[This question paper contains 4 printed pages.]

Your Roll No.....

Sr. No. of Question Paper : 747 **B**

Unique Paper Code : 32161202

Name of the Paper : Archegoniatae

Name of the Course : **B.Sc. (Hons) Botany**

Semester : II

Duration : 3 Hours Maximum Marks : 75

Instructions for Candidates

1. Write your Roll No. on the top immediately on receipt of this question paper.
2. Attempt **five** questions in all.
3. Question No. **1** is compulsory.
4. Attempt any **four** questions from the rest.
5. **All** parts of questions must be attempted together.

1. (a) Define the following : (1×5=5)

   (i) Retort cells

   (ii) Pseudoelaters

P.T.O.

(iii) Operculum

(iv) Apogamy

(v) Sulphur shower

(b) Write generic names of the plants studied by you which structural features. (1×5=5)

(i) Prothallus

(ii) Transfusion tissue

(iii) Coralloid roots

(iv) Ovuliferous scale

(v) Rhizophore

(c) Match the following :

(i) Gemma cup	*Porella*
(ii) Amphigastria	*Pinus*
(iii) Winged pollen grains	*Psilotum*
(iv) Whisk fern	*Selaginella*
(v) Resurrection plant	*Marchantia*

(1×5=5)

2. Differentiate between the following **(any three)** : (3×5=15)

(i) Thalli of *Pellia* and *Porella*

(ii) Liverworts and mosses

(iii) Carinal canal and vallecular canal

(iv) Antheridial and archegonial head of *Funaria*

(v) Long and dwarf shoots of *Pinus*

3. Draw well labeled diagram of **(any three)** : (3×5=15)

(i) T.S. coralloid root of *Cycas*

(ii) T.S. stem of *Selaginella*

(iii) L.S capsule of *Funaria*

(iv) T.S. needle of *Pinus*

(v) L.S. Ovule of *Gnetum*

4. Write short notes on the following **(any three)** : (3×5=15)

(i) *Riccia* sporophyte

(ii) Synangium of *Psilotum*

P.T.O.

(iii) Telome theory

(iv) Heterospory and seed habit of *Selaginella*

(v) Economic importance of gymnosperms

5. (a) Give an illustrated account of sporophyte of *Funaria* and compare it with that of *Marchantia*. (8)

(b) Give an account of adaptation of bryophytes to land habit. (7)

6. (a) Describe alternation of generation? How apogamy and apospory is deviated from common cycle? (7)

(b) Draw well-labeled diagram of transverse section of *Equisetum* stem and describe the hydrophytic and xerophytic characters found in stem anatomy only. (8)

May 2022

(7)

[This question paper contains 4 printed pages.]

Your Roll No.....

Sr. No. of Question Paper : 729 **B**

Unique Paper Code : 32161201

Name of the Paper : Mycology and Phytopathology

Name of the Course : **Botany**

Semester : *II*

Duration : 3 Hours Maximum Marks : 75

Instructions for Candidates

1. Write your Roll No. on the top immediately on receipt of this question paper.
2. Question no. **1** is compulsory.
3. Attempt any **four** questions from **2** to **7**.
4. Please attempt all parts of question together.
5. Draw suitable diagrams wherever necessary.

1. (a) Fill in the blanks **(any five)** : (1×5=5)

   (i) Bread mold fungus _____.

   (ii) An example of aquatic fungus _____.

P.T.O.

(iii) Hypha with dolipore septum is a characteristic feature of class _____.

(iv) Fungal cell wall is predominantly made up of _____.

(v) Microorganism responsible for causing Irish famine is _____.

(vi) Fungus causing smut _____.

(b) Define **(any five)** : (1×5=5)

(i) Hymenium

(ii) Cleistothecium

(iii) Teleutospore

(iv) Appresorium

(v) Budding

(vi) Chlorosis

(vii) Annulus

(c) Match the following : (1×5=5)

(i) Holocarpic	(a) Lichen
(ii) Cup fungi	(b) *Stemonites*
(iii) Isidia	(c) Chytrids
(iv) Pheneroplasmodium	(d) *Peziza*
(v) Heteroecious	(e) *Puccinia*

2. Draw a well labeled diagram of **any three** of the following : (5×3=15)

(i) V.S. apothecium of *Peziza*

(ii) Conidiophore of *Penicillium*

(iii) V.S. *Berberis* leaf passing through Aecial cup

(iv) L.S. of *Agaricus* gill

3. Write short notes on **any three** of the following : (5×3=15)

(i) Mycorrhiza

(ii) Fungi affecting human health

(iii) Lichen as pollution indicator

(iv) Application of fungi in Food Industry

P.T.O.

4. Explain **any five** of the following : (3×5=15)

   (i) Different forms of thalli in fungi

   (ii) Clamp connection in Basidiomycetes

   (iii) Slime molds

   (iv) Black stem rust of wheat

   (v) Parasexuality in fungi

   (vi) Role of fungi in Biological control

5. Describe **any two** with the help of well labeled diagram : (7.5×2=15)

   (i) Life cycle of *Albugo*

   (ii) Life cycle of *Peziza*

   (iii) Life cycle of *Rhizopus*

6. Write the general characteristics of fungi? Describe their mode of nutrition. (10+5=15)

7. What are the causal organisms, symptoms, and control measures of plant diseases namely Citrus Canker and Early Blight of potato? (7.5+7.5=15)

[This question paper contains 6 printed pages.]

Your Roll No.....

Sr. No. of Question Paper : 766 **B**

Unique Paper Code : 42161201

Name of the Paper : Plant Ecology and Taxonomy

Name of the Course : **B.Sc. Life Science**

Semester : II

Duration : 3 Hours Maximum Marks : 75

Instructions for Candidates

1. Write your Roll No. on the top immediately on receipt of this question paper.
2. Attempt **Section A** and **Section B** on separate sheets Question no. **1** is compulsory from **both** sections.
3. In total, attempt **three** questions from **Section A** and **three** questions from **Section B** including question number **1** of **both** sections.

Section A : Plant Ecology

1. (a) Match the following : (5×½=2½)

(i) Zone of illuviation	(a) B-Horizon
(ii) Life forms	(b) Qualitative charact
(iii) Stratification	(c) Anemometer
(iv) Zone of leaching	(d) Raunkiaer
(v) Wind Velocity	(e) A- Horizon

(b) Define the following **(any five)** : (5×1=

(i) Homeostasis

(ii) Humus

(iii) Phanerophytes

(iv) Ecesis

(v) Climax community

(vi) Ecotone

2. Write short notes **(any three)** : (3×5=15)

(i) Soil Profile

(ii) General Process of Succession

(iii) Ecological Pyramids

(iv) Shelford Law of Tolerance

3. (a) Define the term Phytogeography. Name the different botanical provinces of India. Give an elaborate account of any one. (8)

(b) Describe the role of Biogeochemical cycles in the ecosystem. Explain Nitrogen cycle in detail. (7)

4. Differentiate between **(any three)**: (3×5=15)

(i) Sciophytes and Heliophytes

(ii) Food Chain and Food Web

(iii) Colluvial and Alluvial soil

(iv) Autotrophic Succession and Heterotrophic Succession

(v) Paleo-endemism and Neo-endemism

Section B : Taxonomy

1. (a) Expand the following : (½=2½)

(i) DC

(ii) *nom. cons.*

(iii) L.

