# 2022

## M.Sc.

## 4th Semester Examination

## BOTANY

## PAPER—402

*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 : Angiosperm Taxonomy

**1.** Answer any *four* questions. 4×2

(a) What is Apomorphic ? Give an example.

(b) Define Paleoherb. Give an example.

(c) Name a primitive living angiosperm.

(d) What is cryopreservation ?

(e) What is the significance of *Alyxia gracilis* (A.DC.) Hook. f. ?

(f) What is superfluous name ? Give an example.

**2.** Answer any *four* questions. 4×4

Differences between :

(a) Flora and Vegetation.

(b) Paraphyly and Polyphyly.

(c) Antigen and Antibody.

(d) Hot Spots and Hottest Hot spots.

(e) Monograph and Revision.

**3.** Answer any *two* questions. 2×8

(a) Define herbarium. Write the significance of herbarium in Taxonomy study. What are the differences between traditional and digital herbarium ? 2+3+3

(b) What is biodiversity ? Who first proposed this term ? Mention the year of publication. What are the basic and applied categories of biodiversity ? 2+2+4

(c) What is disjunction ? What are the reasons behind disjunction ? Is there any relation with endemism ? Write the differences between Invasions and Introductions ? 1+2+1+4

(d) Write short notes on Liliidae and Asteridae with their phylogeny, putative relationship with the order and few important plants. 4+4

*[ Internal Assessment – 10 Marks ]*

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## Special Paper 402B : Cytogenetics

1. Answer any *four* questions. 4×2

(a) Show how different portions of lipid molecules contribute to the cell membrane to attain its ultimate thickness.

(b) Explain the genetic drift in a population in terms of its nature and cause.

(c) Why the lampbrush chromosome attains its unique structure? Where is it found?

(d) Give an example of supernumerary chromosome. Comment on its origin.

(e) What is the Biological Species Concept?

(f) Mention the names of different members of two different kinds of proteins involved in cell cycle regulation and the nature of their interdependence.

**2.** Answer any *four* questions. 4×4

(a) What is heritability? How does narrow sense heritability differ from broad sense heritability? 1+3

(b) How can genetic drift lead to bottleneck condition and influence founder effect?

(c) Illustrate the arrangement, nature and functions of integral proteins of membrane.

(d) Write on the G protein coupled receptor in cell communication.

(e) Point out the cell cycle check points and mention their significance. 2+2

(f) Explain the nature of quantum speciation and the way it differs from sympatric speciation. 3+1

**3.** Answer any *two* questions. 2×8

(a) Contrast between Allopatric and Parapatric speciation. Highlight the unique nature of

Sympatric speciation explaining the reason behind it. 6+2

(b) Write on some characteristic features of B chromosomes. Comment on the nature of their occurrence in different kinds of plant species. 6+2

(c) Write a comprehensive note on the lipid components of plant cell membrane. Mention the diverse nature of performance due to the presence of different groups linked to phosphate group of lipid. 6+2

(d) How allele frequency may change in a population under the influence of different factors? Explain the constancy of allele frequency and genotype frequency with Hardy Weinberg's equation.

*[ Internal Assessment – 10 Marks ]*

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## Special Paper 402C : Ecology

**1.** Answer any *four* questions. 4×2

(a) Define Deep ecology.

(b) What is ecosystem ?

(c) Mention two unique properties of Ecotone.

(d) What are aerosols ?

(e) Mention the effects of Bhopal disaster.

(f) What is El Nino ?

**2.** Answer any *four* questions. 4×4

(a) Mention different causes of Global warming.

(b) Write a note on mangrove ecosystem.

(c) Write note on Montreal protocaol.

(d) Explain Ecological Resilieance ?

(e) Mention the causes Crypto-vivipary.

(f) Mention the influences of stockholm conference.

**3.** Answer any *two* questions. 2×8

(a) Write the structure and function of forest ecosystem. 4+4

(b) Define stress. Write three environmental stresses. Mention three adaptive features of aquatic plants. 2+3+3

(c) Define acid rain. Discuss the harmful impact of acid rain on lakes. 2+6

(d) Write a comprehensive note on different levels of biological organization in ecological concept.

*[ Internal Assessment – 10 Marks ]*

## Special Paper 402D : Microbiology-Basic

**1.** Answer any *four* questions. 4×2

(a) What is resolving power of a microscope ?

(b) What is diauxic growth ?

(c) Give two examples of Photosynthetic bacteria.

(d) What are bacteriocins ?

(e) What are prions ?

