

[This question paper contains 4 printed pages.]

Your Roll No.....

Sr. No. of Question Paper : 4112

H

Unique Paper Code : 2162011202 ✓

Name of the Paper : Plant Resources and Economic Botany

Name of the Course : **B.Sc. (Hons) 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. 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.
5. Draw diagrams wherever required.

1. (a) Mention the botanical name and family of the following : (any 5) (1×5=5)

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- (i) Para rubber
- (ii) Tobacco
- (iii) Soybean
- (iv) Flax
- (v) Sesame
- (vi) Black pepper

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

- (i) The one seeded indehiscent fruit of wheat is called as _____.
- (ii) Example of a Drug used as a myocardial stimulant _____.
- (iii) The disease, favism is caused by _____.
- (iv) Serpentine is obtained from _____ plant. (Botanical name).
- (v) Malarial fever can be cured by the use of the bark of _____ plant.
- (vi) Groundnut is an example of _____ fruit.

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

- | | |
|-------------------|---------------|
| (i) Hashish | (a) Coconut |
| (ii) Copra | (b) Tea |
| (iii) Thein | (c) Cannabis |
| (iv) Pseudocereal | (d) Poppy |
| (v) Codeine | (e) Sugarcane |
| (vi) Nobilisation | (f) Quinoa |

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

- (i) Ecological importance of legumes
- (ii) Plant genetic resources and conservation
- (iii) Evolution of wheat
- (iv) TPS technology (Potato)
- (v) Health hazards of Tobacco

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

- (i) L.S. of Wheat grain
- (ii) T.S. of Black Pepper

- (iii) T.S. of Citrus fruit
- (iv) T.S of Jute Stem
4. (a) "UN has declared 2023 as the International year of Millets or IYM2023". Answer the following questions on the basis of this statement.
- (i) What are Millets? Mention the botanical names of any two millets. State the differences between millets and pseudocereals. (5)
- (ii) Millets are known as "Poor man's food". What are the reasons for this label? Mention their ecological importance. (5)
- (b) Classify the fibres based on their origin. Briefly explain the processing of cotton and its economic uses. (5)
5. Differentiate between : (any 3) (3×5=15)
- (i) Flue curing and air curing
- (ii) Black Tea and Green Tea
- (iii) White Jute and Tossa Jute
- (iv) Fatty oils and essential oils
- (v) *Orvza indica* and *Oryza japonica*

(1000)

[This question paper contains 4 printed pages.]

Your Roll No.....

Sr. No. of Question Paper : 2942 **H**

Unique Paper Code : 32161401

Name of the Paper : Molecular Biology

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 five questions in all, including Q. No. 1, which is compulsory.
3. Illustrate your answers with appropriate diagrams wherever necessary.

1. (a) Give major contribution of the following scientists
(any five) (1×5=5)

(i) A. Kornberg

(ii) P. Zamecnik

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- (iii) M. Nirenberg
- (iv) E. Blackburn
- (v) E. Chargaff
- (vi) R. Jorgensen

(b) Give reasons for the following (any two)

(2.5×2=5)

- (i) Prokaryotes lack telomerase
- (ii) DNA replicates only in 5' to 3' direction
- (iii) Ribosome is a ribozyme

(c) Expand the following (any five)

(1×5=5)

- (i) GTFs
- (ii) snRNP
- (iii) TC
- (iv) SSB
- (v) CTD
- (vi) UAS

2. (a) Give a detailed account of transcription in prokaryotes along with diagrams. (10)

(b) Explain in detail Hershey and Chase's experiment and give the major conclusion of this experiment? (5)

3. Write short notes on the following (any three)
(5×3=15)
- (a) Enzymes involved in DNA replication
 - (b) Exon shuffling
 - (c) Genome organization in bacteria
 - (d) RNA interference
4. Differentiate between the following (any five)
(3×5=15)
- (a) Nucleotide vs Nucleoside
 - (b) Prokaryotic RNA polymerase w eukaryotic RNA polymerase
 - (c) Continuous vs discontinuous replication
 - (d) Promoter vs enhancer
 - (e) Rho-dependent vs Rho-independent termination
 - (f) Mitochondrial DNA vs Chloroplast DNA
5. (a) Discuss key experiments that led to deciphering of the genetic code. (7)
- (b) What is the significance of introns in eukaryotes? (4)

- (c) For the sequence of DNA template provided below :

(4)

5'--CTTGACCTTAGG--3'

- (i) Write the sequence of complementary strand
- (ii) Write the sequence of the RNA transcribed from the above sequence, marking it's 5' and 3' ends.
- (iii) Calculate melting temperature (T_m) of the template.
6. (a) Explain the different modes of DNA replication. Which mode of replication is supported by the experiment of Meselson and Stahl? (10)
- (b) Discuss the different types of eukaryotic transcription factors and their roles. (5)
7. (a) Explain the mechanism of repressible operon giving a suitable example. (9)
- (b) Discuss the role of RNA as a regulatory molecule in gene expression? (6)

[This question paper contains 4 printed pages.]

