[This question paper contains 4 printed pages.]

Your Roll No.....

Sr. No. of Question Paper : 1988 **F**

Unique Paper Code : 2164001204

Name of the Paper : Ethnobotany

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

Semester : II

Duration : 2 Hours Maximum Marks : 60

Instructions for Candidates

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

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

   (i) Ethnoveterinary

   (ii) Traditional healers

   (iii) Patent

   (iv) Ayurveda

P.T.O.

(v) Stimulants

(vi) Medicinal ethnobotany

(b) State whether the following statements are **true** or **false (any five)** : (1×5=5)

(i) Anthropology is the science that deals with the study of medicinal plants.

(ii) For preparation of herbarium specimens, artificial drying is recommended more than natural drying process.

(iii) *Trichopus zeylanicus* presents a case of bioprospecting from India.

(iv) Herbarium is only used for identification of an unknown plant specimen.

(v) The siddha system is an Indian traditional medicinal system originating in the southern part of the country.

(vi) Sentinelese tribe belong to the Andaman and Nicobar Islands of the Indian Archipelago.

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

(i) CBD

(ii) AYUSH

(iii) TKDL

(iv) IPR

(v) TEK

(vi) TRIPS

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

(i) Traditional uses and pharmaceutical prospects of *Azadirachta indica*.

(ii) IPR and protection of traditional knowledge.

(iii) Etic and emic approaches in ethnobotanical research.

(iv) Field work in ethnobotany.

3. Write the botanical name, family, plant parts used and medicinal uses of the following **(any five)** : (3×5=15)

(i) Sarpagandha

(ii) Nirgundi

(iii) Indian indigo

(iv) Tulsi

(v) Arogyapacha

(vi) Gloriosa lily

P.T.O.

4. (a) Elaborate the differences between biopiracy and bioprospecting with suitable examples. Discuss as how bioprospecting serve as a tool for equity and benefits sharing between the stakeholders of traditional knowledge. (8)

(b) Ethnobotany is an interdisciplinary science. Justify and elaborate the given statement. (7)

5. (a) List down any four intoxicants used by indigenous communities of India and their cultural significance, along with their plant source and the communities. (8)

(b) Discuss the major features and role of traditional knowledge digital library launched by the Indian government for protection of traditional knowledge. (7)

6. (a) Give an account of the role of ethnobotany in current pharmaceutical industries and modern medicine. (7)

(b) Discuss the major processes required for preservation of plant materials and preparation of herbarium specimens. (8)

[This question paper contains 4 printed pages.]

Your Roll No.....

Sr. No. of Question Paper : 1270 **F**

Unique Paper Code : 2162521201

Name of the Paper : Genetics and Molecular Biology

Name of the Course : **B.Sc. (Prog.) – DSC : B2**

Semester : II

Duration : 2 Hours Maximum Marks : 60

Instructions for Candidates

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

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

   (i) 2,4-dioxy-pyrimidine is _____.

   (ii) Number of base pairs per turn in A-DNA is _____.

   (iii) Example of a base analog is _____.

P.T.O.

(iv) _____ site in the ribosome is the site where peptidyl tRNA attaches during elongation.

(v) ORF stands for _____ .

(vi) The chromosome theory of inheritance is given by _____ .

(vii) The condition in which genes are present on the same chromosome, causing them to be inherited as a unit is known as _____ .

(b) Define the following **(any ten)** : (10×1=10)

(i) DNA polymerase

(ii) Lethal mutations

(iii) Karyotype

(iv) Promoter

(v) Okazaki fragments

(vi) Trisomy

(vii) Ribozymes

(viii) Polysomes

(ix) Duplicate genes

(x) Missense mutations

(xi) Ligase

(xii) Start codon

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

(i) Watson and Crick model of DNA structure

(ii) Point mutations

(iii) Genetic code

(iv) Classical and molecular concept of gene

(v) Polygenic inheritance

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

(i) Codominance and Incomplete dominance

(ii) Purines and Pyrimidines

(iii) Autopolyploidy and Allopolyploidy

(iv) Inducible and Repressible operon

(v) Paracentric and Pericentric inversion

4. Explain with the help of diagrams **(any three)** : (5×3=15)

(i) Transcription in prokaryotes

(ii) Central dogma of molecular biology

(iii) Crossing over

(iv) DNA replication mechanism in *E. coli*

(v) Tryptophan operon

5. (a) Explain with the help of diagrams why recombination never exceeds 50%. (7.5)

(b) How are induced mutations different from spontaneous mutations? Briefly describe two different physical and chemical mutagens used for inducing mutation. (7.5)

6. (a) Enumerate the functions of different types of RNA found in the eukaryotic cell. (5)

(b) In a dihybrid cross in pea, two randomly selected plants with purple flowers were crossed and in the F_2 population, 105 purple, 40 red and 52 colorless flowers bearing plants were obtained. Use the given information to find out probable segregation ratio. Also, explain the genetic basis of segregation. Write down the genotypes and phenotypes of parents, F_1 and F_2 plants. (10)

May June 2023

[This question paper contains 4 printed pages.]

Your Roll No.....

Sr. No. of Question Paper : 1195 **F**

Unique Paper Code : 2162011201

Name of the Paper : Microbiology and Plant - Microbe Interactions

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

Semester : II

Duration : 2 Hours Maximum Marks : 60

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. 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) Outside a living cell, virus particle is known as a _____

   (ii) _____ was the first scientist to crystallize a virus.

