M.Sc. 4th Semester Examination, 2024

BOTANY

PAPER – BOT-403

Full Marks : 50

Time : 2 hours

Answer **all** questions

The figures in the right hand margin indicate marks

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

BOT— 403.A

(*Molecular Syatematics*)

GROUP – A

Answer any **four** questions from the following : 2×4

1. What is the full form of AFLP and NGS ?

2. Write the following DNA sequences from the chloroplast gene rbcL of five plant species :

   (*a*) Align the sequences. 1

   (*b*) Identify and explain any conserved and variable sites in the alignment. 1

   (*i*) Species A : ATGCGTACCGAT

   (*ii*) Species B : ATGCGTACCGTT

   (*iii*) Species C : ATGCGAACCGTT

   (*iv*) Species D : ATGCGAACCGAT

   (*v*) Species E : ATGCGTACCGAT

3. Name a true mangrove plant which has no vivipary. Mention the family name.

4. What is the actual length (bp) of mitochondrial DNA (mtDNA) in plants ?

5. Name two important insectivorous plants from South West Bengal with their family.

6. Define paraphyly and monophyly.

GROUP – B

Answer any **four** questions from the following : 4×4

7. Write down the differences between cladogram and phenogram.

8. Write down the differences between true and associated mangrove plants.

9. What is semantides ? Give their examples. What are the application of semantides in plant systematics ? $1 + 1 + 2$

10. Write down the differences between ITS-I and ITS-II.

11. Write the differences between clade and cladistics.

12. Write the differences between cryptic and keystone species.

GROUP – C

Answer any **two** questions from the following : 8×2

13. Define numerical taxonomy. What is Neo Adansonian taxonomy ? State its principle. Discuss the methods of this study. Justify the need of this study. Mention the merits and demerits of numerical taxonomy. $1 + 1 + 2 + 2 + 2$

14. Define molecular systematics. What are the molecular characters used in molecular systematics for solving taxonomic problems with two suitable examples. Mention the merits and demerits of molecular systematics. $2 + 2 + 2 + 2$

15. Define parasitic taxa. What are the basic differences between holo-and hemi-parasitic taxa with examples ? Mention their adaptive features of hemiparasitic taxa with examples. Name two common hemiparasitic taxa from South West Bengal. $2 + 2 + 2 + 2$

16. Define mangrove. How many mangrove taxa are in India ? Write an essay on Mangrove taxa their important features, adaptation and phylogeny with examples. 2 + 1 + 5

[Internal Assessment – 10 Marks]

BOT– 403.B

(*Plant Pathology*)

GROUP – A

Answer any **four** questions from the following : 2×4

1. What is the difference between sign and symptom ?

2. What is exclusion ?

3. Define syndrome.

4. Name the two main types of timber decay.

5. Mention causal organisms of bacterial wilt and root rot of Teak.

6. What is appressorium ?

GROUP – B

Write notes on any **four** of the following : 4×4

7. Pre-penetration stage

8. Powder-post beetles

9. Ti plasmid of *Agrobacterium tumefaciens*

10. Development of disease-resistant transgenic plants

11. Mycorrhiza and disease control.

12. Factors responsible for decay of timber.

GROUP – C

Answer any **two** of the following questions : 8×2

13. Describe general principles of plant disease control.

14. Discuss root rot of Sal and wilt of Sissoo. $4 + 4$

15. Write a note on meristem tip and protoplast culture. $4 + 4$

16. Comment on the origin and evolution of mycorrhiza.

[Internal Assessment – 10 Marks]

BOT– 403.C

(*Molecular Biology and Biotechnology*)

GROUP – A

Answer any **four** questions from the following : 2×4

1. What are splicing speckles ?

2. Name four proteins the C/D box snoRNAs remain associated with.

3. Explain the significance of the name 'C_0t analysis'.

4. How does the negative charge of DNA remain neutralized within the cell ?

5. Which plant cells are ideally chosen for protoplast isolation and why ?

6. Mention the principles of DNA microarray analysis.

GROUP – B

Answer any **four** questions from the following : 4×4

7. Write a brief note on suspension culture of plant cells and its utilities.

8. Illustrate the method of electroporation and its uses.

9. Give a brief account of snRNA and its functions.

10. What is Flow Cytometry ? Briefly describe the instrumentation associated with it. 1 + 3

11. Describe the procedure of preparing Synthetic seeds.

12. Briefly describe the Progeny selection method of breeding mentioning the objective of it.

GROUP – C

Answer any **two** questions from the following : 8 × 2

13. Illustrate the Diallele Selective Mating method of breeding stating its contribution. 6 + 2

14. What is a gene gun ? Briefly describe its structure and mode of its operation. 1 + 7

15. Briefly describe the method of isolation of plant protoplasts for culture. How is the viability of isolated protoplast determined ? Give a brief account of the procedure of somatic hybridization with isolated protoplasts. 2 + 2 + 4