Your Roll No.....

Sr. No. of Question Paper : 2996

H

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 **FIVE** questions in all. Question 1 is compulsory.
3. **All** questions carry **EQUAL** marks.
4. **All** parts of a question **MUST** be attempted together.

1. (a) Fill in the Blanks : (1×5=5)

(i) Transition zone between two communities is called _____.

(ii) _____ is the tendency of a biological

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system to resist change and to maintain itself in a state of stable equilibrium.

(iii) _____ is a process of successful establishment of a species on a bare area.

(iv) _____ is an example of total root parasite.

(v) Pyramid of energy is always _____.

(b) Give **one** word for any **five** of the following :

(1×5=5)

(i) Instrument used to measure wind velocity

(ii) Total water present in soil.

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

(iv) Light loving plants.

(v) Transition zone between two communities.

(vi) The place where an organism lives.

(c) Define any **five** of the following :

(1×5=5)

(i) Pedogenesis

(ii) Autecology

- (iii) Carrying capacity
- (iv) Abundance
- (v) Sciophytes
- (vi) Ecosystem

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

- (i) Primary succession and secondary succession.
- (ii) Grazing food chain and detritus food chain.
- (iii) Autotrophs and heterotrophs.
- (iv) Crown fire and surface fire.
- (v) Mor humus and mull humus.
- (vi) Habitat and ecological niche.
- (vii) Primary productivity and secondary productivity.

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

- (i) Survivorship curves
- (ii) Light as an ecological factor
- (iii) Soil texture
- (iv) Nitrogen cycle
- (v) Raunkiaer's life forms

4. (a) Briefly discuss analytical characters used to study community. (5)
- (b) Write an explanatory note on soil profile with the help of a well labelled diagram.
- (c) Discuss the various types of interactions among organisms with suitable examples.
5. (a) Describe various forms of water present in the soil.
- (b) Briefly comment on the vegetation of Delhi.
- (c) Explain the single channel energy flow model in an ecosystem. (5)
6. (a) What are ecological pyramids? Discuss their types with suitable example. (7)
- (b) Define ecological succession. Describe the process of succession in xeric environment with the help of suitable diagram. (8)

3107

Unique Paper Code 32161403
Name of the Paper Plant Systematics
Name of the Course B.Sc. (H) Botany Part-II
Semester IV

Duration: 3 Hours

Maximum Marks: 75

Instructions for candidates

(Write your Roll No. on the top immediately on receipt of this question paper)

All questions carry equal marks

Question No. 1 is compulsory

Attempt five questions in all including Question No. 1

Q1. a) Expand any five of the following:

(5x1=5 marks)

- i) IBC
- ii) CNH
- iii) IPNI
- iv) R. Br.
- v) EU
- vi) IAAT

b) Match the following:

(5x1=5 marks)

A	B
i) <i>Pinax theatri botanici</i>	a. Linnaeus
ii) <i>Systema naturae</i>	b. AP de Candolle
iii) <i>Flora of British India</i>	c. G. Bentham
iv) <i>Enquiry into plants</i>	d. Sir Joseph Dalton Hooker
v) <i>Theorie elementaire de la botanique</i>	e. Gaspard Bauhin
	f. Theophrastus

c) Define any five of the following:

(5x1=5 marks)

- i) Annotation label
- ii) Heterobathmy
- iii) Homonym
- iv) Sibling species
- v) Biosystematics
- vi) Phenogram

Q 2. Differentiate between any five

(5x3= 15 marks)

a) Apomorphy and Plesiomorphy

- b) Phenetics and Cladistics
- c) Autonym and Tautonym
- d) Monograph and Manual
- e) Edge-punched cards and body-punched cards
- f) Holotype and Paratype

Q 3. Write short notes on any three:

(3x5= 15 marks)

- a) Chemotaxonomy
- b) Effective publication
- c) Neo-Adansonian Principles
- d) Principle of Parsimony

Q4. a) What is classification? Discuss in detail Bentham and Hooker's classification and enumerate its merits and demerits. (1+ 6+ 8 = 15)

Q5. a) Interpret the following:

(7)

- i. *Cassia grandis* L.f. (1)
- ii. *Cynodon dactylon* (L.) Pers. (1)
- iii. *Phyllanthus* L. emend Mull. (1)
- iv. *Cyanthillium cinereum* (L.) H.Rob. 1990
Conyza cinerea L. 1753 (2)
- v. ×*Elyhordeum macounii*
(*Hordeum jubatum* and *Elymus trachycaulus*) (2)

b) Discuss briefly the principles of ICN. (8)

Q6. a) Discuss the importance of botanical gardens in taxonomic studies. Name any two botanical gardens situated in India.