(iv) IAPT

(v) *ex.*

(b) Match the following : (5×1=5)

(i) Binomial Nomenclature	(a) J.D. Hooker
(ii) Phylogenetic classification	(b) Bengaluru
(iii) Numerical Taxonomy	(c) Robert and Sneath
(iv) Lal Bagh Botanical Garden	(d) Takhtajan
(v) Flora of British India	(e) 1st May 1753

2. (a) Give an outline of Engler and Prantl's system of classification. Discuss any two merits and two demerits of this system. (4+4=8)

(b) Give the alternate name of : (4×1=4)

(i) Gramineae

(ii) Compositae

(iii) Cruciferae

(iv) Labiatae

(c) Interpret the following : (3×1=3)

(i) *Delphinium viscosum* Hook.f. et. Thompson

(ii) *Phyllanthus* (Toume.) L.

(iii) *Stellaria media* (L.) Will.

3. Differentiate between **(any three)** : (3×5=15)

(i) Alpha and Omega Taxonomy

(ii) Holotype and Neotype

(iii) Valid and Effective Publication

(iv) Bracketed and Parallel keys

(v) Cladogram and Phenogram

P.T.O.

4. Write short notes on **(any three)** : (3×5=15)

(i) Importance of Botanical Gardens

(ii) Taxonomic categories

(iii) Principles of Priority and its limitations

(iv) Principles of Numerical Taxonomy

May 2022

[This question paper contains 6 printed pages.]

Your Roll No.....

Sr. No. of Question Paper : 1500 **A**

Unique Paper Code : 42161201

Name of the Paper : Plant Ecology and Taxonomy

Name of the Course : **B.Sc. Life Science**

Semester : II

Duration : 3.5 Hours Maximum Marks : 75

Instructions for Candidates

1. Write your Roll No. on the top immediately on receipt of this question paper.
2. Attempt **Section A** and **Section B** on separate sheets Question no.I is compulsory from both sections.
3. In total, attempt **three** questions from **Section A** and **three** questions from **Section B** including question number **I** of both sections.

SECTION A : Plant Ecology

1. (a) Define the following **(Any Five)** : (1×5=5)

P.T.O.

(i) Food web

(ii) Consumers

(iii) Halophyte

(iv) Phytogeography

(v) Edge effect

(vi) Capillary water

(b) Fill in the blanks **(Any Five)** : (0.5×5=2.5)

(i) Pyramid of _____ is always upright.

(ii) The plants, which colonize newly formed bare land are called _____

(iii) Diameter of a clay particle is less than _____

(iv) _____ is an example of a Xerophyte.

(v) _____ is an instrument used to measure wind speed.

(vi) Partially decomposed, dark coloured organic matter present in the upper layer of soil is called _____

2. Write short notes on any **Three** of the following : (3×5=15)

(i) Age pyramids

(ii) Raunkier's life form

(iii) Analytical characters of a community

(iv) Different kinds of survivorship curves

3. (a) Discuss various chemical and physical processes involved in the formation of soil. (8)

(b) Discuss grazing and detritous food chains in nature. (7)

4. (a) Discuss in detail the carbon cycle and its significance. (8)

(b) Describe in details a hydrosere. (7)

P.T.O.

SECTION B : Taxonomy

1. (a) Fill in the blank **(Any five)**: (0.5×5=2.5)

(i) _____ is known as Father of Taxonomy

(ii) The taxonomic category indicated by the suffix '-phyta' is _____

(iii) _____is an International botanical garden.

(iv) World's largest herbarium is located at _____

(v) Alternative name of Compositae is _____

(vi) _____ is the author of Theorie elementaire de la botanique.

(b) Define the following **(Any five)** : (1×5=5)

(i) Flora

(ii) Holotype

(iii) Taxon

(iv) Tautonym

(v) OTUs

(vi) Apomorphy

2. Write short notes of the following **(Any three)** : (3×5=15)

(i) Importance of herbarium

(ii) Typification

(iii) Principles of ICN

(iv) Taxonomic evidences from palynology

3. (a) Give a brief outline of Bentham and Hooker's classification of plants and also discuss the merits and demerits. (5+5=10)

(b) Identify the taxonomic rank of the following :

Liliopsida, *Ranunculus*, Parietales, Chenopodiaceae, Rosoideae (5)

4. Differentiate between any three of the following : (3×5=15)

(i) Homology and Analogy

(ii) Phenogram and Cladogram

(iii) Parallelism and Convergence

(iv) Artificial and Natural classification

[This question paper contains 6 printed pages.]

Your Roll No.....

Sr. No. of Question Paper : 1096 **B**

Unique Paper Code : 32165201

Name of the Paper : Plant Ecology and Taxonomy

Name of the Course : **Botany**

Semester : II

Duration : 3 Hours Maximum Marks : 75

Instructions for Candidates

1. Write your Roll No. on the top immediately on receipt of this question paper.
2. Attempt **Section A** and **Section B** on separate sheets.
3. All parts of a question must be answered together.
4. Draw well-labelled diagrams wherever necessary.

SECTION – A : Plant Ecology

Max Marks : 37.5

Attempt **any three** questions from **Section A** including Question **1**, which is compulsory.

P.T.O.

SECTION – A

1. (a) Define **any five** of the following : (5×1=5)

(i) Endemism

(ii) Autoecology

(iii) Food chain

(iv) Ecotone

(v) Pedogenesis

(vi) Sciophytes

(b) Give one word answer for the following : (5×0.5=2.5)

(i) Development of a bare area without any form of life.

(ii) Instrument used to measure humidity and water vapour present in the atmosphere.

(iii) Study of distribution of plant species in their habitats and elucidation of origin and history of development of floras.

(iv) Sample plot or unit for a detailed analysis of vegetation.

(v) Plants growing upon other plants or objects and getting physical support from them.

(vi) Transition zone between two ecosystems.

2. Differentiate between **any five** of the following : (5×3=15)

(i) Food chain and food web

(ii) Epilimnion and hypolimnion

(iii) Neoendemism and paleoendemism

(iv) Pyramid of number and pyramid of biomass

(v) Flygroscopioc and capillary water

(vi) Hydrophytes and xerophytes

3. Write short notes on **any three** of the following : (3×5=15)

(i) Shelford's law of tolerance

(ii) Quantitative characteristics of plant community

(iii) Temperature as an ecological factor

(iv) Nitrogen cycle

P.T.O.

4. Attempt **any two** of the following : (7.5×2=15)

(a) Define ecological succession. Discuss the general process of succession with reference to hydrosere.

(b) Give a detailed account of soil profile.

(c) State the different biogeographic zones of India. Describe any two in detail.

SECTION – B : Plant Taxonomy

Max Marks : 37.5

1. (a) Fill in the blanks **(any 5)** (5×1=5)

(i) The branch of taxonomy based on the information obtained from phytochemical studies is _____

(ii) The author of Flora of Delhi is _____

(iii) Binomial system of classification was given by _____

(iv) _____ is the alternative name of Umbelliferae.

(v) The ICN sets the formal starting date of plant nomenclature at _____

(vi) The standard size of a herbarium sheet is _____

(b) Expand **any five** of following abbreviations : (5×0.5=2.5)

(i) Hook.f

(ii) APG

(iii) R. Br.

(iv) BSI

(v) IAPT

(vi) IUCN

Differentiate between **any five** of the following : (5×3=15)

(a) Synonym and homonym

(b) Local flora and regional flora

(c) Diagnosis and description

(d) OTUs and OEUs

(e) Holotype and syntype

(f) Phylogenetic and natural systems of classification

3. Write short notes on **any three** of the following : (3×5=15)

(a) Principles of numerical taxonomy

(b) Role of palynology in taxonomy

(c) Single access keys

(d) Role of herbarium and botanical gardens

4. Answer the following : (5+5+5=15)

(a) What is a cladogram? Explain the methodology of cladiastics.

(b) Discuss the merits and demerits of Engler and Prantl's system of classification.

(c) Identify the taxonomic rank of the following :

(i) Asterales

(ii) *Lilium*

(iii) Apiaceae

(iv) Magnoliopsida

(v) *Helianthus annuus*

[This question paper contains 6 printed pages.]

