[This question paper contains 4 printed pages.]

Your Roll No.....

Sr. No. of Question Paper : 1353 **I**

Unique Paper Code : 2162011101

Name of the Paper : Plant Diversity and Evolution

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

Semester : I

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. Draw well labelled diagrams wherever necessary.

P.T.O.

1. (a) Name the genus having the following (Attempt any **five**) : (1×5=5)

(i) Air bladder

(ii) Ligule

(iii) Fairy Ring

(iv) Foliose Lichen

(v) Gemma cup

(vi) Maidenhair fern

(vii) Spiral Chloroplast

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

(i) The term algae was coined by .....

(ii) The reserve food material of red algae is .....

(iii) Engler and Prantl system of classification is an example of ..... system of classification.

(iv) Infectious piece of RNA without protein coat is .....

(v) The number of capsomere in TMV is .....

(vi) True vessel is found in the Gymnosperm .....

(vii) Obliquely placed septa are found in rhizoids of .....

(c) Match the following : (1×5=5)

(i) Peltate Columella	(a) *Polysiphonia*
(ii) Heterotrichous thallus	(b) *Funaria*
(iii) Scales	(c) *Rhizopus*
(iv) Collar	(d) *Marchantia*
(v) Operculum	(e) *Gnetum*

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

(i) Pteridophytes and Gymnosperms

(ii) TMV and Bacteriophage

(iii) Gram-positive and Gram-negative bacteria

(iv) Natural and Artificial classification

(v) Megasporophyll and Microsporophyll of *Selaginella*

3. Draw the well labelled diagram of the following (Attempt any **three**): (5×3=15)

(i) Diagrammatic sketch of Bacterium

P.T.O.

(ii) *Rhizopus* showing asexual reproduction

(iii) V.S Receptacle of *Sargassum* showing bisexual conceptacle

(iv) Morphology of Basidiocarp of *Agaricus*

(v) Morphology of Male cone of *Gnetum*

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

(i) Scalariform conjugation of *Spirogyra*

(ii) Bacterial genetic recombination by Transduction

(iii) Characteristic features of Fungi

(iv) Bryophytes as amphibians of plant kingdom

(v) General features of Viruses

5. Attempt any **two** from the following :

(a) Explain the affinities of Slime molds with Fungi. (7.5)

(b) With the help of diagrams, explain briefly the gametophore of *Marchantia*. (7.5)

(c) What is heterospory? Explain giving one example. (7.5)

[This question paper contains 4 printed pages.]

Your Roll No.....

Sr. No. of Question Paper : 1392 **I**

Unique Paper Code : 2162011103

Name of the Paper : Basic Laboratory and field skill in Plant Biology

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

Semester : I

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) State True or False of the following **(any five)** : (5×1=5)

   (i) Agarose gel electrophoresis mainly used to separate nucleic acids based on the molecular size.

   (ii) The median and the mode of the following data is 44, 49, 44, 54, 42 is 42

(iii) Using a fume hood without ventilation is an example of bio-safety measures.

(iv) PCR is a technique to amplify the DNA of a sample.

(v) Number of moles of solute present in one liter of the solution is called Molality.

(vi) The goal of fixation is to keep the cells or specimen in the living state for longer duration.

(vii) Condenser lens collects the electron beam coming out of specimen after interaction and bends them to magnify the image in electron microscope.

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

(i) HEPA (ii) BOD

(iii) SEM (iv) PAGE

(v) HPLC (vi) EDTA

(vii) YEB

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

(i) _____ in confocal microscope blocks out-of-focus light from above and below the focal point.

(ii) To prepare 500 mL of a 2% (v/v) ethanol solution, you would need _____ mL of ethanol.

(iii) _____ is a measure of data spread or dispersion.

(iv) _____ is a catalogue to collect and preserve plant specimens.

(v) _____ is used to analyses and present the data in organized manner.

(vi) _____ is a workstation used to create a contamination-free and sterilized environment through filters to capture all the particles entering the cabinet.

(vii) _____ incubator is a specialized equipment used to measure the amount of oxygen consumed by microorganisms in wastewater samples.

