

2025

M.Sc. 3rd Semester Examination

BOTANY

Angiosperm Taxonomy and
Molecular Systematics

Paper : BOT - 303A/B/C/E/F/G

(Angiosperm Taxonomy)

Special Paper

(New Syllabus)

Full Marks : 50

Time : Two Hours

*The figures in the margin indicate full marks.
Candidates are required to give their answers
in their own words as far as practicable.*

Group - A

Answer any *four* questions.

2×4=8

1. Define pleiomorphism.
2. What is convergent evolution? Give an example.
3. Define molecular systematics.
4. What is meant by revision in taxonomy?
5. What are new records in respect of plant taxonomy?
Give an example.
6. Define basal angiosperms with an example.

P.T.O.

(2)

Group - B

Answer any *four* questions . $4 \times 4 = 16$

7. Differentiate between homology and homoplasy.
8. Differentiate between flora and vegetation.
9. How does dicots differ from an eudicots?
10. Differentiate between rare and endangered plant species (as per IUCN).
11. Distinguish between taxonomy and systematics.
12. Mention the role of BSI (Botanical Survey of India) in taxonomic studies.

Group - C

Answer any *two* questions. $8 \times 2 = 16$

13. Define APG. Who first established it? Mention the year of publication and the journal where it was published.
Write down the basic concept of APG $2+1+2+3$
14. Define plant nomenclature. Who first established it?
Enumerate the basic differences between ICBN and ICN? In which year was it adopted? $1+1+5+1$
15. What is your concept on biodiversity? Who first introduced the term? Write a note on the levels of diversity. Define alpha and beta diversity. $2+1+3+2$
16. What is taxonomic literature? Write an essay on taxonomic literature. $1+7$

Internal Assessment : 10 marks

(3)

Applied Mycology and Plant Pathology

Paper : BOT - 303B

(Applied Mycology)

Special Paper

(New Syllabus)

Full Marks : 50

Time : Two Hours

The figures in the margin indicate full marks.

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

Group - A

Answer any *four* questions.

2×4=8

1. Describe the basic structure of penicillin.
2. What is dikaryotization?
3. What do you mean by SCP?
4. Name two flavouring agents produced by fungi.
5. Name a water soluble antibiotic and an immuno-suppressant antibiotic.
6. What is antioxidant? Cite one example.

Group - B

Write notes on any *four* questions.

4×4=16

7. Cosmeceuticals
8. Lactic acid

P.T.O.

(4)

9. Cheese
10. Biological control
11. Quorn and Tempeh
12. Semisynthetic penicillin

Group - C

Answer any *two* questions. $8 \times 2 = 16$

13. What is cyclosporine and describe its basic structure. Name two fungal sources of cyclosporine and write their function? Which human fungal pathogen is killed by it?
 $1+2+2+2+1$
14. What is mycoremediation? Why fungi is considered as better agent for bioremediation than bacteria? Write a note on mycoremediation of different types of pollutants.
 $1+2+5$
15. Write notes on industrial production of Gluconic acid and Citric acid.
 $4+4$
16. What is dormancy? Write notes on exogenous and endogenous dormancy of fungal spores. $1+3\frac{1}{2}+3\frac{1}{2}$

Internal Assessment : 10 marks

(5)

Cytogenetics, Molecular Biology and Biotechnology

Paper : BOT - 303C

(Cytogenetics)

Special Paper

(New Syllabus)

Full Marks : 50

Time : Two Hours

The figures in the margin indicate full marks.

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

Group - A

Answer any *four* questions.

2×4=8

1. Mention citing suitable examples how protein/lipid ratio varies in the plasma membranes of different cells.
2. State briefly about the position of CF₁ protein in chloroplast and its functioning.
3. How does a pluralistic approach provide a flawless 'Species' concept?
4. What are epialleles? Characterize metastable epialleles.
5. Name different types of proteins of cytoskeleton and mention their association with different types of cytoskeleton.
6. What is histone acetylation and how does it help to regulate gene functioning?

P.T.O.

(6)

Group - B

Answer any *four* questions.

4×4=16

7. Write briefly how p53 and retinoblastoma work for apoptosis.
8. Characterize B Chromosomes and comment on their probable origin from different sources with suitable examples. 2+2
9. Explain how narrow sense heritability analysis provides more accuracy than that of broad sense heritability.
10. Derive the relationship between founder effect, population bottleneck and genetic drift and state how all these lead to speciation.
11. Give a brief account of the ultrastructural features of mitochondria and the chemical constituents helping in the functioning of it.
12. Elucidate the cell signalling by G protein coupled receptors.

Group - C

Answer any *two* questions.

8×2=16

13. Give a comprehensive account of the epigenetic regulation of traits in eukaryotes.
14. Explain how a species develops from a deme. Contrast Sympatric, Peripatric and Parapatric speciation. What speciality does quantum speciation have? 2+4+2

(7)

15. Illustrate the roles of respective cyclins and cdks in regulating cell cycle. Comment on the implication of BRAF in the occurrence of cancer. 4+4
16. Elucidate the chemical natures of different types of lipids available in plasma membrane.