Your Roll No.....

Sr. No. of Question Paper : 766 **B**

Unique Paper Code : 42161201

Name of the Paper : Plant Ecology and Taxonomy

Name of the Course : **B.Sc. Life Science**

Semester : II

Duration : 3 Hours Maximum Marks : 75

Instructions for Candidates

1. Write your Roll No. on the top immediately on receipt of this question paper.
2. Attempt **Section A** and **Section B** on separate sheets Question no. **1** is compulsory from **both** sections.
3. In total, attempt **three** questions from **Section A** and **three** questions from **Section B** including question number **1** of **both** sections.

Section A : Plant Ecology

1. (a) Match the following : (5×½=2½)

(i) Zone of illuviation	(a) B-Horizon
(ii) Life forms	(b) Qualitative charact
(iii) Stratification	(c) Anemometer
(iv) Zone of leaching	(d) Raunkiaer
(v) Wind Velocity	(e) A- Horizon

(b) Define the following **(any five)** : (5×1=

(i) Homeostasis

(ii) Humus

(iii) Phanerophytes

(iv) Ecesis

(v) Climax community

(vi) Ecotone

2. Write short notes **(any three)** : (3×5=15)

(i) Soil Profile

(ii) General Process of Succession

(iii) Ecological Pyramids

(iv) Shelford Law of Tolerance

3. (a) Define the term Phytogeography. Name the different botanical provinces of India. Give an elaborate account of any one. (8)

(b) Describe the role of Biogeochemical cycles in the ecosystem. Explain Nitrogen cycle in detail. (7)

4. Differentiate between **(any three)**: (3×5=15)

(i) Sciophytes and Heliophytes

(ii) Food Chain and Food Web

(iii) Colluvial and Alluvial soil

(iv) Autotrophic Succession and Heterotrophic Succession

(v) Paleo-endemism and Neo-endemism

Section B : Taxonomy

1. (a) Expand the following : (½=2½)

(i) DC

(ii) *nom. cons.*

(iii) L.

(iv) IAPT

(v) *ex.*

(b) Match the following : (5×1=5)

(i) Binomial Nomenclature	(a) J.D. Hooker
(ii) Phylogenetic classification	(b) Bengaluru
(iii) Numerical Taxonomy	(c) Robert and Sneath
(iv) Lal Bagh Botanical Garden	(d) Takhtajan
(v) Flora of British India	(e) 1st May 1753

2. (a) Give an outline of Engler and Prantl's system of classification. Discuss any two merits and two demerits of this system. (4+4=8)

(b) Give the alternate name of : (4×1=4)

(i) Gramineae

(ii) Compositae

(iii) Cruciferae

(iv) Labiatae

(c) Interpret the following : (3×1=3)

(i) *Delphinium viscosum* Hook.f. et. Thompson

(ii) *Phyllanthus* (Toume.) L.

(iii) *Stellaria media* (L.) Will.

3. Differentiate between **(any three)** : (3×5=15)

(i) Alpha and Omega Taxonomy

(ii) Holotype and Neotype

(iii) Valid and Effective Publication

(iv) Bracketed and Parallel keys

(v) Cladogram and Phenogram

P.T.O.

4. Write short notes on **(any three)** : (3×5=15)

(i) Importance of Botanical Gardens

(ii) Taxonomic categories

(iii) Principles of Priority and its limitations

(iv) Principles of Numerical Taxonomy

[This question paper contains 3 printed pages.]

Your Roll No.....

Sr. No. of Question Paper : 1012 **A**

Unique Paper Code : 32163403

Name of the Paper : Biofertilizers

Name of the Course : **SEC: Botany for Honours**

Semester : IV

Duration : 2 Hours 30 minutes Maximum Marks : 38

Instructions for Candidates

1. Write your Roll No. on the top immediately on receipt of this question paper.
2. Attempt any **three** questions in all.
3. Question No. **1** is compulsory.
4. Draw well labeled diagrams wherever necessary.

1. (a) Expand the Following **(any four)** : (1×4=4)

   (i) AMF

   (ii) PSB

   (iii) YEMA

P.T.O.

(iv) CFU

(v) BOD

(vi) IARI

(b) Define **(any two)** : (2×2=4)

(i) Associative symbiosis

(ii) Appressorium

(iii) Starter culture

(iv) Biological Nitrogen fixation

2. Write short notes **(any three)** : (5×3=15)

(a) Organic farming

(b) *Azotobacter* as biofertilizer

(c) Role of burrowing and nonburrowing earthworms in sustainable agriculture

(d) Actinorrhizal symbiosis

3. (a) Why biofertilizers are better than chemical fertilizers? Compare with the help of suitable examples. (8)

(b) Discuss briefly isolation, and culturing process of *Rhizobium*. (7)

4. (a) Elaborate on the various methods of biocomposting and throw light on their significance as ecofriendly processes. (8)

(b) How VAM helps in sustainable agriculture. How it differs from ectomycorrhiza? (7)

[This question paper contains 6 printed pages.]

Your Roll No.....

Sr. No. of Question Paper : 1368 A

Unique Paper Code : 32161402

Name of the Paper : Ecology

Name of the Course : **B.Sc. (Hons.) Botany (CBCS)**

Semester : IV

Duration : 3 Hours Maximum Marks : 75

Instructions for Candidates

1. Write your Roll No. on the top immediately on receipt of this question paper.
2. Attempt any **five** questions in all.
3. Question No. **1** is compulsory.
4. **All** questions carry equal marks.
5. All parts of a question must be answered together.

1. (a) Define the following terms (Attempt any **Seven**) : (1×7=7)

P.T.O.

(i) Soil texture

(ii) Pedogenesis

(iii) Hydrological cycle

(iv) Sciophyte

(v) Homeostasis

(vi) Autecology

(vii) Glacial soil

(viii) Thermocline

(ix) Ecological amplitude

(b) Give one word for the following : (1×8=8)

(i) Interlocking food chains

(ii) A process of nutrient enrichment in water bodies

(iii) Soil transported by running water

(iv) Organisms which feed on the dead bodies of other organisms

(v) An angiosperm which grows as a total stem parasite

(vi) A process of nutrient enrichment in water bodies.

(vii) Small organisms which feed on dead bodies of other organisms.

(viii) Transition zone of a species

2. Differentiate between the following (Attempt any **five**) : (5×3=15)

(i) Autotrophic and Heterotrophic Succession

(ii) Analytical Characters and Synthetic Characters

(iii) Commensalism and Ammensalism

(iv) Gravitational Water and capillary water

(v) Predator and Parasite

(vi) Ecads and Ecotypes

(vii) Tropical forest and Temperate Forests

P.T.O.

3. (a) Discuss the sequence of processes occurring during a primary succession. (5)

(b) Nitrogen Cycles are perfect cycles. Explain nitrogen cycling in nature with the help of a well labelled diagram showing all the reservoirs and processes. (5)

(c) Briefly comment on the influence of light on the distribution of plants. (5)

4. Write short notes on (any **three**) (5×3=15

(i) Biological spectrum

(ii) Shelford's law of Tolerance

(iii) Soil organisms

(iv) Mutualism

(v) Growth curves

5. (a) What are ecological pyramids? Who gav the concept? Discuss in brief the Pyramids biomass and the limitations of these pyramids. (

(b) Mention the theories proposed for climax. How are the theories different? (5)

(c) Give a detailed account of vegetation in Tropical Rain Forests in India. (5)

6. (a) Discuss the various trophic levels in an ecosystem. Why are the number of trophic levels limited? (5)

(b) Give a brief account of seasonal Vegetation of Delhi. (5)

(c) Define the theory of continental drift. What are the various types of endemics? Discuss in brief. (5)

7. (a) Explain the cycling of Phosphorus in nature. Is it a sedimentary or a gaseous cycle? (5)

(b) What is water holding capacity? How is it different from field capacity? Suggest two methods that can help in improving the water holding capacity of soils. (5)

(c) Draw a schematic representation of Y shaped energy flow model? Explain the main features of this model. (5)

[This question paper contains 6 printed pages.]

