

Total No. of Questions : 4]

SEAT No. :

PD-3456

[Total No. of Pages : 2

[6482]-101
M.Sc (Part -I)
BOTANY
BOT-501 MJ: Plant Taxonomy - I (Algae & Fungi)
(2023 Pattern) (Semester - I)

Time : 2 Hours]

[Max. Marks : 35

Instructions to the candidate:

- 1) *All questions are compulsory.*
- 2) *Neat labelled diagrams must be drawn wherever necessary.*
- 3) *Figures to the right indicate full marks.*

Q1) Answer the following questions :

[5]

- a) Define algae
- b) What is diplontic life cycle?
- c) Enlist any two characters of fungi
- d) What is heterothallic fungi?
- e) Define mycorrhizae.

Q2) a) Attempt any one of the following :

[6]

- i) Explain classification thallus structure and reproduction in phaeo Phyta.
- ii) Describe occurrence, reproduction and life history pattern in Rhodophyta

P.T.O.

b) Attempt any one of the following [4]

- i) Comment on the contribution of any two Indian phychologist.
- ii) Give the structure of two types of Diatoms.

Q3) a) Attempt any one of the following [6]

- i) Explain classification reproduction and life cycle of basidiomycetes
- ii) Describe cell structure, thallus organisation in Ascomycetes.

b) Attempt any one of the following [4]

- i) Give comment on thallus structure & life cycle of Deuteromycetes.
- ii) What is Mycology? Describe step in preparation of fungal flora.

Q4) Write notes on (any four) : [10]

- a) Applications of marine algal farming.
- b) Algae as biofertilizer
- c) Bioremediation
- d) Fungal database
- e) Economic importance of lichen
- f) Role of algae as biofuel



Total No. of Questions : 4]

SEAT No. :

PD3457

[Total No. of Pages : 2

[6482]-102

M.Sc. - I

BOTANY

BOT - 502 - MJ : Plant Taxonomy - II (Bryophytes and Pteridophytes)

(2023 Credit Pattern) (Semester - I) (NEP)

Time : 2 Hours]

[Max. Marks : 35

Instructions to the candidates:

- 1) *All questions are compulsory.*
- 2) *Neat labelled diagram must be drawn wherever necessary.*
- 3) *Figures to the right indicates full marks.*

Q1) Answer the following questions.

[5]

- a) Why bryophytes called as an amphibian among plant kingdom?
- b) What is circinate vernation in ferns?
- c) What is the arrangement of leaves in selaginella?
- d) Which is the dominant phase in the life cycle of bryophytes?
- e) Give any two examples of leafy liverworts.

Q2) a) Attempt any one of the following.

[6]

- i) Explain the morphology & anatomy of sporophyte in Funaria.
- ii) Describe the structure of sporophyte in Anthoceros.

b) Attempt any one of the following.

[4]

- i) Write down the general characteristics of order Marchantiales.
- ii) Give affinities of bryophytes with thallophytes.

P.T.O.

Q3) a) Attempt any one of the following. **[6]**

- i) Comment on evolutionary significance of heterosporous pteridophytes.
- ii) Give brief account of life history of selaginella.

b) Attempt any one of the following. **[4]**

- i) Describe the reproductive structure in Equisetum.
- ii) Explain the anatomical structure of rhizome of pteris.

Q4) Write short notes on (any four). **[10]**

- a) Sporophytic body of Equisetum.
- b) Synangia
- c) Rhizoids & scales in bryophytes
- d) General characters of psilopsida.
- e) Adaptations of bryophytes to land habit.
- f) Economic importance of bryophytes.



Total No. of Questions : 4]

SEAT No. :

PD3458

[Total No. of Pages : 1

[6482]-103

M.Sc. - I

BOTANY

BOT-503-MJ: Plant Physiology

(NEP-2020) (2023 Credit Pattern) (Semester - I)

Time : 2 Hours]

[Max. Marks : 35

Instructions to the candidates:

- 1) *All questions are compulsory.*
- 2) *Figures to the right indicates full marks.*
- 3) *Draw neat labelled diagrams wherever necessary.*

Q1) Answer the following questions. (1 mark each) [5]

- a) Define glycolysis.
- b) Write any two physiological effects of salicylic acids.
- c) Define stress physiology.
- d) Enlist different types of antenna pigments.
- e) What is phloem loading?

Q2) a) Attempt any one of the following. [6]

- i) Describe C₃ cycle.
- ii) Explain respiratory electron transport system.

b) Attempt any one of the following. [4]

- i) Describe the kautsky curve.
- ii) Explain hexose monophosphate shunt.

Q3) a) Attempt any one of the following. [6]

- i) Give the structure and functions of phytochrome.
- ii) Explain the response of plants to biotic stress.

b) Attempt any one of the following. [4]

- i) Explain the mechanism of action of Jasmonic acids.
- ii) Describe source and sink relationship.

Q4) Write short notes on Any four of the following. [10]

- a) Unloading of phloem
- b) Response of plants to drought stress
- c) Light harvesting complexes
- d) Cytochrome
- e) Significance of glycolysis
- f) RUBISCO activity



Total No. of Questions : 4]

SEAT No. :

PD-3459

[Total No. of Pages : 2

[6482]-104

M.Sc. (Part - I)

BOTANY

BOT-504MJ : Plant Biochemistry

(2023 Pattern) (2 Credits) (Semester - I)

Time : 2 Hours]

[Max. Marks : 35

Instructions to the candidates :

- 1) All questions are compulsory.*
- 2) Draw neat and labeled diagrams wherever neccessary.*
- 3) Figures to the right indicate full marks.*

Q1) Answer the following questions:

[5]

- a) What is mean by percent (w/v) solution?
- b) Draw a structure of Glycine.
- c) Define lipid-metabolism.
- d) What is the role of Isomerase?
- e) Define pH.

Q2) a) Attempt any one of the following :

[6]

- i) Describe Glyoxylate cycle in detail.
- ii) Explain the biosynthetic pathway of terpenes.

b) Attempt any one of the following :

[4]

- i) Explain the role of buffers in biological systems.
- ii) Give the mechanism of nucleotide synthesis.

P.T.O.

Q3) a) Attempt any one of the following : **[6]**

- i) Explain the mechanism of proline synthesis in plant.
- ii) Describe the structure and Functions of Haemoglobin.

b) Attempt any one of the following : **[4]**

- i) Write about the mechanism of Enzyme action.
- ii) Describe a non-polar aliphatic 'R' group amino acids with example.

Q4) Write note on any four of the following : **[10]**

- a) Structural difference between DNA and RNA.
- b) Ribozymes
- c) Secondary metabolites.
- d) Protein folds.
- e) Competitive Inhibition.
- f) Seed storage proteins.



Total No. of Questions : 4]

SEAT No. :

PD-3461

[Total No. of Pages : 2

[6482]-106
M.Sc. (Part-I)
BOTANY
BOT-510 MJ: Landscape & Gardening
(2023 Pattern) (Semester - I)

Time : 2 Hours]

[Max. Marks : 35

Instructions to the candidate:

- 1) *All questions are compulsory.*
- 2) *Neat labelled diagrams must be drawn wherever necessary.*
- 3) *Figures to the right indicate full marks.*

Q1) Answer the following questions :

[5]

- a) Define landscape
- b) Write names of any two bulbous plants used in landscape gardening.
- c) What is walkway?
- d) Write types of irrigation.
- e) What is basic plan landscaping?

Q2) a) Attempt any one of the following :

[6]

- i) What are soft elements? Explain any three soft elements in landscape gardening.
- ii) Explain principle of unity & mobility in landscape gardening.

b) Attempt any one of the following

[4]

- i) Give role of arches in landscape gardening.
- ii) Write scope & importance of landscape gardening.

P.T.O.

Q3) a) Attempt any one of the following **[6]**

- i) What is landscape gardening? Write about any two types of landscape gardening.
- ii) Describe different aspects of maintenance in landscape gardening

b) Attempt any one of the following **[4]**

- i) What is grid? How it is used in landscape gardening.
- ii) Explain landscaping for hospitals

Q4) Write short notes on any four of the following : **[10]**

- a) Climbers in landscaping
- b) Auto CAD
- c) Landscape for Residents
- d) Industrial landscape
- e) Lawn
- f) Focal point



Total No. of Questions : 4]

SEAT No. :

PD3462

[Total No. of Pages : 1

[6482]-107

M.Sc. - I

BOTANY

**BOT-511-MJ: Post Harvest Technology of Commercial Crops
(2023 Credit Pattern) (Semester - I) (NEP)**

Time : 2 Hours]

[Max. Marks : 35

Instructions to the candidates:

- 1) *All questions are compulsory.*
- 2) *Neat labelled diagrams must be drawn wherever necessary.*
- 3) *Figures to the right indicate full marks.*

Q1) Answer the following. [5]

- a) Enlist the tools used for Harvesting.
- b) Give any '2' advantages of Maturity indices.
- c) Explain any one post-Harvesting treatment.
- d) Enlist the materials used for packaging.
- e) Define certification.