16. Elucidate the different approaches of developing herbicide-resistant transgenic plants. 8

[Internal Assessment – 10 Marks]

BOT– 403.E

(*Microbiology : Applied*)

GROUP – A

Answer any **four** questions from the following : 2×4

1. What is acidophilus milk ? Name the micro-organisms used in its production.

2. What is triple vaccine ? Give example.

3. Mention one each applications of citric acid and glutamic acid.

4. Mention two microorganisms involved in the degradation of xenobiotics and petroleum.

5. Name two biopolymers with their source organisms.

6. What is probiotic ? Give an example.

GROUP – B

Answer any **four** questions from the following : 4×4

7. What is secondary sewage treatment ? Discuss any one of such treatment process.

8. Write down the process for ELISA.

9. Write down the process and microorganisms involved in bioleaching of copper.

10. Discuss different biofertilizers used in agriculture.

11. Discuss the mechanism for generation of antibody diversity.

12. Write down the process for commercial production of cheese.

GROUP – C

Answer any **two** questions from the following : 8×2

13. What is biopesticide ? What are the different biopesticides used ? Write down the source and mode of action of Bt toxin. $2 + 2 + 1 + 3$

14. Discuss the monoclonal antibody production process. Mention its two applications. 6 + 2

15. Write down any two serological methods used in disease diagnosis.

16. Why *E. coli* is considered as an indicator for water pollution ? Write down the process for treatment of urban waste water. 2 + 8

[Internal Assessment – 10 Marks]

BOT– 403.F

(Palaeobotany, Palynology & Plant Reproductive Ecology)

GROUP – A

Answer any **four** questions from the following : 2×4

1. What is sporoderm ? Write down the chemical nature of sporoderm.

2. What is meant by exineless pollen grains ?

3. Define herkogamy and dichogamy.

4. What is organic sapropel ?

5. What is meant by kerogene ?

6. What are ubish bodies ?

GROUP – B

Answer any **four** questions from the following : 4×4

7. Briefly describe different ranks of coal occurred in nature.

8. Write a brief note on the origin of petroleum.

9. What is meant by deceit pollination ? Discuss with example.

10. Discuss the role of palynology in studying source rock maturation.

11. Write a brief note on apertural pattern found in angiosperm pollen grains.

12. What are disc flowers and tubular flowers ? Give examples.

GROUP – C

Answer any **two** questions from the following : 8×2

13. Briefly describe the Quaternary vegetational history of Kashmir valley through pollen analysis.

14. Discuss the role of palynology in studying source rock potential.

15. What is meant by pollination syndrome ? Explain different adaptive floral traits which are being pollinated by bees and birds.

16. What is meant by flowering pattern ? Discuss different categories of flowering pattern observed in the flowers of Neotropics (Gentry 1974 and Opler et al. 1980).

[Internal Assessment – 10 Marks]

BOT– 403.G

(*Biochemistry and Molecular Biology*)

GROUP – A

Answer any **four** questions from the following : 2×4

1. What is ionic bonding ?

2. Distinguish between enthalpy and entropy.

3. What is meant by Gibbs free energy ?

4. What is lattice energy ?

5. Write down the basic principle of radioactive labelling.

6. What is transcriptome ? Who first proposed the term ?

GROUP – B

Write short notes on any **four** from the following : 4×4

7. Affinity chromatography

8. Western blotting

9. HPLC

10. Stabilizing interactions of biomolecules

11. Mass spectrometry

12. Micro RNA.

GROUP – C

Answer any **two** questions from the following : 8×2

13. Briefly describe about the secondary and tertiary conformations of protein structure. Differentiate between domain and motif of proteins. $6 + 2$

14. What are molecular chaperones ? Describe the protein folding machinery assisted by GroEL/GroES system. $2 + 6$

15. Write a note on the major classes of proteins associated with membrane transport. Schematically represent the mechanism of action of Na+/K+ pump in membrane transport. $4 + 4$

16. Discuss the different types of genomics. Write about the application of genomics in plant improvement. $3 + 5$

[Internal Assessment – 10 Marks]