2023

M.Sc.

4th Semester Examination

BOTANY

PAPER : BOT-403A/403B/403D/403E/403F/403G

Full Marks : 50

Time : 2 hours

The figures in the right-hand margin indicate marks.
Candidates are required to give their answers in their own words as far as practicable.
Illustrate the answers wherever necessary.
Answer from **all** the Groups as directed.

PAPER : BOT-403A

(Molecular Systematics)

GROUP—A

Answer *any* **four** questions from the following : 2×4=8

1. What is the full form of ITS? Mention its function.

2. What is crypto-vivipary? Give an example.

3. Name a stem holoparasitic angiosperm. Name the family to which it belongs.

4. Define clade.

5. Name an endangered plant from Southern part of West Bengal.

6. Define Barcode with an example.

7. What is microsatellite? State its function.

GROUP—B

Answer *any* **four** questions from the following : 4×4=16

8. Write down the differences between cpDNA and mtDNA.

9. Write down the differences between AFLP and RELF.

10. Write down the differences between SDS-PAGE and PAGE.

11. Write down the differences between bistate and multi-state characters.

12. Write down the differences between cladogram and dendogram.

GROUP—C

Answer *any* **two** questions from the following : 8×2=16

13. Define molecular systematics. What are the characters used in solving taxonomic problems? Write the merits and demerits of molecular systematics. 2+2+4=8

14. What is hemiparasitic taxon? What are the differences between holo-parasitic and hemi-parasitic taxa? Mention the adaptive features, phylogeny and distribution of parasitic plants of India. Name two root parasitic taxa from North East India. 1+2+4+1=8

15. Define numerical taxonomy. What is Neo Adansonian taxonony? Write the principles of numerical taxonomy and mention the merits and demerits of numerical taxonomy. 2+1+3+2=8

16. Define mangal. Write an essay on mangrove taxa with their distributions, salient adaptive features. Name a mangrove without viviparous germination. 1+6+1=8

[Internal Assessment : 10 Marks]

PAPER : BOT-403B

(Molecular Biology and Biotechnology)

GROUP—A

Answer *any* **four** questions from the following : 2×4=8

1. Why do DNA possess negative charge? Name two agents which can neutralize that.

2. What is propeller twist in DNA? What would be the impact of lesser propeller twist angle on DNA helix?

3. What is ear to row method in plant breeding? State its significance.

4. Name four fusogens used in fusing plant protoplasts.

5. What are DNA microsatellites? State their uses in molecular biological study.

6. What is overdrive sequence in Ti plasmid? State its significance.

GROUP—B

Answer *any* **four** questions from the following : 4×4=16

7. Comment on ribozymes.

8. Characterize the major and minor grooves of B-DNA commenting on the significance of their roles.

9. Elaborate the mechanism of electroporation and its uses.

10. Describe different parts of tRNA mentioning their significance.

11. Write the measures for testing viability of released plant protoplasts. State the methods of identifying the somatic hybrid cells or tissues.

12. Write an account of batch cell suspension culture.

GROUP—C

Answer *any* **two** questions from the following : 8×2=16

13. Illustrate different parts of mRNA stating their significance. Comment on polycistronic mRNA. 6+2=8

14. Elaborate the procedure of androgenesis in haploid culture. State briefly the different steps of androgenesis. 6+2=8

15. Describe Progeny Testing and state its significance.

16. Give a comprehensive account of basic method of PCR mentioning all the requisite elements.

[Internal Assessment : 10 Marks]

PAPER : BOT-403D

(Microbiology Applied)

GROUP—A

Answer *any* **four** questions from the following : 2×4=8

1. What is BLAST?

2. Give two applications of Glutamic acid.

3. What are biopolymers? Give example.

4. What is triple vaccine?

5. Name two fermented vegetable products.

6. What is kefir?

GROUP—B

Answer *any* **four** questions from the following : 4×4=16

7. Write a short note on purple sulfur bacteria.

8. Write down the process of leaching of copper by microorganisms.

9. Give details of a trickling filter bed.

10. Mention different steps for the production of acidophilus milk.

11. Give two examples of ripened cheese and microorganisms involved in their production.

12. Discuss the structure of IgG molecule.

GROUP—C

Answer *any* **two** questions from the following : 8×2=16

13. Explain the basic design of a fermentor. Discuss different types of fermenters. 3+5=8

14. Discuss the mechanism of development of antibody diversity. Mention different applications of monoclonal antibody. 4+4=8

15. What are the applications of probiotics? Write down the process for industrial production of ethanol. 3+5=8

16. How does *Bacillus thuringiensis* (Bt) work on insects? Give a detailed account of mass cultivation of *Rhizobium* and its use as biofertilizer. 4+4=8

[Internal Assessment : 10 Marks]

PAPER : BOT-403E

(Plant Pathology)

