

2022

M.Sc.

4th Semester Examination

BOTANY

PAPER—403

Full Marks : 50

Time : 2 Hours

The figures in the right-hand margin indicate full marks.

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

Illustrate the answers wherever necessary.

Special Paper 402A : Molecular Systematics

1. Answer any four questions.

4×2

(a) What is Sementides? Give example.

(b) What are plastid genes? Give an example.

(Turn Over)

- (c) What is the full form of ITS ?
- (d) Define cp DNA and mention its one character.
- (e) Name an endemic species with family from Darjeeling.
- (f) Define Isozymes and Allozymes.

2. Answer any four questions.

4x4

Differences between :

- (a) Cladogram and Dendogram.
- (b) Basal and Primitive angiosperms.
- (c) Monoporate and Tricolporate.
- (d) Micromorphology and Macromorphology.
- (e) Macromolecules and Micromolecules.
- (f) Eudicots and Dicots.

3. Answer any *two* questions. 2×8

(a) Define Taximetrics. Mention the objectives and principles of Taximetrics. Point out the differences between Phenetic and Cladistic methods. 2+3+3

(b) Write the Systematic position, distribution, Adaptive features and Phylogeny of special life form of Mangrove Taxa. 2+2+2+2

(c) Define Molecular systematics. What is the significance of molecular systematics in modern day Taxonomy? Write the molecular characters used for solving taxonomic problem with two examples.

(d) Define chemotaxonomy. Mention the stages of chemotaxonomic investigation. What are the differences between primary and secondary constituents? Why secondary constituents are commonly used in chemotaxonomic study? 2+2+2+2

[*Internal Assessment - 10 Marks*]

**Special Paper 403B : Molecular Biology
And Biotechnology**

1. Answer any *four* questions. 4×2
- (a) Give the reasons of naming 5' and 3' polarity in DNA strand.
 - (b) Which kind of chemicals makes *Agrobacterium* attracted to plant cell.
 - (c) What does c value mean and how is a paradox related to it?
 - (d) What kind of callus is preferred for suspension culture and how it may have better performance over the other?
 - (e) How live cells and dead cells are identified in cell culture?
 - (f) What is the common achievement for the varieties developed through all breeding methods of self-pollinating species and why?
2. Answer any *four* questions. 4×4
- (a) Write a comprehensive note on Diallele crossing.

- (b) Describe the structure of gene gun and its function.
- (c) Illustrate the roles of Vir genes.
- (d) Discuss with example the insect resistance transgenesis in plants.
- (e) Elaborate the major steps of isolation of protoplast and their fusion.
- (f) Write on the physical method of DNA cloning.

3. Answer any *two* questions. 2×8

(a) Give a comprehensive account of different functional sites of Ti plasmid and their functional significance.

(b) Elaborate the continuous culture method for suspension culture. State its advantages.

6+2

(c) Describe the single seed descend method. How is the objective of this method achieved?

6+2

- (d) Mention the characteristic features of B DNA. Discuss on the biological significance of A, Z and B DNA. 2+6

[Internal Assessment - 10 Marks]

Special Paper 403C : Biodiversity

1. Answer any *four* questions. 4×2
- (a) Define National Park. Name three national parks.
- (b) What is Ramsar site? Comment on its significance.
- (c) Name four exotic species in India and importance related to that.
- (d) Comment on RET plants.
- (e) Mention the importance of genebank.
- (f) What do you know about species richness?

2. Answer any *four* questions. 4×4

- (a) Comment on CITES.
- (b) Discuss the role of Botanical gardens in conserving biodiversity.
- (c) Write a short note on Red data book.
- (d) Write on the significance of Tiger project.
- (e) Discuss on the impact of biodiversity loss.
- (f) comment on the significance ex-situ conservation.

3. Answer any *two* questions. 2×8

- (a) Define biodiversity. Discuss the major threats to Indian biodiversity. 3+5
- (b) What is bioinvasion? Write five invasive plants of West Bengal. 3+5
- (c) Characterize biodiversity hotspots. Write biodiversity hotspots of India. 3+5

- (d) Discuss the common methods adopted to manage a protected area.

[Internal Assessment - 10 Marks]

Special Paper 403D : Microbiology-Applied

1. Answer any *four* questions. 4×2

- (a) What is fermentation scale up?
- (b) Give example each of a fermented meat product and a fermented vegetable product.
- (c) What is activated sludge?
- (d) What are xenobiotics?
- (e) How an endemic disease differs from pandemic disease?
- (f) Give two commercial applications of monoclonal antibodies.

