



‘সমানো মন্ত্র: সমিতি: সমানী’

UNIVERSITY OF NORTH BENGAL

B.Sc. Honours 4th Semester Examination, 2024

SEC1-P2-BOTANY

Time Allotted: 2 Hours

Full Marks: 60

*The figures in the margin indicate full marks.***The question paper contains Paper - I, II, III, IV, V, VI, VII, VIII and IX.****The candidates are required to answer any *one* from *nine* papers.****Candidates should mention it clearly on the Answer Book.**

PAPER-I

BIOFERTILIZER

GROUP-A

1. Answer any **four** questions from the following: 3×4 = 12
- (a) Define Actinorhizal Symbiosis. Name one bacterium exhibiting this association. 2+1
- (b) Briefly describe the role of microbes used as biofertilizer. 3
- (c) Differentiate between Ectomycorrhizae and Endomycorrhizae. 3
- (d) Mention the uses of green manure and organic fertilizers. 1½ + 1½
- (e) Mention some major limitations of biofertilizer. 3
- (f) Name three nitrogen fixing biofertilizer. 1+1+1

GROUP-B

2. Answer any **four** questions from the following: 6×4 = 24
- (a) Discuss the process of mass multiplication of Rhizobium. 6
- (b) Write short notes on: 3+3
- (i) Azolla in rice cultivation
- (ii) VAM fungi.
- (c) Describe the method of making biocompost. Mention its important uses. 4+2
- (d) Discuss the importance of associative effect of different microorganisms in crop system. 6
- (e) What is Algalization? Mention the effects of Cyanobacteria biofertilizers on the rice cultivation. 1+5
- (f) Write down the process of vermicomposting. Mention its field application. 4+2

GROUP-C

3. Answer any **two** questions from the following: 12×2 = 24
- (a) Discuss in detail the isolation and inoculum production of VAM. How are mycorrhizae beneficial in crop system? 9+3
- (b) Give an account of process of recycling of biodegradable wastes from municipal, agricultural and industries. 4+4+4

- (c) Describe the mechanism of nitrogen fixation by cyanobacteria. Write down the significance of Anabaena-Azolla association. State in brief the importance of mycorrhizal association. 4+4+4
- (d) Give the systematic position and characteristic features of Azotobacter. Give an account of the production and application of Azotobacter. 3+3+3+3

PAPER-II

HERBAL TECHNOLOGY

GROUP-A

1. Answer any **four** questions from the following: 3×4 = 12
- (a) Write a short note on herbal therapy. 3
- (b) What is aromatherapy? Name two plants used in aromatherapy. 1+2
- (c) Distinguish between organised and unorganised drugs. 3
- (d) What is drug adulteration? Give example. 2+1
- (e) Define Siddha system of medicine. 3
- (f) Write the scientific name, systematic position and medicinal uses of Ashoka. 3

GROUP-B

2. Answer any **four** questions from the following: 6×4 = 24
- (a) Write a short note on biological testing of herbal drugs. 6
- (b) Describe the analytical profile and utilization of *Centella asiatica*. 6
- (c) Briefly discuss the biological evaluation of drug. 6
- (d) What is the role of micropropagation of neem in herbal technology? 6
- (e) Describe the phytochemical tests for identification of phenolic compounds. 6
- (f) Describe the uses of Ashoka in curing different ailments. 6

GROUP-C

3. Answer any **two** questions from the following: 12×2 = 24
- (a) What is secondary metabolite? Mention different types of pharmacological activities of steroids. 2+10
- (b) Discuss the importance of medicinal plants on human health. Write a note on future of pharmacognosy. 7+5
- (c) Discuss the cultivation, harvesting, processing of medicinal plants with special reference to *Withania somnifera*. 12
- (d) What is "LD₅₀" value? Write short note on marketing and utilization of medicinal plants. Discuss the micropropagation technique of Tulsi. 2+6+4

PAPER-III

NURSERY AND GARDENING

GROUP-A

1. Answer any **four** questions from the following: 3×4 = 12
- (a) What are the various operations used in gardening practices? 3