(7)

b) 'Species is the basic unit of classification'. Discuss the statement with the help of any two species concepts you have studied. (8)

Q7. a) Discuss the significance of character weighting and homology assessment in cladistic studies. (7)

b) Explain any two theories explaining the origin of angiosperm flower. (8)

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Sr. No. of Question Paper :

Your Roll No.

Unique Paper Code : 2162512401

Name of the Paper : Ecology and Evolution

Name of the Course : Botany (Life Science)

Semester : IV

Duration: 2 Hours

Maximum Marks: 60

Instructions for Candidates: Write your Roll No. on the top immediately on receipt of this question paper. All questions carry equal marks. Attempt total four questions including Question No. 1 which is compulsory. All parts of a question must be attempted together. Draw diagrams wherever necessary.

1. a. Define the following (any five):

5X1= 5

- i. Homeostasis
- ii. Saprophytes
- iii. Productivity
- iv. Homology
- v. Frequency
- vi. Biome

b. Fill in the blanks (any five):

5X1= 5

- i. is the instrument used to measure the velocity of wind
- ii. is an example of sedimentary cycle.
- iii. is defined as branch of phylogenetic tree with its ancestor and all its descendants.
- iv. The energy flow model separates the grazing food chain and detritus food chain.
- v. The modification of a species over many generations by selecting and breeding individuals that possess desired traits by humans is known as.....
- vi. The position of a species in community in relation to other species is termed as.....

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c. Give an example of following (any five, Scientific names only)

5X1= 5

- i. Root Parasite plant
- ii. Neo-endemic plant
- iii. Hydrophyte
- iv. Nitrogen fixing bacteria
- v. Keystone species
- vi. Sciophyte

2. Differentiate between (any five):

5X3 =15

- a. Pyramid of number and Pyramid of energy
- b. Allopatric and Sympatric Speciation
- c. Density and Abundance
- d. Food chain and Food web
- e. Biological species concept and Phylogenetic species concept
- f. Autotrophic and Heterotrophic succession

3. Write short Notes on (any three):

3X5 =15

- a. Thermal stratification in water body
- b. Tree of life
- c. Soil Profile
- d. Allelopathy
- e. Shelford's law of tolerance.

4. Answer the following (any two)

7.5X 2 =15

a. Define Phytogeography. Enlist the phytogeographical zones of India. Discuss any two in detail.

5

b. Illustrate the general process and stages of succession with special emphasis on xerosere.

5

c. Explain the concept of an Ecotone with suitable examples. Also explain the Edge effect.

5

5. a. What are the survivorship curves? Discuss their importance with examples.

5

b. State true or false. Justify your answer.

5X2 = 10

- i. Orchids and some ferns are examples of epiphytes.
- ii. Weathered rock material is known as soil.
- iii. Hygroscopic water is available to plants for growth.
- iv. Trophic organization is studied as a part of community structure.
- v. The amount of nutrients in the soil at any given time is refer to standing crop.

[This question paper contains 2 printed pages.]

SET A

Your Roll No

Unique Paper Code : 2162012401 ✓
 Name of the Paper : Mycology
 Name of the Course : B. Sc. (Hons.) Botany
 Semester : IV
 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. All questions carry equal marks.
3. Attempt all parts of questions together.
4. Question No. 1 is compulsory.
5. Draw well labelled diagrams wherever necessary.

1. (a) Define the following (*any five*): (1X5=5)

- (i) Fairy Rings
- (ii) Haustoria
- (iii) Dolipore septum
- (iv) Conidiophore
- (v) Capillitium
- (vi) Mycoremediation

(b) Fill in the blanks (*any five*): (1X5=5)

- (i) Heterothallism was discovered by
- (ii) are specialized minute reproductive propagules in Lichens consisting of one or more algal cells surrounded by clumps of fungal hyphae.
- (iii) is a coprophilous fungus.
- (iv) Black wart disease of potato is caused by
- (v) In *Albugo candida* the sporangiospores are arranged in succession.

(vi) The female gametes of *Allomyces* sp. release a pheromone known as.....

(c) Match the following:

(1X5=5)

(i) Bioluminescence

(a) *Aspergillus flavus*

(ii) Red bread mould

(b) *Mycena chlorophos*

(iii) Nematophagus fungi

(c) *Cladonia rangiferina*

(iv) Aflatoxins

(d) *Neurospora crassa*

(v) Reindeer Moss

(e) *Arthrobotrys oligospora*

2. Differentiate between *any three* of the following

(5X3=15)

(i) Ectomycorrhiza and Endomycorrhiza

(ii) Cleistothecium and Perithecium

(iii) *Rhizopus* and *Mucor*

(iv) Biotrophic and Necrotrophic fungi

3. Draw a well labelled diagram of *any three* of the following

(5X3=15)

(i) E.M. of budding Yeast cell

(ii) V.S. of leaf showing asexual stage of *Albugo candida*

(iii) Conidial apparatus of *Penicillium*

(iv) V. S. Gill of *Agaricus*

4. Write short notes on *any three* of the following:

(5X3=15)

(i) Early blight of Potato

(ii) Different types of Plasmodia in Myxomycetes

(iii) Mushroom Cultivation

(iv) Parasexual cycle

5. (a) Explain the various stages of *Puccinia graminis tritici* on primary host.