Your Roll No.....

Sr. No. of Question Paper : 1868 **A**

Unique Paper Code : 32165401

Name of the Paper : Economic Botany and Biotechnology

Name of the Course : **Generic Elective: Botany**

Semester : IV

Duration : 3½ Hours Maximum Marks : 75

Instructions for Candidates

1. Write your Roll No. on the top immediately on receipt of this question paper.
2. Attempt **five** questions in all including Question number **1** which is compulsory.
3. All parts of a question must be answered together.
4. Write botanical names wherever applicable and draw relevant diagrams wherever possible.

1. (a) Match the following : (5×1=5)

P.T.O.

(i) Orange pekoe	(a) Kary Mullis
(ii) Drupe	(b) Clove
(iii) PCR	(c) Black pepper
(iv) Androgenesis	(d) Tea
(v) Hypanthium	(e) Shipra Guha and Maheshwari

(b) Expand the following **(any five)** : (5×1=5)

(i) IRRI

(ii) NBPGR

(iii) FAO

(iv) RT – PCR

(v) SNPs

(vi) RAPD

(vii) PAGE

(c) Fill in the blanks **(any five)** : (5×1=5)

(i) Wonder bean/Poor man's meat is botanically known as .....

(ii) Persistent endosperm in black pepper is called .....

(iii) In the GM crop Bt cotton, Bt stands for .....

(iv) On long term storage the fats become unpleasant in taste because of .....

(v) Endosperm culture produces ..... plants.

(vi) SDS-PAGE separates proteins on the basis of _____

(vii) In PCR, denaturation temperature is usually set at _____ °C.

) Draw well labelled diagrams of (any two): (2×5=10)

(i) L.S. black peppercorn

(ii) L.S. clove flower bud

(iii) L.S. wheat grain

P.T.O.

(b) Write a note on Vavilov's centers of origin. (5)

3. Write short notes on the following **(any three)** : (3×5=15)

(a) Methods of sterilization

(b) Semi drying oils

(c) Flavr-Savr tomato

(d) Method of cotton processing

(e) PCR

4. (a) Give the botanical name, family and two uses of the following **(any five)** : (5×2=

(i) Wheat

(ii) Gram

(iii) Cotton

(iv) Tea

(v) Black pepper

(vi) Groundnut

(vii) Soyabean

(b) Discuss the morphology of groundnut plant. Why is its fruit found underground? (5)

5. (a) What is plant biotechnology? What is the role of biotechnology in improvement of crop plants? Discuss citing examples. (8)

(b) Define DNA fingerprinting? What are the various methods and applications of DNA fingerprinting? (7)

6. (a) Give a detailed account of processing of black tea. (8)

(b) What is meant by gene transfer? Discuss any one method of gene transfer. (7)

7. (a) Why are pulses an important dietary constituent? Discuss the ecological and economic importance of legumes. (10)

P.T.O.

(b) What is nutrient media? What is its importance in plant tissue culture? What are the major constituents of nutrient media? 5

[This question paper contains 6 printed pages.]

Your Roll No.....

Sr. No. of Question Paper : 1469 **A**

Unique Paper Code : 32163404

Name of the Paper : Medicinal Botany

Name of the Course : **B.Sc. (Honours) Botany (SEC)**

Semester : IV

Duration : 2½ Hours Maximum Marks : 38

Instructions for Candidates

1. Write your Roll No. on the top immediately on receipt of this question paper.
2. Attempt any **four** questions in all.
3. **All** questions carry equal marks.
4. Support your answers wherever necessary with suitable diagrams.

1. (a) Write suitable answers for the following **(any six)** : (0.5×6=3)

(i) A plant source of Piperine.

P.T.O.

(ii) A plant used in cancer prevention.

(iii) A plant used in key ingredients in non pesticidal management (NPM).

(iv) A plant belonging to Lamiaceae.

(v) A plant known as Shatavari.

(vi) A plant known in Ayurveda as the queen of herbs.

(vii) An Indian system of medicine which has its origin in Greece.

(b) Match of the following : (0.5×5=2.5)

(i) *Azadirachta indica*	(a) Skin burns
(ii) *Aloe vera*	(b) Biopesticide
(iii) *Withania somnifera*	(c) Memory enhancement
(iv) *Ocimum sanctum*	(d) Strength & vitality
(v) *Bacopa moneri*	(e) cold cough

Or

(i) *Curcuma longa*	Meliaceae
(ii) *Tinospora cordifolia*	Combretaceae
(iii) *Azadirachta indica*	Lamiaceae
(iv) *Terminalia chebula*	Menispermaceae
(v) *Ocimum sanctum*	Zingiberaceae

(c) Define the following : **(any four)** (1×4=4)

(i) Cryopreservation

(ii) Sacred grooves

(iii) Red data list criteria

(iv) Endemic

(v) Organoleptic

(vi) Traditional medicine

2. (a) Write short notes on the following : **(any four)** (2×4=8)

(i) Medicinal uses of turmeric

(ii) National gene bank

P.T.O.

(iii) Nutraceuticals

(iv) Endangered plants

(v) Concept of Umoor-e-Tabiya

(vi) Greenhouse technology

(b) Expand the following : **(any three)** (0.5×3=1.5

(i) NBPGR

(ii) CIMAP

(iii) JNTBGRI

(iv) RRL

(v) NMPB

(vi) AIIA

(vii) AYUSH

3. (a) Discuss the historical aspects, concepts and principles of Ayurvedic system of medicine. (5

(b) Write the therapeutic and pharmaceutical uses of important plants used in the Ayurveda system of medicine. (4.5)

4. (a) Differentiate between the following **(any two)** : (2.5×2=5)

(i) Siddha system and Unani system

(ii) National Parks and Botanic Garden

(iii) Saptadhatus and Tridoshas

(b) Discuss the various asexual methods of propagation in medicinal plants. (4.5)

5. Mention two medicinal plants and explain their importance in treatment of hepatic disorders, cardiac diseases, infertility, diabetes, blood pressure, cancer and skin diseases. (9.5)

6. (a) What are the objectives of nursery? Write the lists of important components of nursery. (5)

(b) Discuss methods of cuttings, layering, grafting and budding. (4.5)

7. What are the threats to biodiversity? Discuss the various strategies used for conservation of endangered and endemic medicinal plants of India. (9.5)

[This question paper contains 6 printed pages.]

Your Roll No.....

Sr. No. of Question Paper : 1141 A

Unique Paper Code : 32161401

Name of the Paper : Molecular Biology

Name of the Course : B.Sc. (Hons.) Botany (C.B.C.S)

Semester : IV

Duration : 3:30 Hours Maximum Marks : 75

Instructions for Candidates

1. Write your Roll No. on the top immediately on receipt of this question paper.
2. Attempt **five** questions in all.
3. Question No. 1 is compulsory.
4. All parts of a question should be answered together.

1. (a) Expand **(any five)** : (1×5=5)

(i) RISC

(ii) TBP

P.T.O.

