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PG/IVS/BOT/403 (A,B,C,
E,F,G)/25

M.Sc. 4th Semester Examination, 2025

BOTANY

PAPER — BOT-403(A,B,C,E,F,G)

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*

PAPER — BOT-403 (A)

(Molecular Syatematics)

GROUP—A

Answer any four questions from the following :

2 × 4

1. Define co-evolution with an example.

(Turn Over)

(2)

2. What is the full form rbcL and mention its length ?
3. Define clade and cladistics.
4. What is the full form of ITS ?
5. Define eudicots. Give an example.
6. What are the full forms of TLC and HPTLC ?

GROUP-B

Answer any four questions from the following :

4 × 4

7. Write down the differences between traditional and digital herbaria.
8. Write down the differences between land ward and seaward zone with an example of each.

9. Write short notes on Homology & Homoplasy.
10. Write down the differences between phylogenetic and integrated phylogenetic systems of classification.
11. Write the differences between primary and secondary metabolites.
12. Name two natural dye yielding and two natural fiber yielding plants from South West Bengal.

GROUP-C

Answer any two questions from the following : 8×2

13. Define taximetrics. What is Neo Adansonian taxonomy ? State its objectives. What is OTU ? Write the merits and demerits of taximetrics. 1 + 1 + 3 + 1 + 2

14. What are the basic differences between systematics and 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 + 3 + 3
15. 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
16. What is DNA Barcoding ? What is its utility for authentication and proper identification of medicinal plants ? Define adulterants with an example. 2 + 4 + 2

[Internal Assessment — 10 Marks]

(5)

PAPER – BOT-403 (B)

(*Plant Pathology*)

GROUP – A

Answer any **four** of the following questions :

2 × 4

1. What is the origin of the word mycorrhiza ?
2. What is MGI ?
3. Define active invaders.
4. Which type of mycorrhiza is earliest and how old is it ?
5. Name the causal organisms of Khair root rot and Sandal spike diseases.
6. What is SYM pathway ?

(6)

GROUP—B

Answer any four short notes of the following :

4 × 4

- 7. Preservative treatment to control decay ;**
- 8. Sal root rot ;**
- 9. Root rot of teak ;**
- 10. Disease resistant transgenic plants ;**
- 11. Teak bacterial wilt ;**
- 12. General principles of plant disease management.**

GROUP—C

Answer any two of the following questions :

8 × 2

- 13. Describe the mechanism of prepenetration with figures.**

8

(7)

14. Discuss Sissoo root and wilt diseases. 4 + 4
15. Write a note on diagnosis of infectious and non-infectious diseases. 4 + 4
16. Comment on the naturally decay-resistant species and decay in storage. 4 + 4

[Internal Assessment — 10 Marks]

PAPER — BOT-403 (C)

(Molecular Biology & Biotechnology)

GROUP—A

Answer any four questions from the following :

2 × 4

1. What is twist angle of DNA ? State its significance.

2. Name two genetic abnormalities of medical complications due to defect in small nuclear RNA and mention the nature of molecular defects.
3. In which phase of cell culture the rate of cell division slows down, but the rate of cell expansion increases ?
4. Which DNA sequence out of a repetitive one and a single copy gene sequence will show a lower C_0t value and why ?
5. What are the benefits of adopting progeny testing ?
6. How is the regeneration of wall on naked protoplast examined ? What is the utility of that ?

GROUP - B

Answer any four questions from the following :

7. Illustrate the roles of different Vir genes in Ti plasmid.

4 × 4

4

8. What are the full diallele crossing method of breeding with and without parents? Which method of diallele crossing would be adopted for the parents with male sterility or self incompatibility and why? $2 + 2$
9. Elucidate the working principles, maintenance, advantages, disadvantages and applications of chemostat and turbidostat in cell culture. $2 + 2$
10. Give a brief account of two major classes of snRNA. Name two human diseases associated with snRNPs. $3 + 1$
11. What is sugar pucker in DNA construction? How does it vary for A, B and Z forms of DNA? $2 + 2$
12. Write a note on molecular farming. 4

GROUP - C

Answer any two questions of the following :

8 × 2

13. Illustrate the procedure, merits and demerits of Pedigree method of breeding, How does Mass Pedigree method differs from this ?

6 + 2

14. Mention the utility of haploid culture *in vitro*. Describe different pathways of haploid plant development from microspores. Why often pollen culture is preferred over the anther culture for haploid plant development ?