(5)

(b) Describe the role of fungi in food industry with suitable examples.

(5)

(c) Discuss the mechanism of Crozier formation in Ascomycota.

(5)

[This question paper contains 4 printed pages.]

Your Roll No.....

Sr. No. of Question Paper : 4093

H

Unique Paper Code : 2162012402

Name of the Paper : Ecology and Conservation

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

Semester : IV

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.
3. Question No. 1 is compulsory.
4. All parts of a question should be answered together.

1. (a) Define the following (any six) : (1.5×6=9)

(i) Ecotone

(ii) Homeostasis

(iii) Humus

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- (iv) Natality
- (v) Ecological Pyramids
- (vi) Sacred Groves
- (vii) Ecotypes
- (viii) Weathering

(b) Match the following : (1×6=6)

- | | |
|------------------------|-------------------------|
| (i) Continental Drift | (a) Tansley |
| (ii) Life forms | (b) Synthetic character |
| (iii) Fidelity | (c) Wegener |
| (iv) Energy Flow Model | (d) Raunkiaer |
| (v) Ecosystem | (e) Leaching |
| (vi) Eluviation | (f) Odum |

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

- (i) Autotrophic Succession and Heterotrophic Succession.
- (ii) Paleo-endemism and Neo-endemism.

- (iii) Sciophytes and Heliophytes.
- (iv) Food Chain and Food Web.
- (v) Colluvial and Alluvial soil.
- (vi) Primary Production and Secondary Production.
- (vii) Density-dependent and Density-independent population regulation.

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

- (i) Forms of water in soil.
- (ii) Soil Profile.
- (iii) Ecological pyramids.
- (iv) Wind related plant adaptations.
- (v) Atmospheric moisture.

4. (a) Define the term Phytogeography. List any six Phytogeographical Divisions of India. Give an elaborate account of any one of these.

(1+3+4=8)

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

(7)

5. (a) Explain the distinction between in situ and ex situ conservation. Discuss why in situ conservation is considered essential for biodiversity conservation. (8)
- (b) How do parasitic plants interact with their host plants, and what are the consequences of parasitism for both the host and the parasite? Illustrate your answer with specific examples of parasitic plant species. (7)

Unique Paper Code : 2162012403 ✓
Name of the Paper : Developmental Biology of Angiosperms: Forms,
Anatomy & Function
Name of the Course : B.Sc. (Hons.) Botany
Semester : IV
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. Question number 1 is compulsory.
3. Attempt four questions in all.
4. All parts of a question must be answered together.
5. Supplement your answer with suitable diagrams

Q1.

A. Fill in the blanks (any five)

(1x5=5)

1. In _____ collenchyma the thickening material is found at intercellular contact points.
2. The rod like sclereids are called _____
3. Cystoliths are enclosed in the idioblastic cells known as _____
4. The later formed phloem is known as _____
5. The wall thickening impregnated with suberin and lignin on the radial and transverse walls of endodermis is called _____
6. Plants growing immersed in water are called _____
7. _____ in roots is responsible for the formation of lateral roots.

B. Define the following terms (any five)

(1x5=5)

1. Plasmodesmata
2. Bulliform cells
3. Rhytidome
4. Phellem
5. Hydathodes
6. Transfer cells
7. Lysigenous cavity

C. Match the following

(1x5=5 Marks)

- | | |
|---|---------------------------------|
| a) Sclereids develop from | f) bicollateral vascular bundle |
| b) Vascular bundles with phloem on both sides of the xylem. | g) ergastic substances |
| c) Nonspecialized cells that cover the leaf surface | h) parenchyma cells |
| d) Passage cells are found in | i) endodermis |
| e) Non-protoplasmic materials found in cells. | pavement cells |

Q2. Write short notes on any three

(5x3=15)

- a. Shoot Chimeras
- b. Korper-Kappe theory
- c. Origin of lateral root
- d. Laticifers

Q3. Differentiate between the following (any five)

(3x5=15)

- A. Primary plant body and secondary plant body
- B. Endodermis and exodermis
- C. Ring porous wood and diffuse porous wood
- D. Adcrustation and incrustation
- E. Dedifferentiation and redifferentiation
- F. Protoxylem and metaxylem
- G. Tracheids and vessels

Q4. A. Discuss the xeromorphic adaptations found in anatomy of oleander (*Nerium oleander*) leaf with a well labelled diagram.

5

B. Write about the structure and function of shoot apical meristem. Give a brief account of various theories to describe shoot apical meristem.

10

Q5. A. Illustrate secondary growth in a dicot stem using well labeled diagrams

8

B. What is a stoma. Describe the classification of stomata given by Metcalfe and Chalk.

7

Q6. Answer the following:

A. Write about the applications of anatomy in systematics and pharmacognosy.

5

B. Describe seasonal activity of vascular cambium.

5

C. Discuss the structure and importance of Kranz anatomy in leaf.

5

[This question paper contains 4 printed pages.]

