abscissic acid causes

- (a) **stomatal closure** (b) leaf expansion (c) stem elongation (d) root elongation.

38. Photosynthetic pigments found in the chloroplasts occur in

- (a) **thylakoid membranes** (b) plastoglobules (c) matrix (d) chloroplast envelope.

39. Dark reactions of photosynthesis occur in

- (a) granal thylakoid membranes (b) stromal lamella membranes
(c) **stroma outside photosynthetic lamellae** (d) periplastidial space.

40. Which technique has helped in investigation of Calvin cycle?

- (a) X-ray crystallography (b) X-ray technique (c) **radioactive isotope technique**
(d) intermittent light.

41. During monsoon, the rice crop of eastern states of India shows lesser yield due to limiting factor of

- (a) CO₂ (b) **light** (c) temperature (d) water.

42. Ferredoxin is a constituent of

- (a) **PS I** (b) PS II (c) Hill reaction (d) P₆₈₀

43. Water movement between cells is due to

- (a) T.P. (b) W.P. (c) **D.P.D.** (d) incipient plasmolysis.

44. Which of the following is used to determine the rate of transpiration in plants?

- (a) porometer/hygrometer (b) **photometers** (c) auxanometer (d) tensiometer/barometer

45. Guttation is mainly due to

- (a) **root pressure** (b) osmosis (c) transpiration (d) imbibition.

46. In terrestrial habitats, temperature and rainfall conditions are influence by

- (a) water transformations (b) **transpiration** (c) thermoperiodism (d) translocation.

47. Conversion of starch to organic acids is required for

- (a) **stomatal opening** (b) stomata! Closing (c) stomatal formation (d) stomatal activity

48. At constant temperature, the rate of transpiration will be higher at

- (a) sea level (b) 1 km below sea level (c) 1 km above sea level (d) **1.5 km above sea level**

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

- (a) **closes completely** (b) opens partially (c) opens fully (d) remains unchanged

50. Which is employed for artificial ripening of banana fruits?

- (a) auxin (b) coumarin (c) **ethylene** (d) cytokinin.

51. Cytokinins

- (a) promote abscission (b) influence water movement

(c) **photoperiod less than 12 hours photoperiod below a critical length and uninterrupted long night long night**

- (d) short photoperiod and interrupted long night.

52. Apical dominance is caused by

- (a) abscisic acid in lateral bud (b) cytokinin in leaf tip
(c) gibberellin in lateral (d) **auxin in shoot tip**

53. Bananas can be prevented from over-ripening by

- (a) maintaining them at room temperature (b) refrigeration
(c) **dipping in ascorbic acid solution** (d) storing in a freezer.

54. Flowering dependent on cold treatment is

- (a) cryotherapy (b) cryogenics (c) cryoscopy (d) **vernalisation.**

55. Dwarfness can be controlled by treating the plant with

- (a) cytokinin (b) **gibberellic acid** (c) auxin (d) antigibberellin.

56. The enzyme that catalyses carbon dioxide fixation in C₄ plants is

- (a) RuBP carboxylase (b) **PEP carboxylase**
(c) Carbonic anhydrase (d) Carboxydismutase

57. Photosystem II occurs in

- (a) stroma (b) cytochrome (c) **grana** (d) mitochondrial surface.

58. Chlorophyll a occurs in

- (a) all photosynthetic autotrophs (b) in all higher plants
(c) **help retain chlorophyll** (d) inhibit protoplasmic streaming.

59. Which is produced during water stress that brings stomatal closure?

- (a) ethylene (b) **abscisic acid** (c) ferulic acid (d) coumarin.

60. An adaptation for better gaseous exchange in plant leaves is

- (a) hair on lower surface (b) **multiple epidermis** (c) waxy cuticle
(d) **stomata on lower surface away from direct sun rays.**

61. Klinostat is employed in the study of

- (a) osmosis (b) growth movements (c) photosynthesis (d) **respiration.**

62. The hormone produced during adverse environmental conditions is

- (a) **benzyl aminopurine** (b) bichlorophenoxy acetic acid
(c) ethylene (d) abscisic acid.

63. The regulator which retards ageing/senescence of plant parts is

- (a) cytokinin (b) auxin (c) gibberellins (d) **abscisic acid.**

64. Removal of apical bud results in

- (a) formation of new apical bud (b) elongation of main stem (c) death of plant
(d) **formation of lateral branching.**

65. Translocation of carbohydrate nutrients usually occurs in the form of

- (a) glucose (b) maltose (c) starch (d) **sucrose.**

66. Which one is a C₄-plant?

- (a) papaya (b) pea (c) potato (d) **maize/corn**

67. The carbon dioxide acceptor in Calvin cycle/ C₃-plants is

- (a) phospho-enol pyruvate (PEP) (b) **ribulose 1, 5-diphosphate (RuBP)**
(c) phosphoglyceric acid (PGA) (d) ribulose monophosphate (RMP)

68. Maximum solar energy is trapped by

- (a) planting trees (b) cultivating crops (c) **growing algae in tanks** (d) growing grasses.