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

(i) LR grade and AR grade chemicals

(ii) Light microscope and Electron Microscope

(iii) Pour plate and spread plate technique

(iv) MS excel and power-point

(v) Micrometer and Hemocytometer

(vi) Agarose and SDS-PAGE gel electrophoresis

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

(i) Disposal of hazardous waste

(ii) Culture media: types and applications

(iii) Herbarium

(iv) Fire extinguisher

4. (a) Explain the process of serial dilution and how it is used to estimate the concentration of microorganisms in a sample. Include the steps involved and an example calculation. (8)

(b) Detail the working principle of Spectrophotometer and writes its applications. (7)

5. (a) What is sampling? Briefly describe the different sampling methods? (7)

(b) What is standard error? Compute the mean, standard deviation, standard error and coefficient of variation of the following data that showed increase in the length of pods of a plant after treatment with a hormone.

Observation	1	2	3	4	5	6	7	8	9	10
Length of pod	4.25	4.20	4.15	3.35	3.25	4.70	3.25	3.75	3.70	3.90

(8)

[This question paper contains 4 printed pages.]

Your Roll No.....

Sr. No. of Question Paper : 1074 **I**

Unique Paper Code : 2162012301

Name of the Paper : Phycology – The World of Algae

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

Semester : III

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. Attempt **all** parts of the questions together
5. Draw well labelled diagrams wherever necessary.

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

   (i) Gas vacuole

   (ii) Heterocyst

   (iii) Akinete

(iv) Cystocarp

(v) Conceptacles

(vi) Eye Spot

(vii) Amylum stars

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

(i) Multiflagellate zoospores are found in _____ .

(ii) Cells in *Polysiphonia* are interconnected by _____.

(iii) Presence of Cap cells is the characteristic feature of _____ .

(iv) Iodine is extracted from _____ (Name of algae).

(v) _____ causes Rust disease of tea.

(vi) _____ are the characteristic spores of diatoms.

(vii) Rhizoids of *Chara* possess _____ *septa.*

(c) Name an algal genus for the following **(any five)** : (1×5=5)

(i) Hormogonium

(ii) False branching

(iii) Trichoblast

(iv) Androspore

(v) Spermocarp

(vi) Rolling alga

(vii) Halophilic alga

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

(i) Gongrosira stage and Plakea stage

(ii) Oogamy and Isogamy

(iii) Unilocular sporangia and plurilocular sporangia

(iv) Cyanophyceae and Rhodophyceae

(v) Nannandrous and Macrandrous species of *Oedogonium*

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

(i) Evolutionary significance of *Prochloron*

(ii) Sexual reproduction in *Chara*

P.T.O.

(iii) Significant contribution of F.E. Fritsch and M.O.P. Iyengar

(iv) Bioluminescence in algae

(v) Palmella stage in *Chlamydomonas*

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

(i) V.S. bisexual conceptacle of *Sargassum*

(ii) Discoid thallus of *Coleochaete*

(iii) E.M. of Heterocyst

(iv) W.m. of cystocarp of *Polysiphonia / Gracillaria*

(v) E.M. of *Chlamydomonas / Chlorella*

5. (i) Explain the alternation of generation and its significance in *Ectocarpus*. (8)

(ii) Discuss the range of thallus organization in algae. (7)

OR

Explain the reproduction in *Nostoc*? Highlight its ecological and economic importance. (7)

[This question paper contains 4 printed pages.]

Your Roll No.....

I

Sr. No. of Question Paper : 1131

Unique Paper Code : 2162012302

Name of the Paper : Bryophytes, Pteridophytes and Gymnosperms

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

Semester : III

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** questions carry equal marks.
4. Draw diagrams and write botanical names wherever necessary.
5. All parts of a question must be answered together.

P.T.O.

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

(i) Horsetail	*Cycas*
(ii) Pseudoelaters	*Pteris*
(iii) Winged pollen grains	*Equisetum*
(iv) Coenosorus	*Marchantia*
(v) Gemma cup	*Anthoceros*
(vi) Sago Palm	*Pinus*

(b) Give botanical name of the plants showing the following structural features (**Attempt any five**) : (5×1=5)

(i) Archegoniophore

(ii) Vallecular canals

(iii) Ovuliferous scale

(iv) Trabeculae

(v) Coralloid roots

(vi) Peristome teeth

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

(i) Appendiculate scale

(ii) Perigynium

(iii) Spur

(iv) Bulbil

(v) Rhizophore

(vi) Stomium

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

(a) Ovule of *Cycas* and *Gnetum*

(b) Liverwort and mosses

(c) Apogamy and Apospory

(d) Strobilus of *Selaginella* and *Equisetum*

(e) Sporophyte of *Funaria* and *Marchantia*

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

(a) V.S. antheridiophore of *Marchantia*

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

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

(d) T. S. Coralloid root

(e) V.S. sporophyll of *Pteris*

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

(a) Heterospory and seed habit

(b) Progressive sterilization of sporogenous tissue in bryophytes

(c) Economic importance of gymnosperms

(d) Ecological importance of bryophytes with reference to *Sphagnum*

(e) Significance of *Ceratopteris* or *Ephedra* as a model system

5. (a) Discuss the hydrophytic and xerophytic characters of *Equisetum* with the help of suitable diagrams. (8)

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

6. (a) Discuss in detail the stelar evolution in pteridophytes with the help of suitable diagrams. (8)

(b) Discuss the evolutionary significance of the sporophyte of *Anthoceros*. (7)

[This question paper contains 8 printed pages.]

