1. a) Define water potential.

b) Name one nodule forming and non-nodule forming symbiotic nitrogen fixing bacterium.

c) Name the enzymes involved in GS-GOGAT pathway.

d) What is P-protein?

e) In which region of chloroplast, light and dark reactions occur?

f) What is antenna molecule in photosynthesis?

g) What do you mean by allosteric enzyme?

h) What do you mean by reparatory substrate?

i) Why glycolysis is called EMP pathway?

j) What is fermentation?

k) What are the components of the Electron Transport Chain (ETC)?

l) What is competitive inhibition?

m) What is facilitated diffusion?

n) Define guttation.

o) What is vernalization?

q) Name a stress hormone.

r) Name one natural and synthetic auxin.

2. Answer the following questions

a) What is chlorosis? Which mineral deficiency causes it?

b) How nitrate is assimilated in plants?

c) What are source and sink? Give example.

g) Define Kranz anatomy.

h) What are Obligate Anaerobes, facultative Aerobes and aero-tolerant anaerobes?

3. Answer the following questions

a) Discuss the several factors affecting the rate of transpiration.

b) Describe the structure of Nitrogenase complex. Why ATP is required by this enzyme? Write down the chemical equation of the reaction in which this enzyme is involved.

c) Illustrate the nodulation process with suitable diagram.

d) Discuss the process of phloem loading via apoplastic pathway.

e) Discuss the pressure flow model in phloem translocation.

f) Describe the C2 cycle with suitable diagram.

g) Why Hatch and Slack cycle is called C4 cycle? Briefly illustrate the C4 cycle.

h) Why Krebs cycle is called TCA cycle? Give a schematic diagram of Krebs cycle with enzymes.

i) Give a schematic diagram of glyoxylate cycle. What is the significance of glyoxylate cycle?

j) Write down the physiological roles of Gibberellin

1. Write about the importance of water in plant life.

2. Distinguish between osmosis and diffusion. Discuss their nature and function.

3. Describe the role of cytochrome-pump hypothesis in relation to the entrance of mineral salts. What do you mean by salt respiration?

4. What do you mean by apoplast and symplast? Describe critically the two process regarding the path of absorption and conduction of mineral salts by plant roots.

5. What do you understand by ‘ascent of sap’? How does sap rises in the system and what is its path?

6. What is transpiration? How does it differ from evaporation?

7. What do you mean by the term “antitranspirant”? Name some chemicals which act as antitranspirant. Describe its importance in agriculture.

8. What do you mean by guttation? Explain the mechanism of guttation in plants.

9. Give the classification of mineral elements indicating their essentiality. What criteria should be met before a mineral element can be considered as essential?

10. What are the micronutrients? Give a brief account of the role of micronutrient elements in the nutrition of plants.

11. What are trace and tracer elements? Describe the role of them in plant physiology.

12. Give the physiological role of boron and molybdenum. How do they help in nitrogen fixation and reduction in leguminous plants?

13. Write a notes on hydroponics.

14. What do you understand by translocation of solutes? Discuss its importance in the life of the plants.

15. Define auxins. Write an essay on their detection and bioassay methods.

16. What are gibberellins? Discuss the role of gibberellins in plants particularly in relation to the production of hydrolytic enzymes.

