TELANGANA UNIVERSITY
S.S.R. DEGREE COLLEGE, NIZAMABAD (C.C:5029)
MSC (BOTANY) IV SEMESTER INTERNAL ASSESSMENT-I EXAMINATIONS
PHYSIOLOGY AND MOLECULAR BIOLOGY OF NITROGEN FIXATION
QUESTION BANK

I. Multiple Choice Questions. **10X1/2=5**

1. Chemical nature of Nod factors is (c)
   a) Lipoproteins b) Oligosaccharides c) Lipochitooligosaccharides d) Oligopeptides
2. Site for N2 reduction in nitrogen fixing enzyme is present in (d)
   a) Dinitrogenase reductase b) P Cluster of dinitrogenase
   c) M Cluster of dinitrogenase d) O side chain of serine from the peptide backbone of P cluster
3. An aquatic fern that performs nitrogen fixation is (b)
   a) Nostoc b) Azolla c) Salvinia d) Salvia
4. Nitrogen is absorbed by plants as (d)
   a) Nitrates b) Ammonium c) Nitrites d) All of these
5. Which crop is helpful in nitrogen fixation (d)
   a) beans b) peanuts c) soya beanss d) All of these
6. Nitrate uptake into roots of the plants from soil is facilitated by (d)
   a) Uniporters b) $2H+/NO_{3-}$ symporters
   c) $2H+/NO_{3-}$ antiporters d) Nitrate transporters belonging to chloride channel family
7. N2 fixed by bacteroids is released in the cytosol of the infected cell as (c)
   a) NH3 b) NH4+ c) Glutamine d) Ammonia
8. Which of the following is required for the action of the nitrogenase enzyme (b)
   a) Light b) High input of energy c) Super oxygen radicals d) Mn^{2+}
9. Enzyme responsible for N_2 fixation is (a)
   a) Nitrogenase b) Nitrate reductase c) Nitrite reducatase
   d) All of these
10. Cells where nitrogen fixation takes place in Nostoc are known as (b)
    a) Hormogonia b) Heterocysts c) Akinetes d) Nodules
11. During symbiotic Nitrogen fixation how many moles of ATP are required to fix one mole of nitrogen (d)
    a)12 b)20 c)6 d)16
12. Oxygen is not produced during photosynthesis by (a)
    a) Green sulphur bacteria b) Nostoc c) Chara d)None of these
13. Leghaemoglobin is present in the root nodules of legumes what is the function of leghaemoglobin (a)
    a)Oxygen removal b) Inhibition of nitrogenase activity
    c)Expression of nif gene d) Helmonts process

14. Industrial N2 fixation is carried out by (c)

a) Friedal crafts reaction b) Helmonts process

c) Haber process d) None of the these

15. What is the primary source of nitrogen for most plants (b)

a)Atmospheric Nitrogen (N_2) b) Soil nitrate (No_3)

c) Ammonia (NH_3) d) Organic matter

16. Which of the following is a benefit of nitrogen fixation (c)

a) Increased soil acidity b) Reduced soil fertility

c) Improved plant growth d) Decreased water usage

17. What is the primary site of N2 fixation in legume plants (a)

a) Roots, b) Stems c) leaves d)Flowers

18. What is the role of haemoglobin in N_2 fixing nodules (b)

a) To fix nitrogen b) To regulate oxygen levels

c)To produce ATP d) To synthesize amino acids

19. Which of the following plants is not a legume but has nitrogen fixing abilities (d)

a) Alfallfa b) soyabean c)Pea d) Alder

20. What is the term for the symbiotic relationship between fungi and plant roots that can enhance nitrogen uptake (a)

a)Mycorrhizae b) Nodulation c)N_2 Fixation d) Symbiosis

II. Fill in the Blanks. **10X1/2=5**

1. Plants are able to absorb nitrogen from the soil as **Nitrate, ammonia**
2. Absorption of **Nitrate (No_3)** ions is facilitated by the receptors present on plasma membrane of the root cells
3. Nitrogen is the main constituent of **proteins & nucleic acids**
4. Molecular nitrogen present in the air can be fixed by some of the prokaryotes, which are called **Diazotrophs**
5. Effective symbiosis is established in the form of **nodules** due to the involvement of both rhizobial and host genes
6. Nitrogen-fixing genes of the bacteria, i.e., **nif** are involved in the synthesis of **Nitrogen**
7. 80–90% of the nitrogen available to the plants originates through **Biological N_2 fixation**
8. Alnus, Casuarina, Ceanothus, and many other species are known as **Actinorhizal** plants
9. Nitrogen-fixing bacteria colonize in the **Xylem** in the stem tissues of sugarcane
10. The **Rhizobium** includes species of Azorhizobium, Bradyrhizobium, Mesorhizobium, Rhizobium,and Sinorhizobium
11. Nitrogen is a **inert, odourless, colorless gas.**
12. Nitrogen is **fourth** abundant nutrient element in plants.

13. The process of converting nitrogen into ammonia is called **ammonification.**
14. Amino acids are building blocks of **proteins.**
15. Nitrosomonas and nitrobacter are the examples of **nitrifying** bacteria.
16. Leghaemoglobin is **a pinkish/ reddish pigment.**
17. Nitrogenase enzyme works efficiently under **anaerobic** conditions.
18. **Nickel (Ni)** is an essential component of urease.
19. The higher concentration of ammonia is called **ammonia effect.**
20. The oxides of nitrogen are **nitrate (no_3), nitrite (no_2)**

III.Answer the following questions. **5X2=10**

1. List the genes controlling nitrogen fixation?

A. There are three classes of genes controlling N2 fixation they are nod genes, nif geness fix genes

2. Give one example each of free ling and symbiotic nitrogen fixing organisms, together with their host?

A. Free living:- Azotobacter (Host - None (freeliving),
Symbiotic :- Rhizobium (Host - Legume)

3. List only the essential requirements for biological nitrogen fixation?

A. Nitrogenase is the enzyme that catalyses the conversion of molecular N_2 to NH_3, abundant supply of ATP

4. In which form is the fixed nitrogen transported from the root cells to different parts of the plant?

A. In the form of amino acids particularly glutamine and asparagines or as No_3 or NH_3

5. Which element plays a key role in the nitrogen fixation?

A. Molybdenum (MO) plays a key role in N_2 fixation

6. What is transamination ?

A. A chemical reaction that involves the transfer an amino group ($-NH_2$) from an amino acid to a keto acid, resulting in the formation of a new amino acid.

7. What is GS – GOGAT pathway ?

A. This pathway is a crucial mechanism for nitrogen assimilation in plants and some organisms.

8. What are the two enzymes that are involved in GS GOGAT pathway?

A. GS – Glutamine synthetase
GOGAT – Glutamate synthase

9. What is Amidation ?

A. A chemical reaction that involves the formation of an amide bond between a carboxylic acid and an amine

10. Why nitrogen fixation is necessary ?

A. It is important for agriculture, ecosystem and plant growth.