Your Roll No.....

I

Sr. No. of Question Paper : 1150

Unique Paper Code : 2162012303

Name of the Paper : Genetics and Plant Breeding

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

Semester : III

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. Support your answers with well labelled diagrams wherever necessary.
5. All parts of a question should be answered together.

P.T.O.

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

(i) Missense mutation

(ii) Monosomy

(iii) Pure line selection

(iv) Pseudodominance

(v) Lethal alleles

(vi) Penetrance

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

(i) The phenomenon in plant breeding where the hybrid offspring exhibits superior traits, such as increased size or yield, compared to both parents is known as _____.

(ii) In _____ genetic inheritance, neither allele is completely dominant or recessive, and both alleles contribute equally to the phenotype of the offspring.

(iii) The phenomenon in which a point mutation leads to the premature termination of a polypeptide chain is known as _____ mutation.

(iv) The experiment by Thomas Hunt Morgan with *Drosophila melanogaster* led to the discovery that the X chromosome carries the gene for red eyes and white eyes, demonstrating the principle of _____.

(v) A chromosomal aberration in which a segment of a chromosome is turned around 180 degrees is called _____.

(vi) In _____ speciation, speciation occurs typically due to ecological or behavioral factors without physical barriers.

(c) Match the following with their contributors **(any five)** : (1×5=5)

(i) Chromosomal Theory of Inheritance	a. William Bateson
(ii) Plant Selection Method in plant breeding	b. Watson and Crick
(iii) Linkage	c. Alfred Sturtevant
(iv) Coining of the term 'Genetics'	d. Nilsson-Ehle
(v) DNA structure	e. Theodore Boveri & Walter Sutton
(vi) Genetic Mapping	f. Thomas Hunt Morgan

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

(i) Complete linkage and incomplete linkage

(ii) Test cross and reciprocal cross

(iii) Polyploidy and aneuploidy

(iv) Point mutations and frame shift mutations

(v) Pure line selection and Mass selection

(vi) Maternal inheritance and maternal effect

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

(i) Dosage compensation

(ii) Mitochondrial inheritance

(iii) Interspecific hybridization

(iv) Transposable elements

(v) Chemical mutagens

(vi) Down's syndrome

4. (a) In a fruit fly, the genes for body color (**B**=black, **b**=grey) and wing size (W=long, w=vestigial) are linked. A test cross was done between a heterozygous black body, long winged fly (*BbWw*) and a homozygous recessive gray body, vestigial winged fly (*bbww*). Of the 200 offsprings produced, 180 had parental phenotypes (black body, long wings or gray body, vestigial wings) and 20 had the recombinant

phenotypes (black body, vestigial wings or gray body, long wings). What is the recombination frequency between these two genes? (6)

(b) What is epistasis? Explain the types of epistasis with examples. (3+6=15)

5. (a) Explain the inheritance of kappa particles in *Paramecium*. (7)

(b) Explain chloroplast and mitochondrial inheritance with suitable examples. (4+4=8)

6. (a) In a population of 1,000 individuals, 360 individuals have blue eyes (recessive trait). What are the allele frequencies for blue eyes (b) and brown eyes (B)? (7)

(b) What is barr body? How is it a consequence of dosage compensation? Explain different genetic mechanisms of sex determination in living organisms. (2+2+4)

[This question paper contains 4 printed pages.]

Your Roll No.....

Sr. No. of Question Paper : 5841 **I**

Unique Paper Code : 32161301

Name of the Paper : Anatomy of Angiosperms

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

Semester : III

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** question carries equal marks.
3. Attempt **five** questions in all including question no. **1** which is compulsory.
4. All parts of question must be attempted together.
5. Draw well labelled diagram wherever required in support of your answer.

P.T.O.