Q2) a) Attempt any one of the following. [6]

- i) Explain the physiological methods for identification of Maturity indices with example.
- ii) Comment on the different preservation techniques to enhance the product quality.

b) Attempt any one of the following. [4]

- i) Give the advantages of harvesting indices for post-harvest losses.
- ii) Comment on the nutritional value of cereals, and pulses.

Q3) a) Attempt any one of the following. [4]

- i) Explain the need of quarantine for exportation of product.
- ii) Describe ideal packaging system to prevent the damages.

b) Attempt any one of the following. [6]

- i) Describe the criteria used for the implementation of cost for the pre-harvested products.
- ii) Comment on HACCP.

Q4) Write note on any four of the following. [10]

- a) Nutritional value of any one medicinal plants.
- b) Maturity indices in horticultural crops.
- c) Jucing & fermenting option for processing.
- d) Grading & quality.
- e) Precautions to be taken for transportation of crop plants.
- f) Hydro-cooling.



Total No. of Questions : 4]

SEAT No. :

[Total No. of Pages : 1

PD3463

[6482]-108

M.Sc. (Part - I)

BOTANY

**BOT-512-MJ: Biodiversity Conservation and Utilization
(2023 Credit Pattern) (Semester - I) (NEP-2020) (2 Credits)**

Time : 2 Hours]

[Max. Marks : 35

Instructions to the candidates:

- 1) *All questions are compulsory.*
- 2) *Neat labelled diagrams must be drawn wherever necessary.*
- 3) *Figures to the right indicate full marks.*

Q1) Answer the following questions. [5]

- a) Define keystone species.
- b) Write any two fiber yielding plants.
- c) Define flagship species.
- d) Write botanical name of any two medicinal plants.
- e) Give full form of UNEP.

Q2) a) Attempt any one of the following. [6]

- i) Explain Biodiversity hotspots of India.
- ii) Give Levels of Biodiversity.

b) Attempt any one of the following. [4]

- i) Write causes of Biodiversity Loss.
- ii) Role of Botanical garden in Biodiversity conservation.

Q3) a) Attempt any one of the following. [6]

- i) Explain role of Biodiversity in perfume and fuel industry.
- ii) Give economic importance of ornamental and horticulture plants.

b) Attempt any one of the following. [4]

- i) Role of wwf in Biodiversity conservation.
- ii) Bioresources and their significance.

Q4) Write short notes on any four of the following. [10]

- a) Ex-situ conservation
- b) Farmer rights
- c) National park
- d) Medicinal plant
- e) Biodiversity Acts
- f) Sthalavrikshas



Total No. of Questions : 4]

SEAT No. :

PD3464

[Total No. of Pages : 1

[6482]-109

M.Sc. - I

BOTANY

**BOT-513-MJ: Integrated Pest Management (IPM)
(2023 Credit Pattern) (Semester - I) (NEP-2020)**

Time : 2 Hours]

[Max. Marks : 35

Instructions to the candidates:

- 1) *All questions are compulsory.*
- 2) *Neat labelled diagrams must be drawn wherever necessary.*
- 3) *Figures to the right indicate full marks.*

Q1) Answer the following questions. [5]

- a) Define Integrated Pest Management (IPM).
- b) What is crop rotation?
- c) Mention types of pesticides.
- d) What is biopesticide?
- e) What is validation of IPM?

Q2) a) Explain in brief any one of the following. [6]

- i) Explain application techniques and safety precautions for fungicides.
- ii) What is biological control? Explain its use in IPM.

b) Describe any one of the following. [4]

- i) Explain in brief designing and implementation of IPM programmes.
- ii) Describe climate change and its impact on pest management.

Q3) a) Explain in brief any one of the following. [6]

- i) Write biotechnology applications in pest management.
- ii) Explain constraints and strategies in implementation of IPM.

b) Describe any one of the following. [4]

- i) Explain significance of sustainable pest management.
- ii) Describe different pest population monitoring techniques.

Q4) Write notes on any four of the following. [10]

- a) Diversification
- b) Exclusion techniques
- c) Non agricultural pests
- d) Environmental impact assessment in IPM.
- e) Socioeconomic implication of pest control
- f) Innovations in IPM



Total No. of Questions : 4]

SEAT No. :

[Total No. of Pages : 1

PD3465

[6482]-110

First Year M.Sc.

BOTANY

BOT-514-MJ: Seed Science

(2023 Credit Pattern) (Semester - I) (NEP-2020)

Time : 2 Hours]

[Max. Marks : 35

Instructions to the candidates:

- 1) *All questions are compulsory.*
- 2) *Neat labelled diagrams must be drawn wherever necessary.*
- 3) *Figures to the right indicate full marks.*

Q1) Answer the following questions. [5]

- a) What is seed science?
- b) Enlist the methods of breaking the seed dormancy.
- c) Define - Seed Quarantine.
- d) Enlist two fiber crops.
- e) What is seed Law Enforcement?

Q2) a) Explain in brief any one of the following. [6]

- i) Explain seed structure. Give different types of classes of seed.
- ii) What are seed Legislation & Explain the statutory Bodies and Agencies in India.

b) Describe any one of the following. [4]

- i) Mechanism of seed transmission.
- ii) Biological Control of pest on Vegetable crops.

Q3) a) Explain in brief any one of the following. [6]

- i) What are Tz test? Explain peroxidase and plenol colour test.
- ii) What are seed Entomology? Give Life cycle of any one pest of fiber crops.

b) Describe any one of the following. [4]

- i) Seed coat Infection.
- ii) Storage grain pest with Example.

Q4) Write notes on any four of the following. [10]

- a) Seed Act - 1966
- b) Seed Ageing
- c) Factors Affecting seed dormancy
- d) Quick viability test
- e) Embryo Infection
- f) Physical parity Analysis



Total No. of Questions : 4]

SEAT No. :

[Total No. of Pages : 1

PD3466

[6482]-111

M.Sc. - I

BOTANY

**BOT-541-MN: Research Methodology in Plant Sciences
(2023 Credit Pattern) (Semester - I) (NEP-2020) (2 Credits)**

Time : 2 Hours]

[Max. Marks : 35

Instructions to the candidates:

- 1) All questions are compulsory.*
- 2) Figures to the right indicate full marks.*

Q1) Answer the following questions. [5]

- a) Write any two objectives of Research.
- b) What is difference between primary and secondary data.
- c) Define Literature Review.
- d) What is the need for research design.
- e) Write formula for calculation of Impact factor.

Q2) a) Attempt any one of the following. [6]

- i) Explain the methods of data collection and documentation.
- ii) Comment on T-test, Give its significance.

b) Attempt any one of the following. [4]

- i) Explain in details about writting research proposal.
- ii) Explain standard deviation.

Q3) a) Attempt any one of the following. [6]

- i) Define Hypothesis, Give various types of Hypothesis with example.
- ii) Explain how to write good review.

b) Attempt any one of the following. [4]

- i) Comment on IPR with example of patent.
- ii) Describe the techniques of defining research problem.

Q4) Write notes on. (Any four) [10]

- a) Types of Hypothesis
- b) Give layout of paper presentation
- c) Research Abstract
- d) Copyright
- e) Index Journal
- f) Mean, Mode and Median



Total No. of Questions : 4]

SEAT No. :

PD3467

[Total No. of Pages : 2

[6482]-201

M.Sc. -I

BOTANY

**BOT-551 MJ: Plant Taxonomy - III (Paleobotany and Gymnosperms)
(2023 Credit Pattern) (Semester-II)**

Time : 2 Hours]

[Max. Marks : 35

Instructions to the candidates:

- 1) *All questions are compulsory.*
- 2) *Neat labelled diagram must be drawn wherever necessary.*
- 3) *Figures to the right indicate full marks.*

Q1) Answer the following questions.

[5]

- a) What is Form genero Concept?
- b) Define gymnosperm.
- c) Mention any two characters of calamites.
- d) Write any two character of order cycadales.
- e) What is Paleobotany?

Q2) a) Explain in brief any one of the following.

[6]

- i) Explain female reproductive structure of Thuja with the help of diagram.
- ii) Describe external and internal morphology of Gnetales.

b) Describe any one of the following.

[4]

- i) Define fossil. Write any two types of fossils.
- ii) Explain the salient features of order Lepidodendrales.

P.T.O.

Q3) a) Explain in brief any one of the following. **[6]**

- i) Explain external and internal morphology of Rhynia with the help of diagram.
- ii) Write salient features of cycadeoidales and explain morphology of Williamsonia.

b) Describe any one of the following. **[4]**

- i) Describe the classification of gymnosperm according to Christenhusz et al. 2011.
- ii) Write about salient feature of order Taxales.

Q4) Write notes on any four of the following. **[10]**

- a) Salient features of Welwitschiales.
- b) Anatomy of Ephedra.
- c) Male cone of Zamia.
- d) Geological time scale.
- e) Petrification.
- f) Lepidodendron.