- (b) Explain the term 'air layering'. 3
 (c) What are the components of rooting medium? 3
 (d) What is the most suitable method of propagation for ornamental trees? Give reasons. 1+2
 (e) What is scarification? Mention its significance. 1+2
 (f) What are the factors affecting seed viability? 3

GROUP-B

2. Answer any **four** questions from the following: 6×4 = 24
 (a) What are the effective methods for testing various soil properties and nutrients level in home gardening? 6
 (b) What are the functions of shade house and glass house? 3+3
 (c) Write a short note on problems and prospects of tomato cultivation in North Bengal. 6
 (d) Mention various methods of breaking seed dormancy of garden plants. 6
 (e) What is seed bank? What are the various applications of computer in landscape designing? 2+4
 (f) Briefly discuss about the suitable infrastructure of an ideal Nursery. 6

GROUP-C

3. Answer any **two** questions from the following: 12×2 = 24
 (a) Write short notes on: 6+6
 (i) Transplanting of seedlings
 (ii) Seed propagation technology.
 (b) Describe the cultivation process of cabbage and brinjal with special references to its storage and marketing procedures. 6+6
 (c) Write short notes on:
 (i) Mist chamber
 (ii) Genetic erosion.
 (d) What is turf grass? Mention its significance. Distinguish between transplants and direct seedling. Write a note on seed certification system. 3+6+3

PAPER-IV**FLORICULTURE****GROUP-A**

1. Answer any **four** questions from the following: 3×4 = 12
 (a) Define the term defoliation. 3
 (b) What is Ikebana? How does Ikebana differ from the flower arrangement? 1+2
 (c) What is Bonsai? Give two examples of ornamental plants. 1+2
 (d) What are plant growth regulators? 3
 (e) Comment on the role of hi-tech floriculture in income generation. 3
 (f) Define the term "Wintering". Why is Wintering done in roses? 1+2

GROUP-B

2. Answer any **four** questions from the following: 6×4 = 24
 (a) Describe planting and transplanting with proper explanation. 3+3

- (b) Write short notes on: 3+3
- Topary
 - Pinching.
- (c) Discuss the factors affecting flower production. 6
- (d) Discuss sexual methods of propagation. Describe in brief some of the most commonly used methods of vegetative propagation. 2+4
- (e) What are the various cultivation method of orchids? 6
- (f) Mention the different steps involved in cultivation of succulents. 6

GROUP-C

3. Answer any **two** questions from the following: 12×2 = 24
- Write short notes on: 4+4+4
 - Mughal Garden
 - Garden Wall
 - Seed sowing of Nursery plants.
 - Discuss the cultivation technique and uses of Marigold and Dahlia. 6+6
 - What is pricking? Discuss the principles of Italian and Japanese garden design. 2+5+5
 - Define cut-flower. Briefly describe the process of packaging of cut flowers. 2+4+6
Discuss the importance of landscape gardening.

PAPER-V

MEDICINAL BOTANY

GROUP-A

1. Answer any **four** questions from the following: 3×4 = 12
- What do you mean by endemic species? Give two examples. 1+2
 - Explain the term Umoor-e-tabiya. 3
 - How botanic garden plays important role in conservation of medicinal plants? 3
 - Mention the 'Red List Criteria' of threatened plants. 3
 - Mention the uses of green house for nursery production. 3
 - Mention the role of ethnic communities in preserving folk medicines. 3

GROUP-B

2. Answer any **four** questions from the following: 6×4 = 24
- Explain how Biosphere reserve is important for the conservation of plant genetic resources. 6
 - Write short notes on: 3+3
 - Sacred groves
 - Ethnoecology.
 - Define the term Rasayana. Briefly mention the concept of Saptadhatu and Tridosha. 1+2½+2½
 - Define grafting. What are the advantages of grafting? 2+4
 - Discuss the future of pharmacognosy in relation to herbal food. 6
 - Classify Nursery. What are the major objectives of construction of Nursery? 3+3