GROUP—A

Answer *any* **four** questions from the following : 2×4=8

1. What is Avoidance?

2. Which type of mycorrhiza is earliest and how old is it?

3. Define rhizomorphs.

4. What is the origin of the word mycorrhiza?

5. Mention causal organisms of Khair Root rot and Sandal Spike disease.

6. What is SYM pathway?

GROUP—B

Write notes on *any* **four** from the following : 4×4=16

7. Preservative treatment to control timber decay.

8. Diagnosis of non-infectious diseases.

9. Sissoo root rot.

10. Sterile and fertile structures of Eucalyptus' pink disease.

11. Factors of timber decay.

12. Root rot of teak.

GROUP—C

Answer *any* **two** questions from the following : 8×2=16

13. Differentiate between active and passive invaders. Mention examples. 4+4=8

14. Discuss about stem wilt of casuarina and bacterial wilt of teak. 4+4=8

15. With the help of sketches, mention the stages of pre penetration mechanism. 8

16. What are naturally decay resistant species? Elucidate the decay of timber during storage. 4+4=8

[Internal Assessment : 10 Marks]

PAPER : BOT-403F

(Palaeobotany, Palynology and Plant Reproductive Biology)

GROUP—A

Answer *any* **four** questions from the following : $2 \times 4 = 8$

1. What is meant by taphonomy?

2. Differentiate between inbreeding and outbreeding plant species.

3. What is meant by genic male sterility?

4. What are nectarines?

5. What is organic sapropel?

6. What is clarain?

GROUP—B

Answer *any* **four** questions from the following : 4×4=16

7. What is meant by aperture of a pollen grain? Discuss the trend of apertural evolution of pollen grains in angiosperms.

8. What is sporoderm? Differentiate between intectate, sub-tectate and pertectate pollen grains.

9. Discuss the role of palynology in palaeogeography reconstruction.

10. Briefly describe different varieties of coals found in nature.

11. Mention different types of flower shapes found in nature and categorize them.

12. Discuss different methods for the diagnosis of pollen allergy.

GROUP—C

Answer *any* **two** questions from the following : 8×2=16

13. Briefly describe the quaternary vegetational history of Bengal basin through pollen analysis.

14. Discuss the role of palynology in studying stratigraphy during oil exploration.

15. Compare between flower attractants and floral rewards. Discuss about the different types of floral rewards offered by the plants for the flower visitors.

16. What is meant by pollination syndrome? Discuss about various adaptive floral traits which are being visited by fly and butterfly.

[Internal Assessment : 10 Marks]

PAPER : BOT-403G

(Biochemistry and Molecular Biology)

GROUP—A

Answer *any* **four** questions from the following : $2 \times 4 = 8$

1. Name two polar amino acids.

2. Mention any two non-provitamin A activity of carotenoids.

3. What is meant by apoptosis?

4. Schematically represent peptide bond formation.

5. Name two metalloproteins.

6. What is the principle of gel electrophoresis?

GROUP—B

Write notes on *any* **four** from the following : 4×4=16

7. Denaturation of proteins.

8. Schematic representation of biosynthesis of carotenoids.

9. IP3/DAG system as second messenger.

10. Receptor tyrosine kinase.

11. Conjugated protein.

12. Affinity Chromatography.

GROUP—C

Answer *any* **two** questions from the following : 8×2=16

13. Briefly describe the different levels of structural organisation of protein molecule. 8

14. What are molecular chaperones? Discuss about the mechanism of action of GroEL/GroES system in protein folding. 2+6=8

15. What are signalling molecules? Describe about the different types of signalling molecules involved in signal transduction pathway. 2+6=8

16. Discuss about the techniques of functional genomics applied for transcriptome profiling. 8

[Internal Assessment : 10 Marks]

★ ★ ★

2023

M.Sc.

4th Semester Examination

BOTANY

PAPER : BOT-495A

(Practical)

(Angiosperm Taxonomy, Molecular Systematics)

Full Marks : 50

Time : 3 hours

The figures in the right-hand margin indicate marks.

Attempt **all** questions from the following :

1. Draw, dissect, label and describe the supplied specimens *A* and *B*. Identify these specimens upto species with the help of local flora(s). Leave your preparations.
(Drawing-3+3, Dissection-3+3, Label-1+2, Description-5+5, Identification-3+3) 30

2. Identify the specimens *C* and *D* upto species. 6

3. Make a temporary suitable preparation of the supplied sample *E* and comment on this. 3

4. Submission of herbarium specimens, laboratory notebook and field report. 3+2

5. Viva-voce. 6

★ ★ ★

2023

M.Sc.

4th Semester Examination

BOTANY

PAPER : BOT-495B

(Practical)

(Cytogenetics, Molecualr Biology and Biotechnology)

Full Marks : 50

Time : 3 hours

The figures in the right hand margin indicate marks.