1. (a) Define (5×1=5)

(i) Root cap

(ii) Glandular Trichome

(iii) Rhytidome

(iv) Bulliform Cell

(v) Tyloses

(b) Give the examples of any **FIVE** (Write one example of each) (5×1=5)

(i) A plant with sunkun stomata

(ii) A plant has bicollateral Vascular Bundle

(iii) A plant leaf has multiple epidermis

(iv) A plant has dorsiventral leaf

(v) A plant shows Kranz anatomy

(vi) A plant leaves have silica deposition

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

(i) Latex yielding cells are called _____

(ii) Aerenchyma are an adaptation of _____ plants.

(iii) _____ theory explains the organization of the root apical meristem.

(iv) P-proteins are associated with _____

(v) Study of the growth rings in the trees is called _____

(vi) Suberized casparian strip is a part of _____ in the roots of the vascular plants.

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

(i) Dorsiventral and Isobilateral leaf

(ii) Brachysclereids and Osteosclereids

(iii) Xylem and Phloem

(iv) Fusiform and Ray Initials

(v) Articulate and Non–articulate laticifers

(vi) Ring Porous and Diffuse Porous

(vii) Lysogenous and schizogenous Cavity

3. Draw a well labelled diagram of any **THREE** (3×5=15)

(i) V.S. of *Nerium* leaf

(ii) T.S. of Dicot root

(iii) T.S.of monocot stem

(iv) T.S. of periderm showing Lenticels

(v) T.S. of *Casuarina* stem

4. Write notes on any **FIVE** (5x3=15)

(i) Shoot Chimeras

(ii) Endodermis

(iii) Quiescent Center

(iv) Growth Rings

(v) Cystolith

(vi) Applications of Plant Anatomy in Forensic science

5. (a) Describe the characteristic features of meristematic tissues? Mention the different types of meristematic tissues in angiosperms and write their functions. (8)

(b) Discuss various types of stomata present in angiosperms with suitable examples. (7)

6. (a) Describe the process of secondary growth in dicot stem with the help of suitable diagrams. (7)

(b) Mention different types of simple tissues and draw diagram for each type. (8)

[This question paper contains 4 printed pages.]

Your Roll No.....

Sr. No. of Question Paper : 1112 **I**

Unique Paper Code : 2162013503

Name of the Paper : Plant Physiology

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

Semester : V

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. Only four questions are required to be attempted in all.
3. Question 1 is compulsory.
4. All questions carry equal marks.
5. Attempt all parts of every question together.
6. Illustrate your answers wherever possible.

P.T.O.

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

(i) Osmosis

(ii) Aeroponics

(iii) Etiolation

(iv) Photomorphogenesis

(v) Bolting effect

(vi) Bioassay

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

(i) The water potential of pure water is _____.

(ii) _____ is also called as stress phytohormone.

(iii) Membrane channels that facilitate transport of water are called _____.

(iv) A cell becomes flaccid after being kept in _____ solution.

(v) Gene expressed before FT (full name of FT mention her------) during flowering is known as _____.

(vi) Ordinary companion cells with development of finger-like wall ingrowths are called _____.

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

(i) A synthetic antitranspirant

(ii) An ethylene-releasing compound

(iii) Donnan equilibrium

(iv) Photoreceptor

(v) Chelating agent

(vi) One example of photoblastic seed

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

(i) Passive and active transport

(ii) Phloem loading and unloading

(iii)Scarification and stratification

(iv)Apoplast and symplast

(v)Climacteric and non-climacteric fruits

(vi)Guttation and transpiration

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

(i) Hydroponics

(ii) Brassinosteroids

(iii) Cohesion?tension theory

(iv) Aphid stylet technique

4. (a) Write an explanatory note on structure and mode of action of phytochrome. (8)

(b) Explain the mechanism of stomatal opening and closing with reference to proton transport theory. (7)

5. (a) What is photoperiodism? Discuss three general categories of photoperiodic responses with reference to day length. (5)

(b) Describe the physiological role of auxins in plants with suitable diagram. (5)

(c) Discuss the criteria of essentiality of elements and biological roles of phosphorus and calcium in plants. (5)

[This question paper contains 8 printed pages.]

Your Roll No.....

I

Sr. No. of Question Paper : 5823

Unique Paper Code : 32161501

Name of the Paper : Reproductive Biology of Angiosperms

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

Semester / Mode : V (CBCS)

Duration : 3 Hours Maximum Marks : 90

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. **All** questions carry equal marks.
5. Draw well-labelled diagrams and write the botanical name wherever necessary.

P.T.O.