Total No. of Questions : 4]

SEAT No. :

PD3468

[Total No. of Pages : 2

[6482]-202

M.Sc. (Part-I)

BOTANY

**BOT552 MJ : Taxonomy of Angiosperms
(2023 Credit Pattern) (Semester -II) (NEP)**

Time : 2 Hours]

[Max. Marks : 35

Instructions to the candidates:

- 1) *All questions are compulsory.*
- 2) *Neat labelled diagrams must be drawn wherever necessary.*
- 3) *Figures to the right indicate full marks.*

Q1) Answer the following questions. **[5]**

- a) What is mean by hierarchy in taxonomy?
- b) Mention any two distinguishing character of family Bignoniaceae.
- c) What is molecular systematics?
- d) Write any two botanical names from Family Apiaceae.
- e) Define Phylogenetic System.

Q2) a) Explain in brief any one of the following. **[6]**

- i) Write important rules & recommendations of ICN.
- ii) Outline the major features & Principles of the APG-IV System of classification with its merits & demerits.

b) Describe any one of the following. **[4]**

- i) Give distinguishing characters of family Asteraceae with it's examples.
- ii) Describe the structure of Flower in Orchidaceae.

Q3) a) Explain in brief any one of the following. **[6]**

- i) Write Systematic position with reasons of family Araceae and give it's economic importance.
- ii) Give economic importance of family poaceae.

b) Describe any one of the following. **[4]**

- i) Write major contributions of E.K. Janaki Ammal in taxonomy.
- ii) Explain biological species concept.

P.T.O.

Q4) Write notes on any four of the following.

[10]

- a) Alpha taxonomy.
- b) Merits and demerits of Linnaeus classification system.
- c) Objectives of plant systematics.
- d) Affinities in family Nymphaeaceae.
- e) Economic importance of family Bignoniaceae.
- f) Systematic position of Dipterocarpaceae as per B. & H.



Total No. of Questions : 4]

SEAT No. :

[Total No. of Pages : 2

PD3469

[6482]-203

M.Sc. (Part - I)

BOTANY

**BOT-553-MJ: Cytogenetics and Plant Breeding
(2023 Credit Pattern) (NEP) (Semester - II)**

Time : 2 Hours]

[Max. Marks : 35

Instructions to the candidates:

- 1) *All questions are compulsory.*
- 2) *Neat labelled diagrams must be draw wherever necessary.*
- 3) *Figures to the right indicate full marks.*

Q1) Answer the following questions. [5]

- a) Define cytogenetics.
- b) What is karyotype?
- c) What is pureline selection?
- d) Define plant breeding.
- e) What is aneuploidy?

Q2) a) Explain in brief any one of the following. [6]

- i) What is gene mapping? Explain three point test cross with suitable example.
- ii) Cytological consequences of crossing over in inversion and translocation heterozygotes.

b) Describe any one of the following. [4]

- i) History of plant breeding in India.
- ii) What is heterosis? Describe genetic basis of heterosis.

Q3) a) Explain in brief any one of the following. [6]

- i) What is mass selection? Give procedure of mass selection and add a note on advantages and disadvantages of mass selection.
- ii) Procedure of pureline selection, write its advantages disadvantages and achievements.

b) Describe any one of the following. [4]

- i) Preparation of chromosome for karyotype.
- ii) What is mutation? Explain any two types of mutation in detail.

P.T.O.

Q4) Write notes on any four of the following.

[10]

- a) Somatic cell mapping.
- b) Characters of pureline selection.
- c) Two point test cross.
- d) Male sterility.
- e) Applications of cytogenetics.
- f) Scope and objectives of plant breeding.



Total No. of Questions : 4]

SEAT No. :

PD3470

[Total No. of Pages : 2

[6482]-204

M.Sc. - I

BOTANY

**BOT - 554 - MJ : Molecular Biology
(NEP 2023 Credit Pattern) (Semester - II)**

Time : 2 Hours]

[Max. Marks : 35

Instructions to the candidates:

- 1) All questions are compulsory.*
- 2) Neat labelled diagrams must be drawn wherever necessary.*
- 3) Figures to the right indicate full marks.*

Q1) Answer the following questions.

[5]

- a) Define nuclease.
- b) Write any two properties of genetic code.
- c) Enlist histone subunits.
- d) Define transcription.
- e) What is nucleosome?

Q2) a) Explain in brief any one of the following.

[6]

- i) DNA packaging in eukaryotes.
- ii) Nucleotide excision repair with suitable diagram.

b) Describe any one of the following.

[4]

- i) Transcription apparatus.
- ii) Process of translation in prokaryotes.

P.T.O.

Q3) a) Explain in brief any one of the following. **[6]**

- i) Enzymes and factors involved in DNA replication.
- ii) What is gene regulation? Explain positive and negative gene regulation.

b) Describe any one of the following. **[4]**

- i) Any two DNA modifying enzymes.
- ii) General factors in DNA replication.

Q4) Write notes on any four of the following. **[10]**

- a) Need of DNA packaging.
- b) Structure of spliceosome.
- c) Lac operon.
- d) Types of DNA damage.
- e) Structure of DNA polymerase.
- f) Protein folding and processing.



Total No. of Questions : 4]

SEAT No. :

PD-3471

[Total No. of Pages : 2

[6482]-205
M.Sc. (Part - I)
BOTANY
BOT - 555 - MJ : Pharmacognosy
(2023 Credit Pattern) (Semester - II)

Time : 2 Hours]

[Max. Marks : 35

Instructions to the candidates:

- 1) *All questions are compulsory.*
- 2) *Neat labelled diagrams must be drawn wherever necessary.*
- 3) *Figures to the right indicate full marks.*

Q1) Answer the following questions.

[5]

- a) Give the importance of pharmacognosy.
- b) Define reverse pharmacology.
- c) What is the substitution of herbal drug?
- d) Write any two properties (medicinal) of Quercetin.
- e) Define crude drug.

Q2) a) Explain in brief any one of the following :

[6]

- i) Enlist different genetic manipulators. Describe the role of any 3 manipulators in cultivation of medicinal plants.
- ii) Define extraction. Describe any three methods of extraction.

b) Describe any one of the following :

[4]

- i) Describe the method of cultivation of Isabgol.
- ii) Give the Occurrence of phenolic acids. Describe its medicinal uses and health benefits.

P.T.O.

Q3) a) Explain in brief any one of the following : **[6]**

- i) Write about the chemical nature of B-carotene. Explain its medicinal uses & health benefits.
- ii) Give the source, cultivation and applications of Becopa monnieri.

b) Describe any one of the following : **[4]**

- i) Define adulteration. Describe different types of adulteration.
- ii) Describe role of plant growth regulators in the cultivation of medicinal plants.

Q4) Write notes on any four of the following. **[10]**

- a) Current trade of medicinal plants.
- b) HPTLC in purification of extracts.
- c) Deterioration in herbal drugs.
- d) Ethnopharmacology in drug evaluation
- e) Flavonoids
- f) Plantago Ovata



Total No. of Questions : 4]

SEAT No. :

PD-3472

[Total No. of Pages : 2

[6482]-206

M.Sc. (Part - I)

BOTANY

BOT - 560 - MJ : Hydroponics Technology

(2023 Credit Pattern) (Semester - II)

Time : 2 Hours]

[Max. Marks : 35

Instructions to the candidates:

- 1) *All questions are compulsory.*
- 2) *Neat labelled diagrams must be drawn wherever necessary.*
- 3) *Figures to the right indicate full marks.*

Q1) Answer the following questions.

[5]

- a) What are Macronutrients?
- b) Define hydroponics entrepreneurship.
- c) What is concept of hydroponics?
- d) Enlist chemical factors affecting plant nutrition.
- e) What is static solution culture?

Q2) a) Explain in brief any one of the following :

[6]

- i) Definition, types and future development of hydroponics technology.
- ii) Role of government in promoting hydroponics entrepreneurship.

b) Describe any one of the following :

[4]

- i) Nutrient monitoring and fertilizer selection for hydroponics technology.
- ii) Chilly cultivation through NFT system.

P.T.O.

- Q3) a)** Explain in brief any one of the following : **[6]**
- i) History and present status of hydroponics technology in contrast with soil based culture.
 - ii) Significance and challenges of hydroponics technology.
- b)** Describe any one of the following : **[4]**
- i) Formulation and monitoring of macro and micronutrients in hydroponics.
 - ii) Cultivation of spinach through raft system.
- Q4)** Write notes on any four of the following. **[10]**
- a) Plant nutrition
 - b) Media used for hydroponics
 - c) Applications of hydroponics
 - d) Techniques in hydroponics
 - e) Deficiency symptoms of essential mineral elements
 - f) Global hydroponics market



Total No. of Questions : 4]

SEAT No. :

PD-3473

[Total No. of Pages : 2

[6482]-207

M.Sc. (Part - I)

BOTANY

**BOT-561MJ : Post Harvest Technology of NTFPs
(Non Timber Forest Products)
(2023 Credit Pattern) (Semester - II)**

Time : 2 Hours]

[Max. Marks : 35

Instructions to the candidates :

- 1) *All questions are compulsory.*
- 2) *Figures to the right indicates full marks.*
- 3) *Neat labelled diagrams must be drawn wherever necessary.*

Q1) Answer the following questions:

[5]

- a) Give any two examples of oleoresins yielding plants.
- b) Write any two sources of tannin.
- c) Give the methods of cultivation of canes.
- d) What are flasses?
- e) Define post harvest management.