GROUP-C

3. Answer any **two** questions from the following: 12×2 = 24
- (a) Write a note on 'History of Traditional Medicine on Indian Context'. 12
- (b) Differentiate between in-situ and ex-situ conservation. How medicinal plants are conserved in in-situ conservation method? Explain. 4+8
- (c) Explain how natural products help to cure certain diseases like infertility, skin diseases and cardiac arrests. 4+4+4
- (d) Elaborate on Ayurveda and Siddha System of Medicine. 6+6

PAPER-VI**PLANT DIVERSITY AND HUMAN WELFARE****GROUP-A**

1. Answer any **four** questions from the following: 3×4 = 12
- (a) Mention three reasons for the loss of species diversity. 3
- (b) Distinguish between in-situ and ex-situ conservation. 3
- (c) What is NTFP? Give examples. 2+1
- (d) Write short note on wild taxa. 3
- (e) What is the importance of Red data book? 3
- (f) What do you mean by sustainable development? Mention its significance. 2+1

GROUP-B

2. Answer any **four** questions from the following: 6×4 = 24
- (a) What do you mean by Agrobiodiversity? Write short note on ethical values of biodiversity. 3+3
- (b) Give an account of the varieties of ornamental plants found in India. 6
- (c) Write a note on uses of microbes in human welfare. 6
- (d) What are the factors responsible for ecosystem diversity? 6
- (e) Discuss the functions of WWF to manage biodiversity. 6
- (f) Name some fruit crops and state their commercial importance. 2+4

GROUP-C

3. Answer any **two** questions from the following: 12×2 = 24
- (a) Write short notes on: 6+6
- (i) Traditional alcoholic beverages
- (ii) Biodiversity awareness programmes.
- (b) Give a detailed account of biodiversity information management and communication. 12
- (c) What are avenue trees? Give examples. Mention the features of ideal avenue trees. Briefly discuss the different biodiversity legislation. 1+1+4+6
- (d) Briefly discuss the role of major laws towards protection of biodiversity. Mention the importance of forestry and their utilization. 6+6

PAPER-VII
ETHNOBOTANY

GROUP-A

1. Answer any **four** questions from the following: 3×4 = 12
- Write down the role of ethnobotany in modern medicinal practice. 3
 - Describe in brief the methods of field work in ethnobotany. 3
 - Mention the importance of ethnic groups in ethnobotanical studies. 3
 - Describe morphology of *Pongamia pinnata*. 3
 - Briefly describe "Sharing of wealth concept". 3
 - Mention the ethnobotanical use of *Cassia auriculata*. 3

GROUP-B

2. Answer any **four** questions from the following: 6×4 = 24
- What are the active principles in *Withania* sp? How are these used in modern medicine? 3+3
 - Write short notes on: 3+3
 - Endangered taxa
 - Participatory forest management.
 - Give examples of ancient literature relevant to ethnobotany. How do they help in preservation of traditional knowledge? 2+4
 - Describe the morphology of *Azadirachta indica*. Mention its various ethnobotanical uses. 3+3
 - Mention the role of ethnic groups in conservation of plant genetic resources. 6
 - 'Ethnobotany is an interdisciplinary science'. Justify the statement. 6

GROUP-C

3. Answer any **two** questions from the following: 12×2 = 24
- Write an essay on methodology in ethnobotanical studies. What is the role of sacred groves and temples? 10+2
 - Discuss the morphology and uses of: 6+6
 - Ocimum sanctum*
 - Indigofera tinctoria*
 - Describe the plants used by the tribal communities with reference to food plants, intoxicants and beverages and rasins and oils. 4+4+4
 - Define the term Intellectual Property Rights. Describe the legal aspects of ethnobotany as a tool to protect interests of ethnic groups. 2+10

PAPER-VIII

MUSHROOM CULTURE TECHNOLOGY

GROUP-A

1. Answer any **four** questions from the following: 3×4 = 12
- What is spawn? What are the qualities of good spawn? 1+2

- (b) What is casing material? Mention its function. 1+2
- (c) Name two edible mushrooms (botanical name). Name one commonly cultivated mushroom in India. 1+1+1
- (d) Name three major mushroom research centres in India. 3
- (e) Define pure culture. Name any two chemicals used as disinfectants. 1+1+1
- (f) What is inoculum? What is the optimum temperature required for the incubation of tropical mushroom? 2+1