69. A photosynthesising plant is releasing ¹⁸O more than the normal. The plant must have been supplied with

- (a) O₃ (b) **H₂O with CO₂** (c) CO₂ with ¹⁵O (d) C₆H₁₂O₆ with ¹⁸O

70. Plants, but not animals, can convert fatty acids to sugars by a series of reactions called

- (a) photosynthesis (b) **Kreb's cycle** (c) glycolysis (d) **glyoxylate cycle.**

71. During light reaction of photosynthesis, which of the following phenomenon is observed during cyclic phosphorylation as well as non-cyclic phosphorylation?

- (a) release of O₂ (b) **formation of ATP** (c) formation of NADPH
(d) involvement of PS I and PS II pigment systems.

72. Which of the following pigments acts as a reaction- centre during photosynthesis?

- (a) carotene (b) phytochrome (c) **P₇₀₀** (d) cytochrome.

73. If the growing plant is decapitated, then

- (a) its growth stops (b) leaves become yellow and fall down
(c) axillary buds are inactivated (d) **axillary buds are activated.**

74. The movement of auxin is largely

- (a) centripetal (b) **basipetal** (c) acropetal (d) both 'a' and 'c'.

75. The 1992 Nobel Prize for medicine was awarded to Edmond H. Fischer and Edwin J.Krebs for their work concerning

- (a) **reversible protein phosphorylation as a biological regulation mechanism**
(b) isolation of the gene for a human disease
(c) human genome project
(d) drug designing involving inhibition of DNA synthesis of the pathogen.

76. The closure of lid of pitcher in pitcher plant, is due to

- (a) **paratonic movement** (b) autonomous movement (c) turgor movement (d) tropic movement.

77. The movement of water, from one cell of cortex to adjacent one in roots, is due to

- (a) accumulation of inorganic salts in the cells
(b) accumulation of organic compounds in the cells
(c) **water potential gradient**
(d) chemical potential gradient.

78. The CO₂ fixation during C₄ pathway occurs in the chloroplast of

- (a) guard cells (b) bundle sheath cells (c) **mesophyll cells** (d) spongy parenchyma.

79. Which of the following element plays an important role in biological nitrogen fixation?

- (a) copper (b) **molybdenum** (c) zinc (d) manganese

80. In C₄ plants, CO₂ fixation is done by

- (a) sclerenchyma (b) chlorenchyma and hypodermis (c) **mesophyll cells** (d) guard cells.

81. Which one of the following elements is almost nonessential for plants?

- (a) Zn (b) **Na** (c) Ca (d) Mo

82. In C₄ plants, CO₂ combines with

- (a) **phosphoenol pyruvate** (b) phosphoglyceraldehyde
(c) phosphoglyceric acid (d) ribulose diphosphate.

83. When water enters in roots due to diffusion, is termed as

- (a) osmosis (b) **passive absorption** (c) endocytosis (d) active absorption.

84. Photorespiration is favoured by

- (a) high temperature and low O₂ (b) high humidity and temperature
(c) **high O₂ and low CO₂** (d) high CO₂ and low O₂

85. What will be the number of Calvin cycles to generate one molecule of hexose?

- (a) 8 (b) 9 (c) 4 (d) **6**

86. 'The law of limiting factors' was proposed by

- (a) Leibig (b) Hatch and Slack (c) **Blackman** (d) Arnon

87. The correct sequence of electron acceptor in ATP synthesis is

- (a) Cyt. b, c, a₃, a (b) Cyt. c, b, a, a₃ (c) Cyt. o, a, b, c (d) **Cyt. b, c, a, a₃**

88. Bidirectional translocation of solutes takes place in

- (a) parenchyma (b) cambium (c) xylem (d) **phloem.**

89. Gibberellic acid induces flower

- (a) in short day plants under long day conditions
(b) in day-neutral plants under dark conditions
(c) in some gymnospermic plants only
(d) **in long day plants under short day conditions.**

90. If a tree flowers thrice in a year (Oct., Jan. and July) in Northern India, it is said to be

- (a) **photo and thermo-insensitive**
(b) photo and thermo-sensitive
(c) photosensitive but thermo-insensitive
(d) thermosensitive but photo-insensitive.

91. What will be the effect on phytochrome in a plant subjected to continuous red light?

- (a) phytochrome synthesis will increase
(b) level of phytochrome will decrease
(c) phytochrome will be destroyed
(d) **first (b) then (a).**

92. With an increase in the turgidity of a cell, the wall pressure will be

- (a) fluctuate (b) remain unchanged (c) **increase** (d) decrease

93. Which of the following is not caused by deficiency of mineral nutrition?

- (a) **etiolation** (b) shortening of internode (c) necrosis (d) chlorosis.