Q2) a) Explain in brief any one of the following :

[6]

- i) Explain sources & Extraction of Katha.
- ii) What is IPR? Add a note on sustainable development in NTFPs.

b) Describe any one of the following:

[4]

- i) What is Gum? Give the classification of Gum.
- ii) Explain Nature & occurrence of Non-essential oils.

P.T.O.

Q3) a) Explain in brief any one of the following: **[6]**

- i) Define resins Add a note on collection & sources of resins.
- ii) Write a note on processing of NTFPs.

b) Describe any one of the following: **[4]**

- i) Write sources & classification of dyes?
- ii) Write a note on processing of Beedi leaves.

Q4) Write notes on any four of the following : **[10]**

- a) NTFPs & Traditional knowledge.
- b) Classification of Resins.
- c) Conservation of Bamboo
- d) Plants used as spices
- e) Dye yielding plants.
- f) Post - harvest management in NTFPs.



Total No. of Questions : 4]

SEAT No. :

PD-3474

[Total No. of Pages : 2

[6482]-208

M.Sc.-I

BOTANY

**BOT-562MJ: Plant Resource Management and Geo-spatial Techniques
(2023 Pattern) (Semester - II)**

Time : 2 Hours]

[Max. Marks : 35

Instructions to the candidates:

- 1) All questions are compulsory.*
- 2) Neat labelled diagrams must be drawn wherever necessary.*
- 3) Figures to the right indicate full marks.*

Q1) Answer the following questions :

[5]

- a) What is GPS?
- b) Define center of origin.
- c) What is ex-situ conservation?
- d) What are mapping?
- e) Define Natural dyes

Q2) a) Explain in brief any one of the following :

[6]

- i) National environmental conservation strategies.
- ii) Principles of remote sensing.

b) Describe any one of the following :

[4]

- i) Medicinal Plant Resources
- ii) Basic concept of sustainable development

P.T.O.

Q3) a) Explain in brief any one of the following : **[6]**

- i) Plants used in sugar and starch industry
- ii) GIS techniques

b) Describe any one of the following : **[4]**

- i) Integration of GPS data with GIS.
- ii) Geo-spatial technique.

Q4) Write notes on any four of the following : **[10]**

- a) Resins
- b) In-situ conservation
- c) Environmental education and awareness
- d) Geocoding
- e) Fodder and Fiber crops
- f) Image classification



Total No. of Questions : 4]

SEAT No. :

PD3475

[Total No. of Pages : 2

[6482]-209

M.Sc. - I

BOTANY

**BOT-563-MJ: Plant-Microbe Interaction
(2023 Credit Pattern) (Semester - II)**

Time : 2 Hours]

[Max. Marks : 35

Instructions to the candidates:

- 1) *All questions are compulsory.*
- 2) *Neat labelled diagrams must be drawn wherever necessary.*
- 3) *Figures to the right indicate full marks.*

Q1) Answer the following questions. [5]

- a) What are endophytic fungi?
- b) Give any two examples of endophytic bacteria for biocontrol.
- c) Define Phytopathogenic fungi.
- d) What is quorum sensing in plant pathogen?
- e) Define MYC.

Q2) a) Explain in brief any one of the following. [6]

- i) Explain nutrient uptake mechanism and stress tolerance by endophytic bacteria.
- ii) Discuss tri-trophic interaction of plants with herbivores.

b) Describe any one of the following. [4]

- i) Give details about zigzag model of plant immunity.
- ii) Give details of stomatal Hijacking.

Q3) a) Explain in brief any one of the following. [6]

- i) Define pathogenic bacteria. Explain how pathogenic bacteria manipulate plants.
- ii) Discuss in details interaction of fungi with plants with an example.

b) Describe any one of the following. [4]

- i) Describe the role of NOD factors in symbiotic relationship.
- ii) Explain interaction of plant parasitic nematode with plants.

P.T.O.

Q4) Write notes on any four of the following.

[10]

- a) Symbiotic nitrogen fixation.
- b) Role of SA and JA in plant defence.
- c) Applications of endophytic fungi.
- d) Mechanism of host penetration.
- e) Plant lectins.
- f) Diet breadth.



Total No. of Questions : 4]

SEAT No. :

PD3476

[Total No. of Pages : 2

[6482]-210

M.Sc. - I

BOTANY

**BOT-564-MJ: Seed Technology
(2023 Credit Pattern) (NEP) (Semester - II)**

Time : 2 Hours]

[Max. Marks : 35

Instructions to the candidates:

- 1) *All questions are compulsory.*
- 2) *Neat labelled diagrams must be drawn wherever necessary.*
- 3) *Figures to the right indicate full marks.*

Q1) Answer the following questions. [5]

- a) Define seed sampling.
- b) Define seed technology.
- c) What is a seed certification?
- d) Write about chemical pesticide.
- e) What is a long form of SCA.

Q2) a) Explain in brief any one of the following. [6]

- i) Explain seed production technique in hybrid.
- ii) What is seed inspection? and write procedure and observation during field inspection.

b) Describe any one of the following. [4]

- i) What is seed sampling? and Explain the procedure of seed sampling.
- ii) Write in brief seed packing and storage.

Q3) a) Explain in brief any one of the following. [6]

- i) Write objectives of seed processing and give general layout of seed processing unit.
- ii) Write in brief duties and responsibilities of seed certification officer.

b) Describe any one of the following. [4]

- i) Describe the objective and role of private seed enterprises.
- ii) Describe general procedure of seed production.

P.T.O.

Q4) Write notes on any four of the following.

[10]

- a) Seed weighing & packing.
- b) Scope and importance of seed technology.
- c) Type of seed sample.
- d) Self - incompatibility.
- e) Artificial pollination.
- f) Mixing equipment of seed sample.



Total No. of Questions : 7]

SEAT No. :

PD-3477

[Total No. of Pages : 2

[6482]-301

M.Sc. (Part - II)

BOTANY

**BOT 601A MJ : Advanced Taxonomy of Angiosperms - I
(2023 Credit Pattern) (Semester - III)**

Time : 3 Hours]

[Max. Marks : 70

Instructions to the candidates:

- 1) *Q. 1 is compulsory.*
- 2) *Attempt any Five questions from Q.2 to Q.7.*
- 3) *Q.2 to 7 carry equal marks.*
- 4) *Neat labelled diagrams must be drawn wherever necessary.*
- 5) *Figures to the right indicate full marks.*

Q1) Answer any Five of the following :

[10]

- a) Give any two objectives of taxonomy.
- b) Monographs.
- c) Fossil angiosperms.
- d) Apomictic speciation
- e) Numerical taxonomy.
- f) Monophyly.

Q2) a) Discuss history of botanical explorations in Maharashtra.

[5]

b) Define speciation. Explain allopatric speciation with example.

[7]

Q3) a) Discuss evolutionary trends in carpels.

[5]

b) Define angiosperms. Write characteristic features of angiosperms.

[7]

Q4) a) Define cladistics. Comment on homology giving example.

[5]

b) Write classification, distinguishing characters and economic importance of liliales.

[7]

Q5) a) Give classification and distinguishing characters of scrophulariales.

[5]

b) Explain parallelism and convergence giving examples.

[7]

P.T.O.

Q6) a) Economic importance of zingiberales. [5]

b) Outline of cronquist system of classification. [7]

Q7) Write short notes on any two of the following : [12]

a) Different type of taxonomic literature.

b) Origin and age of angiosperms.

c) Economic importance of urticales.



Total No. of Questions : 7]

SEAT No. :

PD3478

[Total No. of Pages : 2

[6482]-302

M.Sc. - II

BOTANY

**BOT-601B-MJ: Cytogenetics and Plant Breeding - I
(2023 Credit Pattern) (Semester - III) (NEP-2020)**

Time : 3 Hours]

[Max. Marks : 70

Instructions to the candidates:

- 1) *Q.1 is compulsory.*
- 2) *Attempt any five questions form Q.2 to Q.7.*
- 3) *Questions 2 to 7 carry equal marks.*
- 4) *Neat labelled diagrams must be drawn wherever necessary.*
- 5) *Figures to the right indicate full marks.*

Q1) Answer any five of the following. [10]

- a) What is chromosomal theory of inheritance?
- b) Define duplication.
- c) What is pericentric inversion?
- d) Define autopolyploidy.
- e) What is self incompatibility?
- f) Enlist any two applications of bulk method.