5823

1. (a) State whether the following statements are true or false. (1×5=5)

(i) Tapetum forms the outermost anther wall layers that surround the sporogenous tissue.

(ii) Monosporic embryo sac is 7 celled and 8 nucleate structure.

(iii) Cheiropterophily is the pollination by insects.

(iv) S.G Nawaschin discovered the double fertilization.

(v) G.B. Amici has been given the credit of revealing the role of pollen in fertilization.

(b) Fill in the blanks : (1×5=5)

(i) Pollination that takes place with the help of beetles is called _____.

(ii) The explusion of seed, brought about by the turgidity is called _____.

(iii) Nutrient rich nucellar tissue that persists in mature seed is called _____.

(iv) _____ demonstrated the possibility of raising large numbers of haploids from pollen grains of *Datura innoxia*.

(v) The megasporangium together with integuments is called _____.

(c) Match the following : (1×5=5)

Column A	Column B
a. *Aristolochia elegans*	i. Pseudocopulation
b. *Quinchamalium chilense*	ii. Five types of microspore tetrads
c. *Plumbago zeylanica*	iii. Finger like projections in egg cell
d. *Ophrys speculum*	iv. Synergid and antipodal haustoria
e. *Fritillaria*	v. Bambacioni effect

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

(i) Role of synergids in fertilization

(ii) Importance of polyembryony

(iii) Helobial endosperm

(iv) Nemec phenomenon

(v) Obturator

(vi) Pollen Wall

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

(i) Egg cell and Synergids

(ii) 2-celled and 3-celled pollens

(iii) Gametophytic and Sporophytic self-incompatibility

(iv) Hyphydrophily and ephydrophily

4. Briefly explain the following :

(a) Give the biological significance of seed dispersal phenomenon. (5)

(b) Describe briefly apomixis and its significance. (5)

(c) List six types of embryogeny and explain the embryo development in *Paeonia*. (5)

5. Answer the following :

(a) Write briefly on transformation of egg cell through pollen tube pathway method. (5)

(b) Role of tapetum in pollen development. (5)

(c) Describe any two methods to overcome self-incompatibility in plants. (5)

6. (a) Describe in detail any two methods to test Pollen viability. (5)

(b) Briefly explain any two types of Germline transformation methods. (5)

(c) Comment on Male Germ Unit and its structure with examples. (5)

7. Draw well labelled diagram of the following **(any two)** : (2×7.5=15)

(i) L.S. of anatropous, bitegmic, crassinucellate ovule showing *Polygonum* type of embryo sac.

(ii) T.S. young tetrasporangiate anther showing sporogenous tissue.

(iii) Describe the structure of mature *Polygonum* type of embryo sac with the help of labeled diagram.

[This question paper contains 4 printed pages.]

Your Roll No.....

I

Sr. No. of Question Paper : 5877

Unique Paper Code : 32161502

Name of the Paper : Plant Physiology

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

Semester : V

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 **1** which is compulsory.
3. **All** questions carry equal marks.
4. Attempt all parts of the question together.
5. Illustrate your answers wherever possible.

1. (a) Define any **five** (5×1=5)

   (i) Osmosis

   (ii) Bioassay

   (iii) Critical day length

P.T.O.

(iv) Etiolation

(v) Senescence

(vi) Photomorphogenesis

(b) Fill in the blanks : (5×1=5)

(i) Precursor of Hormone ethylene is _____ .

(ii) The protein part of phytochrome is known as _____ .

(iii) Membrane channels which facilitate transport of water are called _____.

(iv) The hydrostatic pressure which develops in a cell from time to time due to osmotic diffusion of water is called _____ .

(v) The water potential of pure water is _____ .

(vi) Hormone that could replace the vernalization _____ .

(c) Write the significant contribution of any **five** of the following : (5×1=5)

(i) J. Levitt

(ii) F.W. Went

(iii) Bennet-Clark

(iv) A. Fick

(v) Priestley

(vi) Garner and Allard

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

(a) Guttation and Transpiration

(b) Simple and facilitated diffusion

(c) Phloem loading and unloading

(d) Micro and macro elements

(e) Apoplast and Symplast

(f) Hormones and enzymes

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

(a) Brassinosteroids

(b) Hydroponics

(c) Cohesion-tension theory

(d) Phytosiderophores

(e) Apical dominance

4. (a) Discuss the concept and importance of water potential. Describe different components of water potential. (5)

(b) Write an explanatory note on discovery and physiological roles phytochrome. (5)

(c) Describe the most widely accepted mechanism of phloem translocation in angiosperms with the help of suitable diagram. (5)

5. Attempt **any two** from the following : (7.5×2=15)

(a) What is photoperiodism? Discuss three general categories of photoperiodic response with reference to day length.

