2020

BOTANY — HONOURS

Fifth Paper

Full Marks : 100

The figures in the margin indicate full marks.

Candidates are required to give their answers in their own words as far as practicable.

Group – A

1. Answer the following in few words :

(a) What is P/O ratio? 1

(b) What do you mean by soil-plant-atmosphere-continuum (SPAC)? 2

(c) What is osmotic potential? Mention its components. 2

(d) Give the chemical structure of IAA. 2

(e) Write down the specific reaction of glycolysis which is oxidative in nature. 2

(f) What is scarification? 1

2. Answer ***any one*** of the following : 10

(a) Briefly describe the role of blue light in stomatal movement.

(b) Discuss the role of GS and GOGAT in ammonia assimilation.

(c) Describe how PSI and PSII cooperate in producing NADPH and ATP in the light reaction of photosynthesis.

(d) Briefly describe the process of phloem loading and unloading with illustrations.

3. Answer ***any one*** of the following :

(a) Why photorespiration is also called peroxisomal respiration? Diagrammatically represent the actual site of synthesis, oxidation and decarboxylation of the photorespiratory substrate with their enzymes. Is the process totally wasteful to plants? — Explain with reason. 4+20+6

(b) Define stress. What is an osmolyte? Discuss various mechanisms present in plants to overcome water stress. What is the difference between Eu-halophytes and halophytic plants? 2+3+20+5

(c) Write notes on : 10×3

(i) Role of ethylene in fruit ripening

(ii) Role of GA in α-amylase production in aleurone cells

(iii) Role of brassinosteroids as plant growth regulator.

(d) Why oxidative pentose phosphate pathway is called a shunt pathway? Schematically describe the pathway giving structures of substrates, products and name the enzymes involved in each step. Mention the significance of this pathway. 4+20+6

Group – B

4. Answer the following in few words :

(a) What are the uncommon bases in DNA and RNA? 2

(b) Define Gibb's free energy. 2

(c) What are Zwitterious? 1

(d) Write down the chemical structure of a pyrimidine nitrogen base. 2

(e) Name an amino acid that lacks a chiral centre. 1

(f) Distinguish between lyase and hydrolase type of enzymes. 2

5. Answer ***any one*** of the following :

(a) Point out the differences between aldose sugar and a ketose sugar with example. What is stereoisomerism? 6+4

(b) Calculate the V_{max} of an enzymatic reaction from the following data using Michaelis-Menten equation : 10

$$K_m = 3.0\ m\ \text{mol}\ L^{-1}$$
$$[S_o] = 1.0\ m\ \text{mol}\ L^{-1}$$
$$V_o = 70\ \mu\ \text{mol}\ L^{-1}\ \text{min}^{-1}$$

(c) Write down the biochemical reactions of β-oxidation. 10

(d) What is redox potential? Explain it with the help of electrochemical gradient. 4+6

6. Write ***any one*** of the following :

(a) What are primary and higher order structures of protein? Write down the various structural levels of proteins indicating the chemical bonds involved in protein folding. How are the two amino acids joined to form a peptide? What are essential and non-essential amino acids? 4+16+6+4

(b) What do you mean by phosphorylation? Distinguish between photophosphorylation and oxidative phosphorylation. In the light of chemiosmotic model describe in brief the mechanism of ATP synthesis in mitochondria. 2+8+20

(c) Mention the source plants, parts used and uses of the following pharmacologically active compounds : Reserpine, Strychnine, Curcuminoids, Catechin and Diosgenin. 6×5

(d) Write short notes on : 10×3

(i) Importance of flavoonoids in the defense of plants against pathogenic microbes and herbivores.

(ii) Biological evaluation of drugs.

(iii) Give an outline of interrelationship of basic metabolic pathways with secondary metabolite biosynthesis.

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