Q2) a) Write note on applications of cytogenetics. [5]

b) Describe origin, occurrence, production and types of deletion. [7]

Q3) a) Explain detail procedure for pureline selection. [5]

b) Explain in detail duplication in plant breeding. [7]

Q4) a) Give evolutionary significance of polyploids. [5]

b) Explain trisomy in Datura and humans. [7]

Q5) a) Describe in brief genetic male sterility. [5]

b) Explain cytology of apomicts. [7]

P.T.O.

- Q6)** a) Write on history of plant breeding. [5]
b) Describe heteromorphic self incompatibility and add a note on distyly and tristyly. [7]
- Q7)** Write short notes on any two of the following. [12]
a) Procedure for transfer of recessive gene in backcross method.
b) Merits and demerits of bulk method.
c) Explain achievements of pedigree method.



Total No. of Questions : 7]

SEAT No. :

PD3479

[Total No. of Pages : 2

[6482]-303

M.Sc. - II

BOTANY

BOT-601CMJ: Plant Physiology - I
(2023 Credit Pattern) (Semester - III) (NEP)

Time : 3 Hours]

[Max. Marks : 70

Instructions to the candidates:

- 1) *Q.1 is compulsory.*
- 2) *Attempt any five questions form Q.2 to Q.7.*
- 3) *Questions 2 to 7 carry equal marks.*
- 4) *Neat labelled diagrams must be drawn wherever necessary.*
- 5) *Figures to the right indicate full marks.*

Q1) Answer any five of the following. [10]

- a) Give the importance of buffer.
- b) What is Donnan equilibrium?
- c) Define photorespiration.
- d) What is the role of cyanide resistant pathway?
- e) Define vernalization.
- f) Mention the role of florigen.

Q2) a) Explain the role of secondary Metabolies in stress. [5]

- b) Describe the molecular mechanism and regulation of guard cell with the help of suitable diagram. [7]

Q3) a) What is passive transport? Explain different types of passive transport.[5]

- b) Describe the mitochondrial electron transport chain in detail with suitable diagram. [7]

Q4) a) Explain the role of pigments in photosynthesis. [5]

- b) Define terpenoids. Describe the classification of terpenoids in detail with suitable examples. [7]

P.T.O.

- Q5)** a) What is auxin? Explain the physiological role of auxin. [5]
b) Describe the regulation of photoperiodism with suitable diagram. [7]
- Q6)** a) Explain the Mechanism of seed development. [5]
b) Describe the CO₂ concentrating Mechanism in C₄ plants. [7]
- Q7)** Write short notes on any two of the following. [12]
a) Aquaporins
b) Interrelationship between primary & secondary metabolites
c) Forms of phytochromes



Total No. of Questions : 7]

SEAT No. :

[Total No. of Pages : 2

PD3480

[6482]-304

M.Sc. - II

BOTANY

**BOT-601D MJ: Herbal Drug Technology - I
(2023 Credit Pattern) (Semester - III) (NEP)**

Time : 3 Hours]

[Max. Marks : 70

Instructions to the candidates:

- 1) *Q.1 is compulsory.*
- 2) *Attempt any five questions form Q.2 to Q.7.*
- 3) *Questions 2 to 7 carry equal marks.*
- 4) *Neat labelled diagrams must be drawn wherever necessary.*
- 5) *Figures to the right indicate full marks.*

Q1) Answer any five of the following. [10]

- a) Enlist endogenous factors affecting cultivation of crude drugs.
- b) Write medicinal properties of senna.
- c) Enlist general methods of extraction.
- d) Give any four applications of LCMS.
- e) Enlist the types of drug adulteration.
- f) What are marine natural products?

Q2) a) Explain super critical extraction method. [5]

b) Explain biosynthesis pathway & extraction of tannic acid. [7]

Q3) a) Give an account of detection of heavy metals from natural drugs. [5]

b) Explain Ex-situ conservation of medicinal plants. [7]

Q4) a) Write applications of HPTLC. [5]

b) Describe in detail microwave assisted extraction method. [7]

Q5) a) Describe the systematic method of cultivation & post harvest technology of Ispaghula. [5]

b) Give an account of advantages and disadvantages of marine toxins. [7]

P.T.O.

- Q6)** a) Write a note on purification of extract with any one suitable method. [5]
b) Describe in detail biosynthesis and extraction of β -carotene. [7]

Q7) Write short notes on any two of the following. [12]

- a) Factors affecting cultivation of crude drugs
- b) Selection of solvents for extraction
- c) Use & scope of environment friendly pesticides



Total No. of Questions : 7]

SEAT No. :

PD3481

[Total No. of Pages : 2

[6482]-305

M.Sc. - II

BOTANY

**BOT-601EMJ: Seed Science and Seed Technology - I
(2023 Credit Pattern) (Semester - III) (NEP-2020)**

Time : 3 Hours]

[Max. Marks : 70

Instructions to the candidates:

- 1) *Q.1 is compulsory.*
- 2) *Attempt any five questions form Q.2 to Q.7.*
- 3) *Questions 2 to 7 carry equal marks.*
- 4) *Neat labelled diagrams must be drawn wherever necessary.*
- 5) *Figures to the right indicate full marks.*

Q1) Answer any five of the following.

[10]

- a) Give key features of Pigeon pea & lower.
- b) What type of inflorescence is seen in Fenugreek.
- c) Give any four disadvantages of organic farming.
- d) Enlist the components used for enriching soil fertility.
- e) Define biopesticide.
- f) Define emasculation.

Q2) a) Describe practices involved in preperation of land for vegetable seed production. **[5]**

b) Explain the basic concept and scope of organic farming in agriculture. **[7]**

Q3) a) Describe the inflorescence and root morphology in cotton. **[5]**

b) Classify the vegetables on the basis of nature of pollination. **[7]**

Q4) a) How does organic farming improve soil health. **[5]**

b) Explain the primary morphological characters of field crop maize. **[7]**

Q5) a) Explain crop rotation, how does it benefit seed production. **[5]**

b) Describe the seed production process of cow pea, emphasizing soil requirements and pest control. **[7]**

P.T.O.

- Q6)** a) Explain methods of weed management. [5]
b) Describe cultural practices in vegetable seed production. [7]
- Q7)** Write short notes on any two of the following. [12]
a) Harvesting, threshing and Grading
b) Hybrid seed production in vegetables
c) Components used for enriching soil fertility



Total No. of Questions : 7]

SEAT No. :

PD3482

[Total No. of Pages : 2

[6482]-306

M.Sc. - II

BOTANY

**BOT-601F MJ: Applied Ecology and Environment - I
(2023 Credit Pattern) (Semester - III) (NEP)**

Time : 3 Hours]

[Max. Marks : 70

Instructions to the candidates:

- 1) *Q.1 is compulsory.*
- 2) *Attempt any five questions from Q.2 to Q.7.*
- 3) *Questions 2 to 7 carry equal marks.*
- 4) *Neat labelled diagrams must be drawn wherever necessary.*
- 5) *Figures to the right indicate full marks.*

Q1) Answer any five of the following.

[10]

- a) What is Ecosystem & Write any two function of Ecosystem.
- b) Define energy fixation.
- c) What is sacred groves in India.
- d) Define Ecology and give any two scope of Ecology.
- e) What are the type of Biodiversity conservation.
- f) What is Ecotone and give any one role in biological process.

Q2) a) Explain the concept of competition exploitation and mutualism.

[5]

b) Explain Economic Effect of air pollutant vehicular pollution & Industrial pollution.

[7]

Q3) a) Explain Energy flow through food chain and food web.

[5]

b) Discuss on protected area and sacred grove in India.

[7]

Q4) a) Explain concept of Hotspot & Hotspot in India.

[5]

b) Explain the population of Dynamic's.

[7]

Q5) a) Explain the effect of environmental factor on organism.

[5]

b) Explain food web & concept of niche & keystone species.

[7]

P.T.O.

- Q6)** a) Describe heavy metal and their effect on biota. [5]
b) Explain Biosphere as an ecosystem & write its Ecological process. [7]

Q7) Write short notes on any two of the following. [12]

- a) National parks
- b) Effect of water pollution on living organism
- c) Ecological efficiencies & pyramids



Total No. of Questions : 7]

SEAT No. :

PD3483

[Total No. of Pages : 2

[6482]-307

M.Sc. - II

BOTANY

**BOT-601G-MJ: Advanced Mycology and Plant Pathology - I
(2023 Credit Pattern) (Semester - III) (NEP-2020)**

Time : 3 Hours]

[Max. Marks : 70

Instructions to the candidates:

- 1) *Q.1 is compulsory.*
- 2) *Attempt any five questions form Q.2 to Q.7.*
- 3) *Questions 2 to 7 carry equal marks.*
- 4) *Neat labelled diagrams must be drawn wherever necessary.*
- 5) *Figures to the right indicate full marks.*

Q1) Answer any five of the following. [10]

- a) What are Appresoria?
- b) Name two sex hormones found in fungi.
- c) Name two entomogenous fungi.
- d) What is dolipore septa?
- e) What is pseudoplasmodium?
- f) What is symptomology in fungi?