(iii) ORF

(iv) miRNA

(v) CAP

(vi) snRNA

(b) Write the contributions of **(any five)**: (1×5=5)

(i) John Cairns

(ii) Francis Crick

(iii) H. G. Khorana

(iv) Fire and Mellow

(v) R.W. Holley

(vi) Fraenkel-Conrat

(c) Define the following **(any five)**: (1×5=5)

(i) Spliceosome

(ii) Repressor

(iii) Hyperchromicity

(iv) Polysome

(v) Processivity

(vi) Split gene

2. Differentiate between the following **(any five)**: (3×5=15)

(i) B-DNA and Z-DNA

(ii) DNA Polymerase I and DNA Polymerase III

(iii) Constitutive and Facultative Heterochromatin

(iv) Rho-dependent and Rho-independent termination

(v) Primosome and Replisome

(vi) Repression and Derepression

3. Write short note on **(any three)**: (5×3=15)

(i) Attenuation in *Trp* Operon

(ii) DNA packaging in eukaryotes

(iii) Post-translational modification of proteins

(iv) Mechanism of RNAi

P.T.O.

4. (a) Discuss in detail, the role of general transcription factors involved in initiation of transcription in eukaryotes. (9)

(b) Describe the events that help in modification of eukaryotic RNA. (6)

5. (a) Describe the mechanism of positive and negative regulation in lac operon. (10)

(b) Name two unusual bases present in tRNA. (1×2=2)

(c) Write down the location for the following **(any three)** : (1×3=3)

(i) Pribnow Box

(ii) Polyadenylation signal

(iii) Shine-Dalgarno Sequence

(iv) 3'splice site

6. (a) With the help of a well labelled diagram, explai semi-discontinuous and bidirectional replication i

a replication bubble of linear DNA. Also show 3' & 5'orientation of template, leading & lagging strands and direction of two replication forks. (5)

(b) Discuss how genetic code was deciphered? Explain the degeneracy of genetic code. (5)

(c) List the target site and consequences of any three antibiotics inhibiting translation. (5)

7. (a) What is tRNA charging? Discuss in detail, initiation of translation in prokaryotes. (9)

(b) If the percentage of cytosine in double stranded DNA molecule is 20, determine the percentage of other 3 bases. (3)

(c) Give the possible reasons for the following **(any three)** : (1×3=3)

(i) DNA polymerase cannot initiate replication on its own.

(ii) Transcription has lower fidelity than replication.

(iii) Mitochondrial and chloroplast DNA show similarity with bacterial DNA

(iv) Genetic code is triplet in nature.

(34)

[This question paper contains 4 printed pages.]

Your Roll No.....

Sr. No. of Question Paper : 1563

Unique Paper Code : 42164401

Name of the Paper : Plant Physiology and Metabolism

Name of the Course : **B.Sc. (Programme) Life Sciences**

Semester : IV

Duration : 3.5 Hours

Maximum Marks : 75

Instructions for Candidates

1. Write your Roll No. on the top immediately on receipt of this question paper.
2. Only **Five** questions are to be attempted in all.
3. Question 1 is compulsory.
4. **All** questions carry equal marks.
5. Attempt all parts of the question together.
6. Illustrate your answers wherever possible.

P.T.O.

Q1. (a) Fill in the blanks (*any ten*): (1×10=10)

(i) RQ is defined as a ratio .....
(ii) .....is the first stable product of dark reaction.
(iii) Glyoxysomes contain enzymes for β- oxidation of .....
(iv) .....is the anti- ageing phytohormone.
(v) Mobilization of food reserves through α-amylase in barley seeds is due to the phytohormone .....
(vi) Photolysis of water in light reaction is associated with ..... ions.
(vii) Letham is associated with the discovery of .....
(viii) The word enzyme was coined by .....
(ix) The occurrence of break in the continuity of water column in the xylem is known as .....
(x) The protein part of enzyme is called as.....
(xi) Blue Green Algae fix ..... directly from air to enhance fertility of crops.
(xii) The movement of water or solutes from cell to cell through cytoplasm with the help of plasmodesmata is called .....
(xiii) The process by which bacteria reduce nitrate to dinitrogen is known as .....

(b) Expand the following (*any five*): (1×5=5)

(i) NAA (ii) SE-CC complex
(iii) PMF (iv) EDTA
(vii) CEC

Q2. Differentiate between (*any five*): (3×5=15)

(i) C3 and C4 plants.
(ii) Aerobic respiration and Anaerobic respiration.
(iii) Oxidative Phosphorylation and Photophosphorylation
(iv) Competitive and non-competitive inhibition
(v) Coenzyme and cofactor
(vi) Carrier proteins and Channel proteins
(vii) V-type ATPase and P-type ATPase

Q3. (a) 'Photorespiration is a wasteful process in plants'. Comment. (5)
(b) Write an explanatory note on phytochrome. (5)
(c) Discuss the theory that best explains the mechanism of stomatal movements. (5)

Q4. (a) Give the discovery and enumerate the commercial applications of Auxins. (5)
(b) What is photoperiodism? Discuss three general categories of plants with reference to day length. (5)
(c) Describe the most widely accepted mechanism of phloem translocation in angiosperms with the help of suitable diagram. (5)

Q5. (a) With the help of a flow chart, give a detailed account of glycolysis. What is the fate of pyruvate in plant respiration? (5)

OR

(a) Discuss the structure and function of reaction center and antenna complex.
(b) Describe properties and mechanism (hypothesis) of action of enzymes. (5)
(c) Discuss essential nutrient elements, criteria of essentiality and role of any two essential elements in plants. (5)

Q6. (a) Write a short note on the following (*any two*): (2.5×2=5)
(i) Bolting
(ii) Apical dominance
(iii) Witches broom

(b) Discuss the mechanism of biological nitrogen fixation and give its significance to plants. (5)

OR

(b) Explain the biogeochemical cycle of Nitrogen.

(c) Describe different methods of studying mineral requirements. Explain how nutrient solution can sustain rapid plant growth? (5)

Q7. (a) Explain with the help of a diagram, the processing of fatty acids in glyoxysomes. How succinate produced in glyoxysomes is processed to form sugars (gluconeogenesis)? (5)

(b) How different amino acids are synthesized in plants by ammonium assimilation and transamination? (NO chemical formula required). (5)

OR

(b) What is leghaemoglobin? Discuss its role in symbiotic nitrogen fixation.

(c) Discuss the water potential, its components and its significance. (5)

OR

(c) Explain why transpiration is considered as a necessary evil.

(100)

[This question paper contains 6 printed pages.]

Your Roll No.....

Sr. No. of Question Paper : 1386 **A**

Unique Paper Code : 32161403

Name of the Paper : Plant Systematics

Name of the Course : **B.Sc. (H) Botany**

Semester : IV

Duration : 3 Hours 30 Minutes Maximum Marks : 75

Instructions for Candidates

1. Write your Roll No. on the top immediately on receipt of this question paper.
2. **All** questions carry equal marks.
3. Question Number **1** is compulsory. Attempt total **5** questions in all.
4. Attempt all parts of a question together.
5. Draw diagrams wherever necessary.

1. (a) Expand the following **(any five)** : (1×5=5)

   (i) ICN

   (ii) IAPT

P.T.O.

(iii) APG

(iv) OTU

(v) UPGMA

(vi) R. Br.

(b) Define the following terms **(any five)** : (1×5=5)

(i) Manual

(ii) Homoplasy

(iii) Monophyly

(iv) Synonym

(v) Taxa

(vi) Clade

(c) Fill in the blanks **(any five)** : (1×5=5)

(i) The starting date for botanical nomenclature is _____

(ii) The taxonomic category indicated by the suffix '-phyta' is _____

(iii) Carolus Linnaeus authored the book _____

(iv) The concept to binomial nomenclature was given by _____

(v) Free central placentation is considered as an _____ character compared to axile placentation.

