

[This question paper contains 4 printed pages.]

Your Roll No.....

Sr. No. of Question Paper : 7911

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Unique Paper Code : 2163010024

Name of the Paper : PLANT STRESS BIOLOGY

Name of the Course : **Botany**

Semester : VIII

Duration : 2 Hours

Maximum Marks : 60

Instructions for Candidates

1. Write your Roll No- on the top immediately on receipt of this question paper.
2. Attempt **FOUR** questions in all. All questions carry equal marks.
3. All parts of questions must be attempted together.
4. Question No. 1 is compulsory.
5. Draw well labelled diagrams wherever necessary.

Q1. (a) Fill in the blanks (any five):

5 x 1 = 5 marks

- i. Soil containing high Na_2CO_3 and high sodium absorption ratio due to low $[\text{Mg}^{++}]$ and $[\text{Ca}^{++}]$ known as
- ii. The process by which plants accumulate low-molecular-weight organic compounds to maintain osmotic balance under stress is called
- iii. _____ is a compatible solute synthesized from glutamate and is particularly accumulated under drought and salinity stress.

P.T.O.

- iv. Under drought stress, stomatal closure is primarily mediated by the phytohormone _____.
- v. _____ are low-molecular-weight proteins induced by pathogen attack that include chitinases, glucanases, and thaumatin-like proteins.
- vi. The protection of a host against a wide range of pathogens is known as the _____ resistance.

(b) Expand the following (any five):

5 x 1 = 5 marks

- i. POD
- ii. PUFA
- iii. SOS
- iv. HR
- v. PR proteins
- vi. CDPK

(c) Define the following (any five):

5 x 1 = 5 marks

- i. Phenotypic plasticity
- ii. Phytoalexins
- iii. Osmolytes
- iv. Aquaporins
- v. Herbivory
- vi. Allelopathy

Q2. Differentiate between the following (**any three**):

3 x 5= 15 marks

- i. Abiotic and biotic stress
- ii. Pattern-triggered immunity and effector-triggered immunity
- iii. LEA proteins and HSPs
- iv. Mutation breeding and protected cultivation

Q3. Write short notes (**any three**):

3 x 5= 15 marks

- i. Ion homeostasis
- ii. Systemic acquired resistance (SAR)
- iii. Role of NO in stress signalling
- iv. Stress-tolerant genetically engineered plants

Q4. (a) Discuss the physiological and biochemical responses of plants to drought stress. 8 marks

(b) What are antioxidant enzymes? Discuss their role in plant stress tolerance. 7 marks

Q5. (a) What are reactive oxygen species (ROS)? Explain their role in plant stress biology.

7 marks

(b) What are secondary metabolites? Discuss the role of any one class of secondary metabolites in tolerance against environmental stress.

8 marks

Q6. (a) Discuss in detail the role of Absciscic Acid (ABA) in stomatal regulation and how it mediates drought tolerance. 8 marks

(b) What are calcium-binding proteins? Explain calcium-mediated stress signalling responses in plants? 7 marks