94. When a cell is fully turgid, which of the following will be zero?

- (a) turgor pressure (b) **water potential** (c) wall pressure (d) osmotic pressure

95. NADPH₂ is generated through

- (a) photosystem II (b) anaerobic respiration (c) glycolysis (d) **photosystem I.**

96. A pigment which absorbs red and far-red light is

- (a) Cytochrome (b) xanthophylls (c) **phytochrome** (d) carotene

97. The core metal of chlorophyll is

- (a) Ni (b) Cu (c) Fe (d) **Mg**

98. Chlorophyll-a molecule at its carbon atom 3 of the pyrrole ring II has one of the following

- (a) carboxylic group (b) magnesium (c) aldehyde group (d) **methyl group**

99. Which one among the following chemicals is used for causing defoliation of forest trees?

- (a) malic hydrazide (b) **2, 4-D** (c) amo-1618 (d) phosphon D.

100. Phytochrome becomes active in

- (a) red light (b) green light (c) blue light (d) **none of these.**

Section –B

Unit- 1(K3)

1. Difference between the diffusion and osmosis.
2. Discuss about the water and chemical potential .
3. Explain the mechanism behind the absorption of water.
4. Difference between the active and passive absorption.
5. Define the transpiration and their significance.
6. What are the factors affecting the transpiration?
7. Classify the stomata based on their movement.
8. Discuss about physiology of stomatal movement.
9. Explain- steward scheme in stomatal movement.
10. What are the factor affecting the stomatal movement and how?
11. Write any three theories that deal with stomatal movement?
12. Write the role of stomatal in plant physiology?
13. Difference between transpiration and guttation.
14. Explain – Munch mass theory.
15. Explain –cohesion and adhesion theory.
16. Write down the evidence that prove the direction of translocation of carbohydrate.

Unit -2

17. Write about Receptors and G-proteins in brief.
18. Explain about phospholipid signaling.
19. What are the roles of cyclic nucleotides?
20. Write about Calcium – Cadmium cascade.

21. Write about minerals nutrition and its elements.
22. List out the role of essential element.
23. Write short note on nutrient uptake and transport mechanism.
24. What are the roles of cell membrane in plants?
25. Write about ion pump carrier.
26. Write down the role of essential elements.

Unit-3

27. What is mean by Photosynthesis? Write its significance.
28. What are Photosynthetic pigments?
29. Explain about Photo protective carotenoids.
30. Write a short note on reaction center complexes.
31. Explain about electron transport pathway in chloroplast membrane.
32. Define Photo phosphorylation. Write its significance.
33. What is calvin cycle and explain its significance.
34. What is the difference between C4 cycle and C3 cycle?
35. What is the difference between C2 cycle and C3 cycle?
36. Define photorespiration and write its significance.

Unit – 4

37. Write a detailed note on TCA cycle and its significance.
38. Write difference between aerobic and anaerobic respiration.
39. List out the importance of nitrogen to plants.
40. What is called biological nitrogen fixation? Explain it in brief.
41. Define Glycolysis. Write its importance to plants.
42. Write a note on oxidative phosphorylation.
43. Define PPP and write its significance.
44. Write about GS pathway.
45. Explain about nitrate assimilation in brief.
46. Write a note on carbohydrate synthesis.

Unit-5

47. Explain about physiology of flowering.
48. What are the Physiological role of photochrome and cytochrome.
49. Explain the concept of photoperiodism.
50. Define and write the conditions of vernalization techniques.
51. Write a short note on biological clock.
52. Write the history and mechanism of ABA.
53. Write about the types of senescence.
54. Explain about the mechanism of abiotic stress tolerance.
55. Write the mechanism of fruit ripening.

56. Write about the physiology of seed germination and mention the physiological change which is takes place during germination.

Section –C

Unit-1

1. Explain the translocation of water through xylem.
2. Explain the mechanism of transpiration and the factor affecting the transpiration.
3. Explain the translocation of photosynthate through phloem
4. Explain the theories of stomatal movement and factor affecting them.

Unit-2

5. Explain about signal transduction in detail.
6. Write about mineral deficiency symptoms and plant disorders.
7. Give a detailed note on nutrient uptake and transport mechanism.
8. Explain about Phospholipid signaling and calcium –cadmium cascade.
9. What is Ion pump carrier? Explain it in detail.

Unit-3

10. Explain calvin cycle in detail.
11. Write a detailed note on C4 carbon cycle.
12. Explain CAM pathway in detail.
13. Give a detailed note on Photorespiration.
14. What are the difference between light and dark reaction?

Unit-4

15. Give a detailed account on Glycolysis.
16. Explain about TCA cycle in detail.
17. Write about electron transport in mitochondria.
18. Expand PPP. Explain it in detail.
19. Write about nitrogen cycle in detail.
20. Explain about GDH and GOGAT pathway in detail.
21. Give a detailed note on Carbohydrate metabolism.
22. Write a detailed note on nitrogen metabolism.

Unit-5

23. Write a detailed note on factors that influence the seed dormancy and break down mechanism.
24. Mention the history, role and mechanism of Auxin.
25. Write about growth inhibiting hormones and their physiological roles.
26. Explain about how plants response to biotic and abiotic stress.
27. Write about mechanism of action of phytochrome and cytochromes.