(vi) The standard size of a herbarium sheet is _____

2. Write note on following **(any three)** : (5×3=15)

(a) Herbaceous origin theory of angiosperms

(b) Principles of ICN

(c) Biological species concept

(d) Contributors of phylogenetic systems of classification

3. Differentiate Between **(any five)** : (3×5=15)

(a) Artificial and Phylogenetic systems of classification

(b) Phenogram and Cladogram

P.T.O.

(c) Holotype and Syntype

(d) Regional flora and Local flora

(e) Parallelism and Convergence

(f) Diagnosis and Description

4. Give a detailed account of a natural **OR** a phylogenetic classification. Also enlist the merits and demerits. (12+3= 15)

5. (a) Discuss the role of palynology **OR** phytochemistry in plant systematics with suitable examples. (7.5)

(b) What are taxonomic keys? Discuss various types of single access keys with their features and utility. (7.5)

6. (a) Give an example of following **(any five)** : (1×5=5)

(i) Genus named after a person

(ii) A database that consists of images of herbarium

(iii) Tautonym

(iv) Most primitive living angiosperm

(v) Journal devoted to taxonomy

(vi) Regional Flora

(b) What are the merits of numerical taxonomy over conventional taxonomy? (6)

OR

Discuss Principle of Priority and its limitations?

(c) Interpret the following **(any four)** : (1×4=4)

(i) *Acacia nilotica* (Linn.) Del. ssp. *nilotica*

(ii) *Gossypium tomentosum* Nutt, *ex* Seem

(iii) *Salix aurita* x *S. caprea*

(iv) *Phyllanthus* Linn, emend. Mull.

(v) X *Triticale*

7. (a) What are the roles of Botanical Gardens? Name any one national and one international botanical garden of repute and briefly highlight their key features. (2+2+2=6)

P.T.O.

(b) Write alternate name and type genus of the following families **(any five)** : (5)

Cruciferae, Umbelliferae, Labiatae, Compositae, Gramineae, Palmae

(c) Write a note on characters and character coding in cladistics methodology. (4)

[This question paper contains 6 printed pages.]

Your Roll No.....

Sr. No. of Question Paper : 1536 **A**

Unique Paper Code : 42167904

Name of the Paper : Analytical Techniques in Plant Science

Name of the Course : **B.Sc. Life Sciences**

Semester : VI

Duration : 3 hours 30 minutes Maximum Marks : 75

Instructions for Candidates

1. Write your Roll No. on the top immediately on receipt of this question paper.
2. Attempt any **four** questions.
3. Question no. **1** is compulsory.
4. Attempt **all** parts of the question together.

1. (a) Fill in the blanks **(any five)** :

   (i) Separation of molecule on the basis of difference in charge is called _____

   (ii) _____ is a technique used for separation of lipids.

P.T.O.

(iii) The two halves of a biological membrane arereferred to as the _____ and E-Half.

(iv) Mass spectrometer was invented by _____

(v) Beer's law states that the intensity of light decreases with respect to _____

(vi) The stationary phase in paper chromatography is _____

(vii) A microscope has a 4X ocular lens and a 10X objective; the microscope's total magnification is _____ X. (5×1=5)

(b) Define the given terms **(any five)**: (5×1=5)

(i) Svedberg unit

(ii) Half life

(iii) Stationary phase

(iv) Cryofixation

(v) Spectrophotometry

(vi) Autoradiography

(c) Match the column (any five): (5×1=5)

(i) Affinity chromatography	*Taq* polymerase
(ii) ELISA	rotor
(iii) PCR	nitrocellulose membrane
(iv) Centrifuge	antigen-antibodies interaction
(v) Confocal microscope	biomolecular intefaction
(vi) Blotting techniques	pin hole aperture

2. Differentiate between **(any five)**: (5×1=5)

(i) Positive and Negative Staining

(ii) Differential and density gradient centrifugation

(iii) Northern and Southern Blotting

(iv) G Banding and Q Banding

(v) GC and HPLC

(vi) Mass spectrometry and X-ray crystallography

P.T.O.

3: Write short notes on the following **(any three)** : (3×5=15)

(i) DNA Sequencing

(ii) Marker enzymes

(iii) Ultracentrifugation

(iv) Shadow casting

4. (a) Define FISH. Give an account of the technique and its application. (7)

(b) What is autoradiography? How is it helpful in determining the site of protein synthesis and the subsequent transport of secretory proteins? Explain. (8)

5. (a) What is molecular sieve chromatography? Discuss its principle and applications. (7)

(b) What is the difference between freeze fracture and freeze etching techniques? How are they useful in understanding membrane structure? (5)

(c) Give a brief account of the phase contras microscopy. (3

6. (a) Explain the principle and working of UV-Visible Spectrophotometry with the help of well labelled diagram. (7)

(b) Differentiate between scanning electron microscopy and transmission electron microscopy. (8)

7. (a) Justify the following statements **(Any five)** : (5×2=10)

(i) Paraffin wax is not used as an embedding material in transmission electron microscopy.

(ii) TLC has an advantage over paper chromatography.

(iii) All the ultracentrifuges are refrigerated.

(iv) Biological materials are coated with heavy metals in scanning electron microscopy.

(v) Proteins are separated on the basis of their length of amino acid chain in SDS-PAGE.

(vi) Resolving power of a microscope is inversely proportional to the limit of resolution

(vii) Carbohydrates and lipids cannot be separated by electrophoresis.

(b) Explain the use of radioisotopes in biological research. (5)

(2)

[This question paper contains 6 printed pages.]

Your Roll No.....

Sr. No. of Question Paper : 1256 **A**

Unique Paper Code : 32167608

Name of the Paper : DSE Bioinformatics

Name of the Course : **B.Sc. (Hons.) Botany**

Semester : VI

Duration : 3.5 Hours Maximum Marks : 75

Instructions for Candidates

1. Write your Roll No. on the top immediately on receipt of this question paper.
2. Attempt **five** questions in all.
3. Question No. **1** is compulsory.
4. All parts of the questions must be answered together.

1. (a) Give the full form **(any five)** : (1×5=5)

   (i) MIAME

   (ii) QSAR

   (iii) PDB

   (iv) PIR

P.T.O.

(v) MSA

(vi) NIH

(vii) ORF

(b) Match the following **(any five)** : (1×5=5)

Column 'A'	Column 'B'
(i) MegaBLAST	Unique identifier of a given protein or DNA sequence
(ii) TrEMBL	A web based sequence submission tool of NCBI
(iii) GCG	A PDB database which provides annotation and three-dimensional structure of protein sequences
(iv) Barcode	A computer-annotated protein sequence database supplementing the Swiss-Prot
(v) Accession number	Program for aligning long sequences
(vi) NRL_3D	Practical Extraction and Report Languages
(vii) PEARL	Genetic Computer Group

(c) Define the following **(any Five)** : (1×5=5)

(i) SRS

(ii) Rooted and Unrooted Tree

(iii) Python

(iv) MEGA

(v) Conserved sequence

(vi) Rasmol

(vii) GeneScan

2. Write short notes **(any three)** : (5×3=15)

(a) NGS and WGS

(b) Sequence File formats

(c) Gene prediction methods

(d) Molecular docking

(c) Transcriptomics

3. Differentiate the following **(any three)**: (3×5=15

(a) Cladogram and Phylogram

(b) PAM and BLOSUM

(c) BLAST and FASTA

(d) Genbank and Genpept

(e) CATH and SCOP

4. (a) Discuss metabolic pathways database and describ any two small molecule databases. (3+4=7

(b) Discuss one protein sequence database and on protein structural databases? (4+4=8

5. (a) What is sequence alignment? Explain pairwis and multiple sequence alignment with thei significance. (2+6=8

(b) Discuss different level of protein structures and describe computational method of protein structure prediction. (3.5+3.5=7)

6. (a) What do you understand by Computer-aided drug designing and also mention various phases of clinical trials? (5+2=7)

(b) What is Molecular phylogeny and compare Neighbour Joining, Maximum Parsimony and Maximum Likelihood methods of phylogeny reconstruction. (2+6=8)

7. (a) Give a comparative account on the various data submission and retrieval tools of NCBI and EMBL. (3.5+3.5=7)

(b) What do you understand by bioinformatics? Discuss its applications, scopes and limitations. (2+6=8)

8. (a) What do you understand by biological databases? Discuss about Primary, Secondary and Composite database. (2+6=8)

P.T.O.

