BOTANY – PAPER-II

Time Allowed : 3 Hours

Full Marks : 200

If the questions attempted are in excess of the prescribed number, only the questions attempted first up to the prescribed number shall be valued and the remaining ones ignored.

Answers may be written either in English or in Bengali or in Nepali but all answers must be in one and the same language

ANSWER ANY FIVE QUESTIONS.

1. Answer any four :-

a) Write Short answer - 2x5

i) Under what circumstances R.Q. of plant tissue may become zero and infinity.

ii) What is Emerson effect ?

iii) Why is CO_2 compensation point low in C_4 plants ?

iv) What is Hill reaction ?

v) At which specific step does molecular oxygen participate in aerobic respiration ?

b) Explain the role of the followings :- 5x2

i) Phytochrome in flowering.

ii) Auxin in phototropism.

c) Distinguish between :- 5x2

i) Z DNA and B DNA

ii) Translocation and Inversion.

d) What is meant by genetic code ? Establish that genetic code is Universal and non overlapping. 3+3+4

e) i) Mention the similarities and dissimilarities between CAM and C_4 plants.

ii) Describe the Organic acid metabolic pathway in CAM plants. 4+6

2. Answer any four :-

a) i) How many oxidative reactions take place in photorespiration ? What are the sites, substrates, enzymes and products of these oxidative reactions.

ii) What are phospholipids ? Where do they occur in plants ? Give example each of saturated and unsaturated fatty acids. 5+5

b) i) What is Operon ? Explain the regulatory mechanism of Lac Operon in the presence of Lactose.

ii) What is transduction ? How does it help to establish that DNA is the genetic material. 5+5

c) What is G_0 phase ? Discuss its relationship with G_1 phase. Discuss the role of cyclin in cell cycle. 2+4+4

d) Write notes on the followings : 5x2

i) Semiconservative DNA replication.

ii) Epistasis.

e) i) Discuss the role of RNA polymerases in protein synthesis.

ii) Discuss different methods of germplasm maintenance. 5+5

3. Answer <u>any four</u> :-

a) i) How carotene differs from Xanthophyll ? Mention the biological significance of carotenoid pigments.

ii) Define free radicals citing examples. Mention the role of free radicals in plant metabolism. 5+5

b) A cross is made between a heterozygote ABC/abc and a recessive homozygote abc/abc. 1280 progeny were analysed, giving the result below. Determine the order of three genes A, B and C. Mention their distance and calculate the co-incidence and interference.

ABC	=	413	Abc	=	170
abc	=	426	aBC	=	161
ABc	=	6	AbC	=	47
abC	=	3	aBc	=	54

7+2+1

c) i) What is Somatic embryogenesis ? Discuss the importance of zygotic embryo culture.

ii) What are the common methods of transfer of genes in plants ? 5+5

d) i) Distinguish between cyclic and non cyclic photophosphorylation.

ii) Outline the Process of Synthesis of amino acids by Gs-GoGAT enzyme system. 3+7

e) Write short notes on :- 5x2

i) Use of DNA markers in plant breeding.

ii) Heterosis and hybrid seed production.

4. a) Write down the principles and applications of UV-Visible Spectrophotometry and deferential centrifugation. 5+5

b) i) Enumerate the structure and function of di-nitrogenase complex.

ii) 'The Calvin Cycle is autocatalytic in nature'. — explain. 5+5

c) i) Discuss the role of Ca^{2+} as second messenger with reference to signal transduction pathway.

ii) How Km value of an enzyme can be determined with the help of an equation of straight line. 5+5

d) i) What are crude drugs ? Write down the differences between primary and secondary metabolites. 2+3

ii) Give an outline of interrelationship of basic metabolic pathways with secondary metabolite biosynthesis. 5

e) Write short notes on : 5x2

i) Drug evaluation

ii) Importance of pharmacognosy in modern medicine.

5. a) i) Write down the geological or taxonomic evidences for organic evolution.

ii) Explain the concept of RNA world. 5+5

b) Distinguish between mass and pedigree selection methods used in plant breeding. Mention the most useful methods that are employed in plant breeding. 4+6

c) i) Name two bioreactive components of Ipecac sp. 2

ii) Write the species name, family and Order of the Ipecac plant from which the active components are isolated. 3

iii) Draw a flow chart for extraction procedure of bioactive components. 5

d) i) What is the Principle of Western blotting ?

ii) Explain (with diagram) the Working Principle of compound microscope. 3

iii) Differentiate between Southern and Northern blotting. 4

e) Distinguish between :- 3

i) Non competitive and Un competitive enzyme inhibition.

ii) Nitrification and Ammonification. 4

iii) Nif gene and Nod gene. 3

6. a) Write short notes on : 3

i) Nucleosome model of chromosome. 5x2

ii) Point mutation.

b) Enumerate the differences between fats and oils. Write a comprehensive note on the types of lipids available in plants. Distinguish between saturated and unsaturated fatty acids.

c) Write a brief note on : 2+6+2

i) Transgenic plants 5x2

ii) Micropropagation

d) Compare between <u>any two</u> :

i) Lyases and Ligases group of enzymes. 5x2

ii) Action spectrum and absorption spectrum.

iii) Glycolipid and phospholipid.

e) Explain —— 5x2

i) 'In aerobic organisms, the Citric acid cycle is an amphibolic pathway'.

ii) 'Photorespiration also called peroxisomal respiration'.

7. a) i) A test cross between F_1 (C_c S_s) corn heterozygous for colour and full endosperm with a corn homozygous and recessive for colourless shrunken, show the following result ——

Colour full -- 4032	Colourless full -- 152
Colour shrunken - 149	Colourless Shrunken - 4035

Are these two genes for colour and shape of the endosperm present in same or different chromosome ? Show the map distance between the 2 (two) genes. 5

ii) Describe allopolyploidy. 5

b) Describe briefly —— 5x2

i) Protin sequence databases.

ii) Maintenance of germplasm.

c) i) Classify Enzymes according to IUBMB. 5

ii) Comment on allosteric enzyme regulation. 5

d) i) Name 2 (two) plant oncogenes and state their functions. 4

ii) What are the meiotic consequence of translocation ? 3

iii) Define 'split gene'. 3

e) Write the principles of the following : 2½x4

i) Electron microscopy.

ii) Colarimetry.

iii) RT - PCR

iv) ELISA