Internal Assessment : 10 marks

P.T.O.

(8)

Microbiology Basic

Paper : BOT - 303E

(Microbiology Basic)

Special Paper

(New Syllabus)

Full Marks : 50

Time : Two Hours

*The figures in the margin indicate full marks.
Candidates are required to give their answers
in their own words as far as practicable.*

Group - A

Answer any *four* questions.

2×4=8

1. What are methanogens? Give example.
2. What is interferon?
3. Mention two properties of plasmids.
4. Mention unique properties of M13?
5. What are viroids?
6. Give examples of two actinomycetes.

Group - B

Answer any *four* questions.

4×4=16

7. Write down the role of nif gene in nitrogen fixation.
8. Write down nodulation process of leguminous plants.

(9)

9. Mention the techniques for isolation and purification of viruses.
10. Write the principle and applications of phase contrast microscope.
11. Discuss different characters of mycoplasmas.
12. What are different mechanisms of drug resistance found in bacteria?

Group - C

Answer any *two* questions.

8×2=16

13. Write short notes on :

4+4

(a) Plant-microbe interaction;

(b) Topoisomerase.

14. (a) What are chemosynthetic microorganisms? Give example of two methanotrophic bacteria.

(b) Mention importance of continuous culture.

(3+2)+3

15. (a) What are oncogenes? How proto-oncogene becomes activated?

(b) Mention different types of amylases and their applications? What is competitive enzyme inhibition?

(2+2)+(2+2)

P.T.O.

(10)

16. Write notes on :

4+4

- (a) Mechanism of electron flow in purple and green sulfur bacteria;
- (b) Molecular biology of lambda bacteriophage.

Internal Assessment : 10 marks

(11)

**Palaeobotany, Palynology and
Plant Reproductive Ecology**

Paper : BOT - 303F

(Palaeobotany)

Special Paper

(New Syllabus)

Full Marks : 50

Time : Two Hours

*The figures in the margin indicate full marks.
Candidates are required to give their answers
in their own words as far as practicable.*

Group - A

Answer any *four* questions.

2×4=8

1. What are primary and secondary formed rocks?
2. What is meant by diastrophism?
3. What are boulders and cobble?
4. What is meant by lithostratigraphy?
5. Name two megafloreal elements of Barren Measure.
6. Who proposed the method of radio-carbon dating of rocks? Write down the mathematical expression of formation of radio carbons in cosmos.

P.T.O.

Group - B

Answer any *four* questions. $4 \times 4 = 16$

7. What is meant by principle of superposition of rocks?
What are 'dip' and 'strike' of a bed? What is geologic clock? $1+2+1$
8. Enumerate the miofloristics recovered from Talchir and Barakar formations. $2+2$
9. Write a comparative account of the megafloristics of Raniganj and Parsora formations. $2+2$
10. What are stromatolites? Mention their importance. 4
11. Write a brief note on distribution of Tertiary strata in India. 4
12. Describe the flora occurred during Mesozoic era. 4

Group - C

Answer any *two* questions. $8 \times 2 = 16$

13. What is meant by Gondwana sequence? Write down the basis of two fold classification of Indian Gondwana sequence. Discuss the mega floristics of Tiki and Hartala hill formations. $2+2+4$
14. Describe the plant succession that had occurred during Siluro-Devonian period. 8

15. What is meant by stratigraphy? What is local section?
What are homotaxial beds? How plant mega-fossils
support in understanding different local sections of a
given area? 2+1+1+4
16. Discuss in detail the Precambrian life-forms. 8

Internal Assessment : 10 marks

P.T.O.

(14)

**Plant Physiology, Biochemistry and
Molecular Biology**

Paper : BOT - 303G

(Plant Physiology)

Special Paper

(New Syllabus)

Full Marks : 50

Time : Two Hours

*The figures in the margin indicate full marks.
Candidates are required to give their answers
in their own words as far as practicable.*

Group - A

Answer any *four* questions.

2×4=8

1. What is the difference between stress and strain?
2. Mention the role of Calmodulin.
3. What is meant by night break phenomenon?
4. How GA regulates flowering?
5. What are SAGs and SDGs?
6. What is defensive PCD?

Group - B

Write short notes on any *four*.

4×4=16

7. Structure of Adenylate cyclase
8. Genes involved in floral development

(15)

9. Mechanism of sodium-potassium pump
10. IP3/DAG system for signal transduction
11. BAG family and their role in PCD
12. Plant responses to oxidative stress

Group - C

Answer any *two* questions. $8 \times 2 = 16$

13. What happens when plant tissue reaches harmful temperature? Describe the molecular mechanism plants employ to mitigate heat stress. $4+4$
14. Discuss about the receptors present in plasma membrane involved in signal transduction. How is protein phosphorylation and dephosphorylation involved in transducing signals? $3+5$
15. Briefly describe the ABC model of flower development. Write a note on vernalisation mediated epigenetic changes in gene expression during flowering. $4+4$
16. Schematically represent the model for regulatory pathway in flower development. Write down the role of enzymes in regulation of PCD in plants. $4+4$

Internal Assessment : 10 marks