17. Discuss the role of ethylene particularly in relation to its fruit preservation.

18. Enumerate the plant growth substances and give a brief account of their physiological effect.

19. Define photoperiodism. Give a detailed account of the plants responsive to day light.

21. What I your idea about the flowering stimulus? Give an account of the ‘florigen’ concept of flowering.

22. What do you mean by phytochrome? Give their chemical nature and role in flower initiation. `

1. What are anabolism & catabolism? Explain role of allosteric & isoenzymes in regulation of cell metabolism.

2. What is photochemical reaction? Explain electron transport in PSI & PSII.

3. What is C4 pathway? Explain the pathway of carbon assimilation in C4 plants.

4. What is CAM? Explain the role of factors affecting CO2 reduction.

5. Write notes on- (i) Photorespiration, (ii) Antenna molecules.

6. Describe the synthesis of sucrose. What is Glycolysis?

7. Explain the process of Oxidative Pentose Phosphate Pathway.

8. Where is the site of TCA cycle? Explain the pathway of TCA cycle. What is the product of it?

9. Describe the process of mitochondrial electron transport chain. What is cyanide resistant respiration?

10. Describe the process of synthesis of triglyceride.

11. Explain the process of Beta-oxidation of Glyoxylic acid.

12. What is Gluconeogenesis? Explain its role in mobilization of lipids during seed germination.

13. What is Leghaemoglobin? Explain the process of biological nitrogen fixation in legumes.

14. Write notes on- (i) Nitrate assimilation & (ii) Transamination

15. Explain the mechanism of Receptor-ligand interaction.

16. What is second messenger concept? Explain calcium calmodulin & MAP-Kinase cascade.

17. Write an explanatory notes on genes involved in nodule formation.

18. Diagrammatically represent the Z-scheme of light reaction.

19. Give a schematic view (with enzymes) of Krebs cycle, indicating the reversible steps.

20. Define light and CO2 compensation points. Comment on the inhibitors of light reaction.

21. Differentiate between: i) Preparatory and pay-off phase in glycolysis ii) Action spectrum and absorption spectrum iii) Reductive amination and transamination iv) Synthesis and degradation of fats

22. Explain the chemiosmotic mechanism for ATP synthesis.

23. Outline the steps of Beta-oxidation of fats. Explain with the help of a 16C long fatty acid.

Q1. What is plant physiology?

**Ans.** Plant physiology is the study of how plants function, including their growth, development, and response to environmental factors.

Q2. What is photosynthesis, and how does it work?

**Ans.** Photosynthesis, occurring in chloroplasts, is the pivotal process through which green plants, algae, and certain bacteria transform sunlight, carbon dioxide, and water into glucose and oxygen. It relies on chlorophyll’s light absorption to split water molecules, generating oxygen and essential chemical compounds that culminate in glucose production. This fundamental process sustains oxygen levels and fuels energy for diverse life forms on our planet.

Q3. What is transpiration?

**Ans.** Transpiration is the loss of water vapour from plant leaves through tiny pores called stomata, which helps in nutrient uptake and cooling.

Q4. What is the role of plant hormones?

**Ans.** Plant hormones, also known as phytohormones, play a crucial role in regulating various growth and developmental processes in plants. They control activities like cell division, elongation, differentiation, and responses to environmental stimuli. Plant hormones include auxins, gibberellins, cytokinins, abscisic acid, and ethylene, each with specific functions in processes such as seed germination, root and shoot growth, flowering, and stress responses, ensuring plants adapt to their surroundings and maintain their overall health and survival.

Q5. How do plants absorb nutrients?

**Ans.** Plants absorb nutrients through their roots via a process called active transport, utilising specialised transport proteins to uptake essential minerals and water from the soil. This allows them to fuel growth and maintain their vital functions.

Q6. What is the importance of soil pH for plant growth?

**Ans.** Soil pH is essential for plant growth as it impacts nutrient accessibility. Plants generally flourish within a slightly acidic to neutral pH range (approximately 6 to 7). Extreme pH levels can hinder nutrient absorption, resulting in stunted growth and reduced vitality. Maintaining the appropriate soil pH guarantees that plants can obtain vital nutrients for their best growth.

Q7. What is the role of gibberellins in plant growth?

**Ans. Gibberellins** promote stem elongation, fruit development, and seed germination in plants.

Q8. What are the effects of excess fertiliser use on plants?

**Ans.** Over-fertilization can lead to nutrient imbalances, soil degradation, and environmental pollution.

Q9. What is the role of the plant cell wall?

**Ans.** The plant cell wall provides structural support and protection, allowing cells to maintain their shape.

Q10. How do plants defend themselves against herbivores and pathogens?

**Ans.** Plants employ physical barriers, chemical toxins, and signaling molecules to deter herbivores and pathogens.

Q11. What is the difference between anaerobic and aerobic respiration in plants?

**Ans.** Aerobic respiration in plants occurs in the presence of oxygen and produces energy more efficiently, yielding more ATP. In contrast, anaerobic respiration occurs in the absence of oxygen and is less efficient, producing less ATP and often leading to the accumulation of toxic byproducts like ethanol.

