PSG COLLEGE OF ARTS & SCIENCE
(AUTONOMOUS)

BSc DEGREE EXAMINATION MAY 2025
(Sixth Semester)

Branch – **BIOCHEMISTRY**

PLANT BIOCHEMISTRY

Time: Three Hours Maximum: 50 Marks

SECTION-A (5 Marks)
Answer **ALL** questions
ALL questions carry **EQUAL** marks (5 x 1 = 5)

1 Find the enzyme responsible for carbon fixation in the Calvin cycle
(i) ATP synthase (ii) Hexokinase
(iii) RuBisCO (iv) NADP reductase

2 Pick out the compound that is initially formed during photorespiration in chloroplasts:
(i) 3-phosphoglycerate (ii) Glycolate
(iii) Oxaloacetate (iv) Pyruvate

3 Choose the term for the conversion of sulfate (SO_4^{2-}) to hydrogen sulfide (H_2S):
(i) Sulfate reduction (ii) Sulfur oxidation
(iii) Sulfur fixation (iv) Sulfation

4 Which hormone is responsible for promoting flowering in long-day plants?
i) Auxin (ii) Ethylene
(iii) Cytokinin (iv) Gibberellin

5 Where does the breakdown of chlorophyll primarily occur during senescence?
(i) In root cells (ii) In leaf chloroplasts
(iii) In stem tissues (iv) In flowers

SECTION - B (15 Marks)
Answer **ALL** Questions
ALL Questions Carry **EQUAL** Marks (5 x 3 = 15)

6 a Bring out the significance of photosynthetic pigments in capturing light energy and initiating the light reaction.

OR

b Explain how environmental factors such as light intensity, temperature, and CO_2 concentration affect photosynthetic efficiency.

7 a State the steps involved in the Photosynthetic Carbon Reduction (PCR) cycle. How do they contribute to the fixation of carbon in plants?

OR

b Classify the key enzymes involved in the synthesis and degradation of sucrose and starch.

8 a Elaborate on the different types of nitrogenases and compare their roles in nitrogen fixation.

OR

b State the nutrient role of sulfur in plants and its involvement in synthesizing amino acids like cysteine and methionine.

Cont...

9 a Summarise the physiological effects of Abscisic Acid during drought stress and its role in maintaining plant homeostasis.

OR

b Point out the different types of gibberellins and describe their respective physiological effects.

10 a Narrate the biological processes that are altered when dormancy is broken in seeds.

OR

b Classify the types of seeds that exhibit epigeal and hypogeal germination. Support your Answer with examples.

SECTION -C (30 Marks)

Answer **ALL** questions

ALL questions carry **EQUAL** Marks (5 x 6 = 30)

11 a Compare Photosystem I and Photosystem II in terms of structure, function, and electron flow.

OR

b Point out the differences between photophosphorylation and oxidative phosphorylation.

12 a Compare and contrast photorespiration and the Calvin cycle. What are the biochemical consequences of photorespiration, and why is it considered wasteful for plants? How does it affect the overall efficiency of photosynthesis?

OR

b Select one plant species that uses the CAM pathway. Trace how the plant fixes carbon at night and stores it in the form of organic acids, and explain how it uses this stored carbon during the day.

13 a Discover the biochemical pathway involved in converting nitrate to ammonium in plants. What enzymes are involved, and what are their respective roles?

OR

b Summarize the sulfur cycle, focusing on sulfur's role in plant nutrition and how it is cycled through the ecosystem.

14 a Compare the physiological effects of auxin and gibberellin on seed germination.

OR

b Categorize the major physiological roles of Cytokinins in plants, and provide examples of how Cytokinins influence cell division and organogenesis.

15 a Elaborate the role of different light receptors in photomorphogenesis, and infer how plants respond to light signals during growth and development.

OR

b Outline the process of senescence in plants, highlighting the metabolic pathways that lead to the degradation of chlorophyll and other cellular components.

Z-Z-Z END