Q2) a) Describe fungal Nutrition in brief. [5]

- b) Describe outline of fungal classification as per Alexopolus, Mims and Blackwell (1996). [7]

Q3) a) Explain distinguishing characters of zygomycotina. [5]

- b) Describe life cycle pattern of stemonitis. [7]

Q4) a) Describe lifecycle pattern in Euascomycetes with suitable example. [5]

- b) Discuss distinguishing characters of Deuteromycotina. [7]

Q5) a) Describe the role of different enzymes during disease development. [5]

- b) Discuss the concept and Importance of plant diseases. [7]

P.T.O.

Q6) a) Describe zoospore variation in Mastigomycotina. **[5]**

b) Describe different types of conidia. **[7]**

Q7) Write short notes on any two of the following. **[12]**

a) Fungal toxins

b) Xerotolerant and osmotolerant fungi

c) Nematophagous fungi



Total No. of Questions : 7]

SEAT No. :

PD3484

[Total No. of Pages : 2

[6482]-308

M.Sc. - II

BOTANY

**BOT - 602 - MJ : Advanced Tools and Techniques in Plant Sciences
(2023 Credit Pattern) (Semester - III) (NEP 2024)**

Time : 3 Hours]

[Max. Marks : 70

Instructions to the candidates:

- 1) Question 1 is compulsory.*
- 2) Attempt any five questions from Q.2 to Q.7.*
- 3) Questions 2 to 7 carry equal marks.*
- 4) Neat labelled diagrams must be drawn wherever necessary.*
- 5) Figures to the right indicate full marks.*

Q1) Answer any five of the following.

[10]

- a) Give speed and unit of centrifugation.
- b) Give principle of electrophoresis.
- c) What is pH.
- d) Give applications of digital herbarium.
- e) Enlist different types of Drones.
- f) Write any two fluorescent Molecules.

Q2) a) Comment on electron microscopy.

[5]

b) What is chromatography, describe HPLC.

[7]

Q3) a) Explain technique of flow cytometry.

[5]

b) Give principle and working of AAS.

[7]

Q4) a) Give principle, working and applications of affinity chromatography. **[5]**

b) Describe PAGE, give it's applications.

[7]

P.T.O.

- Q5)** a) Comment on maceration technique. [5]
b) Explain microtomy technique give it's applications. [7]
- Q6)** a) What is spectra, write concept and properties of electromagnetic radiations.[5]
b) Explain Geiger muller counter. [7]
- Q7)** Write short notes on any two of the following. [12]
a) Satellite imaging
b) Radioactive decay and Half life
c) Acetate pathway



Total No. of Questions : 4]

SEAT No. :

[Total No. of Pages : 2

PD3485

[6482]-309

M.Sc. - II

BOTANY

**BOT-603-MJ: Intellectual Property Rights (IPR)
(NEP) (2023 Credit Pattern) (Semester - III)**

Time : 2 Hours]

[Max. Marks : 35

Instructions to the candidates:

- 1) *All questions are compulsory.*
- 2) *Neat labelled diagrams must be drawn wherever necessary.*
- 3) *Figures to the right indicates full marks.*

Q1) Answer the following questions. [5]

- a) Enlist any two characteristics of intellectual property.
- b) What are criteria for patentability?
- c) What is meaning of plant variety protection?
- d) What is international convention on biological diversity?
- e) Define researcher's rights.

Q2) a) Explain in brief any one of the following. [6]

- i) Explain different kinds of marks.
- ii) Write in detail characteristics of copyrights.

b) Describe any one of the following. [4]

- i) What are limits of patent?
- ii) Explain effects of registration and terms of protection of geographical indication.

Q3) a) Explain in brief any one of the following. [6]

- i) Describe the protection of plant varieties and farmers right act 2001 (PPU & FR) India.
- ii) Explain strategies for managing and protecting intellectual property rights.

b) Describe any one of the following. [4]

- i) Explain key aspects and provisions of plant breeder's rights.
- ii) Describe procedure for registration of plant varieties.

P.T.O.

Q4) Write notes on any four of the following.

[10]

- a) Advantages of trademark licensing
- b) Interrelationship between Novelty and Originality
- c) Exceptions and limitations of plant breeders rights
- d) Role of patenting in innovation
- e) Application process for plant breeders rights
- f) Implementation and mechanisms of international convention on biological diversity



Total No. of Questions : 4]

SEAT No. :

PD-3486

[Total No. of Pages : 2

[6482]-310

M.Sc. (Part - II)

BOTANY

**BOT-610MJ : Advanced Horticultural Techniques
(2023 Credit Pattern) (NEP 2020) (Semester - III)**

Time : 2 Hours]

[Max. Marks : 35

Instructions to the candidates :

- 1) *All questions are compulsory.*
- 2) *Neat labelled diagrams must be drawn wherever necessary.*
- 3) *Figures to the right indicate full marks.*

Q1) Answer the following questions:

[5]

- a) Define Horticulture.
- b) What is micro-grafting?
- c) Define post harvest technology.
- d) What is vertical farming?
- e) Give any two roles of biopesticides.

Q2) a) Explain in brief any one of the following :

[6]

- i) Historical perspective and evolution of horticultural practices.
- ii) Canopy development and management in relation to growth.

b) Describe any one of the following :

[4]

- i) Asexual and sexual methods of propagation.
- ii) In-vitro clonal propagation.

P.T.O.

Q3) a) Explain in brief any one of the following : [6]

- i) Plant quarantine and phyto-sanitary certification.
- ii) Diagnostic tools for plant diseases with the help of digital tools.

b) Describe any one of the following : [4]

- i) Precision irrigation system.
- ii) General techniques of hydroponics.

Q4) Write notes on any four of the following : [10]

- a) Importance of horticulture.
- b) Commercial In-vitro production of Banana.
- c) Principles of organic horticulture.
- d) Applications of aeroponic system.
- e) Green house.
- f) Aquaponics.



Total No. of Questions : 4]

SEAT No. :

PD-3487

[Total No. of Pages : 2

[6482]-311
M.Sc. (Part - II)
BOTANY
BOT-611MJ : Nursery and PTC Techniques
(2023 Pattern) (Semester - III)

Time : 2 Hours]

[Max. Marks : 35

Instructions to the candidates :

- 1) All questions are compulsory.*
- 2) Neat labelled diagrams must be drawn wherever necessary.*
- 3) Figures to the right indicate full marks.*

Q1) Answer the following questions:

[5]

- a) Write any two basic facilities of nursery.
- b) What is vegetative propagation.
- c) Define tissue culture.
- d) Write about any one routine operation in nursery.
- e) Define clone.

Q2) a) Explain in brief any one of the following :

[6]

- i) Use of shed net house in nursery.
- ii) Laboratory contaminants and their control in PTC.

b) Describe any one of the following :

[4]

- i) Inoculation in micropropagation.
- ii) Overly culture.

P.T.O.

Q3) a) Explain in brief any one of the following : **[6]**

- i) Steps in media preparation for PTC.
- ii) Meristem culture.

b) Describe any one of the following : **[4]**

- i) Sales system in plant nursery.
- ii) Ornamental plant nursery.

Q4) Write notes on any four of the following : **[10]**

- a) Weeding in nursery.
- b) Organisation of laboratory for PTC.
- c) Use of polyhouse for propagation.
- d) Grafting techniques.
- e) Sub culture in PTC.
- f) Selection of stock plant in micropropagation.



Total No. of Questions : 7]

SEAT No. :

PD3488

[Total No. of Pages : 2

[6482]-401

M.Sc. -II

BOTANY

**BOT-651A-MJ: Advanced Taxonomy of Angiosperms-II
(2023 Credit Pattern) (Semester-IV)**

Time : 3 Hours]

[Max. Marks : 70

Instructions to the candidates:

- 1) *Question 1 is compulsory.*
- 2) *Attempt any five questions from Q.2 to Q.7.*
- 3) *Questions 2 to 7 carry equal marks.*
- 4) *Neat labelled diagrams must be drawn wherever necessary.*
- 5) *Figures to the right indicate full marks.*

Q1) Answer any five of the following.

[10]

- a) Write any two key characters of family Nymphaeaceae.
- b) Enlist major herbarium of the world.
- c) Write concept of endemism.
- d) Write any two key characters of family Crassulaceae.
- e) What is an arboretum.
- f) Define biodiversity hotspots.

Q2) a) How does the anatomical data is useful in taxonomy?

[5]

- b) Explain the various functions and role of botanic gardens in plant conservation and public education.

[7]

Q3) a) Define a herbarium. What are it's main objectives and functions in botanical studies?

[5]

- b) List the major phytogeographic regions of India and describe any two in detail.

[7]

Q4) a) Explain the endemism in Western Ghats.

[5]

- b) Explain the significance of the APG-IV system of classification in modern taxonomy.

[7]

P.T.O.