1. Attempt *any* **two** questions from the following : 15×2=30

(a) Workout the cytological preparation with the supplied specimen *A* to show pro-metaphase and metaphase as well as early telophase and late telophase with their proper illustrations and descriptions highlighting the differences between them. 4+4+7=15

(b) Workout the cytological preparation with the supplied specimen *B* to show two different meiotic stages and describe them with duly labelled proper illustrations. 8+7=15

(c) Workout the cytological preparation with the supplied specimen *C* and find out any two kinds of cytological abnormalities. Describe them with proper illustrations commenting on the stages of division and nature of abnormalities. 8+7=15

(d) Perform the karyotypic analysis of specimen *D* and comment on it. 12+3=15

(e) Elute DNA from the supplied specimen *E* and estimate colorimetrically. 15

(f) Demonstrate inoculation of plant tissues in front of laminar air-flow. 15

2. Attempt *any* **one** question from the following : $10 \times 1 = 10$

(a) Carry out Regression Analysis of the supplied data and comment on the nature of relationship.

(b) Perform analysis of Variance with the supplied data and comment on the status of the given problem.

3. Laboratory notebook. 5

4. Viva-voce. 5

★ ★ ★

2023

M.Sc.

4th Semester Examination

BOTANY

PAPER : BOT-495D

(Practical)

(Microbiology)

Full Marks : 50

Time : 3 hours

The figures in the right-hand margin indicate marks.

Attempt **all** questions from the following :

(Principle, requisition result and conclusion to the written in the answer script)

1. Find out fermentative ability of supplied bacterial sample(s) in the supplied sugar sample (*A*, *B* & *C*).

(OR)

Determine starch hydrolysing ability of the supplied bacterial strain (*P*). 8

2. Find out the number of bacteria present in supplied sample (*Q*) through spread plate method.

(OR)

Determine sensitivity of the supplied bacteria (*M*) against supplied antibiotic (*X*) through agar cup method. 10

3. Comment on the probability of supplied water sample (*W*) through MPN test. 10

4. Estimate the amount of protein present in supplied sample (*R*) through Lowry method. Standard to be prepared with known protein sample. 6

5. Prepare a phylogenetic tree using BLAST through alignment of the supplied genomic sequence(*N*). 6

6. Laboratory notebook. 3

7. Report of field visit. 2

8. Viva-voce. 5

★ ★ ★

2023

M.Sc.

4th Semester Examination

BOTANY

PAPER : BOT-495E

(Practical)

(Mycology and Plant Pathology)

Full Marks : 50

Time : 3 hours

The figures in the right-hand margin indicate marks.

Attempt *all* questions from the following :

1. Make a suitable preparation of the supplied specimen *A*. Draw, label, describe and identify the genus.
(Slide preparation-3, Drawing-2, Description-2, Identification-1) 8

2. Make a suitable preparation of the supplied specimen *B*. Draw, label, describe and identify the genus.

(Slide preparation-3, Drawing-2, Description-2, Identification-1) 8

3. Make a suitable preparation of the supplied specimen *C*. Write the requirements, method and results with suitable drawing and labelling of the experiment.

(Requirements-2, Method-6, Results-5, Slide preparation-3, Drawing-4) 20

4. Laboratory Notebook. 8

5. Viva-voce. 6

★ ★ ★

2023

M.Sc.

4th Semester Examination

BOTANY

PAPER : BOT-495F

(Practical)

(Palaeobotany, Palynology and Plant Reproductive Biology)

Full Marks : 50

Time : 3 hours

The figures in the right-hand margin indicate marks.

Attempt *all* questions from the following :

1. Analyze the megafloral assemblage A_1, A_2, A_3, A_4. Draw and describe any three elements present in it. Mention their age of occurrence and mode of preservation. 3+6+3=12

2. Describe the acetolysis technique of G. Erdtman (1960) for the preparation of palynological slides. Draw and describe the palynomorphs (any three) present in it. 3+(3+3+3)=12

3. Comment on C, D, E and F. 2½×4=10

4. Submission of practical records. 8

5. Viva-voce. 5

★ ★ ★

2023

M.Sc.

4th Semester Examination

BOTANY

PAPER : BOT-495G

(Practical)

(Plant physiology, Biochemistry and Molecular Biology)

Full Marks : 50

Time : 3 hours

The figures in the right-hand margin indicate marks.

Attempt *any* **two** questions from Q. Nos. **1** to **5** :

1. Evaluate the viability percentage of the supplied seed samples *A*, *B*, *C*, *D* and *E*. Give proper explanation of the results obtained.
(Requisition-2, Principal-5, Procedure-8, Result-5) 2+5+8+5=20

2. Perform the experiment for estimation of total phenol content in the supplied specimen using colorimetry.

(Requisition-2, Principle-5, Procedure-8, Result-5)
2+5+8+5=20

3. Perform the extraction and estimation of total flavonoid contents in the supplied plant samples using spectrophotometry.

(Requisition-2, Principle-5, Procedure-8, Result-5)
2+5+8+5=20

4. Perform the extraction and estimation of the enzyme amylase from plant samples.

(Requisition-2, Principle-5, Procedure-8, Result-5)
2+5+8+5=20

5. Extract and estimate total protein content form plant samples by spectrophotometric method.
(Requisition-2, Principle-5, Procedure-8, Result-5)
2+5+8+5=20

6. Laboratory Notebook. 5

7. Viva-voce. 5

★ ★ ★