(f) Give example each of a sulphur oxidizing and nitrifying bacteria.

**2.** Answer any *four* questions. 4×4

(a) Mention structure and function of leg-haemoglobin.

(b) Write briefly about c-DNA library formation.

(c) Mention role of oncogenes in cancer formation.

(d) Write down mode of action and applications of amylase.

(e) Mention purification steps for viruses.

(f) Mention stages of biofilm formation.

**3.** Answer any *two* questions. 2×8

(a) Write down general characteristics and applications of Actinomycetes.

(b) Write down different mechanisms of drug resistance found in bacteria.

(c) Discuss structue of the nitrogenase enzyme.

(d) Write short note on :

(i) methylase;

(ii) topoisomerase.

*[ Internal Assessment - 10 Marks ]*

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## Special Paper 402E : Applied Mycology

**1.** Answer any *four* questions. 4×2

(a) What is spindle pole body ?

(b) Define heterokaryosis.

(c) Give the full forms of MEN and SIN.

(d) How vegemite is prepared ?

(e) What are MTOCs ?

**2.** Answer any *four* questions. 4×4

(a) Write about fungal siderophores.

(b) Discuss on Quom.

(c) Write a note on the role of PSF.

(d) Discuss about SCP obtained from fungi.

(e) Describe the role of fungi as biofertiliser.

(f) Enumerate the role of fungi in nutrient recycling.

3. Answer any *two* questions. 2×8

(a) Mention the different types of spindle pole body found in fungi and their function. 4+4

(b) Describe endogenous and exogenous dormancy of fungal spores. 4+4

(c) What are the salient features of heterokaryosis? How does it arise? 4+4

(d) Describe the different mechanisms by which mycorrhiza help higher plants.

*[ Internal Assessment – 10 Marks ]*

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**Special Paper 402F : Palaeobotany**

1. Answer any *four* questions. 4×2

(a) How sedimentary rocks are formed?

(b) Differentiate between silt and sand.

(c) What is meant by lithostratigraphy?

(d) Name four megafloral elements of Rajmahal formation.

(e) What is meant by overturned bed? Cite an example.

(f) Differentiate between conformity and unconformity.

**2.** Answer any *four* questions. 4×4

(a) Classify rocks recording to their origin and composition.

(b) Enumerate the megafloristics recovered from Tiki and Hartala hill formations. 2+2

(c) Write a short note on radiometric dating of rocks.

(d) What are guide fossils? Discuss the importance of guide fossil in stratigraphic deductions of an area. 2+2

(e) Write a brief note on stromatolites.

(f) Discuss the Cathaysian flora of Upper Carboniferous.

**3.** Answer any *two* questions. 2×8

(a) What is meant by Indian Gondwana Sequence ? Classify bi-partite system of Indian Gondwana. Describe the miofloritics of Barakar and Kulti formations. 2+2+4

(b) Write briefly about early life forms recovered from Precambrian strata.

(c) Briefly describe the megafloral succession during Siluro-Devonian period.

(d) Discuss briefly the early mesozoic floras of Molteno and Chinle formation.

*[ Internal Assessment - 10 Marks ]*

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## Special Paper 402G : Plant Physiology

**1.** Answer any *four* questions. 4×2

(a) What is LHC ? Mention the components of LHC II in higher plants.

(b) State the difference between adaptation and acclimation.

(c) Name any two synthetic hormones that are used in agriculture.

(d) What are SDGs and SAGs ?

(e) Why C4 plants are more efficient that C3 plants in terms of photosynthetic productivity ?

(f) Name the precursors of ethylene and IAA.

**2.** Answer any *four* questions. 4×4

(a) The roles of different chaperones in Rubisco assembly.

(b) Organization of genes in *Arabidopsis thaliana* chloroplast genome.

(c) Noncyclic photophosphorylation.

(d) Process of root nodule formation.

(e) Current models for IAA induced H+ extrusion.

(f) Biochemical events during senescence.

**3.** Answer any *two* questions. 2×8

(a) Write down the structure of nitrogenase complex. Briefly describe the role of different genes involved in nodulation. 4+4

(b) Differentiate between channel and carrier proteins. Describe the mechanism of action of $Na^+ - K^+$ pump. 3+5

(c) Discuss about the three classes of genes associated with floral development. What phytochrome ? How phytochrome is involved in flowering induction ? 2+1+5

(d) What happens when plant tissue reaches harmful temperature ? Briefly describe the mechanism of heat-stress tolerance in plants. 3+5

*[ Internal Assessment – 10 Marks ]*