P.T.O.

(iii) _____ and _____ discovered process of conjugation.

(iv) Bacterial cell wall is made up of _____

(v) *Azolla* and _____ constitute an example of symbiotic association

(vi) _____ is known as father of microbiology

(b) Select the True/False statement **(any five)** : (5×1=5)

(i) SARS-CoV-2 is a novel, positive-sense, single-stranded RNA virus

(ii) Cell lysis occur during the lysogenic cycle

(iii) Cell to cell contact is required in bacterial transduction

(iv) Binary fission is the common mode of reproduction in bacteria

(v) Heterocysts are biological fertilizers

(vi) Mycorrhiza promotes bacterial activity

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

(i) HIV (ii) ICTV

(iii) NAG (iv) PPLO

(v) PGPR (vi) IARI

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

(i) Lytic cycle and lysogenic cycle

(ii) Viroids and Prions

(iii) Archaebacteria and Eubacteria

(iv) Gram positive bacteria and Gram negative bacteria

(v) Ectomycorrhiza and Endomycorrhiza

(vi) Synthetic media and Differential media

(vii) Photolithoautotrophs and Chemolithoautotrophs

3. Draw a well labelled diagram **(any Three)** : (3×5=15)

(i) Bacteriophage

P.T.O.

(ii) Bacterial Growth curve

(iii) Disease cycle of citrus canker

(iv) Formation of root nodule

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

(i) Baltimore's Classification

(ii) Wall-less forms of bacteria

(iii) Griffith's Experiment

(iv) Role of *Rhizobium* in soil

5. Answer any **two** of the following : (2×7.5=15)

(i) Briefly describe the symptoms, casual organism and control measures of any viral plant disease.

(ii) Bacteria are an integral part of our daily life. Prove this statement with suitable examples from agriculture, fermentation processes, and medicine.

(iii) How do Mycorrhiza colonize the host? Describe various benefits of Mycorrhiza.

[This question paper contains 2 printed pages.]

Your Roll No.....

Sr. No. of Question Paper	:	**5708**	**E**
Unique Paper Code	:	42161201	
Name of the Paper	:	Plant Ecology and Taxonomy	
Name of the Course	:	**B.Sc. (Prog.)**	
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 B** on SEPARATE SHEETS.
3. Question No. 1 of both sections is COMPULSORY.
4. Attempt **three** questions from **Section A** and **three** questions from **Section B** including question number **1** from both the sections.
5. Attempt **all** parts of a question together.

SECTION – A

1. (a) Define **any five** of the following: (5x1=5)
   i. Edge effect
   ii. Holard
   iii. Autogenic succession
   iv. Thermocline
   v. Community
   vi. Abundance

   (b) Fill in the blanks: (5x0.5=2.5)
   i. Instrument used to measure light intensity is called.....
   ii. .....is the process of breakdown of parent rock material.
   iii. ..... are organisms that feed on plants.
   iv. ..... is an example of a xerophytic plant.
   v. The levels of energy transfer in a food chain are called .....

2. Write short notes on **any three** of the following: (5x3=15)
   (a) Food web
   (b) Temperature as an ecological factor
   (c) Raunkiaer's Life forms
   (d) Endemism

3. (a) Illustrate the following with the help of diagrams ONLY: (4x2=8)
   i. Soil Profile
   ii. Single channel energy flow model

P.T.O.

(b) What are the different bio-geographical zones of India? Describe their salient features. (7)

4. (a) Define ecological succession. Explain the process of ecological succession occurring in a water body with the help of suitable diagrams. (7)

(b) What are biogeochemical cycles? Discuss phosphorous cycle with the help of a diagram. (8)

SECTION – B

1. (a) Define **any five** of the following: (5x1=5)
   i. Taxon
   ii. Herbarium
   iii. Flora
   iv. Basionym
   v. OTU
   vi. *nom.cons.*

   (b) Identify the taxonomic rank of the following: (5x0.5=2.5)
   i. Brassicaceae
   ii. *Sorghum*
   iii. Asterales
   iv. Magnoliopsida
   v. Disciflorae

2. Write short notes on any **three** of the following: (3x5=15)
   (a) Principle of priority and its limitations
   (b) Type method
   (c) Englerian concept of a primitive flower
   (d) Rejection of scientific names
   (e) Importance of botanical garden in taxonomy

3. Differentiate between **any three** of the following: (3x5=15)
   (a) Phenogram and Cladogram
   (b) Indented key and Parallel key
   (c) Phenetic and Phylogenetic classification
   (d) Continuous and discontinuous variations
   (e) Taxonomic category and taxonomic group

4. (a) Give an outline of the system of classification proposed by Engler and Prantl for seed plants (upto the level of series). Enumerate its merits and demerits. (5 + 3 = 8)

   (b) Discuss the role of palynology in solving taxonomic problems with suitable examples. (7)

[This question paper contains 4 printed pages.]

Your Roll No.....

F

Sr. No. of Question Paper : 1214

Unique Paper Code : 2162011202

Name of the Paper : Plant Resources and Economic Botany

Name of the Course : **B.Sc. (Hons) Botany - DSC - 4**

Semester : II

Duration : 2 Hours

Maximum Marks : 60

Instructions for Candidates

1. Write your Roll No. on the top immediately on receipt of this question paper.
2. Attempt **Four** questions in all including.
3. Question No. **1** which is compulsory.
4. All parts of a question must be answered together.
5. All questions carry equal marks.
6. Draw diagrams wherever required.