1 + 5 + 2

15. Write a comprehensive note on various major kinds of mechanisms for DNA repairing.

8

16. Distinguish between RT PCR and qPCR. Why is multiplex PCR more advantageous over a general PCR technique ?

6 + 2

[Internal Assessment – 10 Marks]

(11)

PAPER – BOT-403 (E)

(Microbiology Applied)

GROUP – A

Answer any four questions : 2 × 4

- 1. What are secondary metabolites ? Give examples.**
- 2. Give one application each of glutamic acid and citric acid.**
- 3. What are biopolymers ? Give an example.**
- 4. What is subunit vaccine ?**
- 5. Name one each of a fermented fish and a fermented meat product ?**
- 6. What is GRAS ?**

(12)

GROUP-B

Answer any four questions : **4 × 4**

- 7. Write a short note on bioplastic.**

- 8. Write down process of leaching of copper by microorganisms.**

- 9. Write in detail about secondary sewage treatment.**

- 10. Mention different steps for production of acidophilus milk.**

- 11. Write down different properties of a micro-organism to be used in industry.**

- 12. How is antibody diversity developed in mammalian system ?**

GROUP - C

Answer any two questions : 8×2

- 13.** Explain the basic design of a fermentor.
Write down benefits of fermented foods.
Give two examples of fermented vegetable foods. $3 + 3 + 2$
- 14.** How rhizobial biofertilizer can be developed in the laboratory ? Mention the process for production of monoclonal antibody. $4 + 4$
- 15.** What are the applications of probiotics ?
Write down the process for industrial production of ethanol. $3 + 5$
- 16.** Write down the mechanism of action of BT toxin in Lepidopteran insects. What is activated sludge process ? $4 + 4$

[Internal Assessment - 10 Marks]

PAPER — BOT-403 (F)

(Palynology & Plant Reproductive Ecology)

(Specila Paper : Palaeobotany, Palynology & Plant Reproductive Ecology)

GROUP — A

Answer any four questions : 2 × 4

1. What are palynomorphs ?
2. What is meant by taphonomy ?
3. Name the oldest known bonafide angiospermous pollen grain. Mention its nature and age of occurrence.
4. What are source rocks and reservoir rocks ?
5. Write down the adaptive significance of pollen grains having saccate exine.

6. What are sapromyophilous flowers ?

GROUP—B

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

4 × 4

7. Discuss the role of palynology in palaeo-geography reconstruction.
8. Write down the adaptive significance of ornamented exine in pollen grains of entomophilous angiosperms.
9. Discuss different modes of spatial separations and time separations found in reproductive structure of a flower.
10. Write about various adaptive values of multiple germinal exits of pollen grains.
11. Discuss different methods for the diagnosis of pollen allergy.

12. What is meant by cytoplasmic male sterility ? Write its significance.

GROUP – C

Answer any two questions from the following :

8 × 2

13. Briefly describe the Quaternary Vegetational history of Bengal basin through pollen analysis. 8
14. Classify different types of flowers with reference to their shapes according to Kugler (1970) and Faegri & Van der Pijl (1979). 8
15. What are flower attractants and floral rewards ? Discuss about the different types of floral rewards offered by the plants for the flower visitors. 3 + 5

(17)

16. Discuss the process of formation of natural coal. Briefly describe different varieties of coals occurred in nature. 4 + 4

[Internal Assessment – 10 Marks]

PAPER – BOT-403 (G)

(Specila Paper : *Biochemistry and Molecular Biology*)

GROUP – A

Answer any four questions from the following : 2 × 4

1. What is microRNA ?
2. Differentiate between symport and antiport.
3. What is utility of radiolabelling ?

4. Expand the abbreviations NMR and GLC.
5. What is the difference between domain and motif in protein structure ?
6. What are the factors that influence optical density value in spectrophotometry ?

GROUP—B

Write short notes on any four from the following :

7. Structure of a model membrane ; 4 × 4
8. Ion exchange chromatography ;
9. Southern blotting ;
10. α -helix and β -pleated structures of proteins ;
11. Membrane raft ;
12. Channel and carrier proteins.

GROUP – C

Answer any two questions from the following : 8×2

- 13.** Briefly discuss about the biological energy transducers. What are group transferring coenzymes ? Give examples. $5 + 3$
- 14.** Elaborate the steps involved in proteomic analysis. Write a note on functional genomics. $4 + 4$
- 15.** What is the basic principle of electrophoresis ? Discuss the basic principles and application of HPLC in plant biology. $2 + 6$
- 16.** Write down the role of phosphorylation in the functioning of Calcium pump. Mention the weak interactive forces involved in stabilizing a protein structure. $6 + 2$

[Internal Assessment – 10 Marks]