- Q5)** a) Write the characteristic features and economic importance of family Rutaceae. [5]
b) Write the application of DNA barcoding in taxonomy. [7]
- Q6)** a) Explain how does embryology help in solving taxonomic problem. [5]
b) List the botanic garden in India and describe any three in detail. [7]
- Q7)** Write short notes on any two of the following. [12]
a) In-situ and ex-situ conservation.
b) Economic importance of family cucurbitaceae.
c) Role of computer in angiosperms taxonomy.



Total No. of Questions : 7]

SEAT No. :

PD3489

[Total No. of Pages : 2

[6482]-402

M.Sc. -II

BOTANY

BOT-651BMJ: Cyto-Genetics and Plant Breeding -II
(2023 Credit Pattern) (Semester-IV)

Time : 3 Hours]

[Max. Marks : 70

Instructions to the candidates:

- 1) *Question 1 is compulsory.*
- 2) *Attempt any five questions from Q.2 to Q.7.*
- 3) *Questions 2 to 7 carry equal marks.*
- 4) *Neat labelled diagram must be drawn wherever necessary.*
- 5) *Figures to the right indicate full marks.*

Q1) Answer any five of the following.

[10]

- a) Give any two applications of plant tissue culture.
- b) What is molecular marker?
- c) What is somatic hybridization?
- d) Enlist special types of chromosomes.
- e) Enlist stages of mitosis.
- f) What is meant by chromosome walking?

Q2) a) Explain chromosomal handling and identification.

[5]

b) Write applications of genetic engineering.

[7]

Q3) a) Give applications of plant tissue culture.

[5]

b) Explain structure of polytene chromosome.

[7]

Q4) a) Describe different stages of Meiosis.

[5]

b) Explain breeding methods for development of insect resistance.

[7]

P.T.O.

- Q5)** a) Explain problem in breeding for salinity resistance. [5]
b) Describe genetic map using RFLP. [7]
- Q6)** a) Explain breeding for quality traits for protein in rice crop. [5]
b) Describe DNA content and C-value paradox. [7]
- Q7)** Write short notes on any two of the following. [12]
a) Achievement and future prospective of plant breeding.
b) Methods of breeding for disease resistance.
c) Restriction mapping.



Total No. of Questions : 7]

SEAT No. :

[Total No. of Pages : 2

PD3490

[6482]-403

M.Sc. -II

BOTANY

**BOT-651C -MJ: Plant Physiology-II
(2023 Credit Pattern) (Semester-IV)**

Time : 3 Hours]

[Max. Marks : 70

Instructions to the candidates:

- 1) *Question 1 is compulsory.*
- 2) *Attempt any five questions from Q.2 to Q.7.*
- 3) *Question 2 to 7 Carry equal marks.*
- 4) *Neat labelled diagram must be drawn wherever necessary.*
- 5) *Figures to the right indicate full marks.*

Q1) Answer any five of the following.

[10]

- a) What is hydraulic conductance?
- b) What is CO₂ response Curve?
- c) Define seed germination.
- d) What is canopy photosynthesis?
- e) Define net assimilation rate.
- f) What is plant carbon balance?

Q2) a) Describe the carbon sequestration by plants in detail.

[5]

b) Explain TCA cycle in detail.

[7]

Q3) a) Explain mitochondrial electron system in detail.

[5]

b) Explain the role of ethylene and ethylene response factors in regulating specific process of fruit ripening.

[7]

Q4) a) What is shelf life of fruit. Describe various approaches to regulate specific shelf life characters.

[5]

b) Explain Hydroponic media in detail. Add note on its applications.

[7]

P.T.O.

- Q5)** a) Explain the forces involved in water uptake and transpiration. [5]
b) Describe the mechanism of photorespiration in detail. [7]
- Q6)** a) Describe various environmental aspects of reducing post harvest deterioration of fruits. [5]
b) What is seed dormancy? Describe various methods of breaking seed dormancy. [7]
- Q7)** Write short notes on any two of the following. [12]
a) Water cycle.
b) Regulation of Aquaporins.
c) Physiology of fruit development in plant.



Total No. of Questions : 7]

SEAT No. :

PD3491

[Total No. of Pages : 2

[6482]-404

M.Sc. -II

BOTANY

**BOT-651D -MJ: Herbal Drug Technology-II
(2023 Credit Pattern) (NEP) (Semester-IV)**

Time : 3 Hours]

[Max. Marks : 70

Instructions to the candidates:

- 1) *Question 1 is compulsory.*
- 2) *Attempt any five questions from Q.2 to Q.7.*
- 3) *Question 2 to 7 carry equal marks.*
- 4) *Neat labelled diagrams must be drawn wherever necessary.*
- 5) *Figures to the right indicate full marks.*

Q1) Answer any five of the following.

[10]

- a) Enlist any two disadvantages of herbal cosmetics.
- b) What are antioxidants?
- c) What is hair root culture?
- d) Enlist types of monograph.
- e) Give any two differences between herbal and conventional drugs.
- f) What is stability testing of natural products?

Q2) a) Write a note on nutraceuticals.

[5]

b) Describe the formation and production management of herbals.

[7]

Q3) a) Write a note on American and British Pharmacopeia.

[5]

b) Describe the procedure for Indian patent filling.

[7]

Q4) a) Write a note on Ex-situ conservation of medicinal plants.

[5]

b) Explain the various factors affecting biotransformation on the production of biomedical.

[7]

P.T.O.

- Q5)** a) Write a note on Bioprospecting tools for drug discovery. [5]
b) Describe the method of preparation of anti-sunburn and moisturizing cream. [7]
- Q6)** a) Explain the current challenges in upgrading and modernization of herbal formulation. [5]
b) Write a note on application of plant tissue-culture in modern pharmacognocny. [7]
- Q7)** Write short notes on any two of the following. [12]
a) Copyright.
b) Monographs.
c) Skin Physiology and Skin chemistry.



Total No. of Questions : 7]

SEAT No. :

[Total No. of Pages : 2

PD3492

[6482]-405

M.Sc. - II

BOTANY

**BOT-651E -MJ: Seed Science & Seed Technology-II
(2023 Credit Pattern) (NEP) (Semester - IV)**

Time : 3 Hours]

[Max. Marks : 70

Instructions to the candidates:

- 1) *Question 1 is compulsory.*
- 2) *Attempt any five question from Q.2 to Q.7.*
- 3) *Questions 2 to 7 carry equal marks.*
- 4) *Neat labelled diagrams must be drawn wherever necessary.*
- 5) *Figures to the right indicate full marks.*

Q1) Answer any five of the following. [10]

- a) Define Hybrid seed. Mention the objectives of hybrid seed production.
- b) What is plant biotechnology? Enlist its branches.
- c) Define synthetic seed. Write any two applications.
- d) What is roughing? Give its importance in seed production.
- e) Define the terms. Southern blotting & Northern blotting.
- f) Define cryopreservation.

Q2) a) Give detailed account of any one disease of cotton. [5]

- b) Describe the structure of plasmid vector. Discuss its role in gene cloning. [7]

Q3) a) Write a note on ELISA and its role in varietal identification. [5]

- b) Discuss the role of nanotechnology in seed health & seed biotechnology. [7]

Q4) a) Explain the concept of Cold Storage. Add a note on its applications. [5]

- b) Give an account of hybrid seed production of any one crop. [7]

P.T.O.

- Q5)** a) Male sterility in plants. Advantages and Limitations. [5]
b) Discuss various methods of seed health testing. [7]
- Q6)** a) Write a note on Tikka disease of groundnut & its control measures. [5]
b) Give an account of RAPDs and its role in varietal identification. [7]
- Q7)** Write short notes on any two of the following. [12]
a) Seed bank and pollen bank.
b) Field inspection during seed production.
c) Disease of vegetable crops.



Total No. of Questions : 7]

SEAT No. :

PD3493

[Total No. of Pages : 2

[6482]-406

M.Sc. -II

BOTANY

**BOT-651F-MJ : Applied Ecology and Environment-II
(2023 Credit Pattern) (NEP) (Semester-IV)**

Time : 3 Hours]

[Max. Marks : 70

Instructions to the candidates:

- 1) *Question 1 is compulsory.*
- 2) *Attempt any five questions from Q.2 to Q.7.*
- 3) *Questions 2 to 7 carry equal marks.*
- 4) *Neat labelled diagram must be drawn wherever necessary.*
- 5) *Figures to the right indicate full marks.*

Q1) Answer any five of the following.

[10]

- a) Define Environment.
- b) What is ecological restoration?
- c) Define global dimming.
- d) What do you mean by EIA?
- e) What are bioindicators?
- f) Enlist any two effects of acid rain.

Q2) a) Explain different types of species interaction.

[5]

b) Define climatic change. Describe the effects of climatic change.

[7]

Q3) a) Write short note on global warming.

[5]

b) Describe in detail concept of bioindicators.

[7]

Q4) a) Explain in detail bioremedial process.

[5]

b) Describe the environmental assessment process.

[7]

P.T.O.

- Q5)** a) Write short note on environmental audit. [5]
b) Enlist and explain any one type of ecosystem with its distinguishing characters. [7]

- Q6)** a) Explain the concept of biome. [5]
b) Describe in detail global challenges of climate change. [7]

Q7) Write short notes on any two of the following. [12]

- a) Microbial Metabolism.
- b) Objectives of EIA.
- c) Wetland.