P.T.O.

1. (a) Give the Botanical name and family of the following **(any 5)** : (1×5=5)

(i) Rice

(ii) Pigeon pea

(iii) Coconut

(iv) Saffron

(v) Tea

(vi) Potato

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

(i) IARI

(ii) CIMAP

(iii) IRRI

(iv) NBPGR

(v) FRI

(vi) CDRI

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

(i) Citrus fruit	(a) Bast fibre
(ii) Millet	(b) Hesperidium
(iii) Jute	(c) Caryopsis
(iv) Wheat	(d) Ragi
(v) Coffee	(e) Groundnut
(vi) Gynophore	(f) Rubiaceae

2. Draw well labelled diagrams of the following : **(any 3)** (3×5=15)

(i) L.S. of Clove Bud

(ii) L.S. of Cotton seed

(iii) L.S. of Rice grain

(iv) T.S. of Potato tuber

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

(i) Centre of Origin concept by Vavilov

(ii) Processing and uses of rubber

P.T.O.

(iii) Economic importance of spices

(iv) Opium and its derivatives

(v) Processing of Jute

4. (a) What is cane sugar? Explain the processing and commercial production of sugarcane. What are the by-products of cane industry? (10)

(b) What are the essential oils? Mention the procedure of extraction of essential oils? (5)

5. (a) What are therapeutic drugs? List three medicinal plants with Botanical name, family, their constituents and uses in curing diseases. (10)

(b) Fruits and Vegetables are essential components of a balanced diet. Comment. (5)

[This question paper contains 4 printed pages.]

Your Roll No.....

Sr. No. of Question Paper : 1233 **F**

Unique Paper Code : 2162011203

Name of the Paper : Plant Systematics

Name of the Course : **B.Sc. (Hons.) Botany – DSC–5**

Semester : II

Duration : 2 Hours Maximum Marks : 60

Instructions for Candidates

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

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

   (i) _____ is known as the Father of Genus Concept.

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

P.T.O.

(iii) The occurrence of similar features in different species with common ancestry is known as _____ .

(iv) The standard size of a herbarium sheet is _____ .

(v) The starting date of Botanical Nomenclature is _____ .

(vi) The binomial with identical generic name and specific epithet is known as _____ .

(vii) Takhtajan represented his system of classification in the form of a _____ diagram.

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

(i) nom. nud.

(ii) APG

(iii) OTU

(iv) ICNCP

(v) IAPT

(vi) sp. nov.

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

(i) Example of generic name derived from name of a planet.

(ii) Place where first International Botanical Congress was held in 1867.

(iii) Genera plantarum was authored by?

(iv) Type genus of the family Arecaceae

(v) The alternate name of the family Graminae

(vi) Sexual system of classification was proposed by?

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

(i) Herbaceous origin theory of angiosperms

(ii) Principles of ICN_{sfp}

(iii) Valid publication of names

(iv) Importance of Flora in the field of plant systematics

(v) Contributors of phylogenetic systems of classification

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

(i) Sibling species and Compilospecies

(ii) Holotype and Lectotype

(iii) Apomorphy and Plesiomorphy

P.T.O.

(iv) Homology and Analogy

(v) Phenogram and Cladogram

(vi) Taxonomic category and taxonomic group

4. (a) Discuss the role of Palynology in plant systematics with **2** suitable examples. (5)

(b) Discuss Biological species concept. (5)

(c) Discus coevolution of angiosperm and animals with **2** suitable examples. (5)

5. (a) Outline the system of classification proposed by Benthem and Hooker (Up to series). (5)

(b) Define a Clade. What are the major clades in APG IV classification? (5)

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

(i) X *Triticosecale*

(ii) *Delphinium viscosum* Hook. et. Thomson

(iii) *Acacia nilotica* (L.) Delile ssp. *nilotica*

(iv) *Gossypium tomentosum* Nutt. *ex* Seem.

(v) *Rosa floribunda* 'Blessings'

(vi) *Perityle vigilans* Spellenb. & A.M. Powell, *sp. nov.*

[This question paper contains 2 printed pages.]

Your Roll No.....

Sr. No. of Question Paper : 4565 **E**

Unique Paper Code : 32163403

Name of the Paper : Biofertilizers

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

Semester : IV

Duration : 2 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 **three** Questions in all.
3. Question No. **1** is compulsory.
4. Draw well labelled diagrams wherever necessary.

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

   (i) FYM

   (ii) CRYEMA

   (iii) PSB

   (iv) IARI

   (v) PGPR

P.T.O.

(b) Define (**any two**) : (2×2=4)

(i) Hartig net

(ii) Curing in fertilizer technology

(iii) Carriers for biofertilizers

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

(i) Types of Biofertilizers

(ii) Green revolution

(iii) Composting techniques

(iv) Actinomycetes and its symbiotic association

3. (a) Discuss the role of earthworms in improving the physical, chemical and biological properties of soil. (8)

(b) Discuss briefly the significance of *Azotobacter* in sustainable agriculture. (7)

4. (a) Discuss briefly isolation and culturing process of *Rhizobium*. (8)

(b) Explain with the help of diagram *Azolla-Anabaena* symbiosis and its significance in paddy fields. (7)

(1000)

[This question paper contains 4 printed pages.]

Your Roll No.....

