TELANGANA UNIVERSITY
S.S.R. DEGREE COLLEGE, NIZAMABAD (C.C:5029)
IV SEMESTER INTERNAL ASSESSMENT-II EXAMINATIONS
DEPARTMENT OF BOTANY
Physiology and molecular Biology of Nitrogen Fixation
QUESTION BANK

I. Multiple choice questions **10 X ½= 5 Marks**

1. The Primary enzyme responsible for nitrogen fixation (**A**)
   A. Nitrogenase B. Gibberellin
   C. Glutamine synthetase D. Glutamine dehydrogenase

2. Which gene cluster is responsible for nitrogen fixation in rhizobia (**D**)
   A. Nif genes B. Fix genes C. nod genes D. Both A and B

3. The Primary function of nif genes in Klebsiella Pneumoniae (**B**)
   A. To fix Co_2 B.To fix N_2 C.To Produce auxins D. None

4. Which of the following nif genes encodes for the Fe Protein component of nitrogenase (**C**)
   A. nif D B. nif K C. nif H D. nif E

5. Which of the following is a key regulator of nif gene expression in rhizobia (**A**)
   A. nif A B. nod D C. fix L D. fix J

6. Which of the following is a Key nod gene in rhizobia (**B**)
   A. nif H B. nod A C. fix L D. fix J

7. What is the first stable product of Nitrogen fixation in the root nodules of leguminous plants (**C**)
   A. Glutamate B.No_3 C. Ammonia D. No_2

8. The element plays a Key role in the Nitrogen fixation (**B**)
   A. Manganese B. Molybdenum C. Zinc D) Copper

9. In which year did R.A. Dixon transfer nif genes of K. pneumoniae in to E. coli (**B**)
   A.1970 B. 1972 C.1974 D. 1976

10. Nitrite reductase in plant cells is specifically dependent on which electron donor for its activity (**C**)

    A. NADH B. NADPH C. Ferredoxin D. FAD

11. Heterocyst from cyanobacteria contains enzyme (**C**)
    A. Pectinase B. Cellulase C. Nitrogenase D. Phosphorylase

12. Which enzyme is responsible for recycling hydrogen gas produced during nitrogen fixation (**B**)
    A. Nitrogenase B. Hydrogenase
    C. Nitrite reductase D. Nitrate reductase

13. Which of the following is an effect of hydrogenase activity on nitrogen fixation (**C**)
    A. Increased energy expenditure B. Increased h_2 release
    C. Reduced energy loss D. Decreased ammonia production

14. What is the role of nod genes in rhizobia (**B**)
    A. N_2 fixation B. Nodulation C. Plant defense D. Stress response

15. The Primary benefit of using legumes in crop rotation (**B**)
    A. Increased pest resistance B. Improved soil fertility
    C. Enhanced drought tolerance D. Reduced soil Erosion

16. The following crop is known for its nitrogen fixing ability (**B**)
    A. Wheat B. Soybean C. Corn D. Rice

17. The atmosphere is composed of approximately _____% of nitrogen (**C**)
    A. 80% B. 79% C. 78% D. 60%

18. The atomic number of Nitrogen is (**B**)
    A. 5 B. 7 C. 6 D. 8

19. The electronic configuration of nitrogen is (**B**)
    A. [He] $2S^2 2p^4$ B. [He]$2S^2 2P^3$ C. [He]$2S^2 2P^5$ D. [He]$2S^2 2P^2$

20. How many molecules of ATP are required to fix one molecule of nitrogen (**D**)
    A. 12 B. 20 C. 6 D. 16

II. Fill in the Blanks **10 X ½ = 5 Marks**

1. Klebsiella pneumonia is **Gram negative** bacteria
2. The nif genes cluster in Klebsiella pneumonia consists **20** nif genes
3. Nif genes means **Genes responsible for N_2 fixation**
4. **Nif D** nif gene encodes for the MoFe protein component of nitrogenase
5. Rhizobia live in **legume** root nodules.
6. Nod A, nod B, nod C are the examples of **nod** genes
7. Nodulation enhances **Soil fertility**
8. Hydrogenase produce **H2** as a byproduct of metabolism

9. Hydrogenases are Sensitive to **Oxygen**

10. Hydrogenases can be used to produce H2 for **biofuels**

11. Some strains of rhizobium carry the **hup gene cluster** which encodes uptake hydrogenase.

12. Growing legumes along side **non legumes** promotes N2 sharing and improves overall soil fertility

13. Nitrogen fixing bacteria in pea is **Rhizobium leguminosarum**

14. Nitrogen fixing bacteria in soybean is **Bradyrhizobium japonicum**

15. The scientific name of soybean is **Glycine max**

16. The scientific name of pea is **Pisum sativum**

17. Oryza sativa is **non legume** plant

18. **Liquid nitrogen** is used as a refrigerant

19. Nitrogen is a **diatomic** molecule

20. The steps involved in nitrogen cycle are **N2 fixation, Nitrification, Ammonification denitrification**

III. One word answers 5X 1 = 5 Marks

1. What is nitrogen fixation ?

A. The conversion of atmospheric nitrogen into usable compounds such as No3, No2, &NH3.

2. What is nodulation ?

A. Nodulation is the process by which nitrogen fixing bacteria form nodules on the roots of leguminous plants.

3. Write the examples of leguminous plants ?

A. Peas, beans, cloves, soybean

4. Write the examples of non leguminous plants ?

A. Alder, casuarina, cycas.

5. What are the nif genes in klebsiella pneumonia ?

A. nif H, nif D, nif K, nif L, nif U, nif S

6. What are the nif genes in rhizobia ?

A. nif B, nif E, nif N, nif A.

7. What are the agricultural applications of N2 fixation ?

A. Cuts input costs for farmers
enhances soil health
Supports organic & eco friendly farming

8. What is Genetic Engineering ?

A. The direct manipulation of an organisms DNA using biotechnology.

9. What is the full form of CRISPR ?

A. Clustered Regularly Interspaced Short Palindromic Repeats.

10. What is Cas 9 ?

A. CRISPR associated protein 9 an enzyme that acts like molecular scissors to cut DNA.

IV. Assignment **1X 5 =5 Marks**