

2022

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 given either in **English** or in **Bengali** or in **Nepali** but all answers must be in one and the same language.*

Answer any five questions.

40×5=200

1. Answer any four from the following:

(a) Describe in brief:

(i) Principles of enzyme action (Fishers and Koshland model)

(ii) Michaelis-Menten equation of enzyme Kinetics

(iii) Allosteric enzyme regulation

4+3+3=10

(b) Distinguish between:

(i) Functions of Ethylene and Absciscic acid

(ii) Symbiotic and non-symbiotic N₂-fixation

(iii) DNA and c-DNA

3+4+3=10

(c) Answer in brief:

(i) Sex-linked inheritance

(ii) Application of R-DNA technology and its social ethics

(iii) Oxidative Pentose-Phosphate Pathway

3+3+4=10

(d) Explain with diagram:

(i) C₄-pathway and crop productivity

(ii) Semiconservative replication of DNA

(iii) Maintenance of germplasm

4+3+3=10

(e) Justify:

(i) Triplet nature of genetic code

(ii) Asymmetric structure of plasma membrane

(iii) Pericentric inversion

4+3+3=10

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2. Answer *any four* from the following:

- (a) Write short notes on: 5×2=10
- (i) Restriction enzymes
 - (ii) ELISA
- (b) Explain:
- (i) Universal nature of genetic code
 - (ii) Stress physiology 5+5=10
- (c) Compare:
- (i) *nif* gene and *nod* gene
 - (ii) Mass selection and pure line selection
 - (iii) Allosteric and covalently modulated enzyme regulation 3+3+4=10
- (d) What are *phytochromes*? Discuss the various roles of phytochromes in flowering and plant growth. 2+4+4=10
- (e) (i) Describe the structure and functions of endoplasmic reticulum.
- (ii) Discuss the origin of allopolyploids and their importance. (3+2)+(4+1)=10

3. Answer *any four* from the following:

- (a) Describe only with diagram/flow chart:
- (i) Opening and closing mechanism of stomata
 - (ii) TCA-cycle with enzymes 5+5=10
- (b) (i) Classification of enzymes according to IUBMB
- (ii) Describe the process of biosynthesis of cytokinin. 5+5=10
- (c) Compare the following:
- (i) Compound and electron microscopy
 - (ii) Linkage and crossing-over 5+5=10
- (d) Discuss in brief:
- (i) Photoperiodism and plant types
 - (ii) Prokaryotic cellular types 5+5=10
- (e) Write a brief account of Darwinism and mutation theory of de Vries. 7+3=10

4. Answer *any four* from the following: 10×4=40

- (a) Explain in brief:
 - (i) Hybridization technique
 - (ii) Hardy-Weinberg equilibrium 5+5=10
- (b) Define with example—holoenzyme, apoenzyme, co-factor, co-enzyme and prosthetic group. 2×5=10
- (c) Define blotting. Briefly discuss Southern, Northern and Western blotting. 1+9=10
- (d) Distinguish between:
 - (i) Mitotic and meiotic metaphase
 - (ii) Chromosomal mutation and gene mutation 5+5=10
- (e) (i) Role of bacteria as an alternative source of Nitrogen fertilizer
- (ii) Cell cycle control 5+5=10

5. Answer *any four* from the following: 10×4=40

- (a) Write notes on:
 - (i) Nucleosome model
 - (ii) Structure and function of ribosome 5+5=10
- (b) Answer the following: 2×5=10
 - (i) Define ribozymes.
 - (ii) What technique is employed to separate isozymes?
 - (iii) Distinguish between DNA and RNA.
 - (iv) What are phospho-lipids? Where do they occur in plants?
 - (v) What bonds are associated with formation of protein structure?
- (c) Explain in brief:
 - (i) Ethylene as plant growth regulator
 - (ii) Z-scheme 5+5=10
- (d) Distinguish between C₃ and C₄ pathway. Cite examples of C₃ and C₄ plants. 8+2=10
- (e) Explain briefly with examples.
 - (i) Transgenic plants
 - (ii) PCR technique 5+5=10

6. Answer *any four* from the following: 10×4=40

(a) Define micropropagation with examples. Briefly discuss the different gene transfer methods. 4+6=10

(b) Distinguish between transcription and translation. Name the various types of RNA-polymerase with function. What is reverse transcriptase? 2+6+2=10

(c) Distinguish between: 2×5=10

(i) Split gene and overlapping gene

(ii) Anaphase Chromosome of Meiosis I and II

(iii) Omega 3 and Omega 6 fatty acids

(iv) Homeotic gene and Caretaker gene

(v) Auto and allopolyploids

(d) Write notes on:

(i) Techniques of sexual hybridization

(ii) Role of intercalating agents on DNA-mutation 5+5=10

(e) Find out mean, standard deviation, mean deviation, co-efficient of variation and standard error from the given sample:

<u>Class value</u>	<u>Frequency</u>	
48	8	
50	32	
52	75	
54	52	
56	28	
58	5	2×5=10

7. Answer *any four* from the following: 10×4=40

(a) (i) Briefly describe the Lac-operon concept.

(ii) Write a note on embryo culture and its importance. 5+5=10

(b) Define chromosomal aberration. Briefly discuss deletion, duplication, translocation and inversion. 2×5=10

(c) Describe the structure and function of dinitrogenase complex. Write a note on ETS of dinitrogenase. 6+4=10

(d) Write notes on:

(i) Visible and UV-visible spectrophotometry and its significance.

(ii) Biochemical reactions of 'Calvin's Cycle' and stoichiometry. 5+5=10

(e) Discuss the overdominance hypothesis of Heterosis. Give an outline of different techniques of Emasculation in hybridization. Write a note on cytoplasmic male sterility. 4+4+2=10