

2021

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 same language.

Answer any five questions.

40×5=200

1. Answer any four from the following:

(a) Describe in brief:

- (i) Check-points of cell-cycle
- (ii) ATP generation from TCA cycle
- (iii) Active principle and uses of *Adhatoda*

4+3+3=10

(b) Distinguish between:

- (i) Symbiotic and non-symbiotic nitrogen fixation
- (ii) Mass selection and pure-line selection
- (iii) Complete and incomplete linkage

3+4+3=10

(c) Answer in brief:

- (i) Explain the concept of RNA world.
- (ii) State the causes of heterosis.
- (iii) Describe the role of phytochrome in flower initiation.

3+4+3=10

(d) Explain with diagram:

- (i) Z-scheme
- (ii) Allosteric enzyme regulation
- (iii) Transcription in prokaryotes

4+3+3=10

(e) Justify:

- (i) In a region of high interference, we observe few double crossing-overs.
- (ii) Amino acids can be classified on the basis of their side chains.
- (iii) DNA markers can be used in plant breeding.

3+4+3=10

2. Answer any four from the following:

(a) Write short notes on:

5×2=10

- (i) Multiple alleles
- (ii) Chi-square test

- (b) Explain: 5+5=10
- (i) Degeneracy of genetic code
 - (ii) Physiology of senescence and ageing
- (c) Compare:
- (i) Triploidy and Trisomy
 - (ii) Zygotic and somatic embryogenesis
 - (iii) Photosynthetic efficiencies of C_3 and C_4 plants 4+3+3=10
- (d) Describe the biochemical reactions involved in β -oxidation of fatty acids. State the significance of the process. 8+2=10
- (e) (i) What are epimers? Cite example. State differences between D-glucose and d-glucose? 1+1+3=5
- (ii) Discuss origin of amphidiploids and their importance. 3+2=5

3. Answer *any four* from the following:

- (a) Describe only with diagram/flow chart:
- (i) Organization of chromatin to form a metaphase chromosome based on Nucleosome concept
 - (ii) EMP pathway 5+5=10
- (b) (i) Write the process of biosynthesis of IAA from tryptophan.
- (ii) Write a note on secondary structure of proteins. 5+5=10
- (c) Compare between:
- (i) B-form and Z-form of DNA
 - (ii) Euploids and aneuploids 5+5=10
- (d) Discuss in brief:
- (i) Cytoplasmic inheritance in plants
 - (ii) Ultra structure of mitochondria 5+5=10
- (e) Give an illustrated account of the different stages of Prophase I in meiosis. 10

4. Answer *any four* from the following:

- (a) Explain briefly: 5×2=10
- (i) R-DNA technology
 - (ii) Theories of heterosis.
- (b) Discuss the triplet-binding technique for deciphering genetic code. Explain Wobble hypothesis. 6+4=10
- (c) Explain Mendel's laws of inheritance. State the monohybrid and dihybrid test-cross ratios according to Mendel. 8+2=10

- (d) Distinguish between: 5×2=10
- (i) Transition and transversion
 - (ii) Competitive and non-competitive enzyme action
- (e) (i) Describe the importance of pharmacognosy in modern medicine.
- (ii) Explain the laws of probability. 5+5=10

5. Answer any four from the following:

- (a) Write notes on: 5×2=10
- (i) Nuclear pore complex
 - (ii) Structure of endoplasmic reticulum
- (b) Answer the following: 2×5=10
- (i) What do you mean by covalent and non-covalent bonds?
 - (ii) Why pH 7 is considered as neutral pH?
 - (iii) Name two metalloenzymes.
 - (iv) What is meant by a reducing sugar? Give an example.
 - (v) Define free-energy of a chemical reaction.
- (c) Explain in brief:
- (i) Mechanism of opening and closure of stoma
 - (ii) Photolysis of water 5+5=10
- (d) What are crude drugs? Describe different methods of microscopic and biological evaluation of drugs. 2+8=10
- (e) Distinguish between: 5×2=10
- (i) Oxygenase and oxidase
 - (ii) Deletion and duplication of chromosomes

6. Answer any four from the following:

- (a) What is a cloning vector? State the properties of an ideal cloning vector. Name two restriction endonucleases and their sources. 2+4+4=10
- (b) (i) According to height 200 jute plants can be grouped as follows:

Class Value (in cm)	Frequency
60	10
62	30
64	75
66	50
68	30
70	5

Calculate the mean height and standard deviation.

- (ii) State the principle and applications of electron microscopy. 5+5=10

- (c) What is primary seed dormancy? How does it differ from quiescence? What are the main causes of seed dormancy and bud dormancy? Describe briefly the methods of artificially breaking seed dormancy. 2+2+3+3=10
- (d) Distinguish between: 2×5=10
- (i) Codon and anticodon
 - (ii) Euchromatin and heterochromatin
 - (iii) Nucleotide and nucleoside
 - (iv) PCR and RT-PCR
 - (v) Variance and standard deviation
- (e) Write notes on:
- (i) Northern blotting technique
 - (ii) Anatomical evidences of organic evolution 5+5=10

7. Answer any four from the following:

- (a) (i) Draw the structures of purines and pyrimidine bases of nucleic acids.
(ii) Write a note on fine structure of genes. 5+5=10
- (b) (i) What are oncogenes?
(ii) What is meant by aminoacylation of t RNA?
(iii) State the steps of *Agrobacterium*-mediated gene transfer. 2+3+5=10
- (c) What is phloem loading and unloading? Describe the mechanism of translocation through phloem, with special reference to mass-flow hypothesis. 2+8=10
- (d) (i) Give an outline of interrelationship of basic metabolic pathways with secondary metabolite biosynthesis.
(ii) Describe, in brief, the role of ethylene in fruit ripening. 5+5=10
- (e) (i) Discuss the aseptic manipulations required in tissue culture laboratory.
(ii) In a population of 100 persons tested for their MN blood types, the genotypic data found were MM = 66, MN = 20, NN = 14, Prove that the population was in Hardy-Weinberg's equilibrium. 5+5=10