Sr. No. of Question Paper : 4677 **E**

Unique Paper Code : 32161402

Name of the Paper : Ecology

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

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. Question No. **1** is compulsory. **All** questions carry equal marks.
3. **All** parts of a question must be answered together.

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

   (i) Flora

   (ii) Ecological amplitude

P.T.O.

(iii) Standing crop

(iv) Homeostasis

(v) Primary Productivity

(vi) Pedon

(vii) Population

(b) Write one word answer for each of the following (Attempt any **five**) : (1×5=5)

(i) The fully decomposed organic matter in soil

(ii) Interconnected network of food chains

(iii) The organisms feeding on the dead and decayed matter

(iv) The zone of transition representing a situation of special ecological interest between two different types of communities

(v) The structural and functional unit of biosphere

(vi) Plants living under shade

(c) Match the following : (1×5=5)

(i) Eolian soil	(a) Instrument used to measure light intensity
(ii) *Orobanche*	(b) Soil transported by wind
(iii) Litter	(d) Total water present in soil
(iv) Holard	(f) Root parasite
(v) Luxmeter	(g) Freshly fallen dead matter

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

(a) Analytical Characteristics and Synthetic Characteristics

(b) Autotrophic Succession and Heterotrophic Succession

(c) Mor humus and Mull humus

(d) k-selection and r- selection

(e) Grazing Food Chain and Detritus Food Chain

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

(a) Raunkiaer's life forms

(b) Habitat and ecological niche

P.T.O.

(c) Ecological pyramids

(d) Fire as an ecological factor

(e) Survivorship curves

4. (a) What are biogeochemical cycles? Explain any **one** biogeochemical cycles of your choice along with the labelled diagrams. (5)

(b) Briefly discuss the different types of age pyramids with suitable examples. (5)

(c) Define biotic interaction. Discuss any two positive interactions among organisms with suitable examples. (5)

5. (a) Define soil profile. Discuss along with the diagram. (5)

(b) Briefly explain the Y shaped energy flow model in an ecosystem. (5)

(c) Comment on light as an ecological factor. (5)

6. (a) What is Phytogeography? Discuss any four phytogeographical divisions of India. (7)

(b) Define Ecological succession. Discuss the type of succession that will occur in a water body with the help of diagrams. (8)

(1000)

[This question paper contains 4 printed pages.]

Your Roll No.....

Sr. No. of Question Paper : 6132 **E**

Unique Paper Code : 32165401

Name of the Paper : Economic Botany and Biotechnology

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

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 **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)

(i) Cotton	(a) *Bacillus thuringiensis*
(ii) Golden rice	(b) Gynophore
(iii) *Cry gene*	(c) Golden tips
(iv) Tea	(d) Ginning
(v) Groundnut	(e) Ingo Potrykus

P.T.O.

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

(i) IARI

(ii) NBPGR

(iii) IRRI

(iv) BAC

(v) GUS

(vi) PCR

(vii) RAPD

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

(i) Members of family Fabaceae cultivated primarily for their seeds are chief source of _____ in human diet.

(ii) Botanical name of the king of spices is _____

(iii) The bread wheat has _____ ploidy level.

(iv) _____ fibres are epidermal prolongations of the seed coat cells.

(v) Haploid plants in *Datura innoxia* through anther culture were first obtained by? _____

(vi) The enzyme responsible for degradation of the cell wall of tomato is _____

(vii) _____ genes of Ti plasmid are responsible for T-DNA transfer into plants.

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

(a) Processing of cotton

(b) General utilization of spices

(c) Sterilization techniques in tissue culture laboratory

(d) Roundup ready soybean

(e) Organogenesis in tissue culture

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

(a) Black tea and Green tea

(b) Gram and Groundnut

(c) Semi-drying oils and drying oils

(d) Androgenesis and Gynogenesis

(e) Vaccines and edible vaccines

(f) Cybrid and Hybrid

(g) Direct and indirect embryogenesis

P.T.O.

4. (a) Draw well labelled diagrams of the following (any two) : (2×5=10)

(i) L.S. fruit of 'king of spices'

(ii) L.S. clove flower bud

(iii) L.S. wheat caryopsis

(b) Discuss the technique of PCR in detail and mention its applications. (5)

5. (a) Discuss the concept of 'centres of origin of cultivated plants' with reference to Vavilov's work. (8)

(b) Discuss the morphology of any two leguminous crops and their importance to humans and ecosystem. (7)

6. (a) Describe the origin of hexaploid wheat, its advantages and economic importance. (8)

(b) Define plant tissue culture. Describe four major applications of plant tissue culture. (7)

7. (a) Discuss any two genetically modified plants in detail. (10)

(b) Explain (any one) blotting technique employed as a biotechnological tool. (5)

(500)

[This question paper contains 4 printed pages.]

(3)

Your Roll No.....

Sr. No. of Question Paper : 4521 E

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 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) Rf-C

   (ii) ORC

   (iii) CRP

   (iv) RISC

P.T.O.