(b) What do understand by sequence homology and explain local and global alignment with diagram? (2+5=7)

[This question paper contains 4 printed pages.]

Your Roll No.....

Sr. No. of Question Paper : 1169 **A**

Unique Paper Code : 32167601

Name of the Paper : Industrial and Environmental Microbiology

Name of the Course : **B.Sc. (H) Botany (CBCS)**

Semester : VI

Duration : 3 Hours Maximum Marks : 75

Instructions for Candidates

1. Write your Roll No. on the top immediately on receipt of this question paper.
2. Attempt any **five** questions in all.
3. Question No. **1** is compulsory.
4. Attempt **all** parts of a question together.

1. (a) Fill in the blanks **(Any five)** : (5×1=5)

   (i) _____ medium is designed to suppress the growth of some microorganisms while allowing the growth of others.

P.T.O.

(ii) _____ is an enzyme that hydrolyzes a-1,4 glycosidic linkages in starch.

(iii) The word _____ comes from the Latin verb 'fervere' which means to boil.

(iv) Industrial amino acids are obtained in _____ stage of microbial growth

(v) _____ is one of the common bacteria found in sewage.

(vi) Mixing or agitation of medium to maintain uniformity in a fermenter is achieved by _____

(b) Define any **five** of the following :- (5×1=5)

(i) Trickling filter

(ii) Sparger

(iii) Filter aids

(iv) Industrial Microbiology

(v) Lyophilization

(vi) Enriched medium

(c) Expand any **five** of the following abbreviations : (5×1=5)

(i) PDA

(ii) NBAIM

(iii) ATCC

(iv) NRRL

(v) EMB

(vi) GRAS

2. Write short notes on any **three** of the following : (3×5=15)

(i) Ideal media for industrial fermentation

(ii) Enzymes used for industrial applications

(iii) Microbial growth phases

(iv) Role of microbes in environment

3. Differentiate between any **three** of the following : (3×5=15)

(i) Solid and liquid state fermentation

(ii) Filtration and centrifugation

P.T.O.

(iii) Casein and starch hydrolysis

(iv) Airlift and continuously stirred tank fermenter

4. (a) What are the various causes of water pollution? Discuss the various control measures to reduce it? (7)

(b) What are coliform bacteria? Elaborate upon the various steps used to detect the presence of coliform bacteria in drinking water. (8)

5. (a) Discuss different steps involved for recovery and purification of fermentation products? (8)

(b) Discuss in detail the industrial production of

(i) Ethanol

(ii) Citric acid useing microbes. (7)

6. (a) Discuss the role of microbes in sewage treatment. (8)

(b) Name at least four soil borne microbes. Discuss various methods for their isolation? (7)

[This question paper contains 4 printed pages.]

Your Roll No.....

Sr. No. of Question Paper : 1405 **A**

Unique Paper Code : 42163601

Name of the Paper : Intellectual Property Rights

Name of the Course : **B.Sc. Life Science (Skill Enhancement Course)**

Semester : VI

Duration : 3.5 Hours Maximum Marks : 38

Instructions for Candidates

1. Write your Roll No. on the top immediately on receipt of this question paper.
2. Attempt any **five** questions in all. Question No. **1** is compulsory.
3. **All** question carry equal marks.

1. (a) Define the following **(any five)** : (1×5=5)

   (a) Intellectual Property

   (b) Industrial Design

P.T.O.

(c) Geographical Indications

(d) Benefit sharing

(e) Biopiracy

(f) Infringement

(g) Semi-conductor chips

(b) Match the following : (0.5×6=3)

a. Madrid Protocol	i) Literary & Artistic work
b. Hague Agreement	ii) Specific origin
c. Berne Convention	iii) Industrial Designs
d. Software	iv) Trademark
e. Paris Convention	v) Industrial Property
f. Geographic Indication	vi) Patent

2. Write short notes on ***any five*** of the following : (3×5=15)

(a) NDUS criteria of a new plant variety

(b) Software protection in India

(c) Protection of Traditional Knowledge in the International Arena

(d) Paris Convention and Berne Convention

(e) Remedies available for Design Infringement

(f) Product patent and Process patent

(g) Domain Name Protection

3. Attempt **any two** : (7.5×2=15)

(a) What is a Copyright? Briefly explain the process of obtaining Copyright. How Copyright is transferred in India?

(b) Discuss the Patent Act 1970, and its three major amendments. What constitutes a patent infringement?

(c) What is a Trademark? Explain the different types of trademarks with examples. What is the process of registering a trademark?

(d) Describe the PPVFR Act, 2001 in detail. How this act is protecting 'breeders', 'farmers' and 'researchers' right?

[This question paper contains 6 printed pages.]

Your Roll No.....

Sr. No. of Question Paper : 1351 **A**

Unique Paper Code : 32161602

Name of the Paper : Plant Biotechnology

Name of the Course : **B.Sc. (H) Botany**

Semester : VI

Duration : 3 Hours Maximum Marks : 75

Instructions for Candidates

1. Write your Roll No. on the top immediately on receipt of this question paper.
2. Attempt **five** questions in all.
3. Question No. **1** is compulsory.

1. (a) List any one contribution of the following Scientists **(any five)** (1×5=5)

(i) Ingo Portykus and Peter Beyer

(ii) Charles Amtzen

(iii) Anand Mohan Chakraborty

P.T.O.

(iv) Werner Arber and Daniel Nathans

(v) Haberlandt

(vi) Guha and Maheshwari

(vii) E. C. Cocking

(b) Expand the abbreviations **(any five)** (1x5=5)

(i) EPSPS

(ii) *nptII*

(iii) GUS

(iv) CaMV 35S

(v) pBR 322

(vi) MCS

(vii) ICP

(c) Define **(any five)** (1×5=5)

(i) Superbug

(ii) Blue-White Screening

(iii) Isoschizomers

(iv) Artificial Chromosome Vectors

(v) Totipotency

(vi) Androgenesis

(vii) Plantibodies

2. Differentiate between any **three**: (5×3=15)

(i) Phagemidsand Cosmids

(ii) Genomic DNA Library and cDNA Library

(iii) Microinjection and Electroporation

(iv) RAPD and RFLP

(v) Primary and Secondary Metabolites

3. Write short notes on **(any three)** (5×3=15)

(i) Methods of Screening of libraries for gene localization

(ii) Colony hybridization

(iii) cDNA library preparation

(iv) Cryopreservation

P.T.O.

(v) Transgenics for Biodegradable plastic production

4. (a) With the help of illustrations, describe the structure of a yeast artificial chromosome (YAC) cloning vector. Explain the process of gene cloning using a YAC vector. (4+6=10)

(b) What do you understand by molecular farming? How have transgenic plants been utilized to produce industrial enzymes? (5)

Or

Discuss about the development of transgenics for increasing the shelf life of tomatoes. (5)

5. (a) Describe in detail the process that led to the development of transgenic Bt cotton. What are its advantages and limitations? (7+3=10)

(b) Give a short account of the ethical concerns associated with the development and release of transgenic crops. (5)

Or

Taking one suitable example, illustrate how transgenics have been useful in horticulture. (5)

6. (a) Give a detailed account of the reporter genes used for the selection of transgenics. (12)

(b) Mention the essential requirements for performing a PCR reaction. (3)

Or

Discuss the advantages of artificial seeds. (3)

7. (a) Give a detailed account of the types, biological role and applications of restriction endonucleases. (10)

Or

A linear DNA molecule is subjected to single and double digestions with restriction endonucleases, and the following results are obtained: (10)

Enzymes	Fragment Sizes (in kb)
EcoRI	8.5, 5.0, 3.0
HindIII	9.5, 6.0, 1.0
EcoRI and HindIII	6.0, 4.0, 3.0, 2.5, 1.0

Draw the restriction map defined by these data.