Total No. of Questions : 7]

SEAT No. :

[Total No. of Pages : 2

PD3494

[6482]-407

M.Sc. -II

BOTANY

**BOT-651GMJ : Advanced Mycology and Plant Pathology - II
(2023 Credit Pattern) (Semester-IV) (NEP 2020)**

Time : 3 Hours]

[Max. Marks : 70

Instructions to the candidates:

- 1) *Question 1 is compulsory.*
- 2) *Attempt any five questions from Q.2 to Q.7.*
- 3) *Questions 2 to 7 carry equal marks.*
- 4) *Neat labelled diagram must be drawn wherever necessary.*
- 5) *Figures to the right indicate full marks.*

Q1) Answer any five of the following.

[10]

- a) Define IDM
- b) Enlist the characteristics of lichens.
- c) Write any two examples of antiviral chemicals.
- d) Give any two examples of fungi as a vitamin source.
- e) Write any two control measures against mucoromycosis.
- f) Define phycobloant and mycobloant.

Q2) a) Explain the secondary metabolites from lichens.

[5]

b) Explain the properties and mode of action of chemicals on plant disease.[7]

Q3) a) Explain molecular approach for disease management.

[5]

b) Define applied mycology. Explain application of fungi in food Industry.[7]

Q4) a) Note on mycoinsecticides and myconematocides.

[5]

b) Write symptoms,causal organisms and control measures of root knot disease.
[7]

P.T.O.

- Q5)** a) Explain damping off disease in detail. [5]
b) Define mycorrhizae. Explain their types and importance in agriculture.[7]
- Q6)** a) Write about TMV [5]
b) Define medical mycology. Explain disease occurs on humans with their control measures. [7]
- Q7)** Write short notes on any two of the following. [12]
a) IPM
b) PMV
c) Thallus structure of lichens



Total No. of Questions : 7]

SEAT No. :

PD3495

[Total No. of Pages : 2

[6482]-408

M.Sc. (Part-II)

BOTANY

BOT-652 MJ : Bioinformatics and Bio-Statistics

(2023 Credit Pattern) (Semester -IV) (NEP)

Time : 3 Hours]

[Max. Marks : 70

Instructions to the candidates:

- 1) Question 1 is Compulsory.
- 2) Attempt any five questions from Q.2 to Q.7.
- 3) Questions 2 to 7 carry equal marks.
- 4) Neat labelled diagrams must be drawn wherever necessary.
- 5) Figures to the right indicate full marks.

Q1) Answer any five of the following.

[10]

- a) Define regression.
- b) What is normalization in mass spectrometry data?
- c) Write the properties of parametric tests.
- d) Define Bioinformatics.
- e) Write the applications of NCBI in biomedical research.
- f) Write the principle of third generation sequencing.

Q2) a) What is genome annotation? Describe different steps of genome annotation. [5]

- b) Find out karl pearson's coefficient of correlation between the marks in subject A and subject B from the data given. Find out the degree of correlation between them. [7]

Marks in Subject A	52	46	32	41	27
Marks in Subject B	47	41	34	28	32

Q3) a) A sample of 64 plants have taken from the experiment tested under abiotic stress. The average survive plant samples are found to be 47.8 and standard deviation 10. Test the claim that, the average survive plants are at least 50 plants at 5% level of significance (Table value = 2.97) [5]

- b) Describe the scope and importance of Bioinformatics. [7]

P.T.O.

- Q4)** a) Explain any two tools of NCBI. [5]
b) What is experimental design? Explain different types of experimental design. [7]
- Q5)** a) What is probability? Describe the difference between normal and binomial distribution. [5]
b) What is genome sequencing? Describe any two methods of genome sequencing technology. [7]
- Q6)** a) Describe the significance of biostatistics in biological research. [5]
b) Describe any two softwares used in sequence alignment and analysis. [7]
- Q7)** Write short notes on any two of the following. [12]
a) ANOVA
b) Randomized block design
c) PhyML



Total No. of Questions : 4]

SEAT No. :

PD3496

[Total No. of Pages : 2

[6482]-409

M.Sc. (Part - II)

BOTANY

**BOT-660-MJ: Organic Farming and Soil Health Technology
(2023 Credit Pattern) (Semester - IV)**

Time : 2 Hours]

[Max. Marks : 35

Instructions to the candidates:

- 1) *All questions are compulsory.*
- 2) *Neat labelled diagrams must be drawn wherever necessary.*
- 3) *Figures to the right indicate full marks.*

Q1) Answer the following questions. [5]

- a) Define biofertilizers.
- b) Give the full form of NPOP.
- c) Define biodynamic farming.
- d) Name two major elements required by plants.
- e) Define Green Revolution.

Q2) a) Explain in brief any one of the following. [6]

- i) Explain the principles of organic farming.
- ii) Write in brief about Certification trademark in organic farming.

b) Describe any one of the following. [4]

- i) Mention different soil properties concerned with soil physics.
- ii) Describe in brief about detrimental effects of chemical dependent farming.

Q3) a) Explain in brief any one of the following. [6]

- i) Explain the role of soil characteristics in organic farming.
- ii) Explain the role of Organic waste and their use for production of biogas & manures.

b) Describe any one of the following. [4]

- i) Describe the importance of organic market in India.
- ii) Give an account on Initiatives of Organic farming in India.

P.T.O.

Q4) Write notes on any four of the following.

[10]

- a) Concept of point zero charge.
- b) Approaches of organic farming.
- c) Thermal properties of soil.
- d) Current status of world organic market.
- e) Biotic factors in soil development.
- f) Constraints for organic farming & products in Domestic market.



Total No. of Questions : 4]

SEAT No. :

PD3497

[Total No. of Pages : 2

[6482]-410

M.Sc. (Part - II)

BOTANY

**BOT-661-MJ: Green Nano - Technology
(2023 Credit Pattern) (Semester - IV)**

Time : 2 Hours]

[Max. Marks : 35

Instructions to the candidates:

- 1) *All questions are compulsory.*
- 2) *Neat labelled diagrams must be drawn wherever necessary.*
- 3) *Figures to the right indicate full marks.*

Q1) Answer the following questions. [5]

- a) Define nanoparticle.
- b) What is biocompatibility of nanoparticle?
- c) Write about SLNs.
- d) Give any one application of nanoparticles in water treatment.
- e) What is thermogravimetric analysis?

Q2) a) Explain in brief any one of the following. [6]

- i) Ceramic and metallic nanomaterials.
- ii) Lipid based nanomaterials.

b) Describe any one of the following. [4]

- i) Use of green nano technology in biomedical applications.
- ii) Differential scanning calorimetry.

Q3) a) Explain in brief any one of the following. [6]

- i) Optical characterisation of nanomaterials.
- ii) Any one biological synthesis method for nanomaterials.

b) Describe any one of the following. [4]

- i) Physical properties of nanoparticles.
- ii) Semiconductor nanomaterials.

P.T.O.

Q4) Write notes on any four of the following.

[10]

- a) Green Chemistry.
- b) DLS - Dynamic Light Scattering.
- c) Fullerenes.
- d) Laser ablation.
- e) Dendrimers.
- f) Nano tubes.



Total No. of Questions : 4]

SEAT No. :

PD3498

[Total No. of Pages : 2

[6482]-411

M.Sc. (Part - II)

BOTANY

**BOT-662-MJ: Mushroom Cultivation Technology
(2023 Credit Pattern) (Semester - IV) (NEP)**

Time : 2 Hours]

[Max. Marks : 35

Instructions to the candidates:

- 1) *All questions are compulsory.*
- 2) *Neat labelled diagrams must be drawn wherever necessary.*
- 3) *Figures to the right indicate full marks.*

Q1) Answer the following questions. [5]

- a) Define spawn.
- b) Write any two economic importance of mushroom.
- c) Define Terricolous habitat.
- d) What is Mushroom?
- e) What is Mean by IPM?

Q2) a) Explain in brief any one of the following. [6]

- i) Describe life cycle of oyster mushroom in details.
- ii) Explain global and national scenario of mushroom industry.

b) Describe any one of the following. [4]

- i) Explain in detail the preparation of spawn substrate.
- ii) Write the method of storage of mushroom in detail.

Q3) a) Explain in brief any one of the following. [6]

- i) Define Composting. Explain principles and Machinery required for composting.
- ii) Explain in detail the cultivation of Lentinula edodes.

b) Describe any one of the following. [4]

- i) Explain fundamentals of cultivation system of mushroom.
- ii) Write nutritional and medicinal value of mushroom.

P.T.O.

Q4) Write notes on any four of the following.

[10]

- a) Scope of Mushroom.
- b) Government sponsored schemes for mushroom cultivation.
- c) Macro morphology of fruit bodies.
- d) Value added products of mushroom.
- e) Draw mushroom farm layout.
- f) Disease management in mushroom cultivation.