Your Roll No.....

Sr. No. of Question Paper : 2924

H

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 Question No. 1 is compulsory.
3. Attempt five questions in all including Question No. 1.

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

(i) _____ plants exhibit Kranz anatomy.

(ii) Acetyl CoA is converted to Malonyl CoA by the enzyme _____.

(iii) Isocitrate lyase is located in _____.

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(iv) Lock and key hypothesis was proposed by _____.

(v) _____ is a free-living anaerobic nitrogen-fixing bacterium.

(vi) The synthesis of complex molecules from simple molecules with the utilization of energy is called _____.

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

(i) Allosteric enzyme

(ii) RQ

(iii) Anaplerotic reaction

(iv) Transamination

(v) Phospholipids

(vi) Absorption spectrum

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

(i) Write the Michaelis-Menten equation.

(ii) Name the first enzyme to be crystallized.

(iii) Name the immediate donor of electrons to PSI.

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(iv) Describe the type of reaction catalyzed by hydrolases.

(v) What are uncouplers?

(vi) Name the acyl carrier for lipid biosynthesis.

2. Differentiate between the following (**any five**) :

(5×3=15)

(a) Aerobic and anaerobic respiration.

(b) Synthesis and degradation of fatty acids.

(c) Nitrification and Ammonification.

(d) Competitive and Noncompetitive inhibition.

(e) PSI and PSII.

(f) Cyclic and noncyclic photophosphorylation.

3. Write short notes on the following (**any three**) :

(3×5=15)

(a) Emerson's enhancement effect and its significance.

(b) Nitrogenase.

(c) Effect of temperature and substrate concentration on enzyme activity.

- (d) Sucrose synthesis in plants.
4. (a) Discuss the chemiosmotic mechanism for ATP synthesis. (8)
- (b) Explain the mechanism of enzyme action. (7)
5. (a) Discuss photorespiration and its significance. (8)
- (b) Give an account of the β -oxidation of fatty acids. How many cycles of β -oxidation are needed for the complete oxidation of fatty acid containing 16 C atoms? (7)
6. (a) Explain the process of nodulation in legumes. What imparts pink color to the nodule and of what significance is it to nitrogen fixation? (8)
- (b) Give a detailed account of glycolysis with the help of a flow chart and tabulate the end products. (7)
7. Give a comparative account of C₃, C₄ and CAM pathways in plants. (15)

[This question paper contains 8 printed pages.]

Your Roll No.....

Sr. No. of Question Paper : 2978

H

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) YAC

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- (ii) PHB
- (iii) RFLP
- (iv) SDS
- (v) GFP
- (vi) MCS
- (vii) RT-PCR

(b) Define (any five)

(1×5=5)

- (i) Synthetic seeds
- (ii) Bioremediation
- (iii) Isoschizomers
- (iv) Osmoprotectants
- (v) Totipotency
- (vi) Cryopreservation
- (vii) Plantibodies

(c) Match the following (any five)

(1×5=5)

i)	Golden rice	Kary Mullis
ii)	Superbug	Guha and Maheshwari
iii)	Edible vaccines	Werner Arber and Daniel Nathans
iv)	Anther culture	Charles Arntzen
v)	PCR	Anand Mohan Chakraborty
vi)	Restriction enzymes	Ingo Potrykus and Peter Beyer

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

(a) Ti Plasmid

(b) Microinjection

(c) Technique of protoplast isolation

(d) Gene construct of *Flavr Savr^R* tomato

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

(a) DNA Fingerprinting

(b) Micropropagation

(c) cDNA library preparation

(d) Role of plant growth regulators in tissue culture

4. Answer (any three)

(a) Explain the process of construction of genomic libraries. (5)

(b) What do you understand by bioplastics? How are they produced in *Arabidopsis*? (5)

(c) Mention in brief the use of haploids and triploids by citing one example for each. (5)

- (d) Explain the concept of germplasm conservation and its significance. (5)
5. (a) Write a note on the development of transgenics for herbicide tolerance in crop plants. (7)

OR

Write a note on secondary metabolites and their importance.

- (b) Plasmid PRT IV was digested with Eco RI and Hind III. The following fragments were obtained in single and double digest reactions. Construct a restriction map with the given data. (8)

Eco RI 6.5Kb 7.5Kb

Hind III 5.0Kb 9.0Kb

Eco RI & Hind III 2.0Kb 3.0Kb 3.5Kb 5.5Kb

6. Give a brief account on (any three) : (5×3=15)

(a) Somaclonal variation

(b) Biosafety concerns about transgenic crops

(c) Reporter genes

(d) Protoplast isolation

(e) PCR

7. (a) Give a detailed account of the types and role of restriction endonucleases. (5)

OR

Define molecular markers. Explain their role in solving biological problems. (5)

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(b) Mention whether the following statements are True or False (1×5=5)

- (i) Membrane permeability can be increased by giving short and intense electric pulses.
- (ii) Restriction endonucleases are produced by bacterial cells as a mechanism of its immune system .
- (iii) Golden rice was developed with aim of enhanced levels of Vitamin C.
- (iv) DNA sequencing is limited to identification of restriction sites on a DNA sequence
- (v) SacB gene manipulation in transgenics crops was done with aim of production of polyfructans

- (c) Give a brief account of molecular farming with special reference to edible vaccines. (5)



[This question paper contains 4 printed pages.]