Q12. How do plants adapt to environmental stress?

**Ans.** Plants adapt to stress through mechanisms like drought tolerance, cold resistance, and altering their growth patterns.

Q13. What is the role of chlorophyll in photosynthesis?

**Ans.** Chlorophyll molecules capture light energy and convert it into chemical energy, initiating the photosynthesis process.

Q14. What are stomata, and what is their function?

**Ans.** Stomata are small openings in plant leaves that regulate gas exchange, including the uptake of carbon dioxide and release of oxygen.

Q15. How do plants respond to light and gravity?

**Ans.** Plants exhibit phototropism (growth towards light) and gravitropism (response to gravity) through hormone-controlled growth.

Q16. What is the role of mycorrhizal associations in plants?

**Ans.** Mycorrhizal fungi form symbiotic relationships with plant roots, enhancing nutrient absorption and plant health.

Q17. How do plants transport water and nutrients from roots to leaves?

**Ans.** The transpiration-cohesion-adhesion mechanism allows water and nutrients to move from roots to leaves through the xylem.

Q18. What is the significance of plant reproduction?

**Ans.** Plant reproduction ensures the continuation of species through processes like pollination, seed formation, and vegetative propagation.

Q19. What are the main functions of plant roots?

**Ans.** Plant roots serve vital roles in a plant’s life. They anchor the plant securely in the soil, providing stability and support. These roots also act as nature’s nutrient sponge, absorbing water and essential nutrients to fuel the plant’s growth and overall health. Additionally, roots function as a storage unit, storing carbohydrates and other valuable resources to ensure the plant’s continuous nourishment and development.

Q20. How do plants respond to environmental cues like temperature and photoperiod?

**Ans.** Plants exhibit phenotypic plasticity, adjusting their growth and development in response to changing environmental conditions.

Q21. What is the role of nitrogen fixation in plants?

**Ans.** Nitrogen-fixing bacteria help convert atmospheric nitrogen into a usable form for plants, promoting their growth.

Q22. What is the relationship between light intensity and plant photosynthesis?

**Ans.** Light intensity directly affects the rate of photosynthesis, with plants requiring adequate light for optimal growth.

Q23. How do plants respond to water stress?

**Ans.** Plants employ strategies like closing stomata and adjusting their growth to conserve water during drought conditions.

Q24. What is the role of abscisic acid in plant stress responses?

**Ans.** Abscisic acid helps plants respond to stress by regulating stomatal closure and initiating protective mechanisms.

Q25. How do plants sense and respond to gravity?

**Ans.** Plants sense gravity through specialised cells called osteocytes in their roots and stems, which contain dense organelles called statoliths. When these statoliths settle due to gravity, they trigger signals that guide the plant’s growth and orientation, allowing it to respond by growing roots downward and shoots upward.

* Concept of homeostasis and its basic working mechanism.
* Thermoregulation in ectotherms and endotherms.
* Definition of digestion and types of digestion – extra and intracellular.
* Digestion of Carbohydrates, proteins, lipids and cellulose digestion.
* Absorption and assimilation of digested food materials.
* Gastrointestinal hormones – control of digestion.
* Open and closed circulation.
* Structure of mammalian heart and its working mechanism – Heartbeat and cardiac cycle. Myogenic and neurogenic hearts.
* Definition of excretion.
* Forms of nitrogenous waste material and their formation: classification of animals

on the basis of excretory products.

* Nature of nerve impulse – resting potential and action potential. Properties of nerve impulse – threshold value, refractory period, all or none response.
* Conduction of nerve impulse along an axon
* Structure of synapse, mechanism of synaptic transmission – electrical and chemical transmissions.
* Relationship between hypothalamus and pituitary gland.
* Hormones of hypothalamus.
* Hormones of Adenohypophysis and Neurohypophsis.
* Hormones of pineal gland, thyroid gland, parathyroid, thymus, adrenal and pancrease
* Endocrine control of mammalian reproduction – Male and female hormones.
* Hormonal control of menstrual cycle in humans
* Physiology of urine formation.
* Structure and function of Nephron – Counter current mechanism.
* Gross organization of mammalian excretory system and structure of kidney.
* Structure of nerve cell.