2. Answer any *four* questions. 4×4

- (a) Mention different advantages of fermented foods.

- (b) Discuss different parts of a fermentor.
- (c) Discuss secondary sewage treatment.
- (d) What are different applications of bioinformatics?
- (e) Discuss different parts of IgG.
- (f) Mention stages of cheese preparation.
- (g) Mention production process and uses of glutamic acid.
- (h) Write a note on trickling filter bed.

3. Answer any *two* questions. 2×8

- (a) What are biopesticides? Mention mode of action of Bt toxin. 2+6
- (b) Mention different strategies of controlling air microorganisms.
- (c) Write down process of leaching of copper by microorganisms.
- (d) Write short note on
 - (i) vaccine; (ii) biogas production.

[*Internal Assessment - 10 Marks*]

Special Paper 403E : Plant Pathology

1. Answer any *four* questions. 4×2

(a) What is the difference between sign and symptom ?

(b) What is totipotency ?

(c) Define syndromic.

(d) Discuss in brief two main types of timber decay.

(e) Mention causal organisms of bacterial wilt and root rot of Teak.

(f) What is MGI ?

2. Answer any *four* questions. 4×4

(a) Discuss prepenetration stage.

(b) Comment on diagnosis of infectious diseases.

(c) Draw and describe the Ti plasmid of *Agrobacterium tumefaciens*.

- (d) Write about the development of disease resistant transgenic plants.
- (e) Elucidate mycorrhiza and disease control.
- (f) Comment on the factors responsible for decay.

3. Answer any *two* questions. 2×8

- (a) Describe general principles of plant disease control.
- (b) Discuss root rot of Sal and wilt of Sissoo.
- (c) Comment on the origin and evolution of mycorrhiza.
- (d) Write a note on meristem tip and protoplast culture.

[Internal Assessment - 10 Marks]

**Special Paper 403F : Palynology
and Plant Reproductive Biology**

1. Answer any *four* questions. 4×2

- (a) What is sporopollenin? Write its chemical nature.

- (b) What is meant by omni aperturate type of pollen grains?
- (c) Why pollen grains cause allergy? Name two allergenic pollen taxa of West Bengal.
- (d) What is urticaria?
- (e) What is meant by cytoplasmic male sterility? Write its significance.
- (f) Mention the adaptive features of flowers pollinated by bats.

2. Answer any four questions. 4×4

- (a) Briefly discuss the structure of pollen wall. Write its chemical nature. 2+2
- (b) Write a note on flower attractants and floral rewards. 2+2
- (c) Briefly describe different ranks of coals occurred in nature.

(d) Discuss the role of palynology in studying source rock maturation.

(e) What are different modes of spatial separation and time separations found in reproductive structures of a flower?

3. Answer any *two* questions.

2×8

(a) Briefly describe the Quaternary vegetational history of Kashmir valley through pollen analysis.

(b) Discuss the role of palynology in studying source rock potential.

(c) Categorize flower types with reference to their shapes according to Kugler (1970) and Faegri and Vande Pijl (1979).

- (d) Discuss about the different adaptive floral traits which are being pollinated by bees and birds

[Internal Assessment - 10 Marks]

**Special Paper 403G : Biochemistry and
Molecular Biology**

1. Answer any *four* questions. 4×2
- (a) Name one essential and one nonessential amino acids.
- (b) How carotene is converted to retinol?
- (c) What is meant by second messenger? Give example.
- (d) What is Edman reagent?

(e) Name one dipeptide and one tripeptide of biological importance.

(f) What is isoelectric point?

2. Write short notes on any *four* questions. 4×4

(a) Ramchandran plot.

(b) Schematic representation of biosynthesis of aromatic amino acid.

(c) Calmodulin.

(d) Protein purification on the basis of molecular size.

(e) Protein transport into chloroplast.

(f) Mass spectrometry.

3. Answer any *two* questions. 2×8

(a) Briefly describe the pathway of carotenoid biosynthesis mentioning the enzymes involved.

- (b) Write about the different types of post translational modifications of protein.
- (c) Enumerate the procedure of amino acid sequencing by Sanger's method. What are the applications of protein sequencing?
5+3
- (d) Discuss about the role of phosphorylation in signal transduction pathway. Write down the working principle of G-protein coupled receptors.
5+3

[Internal Assessment - 10 Marks]