Your Roll No.....

Sr. No. of Question Paper : 3136

H

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) : (5×1=5)

(i) Ras Mol

(ii) Scoring Matrix

(iii) PubMed

(iv) Metabolomics

(v) Unrooted tree

(vi) Phylogram

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

- (i) QSAR
- (ii) NIH
- (iii) MIAME
- (iv) ORF
- (v) ZINC
- (vi) OTU

(c) Give an example of each : (5×1=5)

- (i) Languages in bioinformatics.
- (ii) Metabolic database.
- (iii) Disease Database.
- (iv) Chemical database.
- (v) Protein structure Database.

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

(3×5=15)

- (a) Genomics and Proteomics
- (b) Bank IT and Sequin
- (c) PAM and BLOSUM
- (d) Monophyletic and Polyphyletic trees
- (e) Global alignment and Local alignment

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3. Write short notes on (any three) : (3×5=15)
- (a) Salient features of Swiss-Prot
 - (b) Sequence file formats
 - (c) Next generation Sequencing
 - (d) Gene prediction methods
 - (e) Microbial genome applications
4. (a) Explain various approaches for Computer-aided drug designing and role of structural bioinformatics in drug discovery. (8)
- (b) What do you understand by Bioinformatics? Discuss its applications, scope and limitations. (7)
5. (a) What do you understand from biological databases? Explain Primary, Secondary and Composite databases with suitable examples. (8)
- (b) Elaborate various data submission and retrieval tools of NCBI and EMBL. (7)
6. (a) What is Sequence alignment? Explain Pairwise and multiple sequence alignment with its significance. (8)
- (b) Comment on molecular phylogeny and give

comparative account of Maximum Parsimony, Maximum Likelihood and Neighbour Joining method of phylogenetic tree construction. (7)

7. (a) What is BLAST? With the help of schematic diagram, briefly explain the different types of BLAST. (8)

(b) Discuss different level of Protein structures and describe various methods for protein structure prediction and modelling. (7)

8. (a) Explain small molecule databases with suitable examples. (8)

(b) What is DDBJ? Give an account of various resources available at DDBJ. (7)

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[This question paper contains 4 printed pages.]

Your Roll No.....

Sr. No. of Question Paper : 4074

H

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) _____ discovered TMV.

(ii) Viroid genetic material consists of _____

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- (iii) _____ and _____ explained Griffith's experiment of transformation.
- (iv) Prions are made up of _____.
- (v) The enzyme Nitrogenase functions under _____ condition.
- (vi) _____ is the example of endomycorrhiza.

(b) Select the True/False statement (**any five**)

(5×1=5)

- (i) *Azolla* is an example of asymbiotic BGA.
- (ii) ΦX174 has a circular single-stranded DNA genome made of 5386 nucleotides.
- (iii) The Baltimore scheme of classification groups viruses on the basis of mRNA produced during replicative 2 cycle of the virus.
- (iv) Pilli play an important role during conjugation.
- (v) Binary fission is a common mode of reproduction in bacteria.
- (vi) Hartig net is an important characteristic of

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nitrogen fixing bacteria.

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

(i) AIDS

(ii) COVID-19

(iii) NAM

(iv) STD

(v) AMF

(vi) TERI

2. Differentiate between the following (any five)

(5×3=15)

(i) Virus and Viroids

(ii) Transduction and Conjugation

(iii) Mesosomes bacteria and Lysosomes

(iv) Autotrophic and heterotrophic bacteria

(v) Arbuscules and Vesicles

(vi) Cyanobacteria and Mycorrhiza

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

(i) TMV

- (ii) Lytic cycle
- (iii) Bacterial transformation
- (iv) EM of endospore
- (v) *Azolla* leaf with *Anabaena* association

4. Write short notes on the following (**any three**)

(3×5=15)

- (i) Vein clearing disease
- (ii) Mycoplasma
- (iii) Archaeobacteria
- (iv) PGPR

5. Answer any **two** of the following :

(2×7.5=15)

- (i) Briefly describe the symptoms, casual organism and control measures of any bacterial plant disease.
- (ii) Viruses are an integral part in our daily life. Prove this statement with suitable examples from vaccine production and agriculture.
- (iii) What is mycorrhiza? Briefly describe the types of mycorrhizal association in plants.

12
[This question paper contains 4 printed pages.]