(b) Briefly enumerate the applications of plant tissue culture. (5)

[This question paper contains 10 printed pages.]

Your Roll No.....

Sr. No. of Question Paper : 1752 A

Unique Paper Code : 32165201

Name of the Paper : Plant Ecology and Taxonomy

Name of the Course : Botany

Semester : VI

Duration : 3 hours + 30 minutes Maximum Marks : 75

Instructions for Candidates

1. Write your Roll No. on the top immediately on receipt of this question paper.
2. Attempt **Section A** and **Section B** separately.
3. All parts of a question must be answered together.
4. Draw well-labelled diagrams wherever necessary.

SECTION A

(Plant Ecology) (37.5)

Attempt **any three** questions from **Section A** including Question 1, which is compulsory.

P.T.O.

1. (a) Fill in the Blanks : (10×0.5=5)

(i) An _____ consists of all the organisms and the physical environment with which they interact.

(ii) An instrument to measure rainfall is _____ .

(iii) The vertical section of the soil from the ground surface downwards to where the soil meets the underlying rock is called _____ _____

(iv) The life-supporting zone of the Earth where the atmosphere, hydrosphere and the lithosphere interact and make life possible is known as the _____ .

(v) The _____ zone is the lowest ecological zone in a water body.

(vi) The transition area between two biological communities where two communities meet and integrate is _____ .

(vii) The water present in narrow soil spaces is called _____ water available to plants roots for absorption.

(viii) The functional level of an organism in any food chain is _____.

(ix) Ecology is the relationship between living things and its _____.

(x) Each developmental stage in a succession is known as _____.

(b) Match the following **(Any five)** (5×0.5=2.5)

(i) Botanical Life Forms	a. Always upright
(ii) A Group of populations of different species occupying the same geographical area	b. Raunkiaer
(iii) Ecological Pyramids	c. R. Mishra
(iv) Food chain	d. Community
(v) Pyramid of Energy	e. A.G. Tansley
(vi) Father of Ecology in India	f. Trophic Level
(vii) Endemism	g. Restricted to small geographic area

2. Differentiate between the following : **(Any three)** (5×3=15)

(a) Primary succession and Secondary succession

(b) Ecotone and Edge effect

(c) Food chain and Food web

(d) Commensalism and Amensalism

(e) Grazing food chain and Detritus food chain

(f) Terrestrial ecosystem and Aquatic Ecosystem

3. Write short notes on the following : **(Any three)** (5×3=15)

(a) Ecological pyramids

(b) Soil texture

(c) Endemism

(d) Nitrogen cycle or Carbon cycle

(e) Importance of Decomposers in ecosystem

(f) Shelford's law of tolerance

(g) Light as an Ecological factor

Answer the following : (7.5+7.5=15)

(a) What are Plant Communities? Discuss the quantitative characters of Communities.

OR

What are Ecological factors. Discuss the important of temperature, soil and water that impact on the plants.

(b) What is an Ecological Succession? Describe the process of succession in a water body.

OR

Describe the different biogeographic zones of India.

SECTION B

(Taxonomy) (37.5)

Attempt **any three** questions from **Section B** including Question **1**, which is compulsory.

1. (a) Fill in the Blanks : (10×0.5=5)

(i) Benthum and Hooker's system of botanical taxonomy was based on the principle of _____ affinities.

(ii) Suffix-ales denotes the rank _____

(iii) _____ is the basic unit of Taxonomy.

(iv) _____ proposed the five-kingdom classification.

(v) Fabaceae or Leguminosae is commonly known as the _____ family.

(vi) Binomial system of classification was given by _____

(vii) The standard size of an herbarium sheet is _____

(viii) The basic components of systematics are identification, nomenclature and _____

(ix) _____ as a branching diagrammatic tree used in phenetic classification to illustrate the degree of similarity among taxa.

[This question paper contains 6 printed pages.]

Your Roll No.....

Sr. No. of Question Paper : 1106 **A**

Unique Paper Code : 32161601

Name of the Paper : Plant Metabolism

Name of the Course : **B.Sc. (Hons.) Botany**

Semester : VI

Duration : 3 hours + 30 minutes Maximum Marks : 75

Instructions for Candidates

1. Write your Roll No. on the top immediately on receipt of this question paper.
2. Attempt any **five** questions in all, including question number **1**, which is compulsory.
3. Attempt all parts of a question together.

1. (a) Fill in the blanks **(any six)** : (6×0.5=3)

   (i) Conversion of ammonia to nitrite and then to nitrate is called _____ .

   (ii) Triacylglycerols are cleaved by _____ into glycerol and fatty acids.

P.T.O.

(iii) _____ catalyzes the first step in glycoly pathway.

(iv) The enzyme succinate dehydrogenase present on _____ of mitochondria.

(v) Charles Barnes coined the term _____ 1893.

(vi) Cramps caused by heavy exercise result accumulation of _____.

(vii) The synthesis of glucose from no carbohydrate source is known as _____

(b) Briefly explain the following terms **(any four)** (4×2=

(i) Hill's reaction

(ii) Bacteroids

(iii) Coupled reaction

(iv) Michaelis Constant (Km)

(v) RQ

(vi) α-oxidation

(c) Expand the following : (4×1=4)

(i) FAD

(ii) PEPC

(iii) DCPIP

(iv) PUFA

2. Differentiate between the following **(any five)** : (5×3=15)

(a) Lock and key hypothesis and induced fit model

(b) Anabolism and Catabolism

(c) Substrate level phosphorylation and oxidative phosphorylation

(d) Saturated and unsaturated fatty acids

(e) Nitrate reductase and nitrite reductase

(f) Aerobic and anaerobic respiration

3. Write explanatory notes on the following **(any three)** : (3×5=15)

P.T.O.

(a) Mobilization of lipids during seed germination

(b) Blackman's law of Limiting Factors

(c) Chemiosmotic mechanism of ATP synthesis

(d) Classification of enzymes

(e) Emerson enhancement effect and its significance

4. (a) Give the contributions of the following scientists **(any five)** : (5)

(i) TW Engelman

(ii) Hans Kornberg

(iii) E Racker

(iv) Peter Mitchel

(v) CB van Niel

(vi) Louis Pasteur

(b) Write a short note on synthesis and catabolism of sucrose. (5)

(c) Explain the flow of electron during light reaction of photosynthesis, with the help of flowchart. (5)

5. (a) Explain the various factors affecting enzyme activity. (8)

(b) Describe Pentose phosphate Pathway and give its significance. (7)

6. (a) Give an account of β-oxidation of fatty acids along with its energetics. (8)

(b) Discuss the amphibolic pathways of Citric acid cycle with the help of flow chart. (7)

7. (a) Explain the carbon fixation process in CAM plants. How is it different from C4 cycle? (8)

(b) Discuss in details the assimilation of ammonia by plants. (7)

8. (a) Give an outline of the Calvin cycle, showing the substrates, product and enzymes for each of the important steps. (8)

(b) Discuss the process of ATP synthesis with reference to structure of ATP synthase and Boyer's conformational model. (7)