(v) TFIID

(vi) PCNA

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

(i) A. Korenberg

(ii) M. Meselson and F. Stahl

(iii) Hershey and Chase

(iv) J. Shine and L. Dalgarno

(v) George Gamow

(vi) H. Temin and D. Baltimore

(vii) J. D. Watson

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

(i) Repliosome

(ii) Enhancer

(iii) Okazaki fragment

(iv) Exon

(v) Ribozyme

(vi) Operon

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

(i) Left handed DNA and Right handed DNA

(ii) Euchromatin and Heterochromatin

(iii) Negative and Positive Gene Regulation

(iv) Denaturation and Renaturation

(v) Self Splicing and Spliceosome Mediated Splicing

(vi) Monocistronic and Polycistronic RNA

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

(i) Organization of DNA in Prokaryotes

(ii) 5' and 3' modifications in eukaryotic mRNA

(iii) Telomeric Replication

(iv) RNA interference

4. (a) Discuss in detail, two majormechanisms of transcription termination in prokaryotes. (9)

(b) What is Central Dogma? Why RNA virusesdonot follow Central Dogma? (3)

(c) State the function of the following **(any three)** : (3)

(i) PCNA

(ii) Gyrase

(iii) SSB

(iv) DNA Polymerase α

5. (a) Describe briefly the *Trp* operon and how it controls the biosynthesis of aminoacid tryptophan. (9)

(b) What is reassociation kinetics and how it can be used to plot cot curve? Also give its implications. (6)

6. (a) With the help of a well labelled diagram, explain the mechanism of initiation of DNA replication in prokaryotes. (6)

(b) Explain the salient features of genetic code. (6)

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

(i) 5'splice site

(ii) TATA Box

(iii) Polyadenylation signal

(iv) Kozak Sequence

7. (a) Discuss in detail, the mechanism of initiation of translation in prokaryotes and compare it with that of eukaryotes. (9)

(b) How can a single gene produce multiple protein products? Explain. (6)

(1000)

(3)

[This question paper contains 6 printed pages.]

Your Roll No.....

E

Sr. No. of Question Paper : 4801

Unique Paper Code : 32161403

Name of the Paper : Plant Systematics

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

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 **FIVE** QUESTIONS in all including Question No. **1** which is COMPULSORY.
3. Attempt all parts of the question together.

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

   (i) D.C.

   (ii) L.

   (iii) Nom.nud.

P.T.O.

(iv) R.Br.

(v) Hook. *f.*

(vi) et.

(b) Answer the following **(any five)** : (5)

(i) Name a genus commemorating a place

(ii) The alternate name of family Cruciferae

(iii) An example of autonym

(iv) Author of Flora of Delhi

(v) Significance of May 1, 1753

(vi) Type genus of family Fabaceae

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

(i) The standard size of a herbarium sheet is _____ .

(ii) _____ is an angiosperm lacking vessels.

(iii) The occurrence of similar features in different species with a common ancestry is known as _____ .

(iv) _____ is an example of journal devoted to taxonomy.

(v) _____ is the Father of genus concept.

(vi) _____ is an International Botanical Garden.

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

(a) Parallelism and Convergence

(b) APG

(c) Typification

(d) Principles of ICN

3. (a) Give an outline of Bentham and Hooker's **OR** Engler and Prantl system of classification. (6)

(b) "Angiosperm and their pollinators have evolved together". Comment. (4)

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

(i) *Rosa floribunda* 'Blessings'

(ii) *Capparis lasiantha* R.Br. *ex* DC.

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

(iv) *Delphinium viscosum* Hook. *f. et.* Thomson

(v) *Triticum aestivum* Linn., nom.cons.

(vi) *Salix aurita x S. caprea*

4. (a) Explain the role of semantides in plant systematics with suitable examples? (6)

(b) Explain Principle of Priority citing various examples. (6)

(c) Give endings of the ranks provided by ICN **(any three)** : (3)

(i) Division

(ii) Class

(iii) Order

(iv) Family

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

(i) Homology and Analogy

(ii) Synonym and Homonym

(iii) Indented keys and Bracketed keys

(iv) Flora and Monograph

(v) Taxonomic category and Taxonomic group

(vi) Monophyly and Polyphyly

6. Attempt **any two** of the following :

(a) Explain the Ranalian and Englerian concept of primitive angiosperm. (7.5)

(b) Discuss the role of palynology in plant systematics. (7.5)

(c) What are the roles of herbaria? Name any one national and one international herbarium of repute and briefly highlight their key features. (7.5)

7. (a) What are taxonomic keys? Explain various types of multi-access keys. (9)

(b) What is a species concept and its types? Explain any one of its types in detail. (6)

P.T.O.

Or

Write a note on methodology of phenetics.

[This question paper contains 4 printed pages.]

Your Roll No.....

Sr. No. of Question Paper : 5746 **E**

Unique Paper Code : 42167904

Name of the Paper : Analytical Techniques in Plant Sciences

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

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. **All** questions carry equal marks.
4. Question No. **1** is compulsory.
5. **All** parts of a question must be answered together.

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

   (i) FISH

   (ii) FACS

   (iii) TLC

   (iv) RCF

   (v) MALDI

P.T.O.

(vi) GFP

(vii) RFLP

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

(i) Positive Staining

(ii) T-Banding

(iii) Cryofixation

(iv) Marker enzymes

(v) Chromosome banding

(vi) Fluorochrome

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

(i) The sedimentation coefficient is expressed as _____ units.

(ii) The instrument used for obtaining sections of uniform thickness for observing under the microscope is called the _____

(iii) A thermostable enzyme used in PCR is _____

(iv) The electrophoretic mobility for separation of nucleic acid depends upon _____ differences of the molecule.

(v) _____ is a marker enzyme for peroxisomes.

(vi) _____ lensesare used in electron microscopes.

(vii) _____ is a fluorescent dye used to stain DNA.

