

**M.Sc. (BIOTECHNOLOGY) SEMESTER II,
ONLINE EXAMINATION, AUGUST 2021
PAPER CODE - MBT-CC202**

PAPER TITLE: MOLECULAR PLANT PHYSIOLOGY

Time: Three Hours

Maximum Marks: 75

Attempt all questions. Use only A4 sheets. All parts of a question must be attempted in continuation. Start answer of a fresh question on a new page. Cite examples and draw labelled diagrams wherever necessary.

Question No. 1:

A) Choose the correct answer:

[1 x 5 = 5]

- 1) What is the source of Oxygen evolved during photosynthesis?
 - a) CO_2
 - b) H_2O
 - c) $\text{C}_6\text{H}_{12}\text{O}_6$
 - d) All of the above
- 2) How many ATP and NADPH_2 are formed during the activity of PSI and PSII simultaneously?
 - a) $3\text{ATP} + 2\text{NADPH}_2$
 - b) $2\text{NADPH}_2 + 2\text{ATP}$
 - c) $2\text{ATP} + \text{NADPH}_2$
 - d) $\text{NADPH}_2 + 3\text{ATP}$
- 3) How many NADPH_2 and ATP molecules are needed to fix three molecules of CO_2 ?
 - a) $6\text{ATP} + 9\text{NADPH}_2$
 - b) $9\text{ATP} + 6\text{NADPH}_2$
 - c) $3\text{ATP} + 3\text{NADPH}_2$
 - d) $4\text{ATP} + 9\text{NADPH}_2$
- 4) In which of the following light conditions, the rate of photosynthesis is maximum?
 - a) When plants are exposed to monochromatic light of 680nm.
 - b) When plants are exposed to monochromatic light of 700nm.
 - c) When plants are exposed to monochromatic light of both 680nm and 700nm simultaneously
 - d) None of the above
- 5) How many extra ATP molecules are needed to fix CO_2 through C_4 -mode of CO_2 fixation?
 - a) One ATP
 - b) Two ATP
 - c) Three ATP
 - d) None of the Above

B) Write True (T) or False (F) for the following statements: [1 × 5 = 5]

- a) Legumes are capable of reducing atmospheric nitrogen into NH_4^+ through symbiotic nitrogen fixation involving rhizobial species.
- b) Ethylene and abscisic acids are not stress hormones
- c) Fruit ripening could not be delayed by inhibiting polygalacturonase and pectin methyltransferase activity.
- d) Methallothioneins and phytochelatins protect plants from heavy metal stress
- e) Seed dormancy could not be broken by vernalization.

C) Fill in the Blanks of following sentences: [1 × 5 = 5]

- a) In cyanide resistant respiration, _____ ATP _____ produced and it is the characteristic of arum lily flowers.
- b) In photorespiration, glycine is _____ and _____ to yield $\text{NADH} + \text{H}^+$ and CO_2 .
- c) Energy in the form of _____ is utilized by _____ for its activity.
- d) The compatible solute _____ protects plants from _____ stress.
- e) Nitrogen reductase catalyzes the reduction of _____ into _____.

Question No. 2:

A) Answer briefly any TWO of the following questions: [7.5 × 2 = 15]

- i. C_3 -Pathway of CO_2 fixation with C_4 - pathway.
- ii. Reductive pentose phosphate pathway with Oxidative pentose phosphate pathway.
- iii. Photorespiration with photoinhibition.

OR

B) Answer briefly any TWO of the following questions: [7.5 × 2 = 15]

- i. What is cyanide resistant respiration? What is its physiological significance?
- ii. What is CAM mechanism of CO_2 fixation? Why it is exhibited by desert plants?
- iii. Which form of the sugar is transported in plants? What is the mechanism of its biosynthesis?

Question No. 3:

A) Briefly discuss any TWO of the following: [7.5 × 2 = 15]

- i. Criteria of essentiality of mineral nutrients and their uptake by plants from soil.
- ii. The transport of ions across the cell membrane.

iii. Sulphur assimilation in plants.

OR

B) Compare any TWO of the following:

[7.5 × 2 = 15]

- i. Active uptake from passive uptake
- ii. Symbiotic nitrogen fixation from asymbiotic nitrogen fixation
- iii. Inorganic nitrogen assimilation from biological nitrogen fixation.

Question No. 4:

A) Attempt any TWO of the following:

[7.5 × 2 = 15]

- i. Briefly discuss the biosynthesis and physiological role of gibberellic acid in plants using well labelled diagram.
- ii. What is cryptochrome? What is its function in plants?
- iii. What is vernalization? Briefly discuss its role in seed dormancy.

OR

B) Attempt any TWO of the following:

[7.5 × 2 = 15]

- i. What is the role of cytokinin in plants? Using well labelled diagram, briefly describe its biosynthesis.
- ii. Which plant hormone is involved in drought stress and senescence? Briefly discuss its mode of actions in these physiological phenomena.
- iii. Briefly discuss the structure and function of phytochrome in flowering.

Question No. 5:

A) Write short notes on any THREE of the following:

[5 × 3 = 15]

- i. Molecular chaperons and their role in plants exposed to thermal stress.
- ii. Metallothionins and their role in plants exposed to heavy metal stress.
- iii. Role of SOS pathway in salt tolerance of plants.
- iv. The molecular mechanism of fruit ripening and development of tomato variety with improved shelf life.

OR

A) Write short notes on any THREE of the following:

[5 × 3 = 15]

- i. Heat shock factor (HSF) and its role in the synthesis of heat shock proteins.
- ii. Molecular basis of drought tolerance in plants.
- iii. LEA proteins and their role in osmotic stress tolerance of plants.
- iv. Role of desaturation of fatty acids in protecting plasma membrane from the damage by chilling injury.

It should be noted that 60 minutes extra time will be provided to scan your answer sheets, build a PDF and upload it to biotechnologyexam2020@gmail.com

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