GROUP-B

2. Answer any **four** questions from the following: 6×4 = 24
- (a) Describe the infrastructure required for a mushroom cultivation unit in case of oyster mushroom. 6
- (b) What are the importance of 'bed' in mushroom cultivation? What are the factors that affect the mushroom bed preparation? 2+4
- (c) Describe the nutritional aspect of mushroom with respect to amino acids, carbohydrates and vitamins. 2+2+2
- (d) Why do mushrooms make an ideal food? Explain. 6
- (e) Write the importance of post-harvest management of mushroom. Briefly describe the long-term storage of mushroom. 2+4
- (f) Write short notes on: 3+3
- (i) Export value of Mushroom
- (ii) Sterilization in spawn preparation.

GROUP-C

3. Answer any **two** questions from the following: 12×2 = 24
- (a) Define drying of mushroom. What are the importance of drying in the storage of mushroom? Briefly describe, the storage of mushroom in salt solutions. 2+4+6
- (b) Write notes on: 6+6
- (i) Composting technology in mushroom production
- (ii) Cost-benefit ratio in mushroom cultivation.
- (c) Describe the various types of foods prepared from mushroom. Explain short term storage of mushroom. Mention the medicinal value of edible mushroom. 6+3+3
- (d) Write short notes on: 4+4+4
- (i) Medicinal value of edible mushrooms
- (ii) Poisonous mushrooms
- (iii) Nutritional value of *Agaricus bisporus*.

PAPER-IX**INTELLECTUAL PROPERTY RIGHTS****GROUP-A**

1. Answer any **four** questions from the following: 3×4 = 12
- (a) What is GI tag? Explain its uses with examples. 1+2
- (b) Write down the characteristics of IP. 3

- (c) What is transfer of copyright? Define copyright infringement. $1\frac{1}{2}+1\frac{1}{2}$
 (d) Briefly describe Bio-prospecting and Bio-piracy. $1\frac{1}{2}+1\frac{1}{2}$
 (e) What are the differences between integrated circuit design and industrial design? 3
 (f) What is Traditional Knowledge Digital Library? 3

GROUP-B

2. Answer any **four** questions from the following: $6 \times 4 = 24$
 (a) Write a note on the computer softwares used in IPR. 6
 (b) Discuss the objectives and applications of Patenting Biotech Inventions. $3+3$
 (c) Write short notes on: $3+3$
 (i) Protection of goodwill
 (ii) TRIPS.
 (d) How does Protection of Plant Varieties take place in India? 6
 (e) What is Sui-Generis? What are the provision for providing protection to indigenous people and local communities? $2+4$
 (f) Briefly describe Patent Act, 1970 and its amendments. 6

GROUP-C

3. Answer any **two** questions from the following: $12 \times 2 = 24$
 (a) Describe the rights of farmers under The Protection of Plant Varieties and Farmers Rights Act, 2001. $6+6$
 (b) Explain the concept of Novelty and Inventive step. Describe the moral issues in Patenting Biotechnological inventions. $3+3+6$
 (c) What do you mean by rights? Discuss in detail Infringement, Passing off, Defences and Domain name of trademarks. $2+2\frac{1}{2}+2\frac{1}{2}+2\frac{1}{2}+2\frac{1}{2}$
 (d) What is Database and Data Protection? Discuss the laws related to protection of Semi-conductor chips. $2+2+8$

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CC8-BOTANY

MOLECULAR BIOLOGY

Time Allotted: 2 Hours

Full Marks: 40

The figures in the margin indicate full marks.

GROUP-A

1. Answer any **five** questions from the following: 1×5 = 5
- What is nucleosome?
 - What do you mean by RNA priming?
 - What is spliceosome?
 - Mention the role of rho (ρ) factor in transcription.
 - What is ribozyme?
 - What do you mean by central dogma of protein synthesis?
 - What do you mean by Shine-Dalgarno Sequence?
 - Mention the amino acid specified by the start codon during protein synthesis in Prokaryotes.