Your Roll No.....

Sr. No. of Question Paper : 4150

H

Unique Paper Code : 2162011203 ✓

Name of the Paper : Plant Systematics

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 **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) Starting date for binomial nomenclature is _____.

(ii) *Die naturlichen pflanzenfamilien* is authored by _____.

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- (iii) The system of classification proposed by Takhtajan is considered as _____.
- (iv) _____ is a store house of collected plant specimens which are dried, pressed and preserved on sheets.
- (v) The occurrence of ancestral or primitive characters in a taxon is known as _____.
- (vi) _____ is a angiosperm lacking vessels.
- (vii) _____ is the author of Flora of British India.

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

- (i) Benth.
- (ii) Hook. f.
- (iii) DC
- (iv) emend.
- (v) ex.
- (vi) UPGMA

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

- (i) Example of generic name derived from common name.
- (ii) Name the angiosperm family characterized by the presence of pollinia.

- (iii) Father of taxonomy.
- (iv) Type genus of the family Asteraceae.
- (v) The alternate name of the family Umbelliferae.
- (vi) A specimen which is duplicate of holotype.

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

- (i) APG IV system of classification
- (ii) Biological species concept
- (iii) Typification
- (iv) Importance of herbarium in the field of systematics
- (v) Rejection of scientific names

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

- (i) Phylogenetic and Phenetic systems of classification
- (ii) Parallelism and Convergence
- (iii) Monophyly and Polyphyly
- (iv) Primitive and Advanced characters
- (v) Flora and Monograph
- (vi) Euanthial and Pseudanthial theory

4. (a) Discuss the Principal of Priority and its limitations. (5)
- (b) Describe the importance of secondary metabolites in plant systematics by giving suitable examples. (5)
- (c) Write a note on Basal living angiosperms and why are they placed separately from Eudicots in APG system of classification? (5)
5. (a) Outline the system of classification proposed by Engler and Prant (Upto subclass). (5)
- (b) Write a note on characters and characters coding in cladistics methodology. (5)
- (c) Interpret the following : (any five) (5×1=5)
- (i) *Tricholepis tibetica* Hook.f. & Thomson in C.B. Clarke, Comp. Ind.
- (ii) *Lupinus* [Toumefort] L.
- (iii) *Salvia x palmeri* (A.Gray) Greene.
- (iv) *Microseris elegans* Greene ex A. Gray.
- (v) *Phyllanthus* L. emend. Muell.
- (vi) *S. apiana* x *S. clevelandii*

13
[This question paper contains 4 printed pages.]

Your Roll No.....

Sr. No. of Question Paper : 4177

H

Unique Paper Code : 2163012003 ✓

Name of the Paper : Applied Phycology

Name of the Course : Botany (DSE)

Semester : IV

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) _____ is a green alga and is used by astronauts as a food supplement.

(ii) Unlike other algae, diatoms do not readily decay due to their _____.

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- (iii) *Haematococcus* is known for its ability to accumulate large quantities of strong antioxidants such as _____.
- (iv) _____ is a unicellular green alga which contains large amounts of β -carotene, glycerol, and protein and it can be cultured in highly saline water.
- (v) Algae often float on the surface of water during the day but sink during the night due to the evolution and trapping of _____ during photosynthesis.
- (vi) Heterocysts are specialized cells found in certain _____.
- (vii) Cultivation of seaweeds is commonly known as _____.

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

- | | |
|------------------------|------------|
| (i) <i>Porphyra</i> | Kelps |
| (ii) <i>Laminaria</i> | Irish moss |
| (iii) <i>Sargassum</i> | Nori |
| (iv) <i>Palmaria</i> | Rockweed |
| (v) <i>Undaria</i> | Dulse |
| (vi) <i>Fucus</i> | Gulfweed |
| (vii) <i>Chondrus</i> | Wakame |

- (c) Expand the following (any Five) : (5×1=5)
- (i) PUFA (ii) HRAP
(iii) EDTA (iv) BG11
(v) ROS (vi) PAH
(vii) BOD
2. Briefly describe (any Five) : (5×3=15)
- (a) Gene sequencing and algal systematics
(b) Three algal toxins and their source
(c) Photobioreactors
(d) Provasoli ES medium
(e) Raft culture of seaweeds
(f) Algae as pollution indicators
(g) Three commercially important secondary metabolites from algae
3. Draw a well labelled diagram of the following (any Three) : (3×5=15)
- (a) Morphology of *Acetabularia*
(b) *Azolla*- *Anabaena* symbiosis (Vertical section)
(c) Algae-based biorefinery

- (d) Diagrammatic representation of a Raceway Pond
4. Write short notes on the following (any **Three**):
(3×5=15)
- (a) Bioluminescence in algae
 - (b) Isolation methods of microalgae
 - (c) Diatomaceous earth
 - (d) Role of algae in cosmetic industry
 - (e) Algal biofertilizers
5. Answer (any **Two**) of the following: (2×7.5=15)
- (a) 'Algae are the perfect 'super food' for future'. Justify the statement giving at least 5 suitable examples from various groups of algae.
 - (b) Define algal blooms. Comment on the statement: 'Algal blooms adversely affect health of both the aquatic ecosystems and humans' with suitable examples.
 - (c) Discuss the challenges and limitations of first- and second-generation biofuels, and explain how algal biofuels can overcome these challenges. Also, mention the limitations faced by the algal biofuel industry.