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

(i) Positive Staining and negative staining

(ii) Paper Chromatography and Thin layer chromatography

(iii) SEM and TEM

(iv) Differential centrifugation and Density gradient centrifugation

(v) Freeze fracturing and Freeze etching

(vi) AGE and PAGE

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

(i) Affinity Chromatography

(ii) X -ray crystallography

(iii) Autoradiography

(iv) Confocal Microscopy

4. (a) Explain the procedure and applications of the Polymerase Chain Reaction. (5)

(b) Briefly explain the sample preparation for electron microscopy. (5)

P.T.O.

(c) Explain the pulse-chase experiment in detail with an example. (5)

5. Describe the following techniques and their applications (**any three**) (3×5=15)

(i) Shadow Casting

(ii) Fluorescence microscopy

(iii) Molecular sieve chromatography

(iv) Mass spectrometry

6. (a) Define resolution. Describe different factors that influence the resolution and resolving power of a microscope. (7)

(b) What are radioisotopes? Give an account of different types of radiations emitted by radioisotopes. Discuss the role of Radioisotopes in biological research (8)

7. (a) Briefly discuss the technique of flow cytometry and its applications. (6)

(b) Explain the principle, working and applications of Western Blotting. How is it different from Southern blotting? (9)

[This question paper contains 4 printed pages.]

Your Roll No.....

Sr. No. of Question Paper : 4828 **E**

Unique Paper Code : 32167608

Name of the Paper : Bioinformatics

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 any **five** questions in all.
3. Question No. **1** is compulsory.
4. **All** parts of the question must be answered together.

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

(i) Gene annotation

P.T.O.

(ii) Conserved domain

(iii) Database

(iv) Metabolomics

(v) e-value

(vi) Dendrogram

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

(i) SNP

(ii) NGS

(iii) PDB

(iv) NCBI

(v) MEGA

(vi) OMIM

(c) Fill in the Blanks **(any Five)** (5×1=5)

(i) The term genome was used by German botanist _____

(ii) _____ is an integrated search engine which allows users to search and retrieve different data.

(iii) A web server designed for identifying protein

coding region in expressed sequence tag-derived sequences is _____

(iv) A graphical method for comparing two sequences to identify region of similarity is _____

(v) The first protein database was generated by _____

(vi) _____ is a tool used to align mRNA sequence and gene sequence.

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

(i) Python in bioinformatics

(ii) Swiss Modelling

(iii) RasMol

(iv) Transcriptomics

(v) Microarray

(vi) Whole Genome Sequencing

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

(i) GenBank and FASTA file format

(ii) Secondary and composite database

(iii) Webin and Sequin

(iv) Structural and functional genomics

4. (a) DDBJ is a widely used bioinformatic resource. Discuss the various tools available at DDBJ." (8)

(b) Explain the main features of PDB and PIR. How the PDB and PIR protein databases different from each other. (7)

5. (a) What is a phylogenetic tree. Discuss the three methods used in construction of phylogenetic tree. (8)

(b) Briefly discuss the role of bioinformatics in microbial genomics and crop improvement. (7)

6. (a) Explain the key points of Local and Global sequence alignment and describe various methods used for alignment. (8)

(b) Discuss the main features of computer aided drug design and its role in medical science. (7)

[This question paper contains 4 printed pages.]

Your Roll No.....

Sr. No. of Question Paper : 4705 **E**

Unique Paper Code : 32167601

Name of the Paper : DSE-III (Industrial and Environmental Microbiology)

Name of the Course : **B.Sc. (Honours) 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 including Question number **1** which is compulsory.
3. **All** parts of a question must be answered together.
4. Draw well labelled diagrams wherever necessary.

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

(i) BOD (ii) MPN (iii) UASB (iv) HFCS

(v) PDA (vi) CFU

P.T.O.

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

(i) In trickling filters _____ forms a slime matrix, that can accommodate heterogenous microbial community.

(ii) _____ are plates in the bioreactor that enhance aeration efficiency and prevent vortexing.

(iii) _____ fungi catalyses the breakdown of cellulose.

(iv) Process of fermentation was first described by _____

(v) _____ is a methodused to reduce the concentration of a substance in a solution by repeatedly diluting it with a solvent.

(vi) _____ fungal species are used for alcohol production as they can tolerate high levels of alcohol.

(c) Read the following statements carefully and write *True ox False.* (1×5=5)

(i) Gravimetric method is used to measure TOC.

(ii) Millipore filters are used for sterilization.

(iii) α-Amylase is an endogenous enzyme of *Bacillus subtilis.*

(iv) In liquid state surface fermentations, no agitation is carried out and thus the moulds grow as mycelial mats on the surface of the medium.

(v) Cell disruption is a mandatory step in intracellular product recovery.

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

(i) Components of a Bioreactor

(ii) Isolation of microbes from Air/water

(iii) GRAS

(iv) Algal Blooms

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

(i) Enrichment medium and differential medium

(ii) Solid state fermentation and Liquid state fermentation

(iii) COD and BOD

(iv) Lyophilization and Spray drying

P.T.O.