GROUP-B

2. Answer any **three** questions from the following: 5×3 = 15
- With suitable diagram, describe 3'-Polyadenylation during mRNA processing. 5
 - Briefly describe the Hershey-Chase experiment with proper diagram. 5
 - Delineate the characteristic features of Genetic Code. 5
 - Name the structural genes and their products of Lac Operon. With suitable diagram, illustrate the Positive regulation of Lac Operon. 2+3
 - Differentiate between: $2\frac{1}{2} + 2\frac{1}{2}$
 - Euchromatin and Heterochromatin
 - Prokaryotic Transcription and Eukaryotic Transcription.

GROUP-C

3. Answer any **two** questions from the following: 10×2 = 20
- Describe in stepwise manner the mRNA transcription in prokaryotes. 10
 - With suitable diagram, describe the initiation of translation process for the prokaryotes. Name any one protein synthesis inhibitor and its mode of action. 7+1+2
 - Discuss the Griffith's experiment with proper schemes and illustrations to prove that DNA is a genetic material. What is a circular DNA and where it is found? 8+1+1
 - Write notes on: 5×2 = 10
 - Attenuation
 - Types of DNA.

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CC9-BOTANY

PLANT ECOLOGY AND PHYTOGEOGRAPHY

Time Allotted: 2 Hours

Full Marks: 40

The figures in the margin indicate full marks.

GROUP-A

1. Answer any **five** questions:

1×5 = 5

- What is endemism? Name one endemic plant of India.
- What is natality?
- Give an example of symbiotic association.
- What is homeostasis?
- Define primary productivity.
- What is ecological niche?
- Name one ecosystem where an inverted pyramid can be observed.
- Define hydrological cycle.

GROUP-B

2. Answer any **three** questions:

5×3 = 15

- Differentiate between Commensalism and Parasitism.
- Discuss adaptive features in xerophyta.
- Give a brief account of phytogeographical regions of India.
- Briefly describe the phosphorus cycle in the ecosystem.
- Write a note on Ecotone and Edge effect.

$2\frac{1}{2} + 2\frac{1}{2}$
5
5
5
5

GROUP-C

3. Answer any **two** questions:

10×2 = 20

- Discuss various trophic levels in a forest ecosystem. Differentiate between food chain and food web.
- Write notes on:
(i) Carrying Capacity of population (ii) Soil profile.
- Explain the "Theory of Tolerance". Briefly describe various components of temperate biome.
- What is plant succession? Illustrate the various stages of hydrosere.

6+4
5+5
2+8
2+8

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CC10-BOTANY

PLANT SYSTEMATICS

Time Allotted: 2 Hours

Full Marks: 40

The figures in the margin indicate full marks.

GROUP-A

1. Answer any **five** questions from the following: 1×5 = 5
 - (a) What is basionym?
 - (b) Write the full names of Hook.f. and DC.
 - (c) Define monograph.
 - (d) What is the acronym of Central National Herbarium?
 - (e) What is cladogram?
 - (f) What is sporopollenin?
 - (g) Name two economically important plants from the family Asteraceae.
 - (h) What is cyathium inflorescence? Name one family where it is found.

GROUP-B

2. Answer any **three** questions from the following: 5×3 = 15
 - (a) Discuss the major contributions of Hutchinson and Cronquist. 5
 - (b) Briefly describe the salient features of the family Poaceae. 5
 - (c) Briefly discuss monophyly, paraphyly and polyphyly. 5
 - (d) What is taxonomic key? Differentiate between indented key and bracketed key. 2+3
 - (e) Give the full form of ICN. Describe the rules of ICN. 1+4

GROUP-C

3. Answer any **two** questions from the following: 10×2 = 20
 - (a) Briefly explain the Engler and Prantl's system of classification. Give an idea about the merits and demerits of the classification system. 6+4
 - (b) Compare and contrast the diagnostic features of family Brassicaceae and Lamiaceae. 5+5
 - (c) What is a type specimen? Discuss the various type specimens used in taxonomy. 2+8
 - (d) What do you mean by virtual herbarium? What are the function of Herbarium? Write two botanical Garden in India. 2+6+2

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