15
[This question paper contains 4 printed pages.]

Your Roll No.....

Sr. No. of Question Paper : 3026

H

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 any five questions in all.
3. Question no. 1 is compulsory.
4. All parts of a question must be answered together.
5. Draw well-labelled diagram wherever necessary.

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

(i) Extracellular enzymes

(ii) Impeller

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- (iii) Selective medium
- (iv) Psychrotrophs
- (v) Lyophilization
- (vi) Eutrophication

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

- (i) ATCC
- (ii) CFU
- (iii) IMTECH
- (iv) PDA
- (v) TOC
- (vi) GRAS

(c) Match the following : (5×1=5)

- | | |
|--|-----------------------------|
| (i) Nitrification | (a) Charles Chamberland |
| (ii) Autoclave | (b) <i>Bacillus cereus</i> |
| (iii) Phosphate solubilizing microorganism | (c) <i>Zoogloea</i> sp. |
| (iv) Casein hydrolysis | (d) <i>Pseudomonas</i> sp. |
| (v) Trickling filter | (e) <i>Nitrosomonas</i> sp. |

2. Write short notes on the following (any three) :
(3×5=15)
- (i) Factors affecting aeromicroflora
 - (ii) Bacterial growth curve
 - (iii) Role of microbes in industry
 - (iv) Cell Disruption
3. Differentiate between the following (any three) :
(3×5=15)
- (i) Batch fermentation and Continuous fermentation
 - (ii) Freeze drying and Spray drying
 - (iii) BOD and COD
 - (iv) Centrifugation and Filtration
4. (a) Briefly discuss different methods of enzyme immobilization. (8)
- (b) What are HFCS? What is the industrial importance of immobilization of glucose isomerases? (7)
5. (a) Discuss in detail the industrial production of citric acid. (8)

- (b) Describe different methods for isolating soil microorganisms. (7)
6. (a) What are total coliforms? Discuss evaluation methods (**any three**) for detecting coliforms in drinking water. (8)
- (b) Discuss the primary and secondary methods for treatment of sewage water? (7)
7. (a) What is meant by up stream processing? Discuss the steps involved in up stream processing. (8)
- (b) Explain the structure and working of fluidized bed reactor. (7)

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Your Roll No.....

Sr. No. of Question Paper : 3363 **H**

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

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SECTION - A

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

(i) Homeostasis

(ii) Standing state

(iii) Ecotone

(iv) Ecesis

(v) Eutrophication

(vi) Biomagnification

(b) Fill in the blanks : (0.5×5=2.5)

(i) Succession occurring on sand is called

(ii) *Eichhornia* SP. is an example of a _____

(iii) Pyramids of energy are always _____

(iv) Hygrometer is used to measure _____

(v) Total water content in soil is known as _____

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

(b) Explain the cycling of Nitrogen with the help of a diagram. (5)

(c) Briefly comment on the light as an ecological factor. (5)

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

(a) Soil profile

(b) States of water in soil

(c) Ecological pyramids

(d) Synthetic characters of plant communities

(e) Shelford's law of tolerance

4. Differentiate between **any three** of the following :

(5×3=15)

(a) Grazing food chain and detritus food chain

(b) Neoendemism and paleoendemism

(c) Heterotrophic succession and autotrophic
succession

- (d) Primary productivity and secondary productivity
- (e) Single channel energy flow model and Y shaped energy flow model

SECTION - B

1. (a) Expand **any five** of the following: (5x1=5)

(i) OTU

(ii) IAPT

(iii) *nom. nud.*

(iv) DC

(v) R.Br.

(vi) BSI

(b) Give the alternate name of the following families :
(5×0.5=2.5)

(i) Compositae

(ii) Palmae

(iii) Labiatae

(iv) Cruciferae

(v) Gramineae

2. Write short notes **any three** of the following :

(3×5=15)

(a) Principles of ICN

(b) Importance of botanical gardens in taxonomy

(c) Taxonomic hierarchy

(d) Numerical taxonomy

(e) Author citation

3. Differentiate between any three of the following :

(3×5=15)

(a) Tautonym and autonym

(b) Phenogram and cladogram

(c) Indented key and parallel key

(d) Holotype and lectotype

(e) Artificial and natural system of classification

4. (a) Give the outline of the system of classification

proposed by Bentham and Hooker for seed plants

(upto the level of series). Enumerate its merits

and demerits.

(5+3=8)

- (b) Discuss role of cytology in solving taxonomic problems with suitable examples. (7)