(v) .Extracellular microbial enzymes and Intracellular microbial enzymes

(vi) Laminar air flow and Autoclave

4. (a) Discuss in detail the production and estimation of amylase using microorganisms. (8)

(b) Discuss various methods of down stream processing. (7)

5. (a) What do you understand by enzyme immobilization? What are the different methods of enzyme immobilization? (8)

(b) What is the industrial importance of glucose isomerase? What are the advantages of semisynthetic penicillin over natural penicillin? (7)

6. (a) What are coliforms? Discuss methods **(any three)** for detecting coliforms in drinking water. (8)

(b) Discuss the secondary methods for treatment of sewage water. (7)

7. (a) Discuss the scope of microbes in Industry. (8)

(b) What are the different components of synthetic culture media? (7)

(1000)

(3)

[This question paper contains 4 printed pages.]

Your Roll No.....

Sr. No. of Question Paper : 5600 **E**

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

(i) Duration for trademark protection in India is _____ .

P.T.O.

(ii) Head office for filing an application for registration of a design is at _____.

(iii) _____ and _____ are examples of GI handlooms in India.

(iv) Plagiarism is a type of _____ infringement.

(v) A _____ is an exclusive right granted for an invention.

(vi) World Intellectual Property Day is celebrated on _____.

(vii) Protection of Literary and Artistic Works was first established at the _____ Convention.

(viii) Protection of Plant Varieties in India is covered under _____ Act.

(b) Define the following **(any three)** : (1×3=3)

(i) Appellations of origin

(ii) Gene Bank

(iii) Domain Name

(iv) Trade secret

(v) Goodwill

(vi) Vienna Code

(vii) PPVFR

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

(a) Patent vs. Copyright

(b) Bio-piracy vs. Bio-prospecting

(c) Passing off vs. Infringement

(d) WIPO vs. WTO

(e) Trademark vs. Geographical Indications

3. Attempt any **two** : (7.5×2=15)

(a) Define Trademark. Discuss various types of trademarks with examples. Briefly describe the Defenses in cases of Passing off.

P.T.O.

(b) What is TKDL? Why was it established? Discuss its structure and one example.

(c) What is meant by *Sui Generis* protection? What are the criteria for giving a GI tag? Explain with two examples.

(d) According to the Patent Act, what are Patentable and Non-patentable Inventions? Explain in brief the working of Patents. What are the objectives of patenting Biotechnology inventions? Explain with examples.

[This question paper contains 2 printed pages.]

Your Roll No.....

Sr. No. of Question Paper	:	**4566**	**E**
Unique Paper Code	:	32163404	
Name of the Paper	:	Medicinal Botany	
Name of the Course	:	**B.Sc. (Hons.) Botany (SEC)**	
Semester	:	IV	

Duration : 2 Hours Maximum Marks : 38

Instructions for the candidates:

1. Write your roll number on the top immediately on receipt of this question paper.
2. Question number 1 is mandatory and attempt any **four** questions including question number 1.
3. All questions carry equal marks.
4. **All** the parts of the question must be attempted together.
5. Draw well labeled diagrams and write botanical names wherever necessary.

1. a. Define the following: (**any five**) (0.5×5=2.5)
   (i) Folk medicine
   (ii) Rasayana drugs
   (iii) Nutraceuticals
   (iv) Sacred groves
   (v) Endemic medicinal plants
   (vi) *Ex-situ* conservation

   b. Expand the following: (**any four**) (1×4=4)
   (i) NBPGR
   (ii) CIMAP
   (iii) TBGRI
   (iv) IUCN
   (v) NMPB
   (vi) AYUSH

   c. Match the following (0.5×6=3)

(i) Knowledge of Drugs	(a) Meliaceae
(ii) *Catheranthus roseus*	(b) Treating High Blood Pressure
(iii) *Rauwolfia serpentina*	(c) Treatment of Malaria
(iv) *Cinchona*	(d) Pharmocognosy
(v) Contamination of herbal drug	(e) Anti-cancer drug
(vi) *Azadirachta indica*	(f) Adulteration

P.T.O.

2. a. Differentiate between (2×3=6)
   (i) Ayurveda and Unani system of medicine
   (ii) Biosphere reserves and National Parks

   b. Explain Greenhouse technology (3.5)

3. a. Write short notes on the following: (**any three**) (2×3=6)

   (i) Polyherbal formulations
   (ii) Medicinal uses of Ashwagandha
   (iii) Concept of Umoor-e-Tabaiya
   (iv) Role of NMPB in the promotion of Medicinal plants

   b. Write the names of any two plants and their importance in treatment of the following diseases/ disorders: (3.5)
   (i) Diabetes
   (ii) Hepatic disorders

4. a. Write the objectives and components of Nursery. (5)

   b. Discuss the various methods of vegetative propagation of medicinal plants with the help of labeled diagrams. (4.5)

5. What is IUCN red list criteria? E xplain the red list categories in brief. (9.5)

6. a. Write the WHO guidelines for Good Agriculture and Cultivation Practices. (5)

   b. Explain the methods of *In-situ* conservation. (4.5)

7. Explain the various methods of adulteration of herbal drugs and describe phytochemical methods of evaluation of herbal drugs. (9.5)

[This question paper contains 8 printed pages.]

Your Roll No.....

E

Sr. No. of Question Paper : 4784

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

(i) PAGE

P.T.O.

(ii) Ti-plasmid

(iii) scFv

(iv) PEG

(v) BAC

(vi) Taq

(b) Define **(any five)** (1×5=5)

(i) Superbug

(ii) Phagemid

(iii) Somaclonal variations

(iv) Genetically modified crop

(v) Probe

(vi) Restriction endonucleases

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

(i) Synthetic insulin developed using recombinant DNA technology was called _____ .

(ii) The bacterial cells which are modified for the uptake of foreign DNA are called _____ cells.

(iii) The gene which was silenced in Flavr Savr^{R} is _____ .

(iv) _____ is an example of biofortified transgenic crop.

(v) The plant-based antibodies developed for dental caries is against bacteria _____ .

(vi) High cytokinin and low auxin ratio promotes _____ production in plant tissue culture.

2. Draw labelled diagrams of **(any three)** (5×3=15

(a) Gene gun

(b) Polymerase chain reaction

(c) Gene construct of Golden rice

(d) BAC

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

(a) Selectable marker gene and reporter gene

(b) Somatic Hybridization and cybridization

(c) Haploid and Triploid plantlets

(d) cDN library and genomic DNA Library

(e) Primary and Secondary metabolites

(f) RAPD and RFLP

(g) Zygotic and somatic embryogenesis

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

(a) Molecular markers

(b) Anther culture

(c) Round Up ready Soyabean

(d) Applications of tissue culture

5. (a) What are osmoprotectants? Provide examples of any two osmoprotectants and their role in abiotic stress tolerance in plants. (5)

(b) Discuss the role of plants as bioreactors from the view point of production of biopolymers. (5)

OR

A linear molecule of DNA was cut with the following restriction enzymes : (5)

EcoRI – 2 fragments produced – 3.7 kb, 2.3 kb

SmaI – 3 fragments produced – 4.3 kb, 1.2 kb, 0.5 kb

Double digestion with both enzymes – 4 fragments produced: 2.5 kb, 1.8 kb, 1.2 kb, 0.5 kb

(i) What is the size of DNA? (0.5)

(ii) Draw a gel profile from the data provided (1)

(iii) Make a restriction map (2)

(iv) What can you conclude from this data? (1.5)

(c) Describe the mechanism of action of cry gene in Bt cotton. What were the advantages of Bt crop over the traditionally grown crops? (5)

6. Answer the following :

(a) Describe the *Agrobacterium*-mediated method of gene transfer in plants with the help of suitable illustrations (binary and co-integrate methods). (5)

(b) Give a detailed account of purpose and strategy used in developing Golden rice. (5)

(c) Provide any one (Key) application of following : (1×5=5)

(i) Lipase

(ii) Cryopreservation

(iii) Meristem culture

(iv) Recombinant DNA technology

(v) Phytohormones in Plant tissue culture

7. (a) Give a brief account of any two prokaryotic vectors. (8)

(b) Describe the biosafety and bioethical concerns in development of transgenic plants. (7)

OR

Give role of genetic transformation in changing the floral characters in carnations. (7)

[This question paper contains 8 printed pages.]

Your Roll No.....

Sr. No. of Question Paper : 4504 **E**

Unique Paper Code : 32161601

Name of the Paper : Plant Metabolism

Name of the Course : **B.Sc. (Hons) 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. **All** questions carry equal marks.
3. Question No. **1** is compulsory.
4. Attempt **five** questions in all including Question No. **1**.

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

P.T.O.

(i) If respiratory quotient is 1, the respiratory substrate is _____.

(ii) The enzyme first isolated and purified in the crystalline form was _____.

(iii) _____ received the noble prize for tracing the path of carbon in photosynthesis.

(iv) Bacteroids are surrounded by _____ membrane in nodules.

(v) _____ number of molecules of Acetyl Co A are produced after β-oxidation of 14 carbon fatty acid.

(vi) The breakdown of complex molecules into simpler molecules with the release of energy is called _____.

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

(i) Absorption spectrum

(ii) Isoenzymes

(iii) Uncouplers

(iv) Triglycerides

(v) Hill reaction

(vi) Anaerobic respiration

(c) State True or False **(any five)** (5×1=5)

(i) Pepsin is a non-proteinaceous enzyme.

(ii) Manganese is the central atom in the porphyrin head of the chlorophyll molecule.

(iii) Starch biosynthesis begins with production of ADP glucose.

(iv) Oxidative phosphorylation occurs in inner membrane of mitochondria.

(v) The nitrate reductase is an inducible enzyme.

(vi) Glycolate cycle is also known as EMP pathway.

Write explanatory notes on **(any three)**

(3×5=15)

(a) Cyanide resistant respiration

(b) Sucrose synthesis in plants

(c) Enzyme classification

(d) Tricarboxylic acid

Differentiate between the following **(any three)**

(3×5=15)

(a) Synthesis and degradation of fatty acids

(b) CAM and C4 cycle

(c) Competitive and Non competitive inhibition

P.T.O.

(d) Respiration and Photorespiration

4. Write short notes on the following **(any five)** (5×

(a) Emerson enhancement and its significance

(b) Effect of pH on enzyme activity

(c) Leghemoglobin

(d) Role of acetyl CoA in cellular metabolism

(e) Nitrate assimilation

(f) Kranz anatomy

5. (a) Explain β-oxidation pathway of breakdown of fatty acids? (7)

Explain the process of rhizobial infection and root nodulation in legumes. (8)

(a) What is gluconeogenesis ? Write an account of the glyoxylate pathway. (7)

(b) Explain the structure and mechanism of action of ATP synthase. (8)

(a) Schematically represent and explain Z-scheme of electron transport. (7)

(b) Give the contributions made by the following scientists **(any four)** (4×2=8)

(i) Blackman

(ii) Hans Krebs

(iii) Emil Fischer

(iv) Beijerinck

(v) Peter Mitchell

(vi) Stephen Hales