(b) Describe the physiological role of auxin in plants.

(c) Discuss essential nutrient elements, criteria of essentiality and role of Nitrogen and Calcium in plants.

6. (a) Give an account of classification of enzymes. (5)

(b) Elaborate the carrier concept of mineral uptake. (5)

(c) Give a brief account of factors affecting transpiration. (5)

[This question paper contains 4 printed pages.]

Your Roll No.....

Sr. No. of Question Paper : 1179 **I**

Unique Paper Code : 2163013005

Name of the Paper : Plant Pathology (DSE)

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

Semester : V

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 number **1,** which is compulsory.
3. **All** questions carry equal marks.
4. Draw diagrams wherever required.

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

   (i) Hyperparasite

   (ii) Appressorium

(iii) Hypersensitive response (Hr)

(iv) Cenocentrum

(v) Epidemiology

(vi) Haustorium

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

(i) Bengal famine	(a) SAR
(ii) Heteroecious life cycle	(b) Zoospore
(iii) Salicylic acid	(c) *Phytophthora infestans*
(iv) Motile spore	(d) *Trichoderma*
(v) Biocontrol fungus	(e) *Alternaria solani*
(vi) Early blight of potato	(f) *Puccinia graminis* f. sp. *tritici*

(c) Fill in the blanks : (1×5=5)

(i) Enlargement of an organ or tissue due to an increase in size of its cells is called _____ .

(ii) _____ is the network of hypha making up the body of fungi.

(iii) The interactions of the three components of disease, i.e. pathogen, host and _____ are represented as a triangle called the disease triangle.

(iv) A disease is classified as an _____ disease when it is constantly present and confined to a particular region.

(v) Vein clearing of Bhindi is caused by _____ .

2. Differentiate between **(any two)** (7.5×2=15)

(a) Yellow and brown rust of wheat

(b) Downy and Powdery mildew

(c) Early blight and Late blight of Potato

(d) Pandemic, epidemic and sporadic diseases

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

(a) Life cycle of citrus canker

(b) Various structures formed by predator fungi

(c) V.S. of barberry leaf showing rust infection

(d) Events that takes place during penetration of a pathogen into the host

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

(a) Physical methods of disease control

(b) Contributions of Louis Pasteur

(c) Forecasting of Plant diseases

(d) Koch's postulates

5. (a) What is Biological control? Discuss various terms like- antibiosis, ISR and hyper-parasitism. (7.5)

(b) Briefly describe the role of plant quarantine in control of diseases and its significance. (7.5)

6. Discuss about the causal organism, symptoms, disease cycle and control measures for Late blight of potato disease. (15)

[This question paper contains 4 printed pages.]

Your Roll No.....

Sr. No. of Question Paper : 1373 **I**

Unique Paper Code : 2162011102

Name of the Paper : Cell Biology : Organelles and Biomolecules

Name of the Course : **Botany**

Semester : I

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 No. **1** is compulsory.
3. Attempt **four** questions in all.
4. Attempt **all** the parts of a question together.

1. (a) Write at least one contribution of the following scientists (Attempt any **five**) : (1×5=5)

   (i) Maurice Wilkins

   (ii) Singer and Nicolson

   (iii) Robert Brown

   (iv) Fritz Lipmann

P.T.O.

(v) Gunter Blobel and David Sabatini

(vi) George Palade

(b) State whether the following statements are true or false (any **ten**) (½×10=5)

(i) Tertiary structure of proteins involves more than one polypeptide.

(ii) Sucrose is a disaccharide and has alpha (1-4) bond.

(iii) Nucleus communicates with the cytoplasm through nucleopores.

(iv) Cell membranes are composed of amylose and amylopectin.

(v) Cellulose form the lipid component of the cell walls.

(vi) Phosphodiglycerides are a part of cell membranes.

(vii) Golgi bodies are seat of N-glycosylation of lipids.

(viii) Cholesterol is major constituent of plant cell membrane.

(ix) Pectin is a constituent of bacterial cell wall.

(x) Phosphodiester bonds link nitrogenous bases to sugars.

(xi) Ribosomes are single membrane bound organelles.

(xii) Lysosome helps in protein folding.

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

(i) ..... amino acid participates in the formation of disulphide bonds.

(ii) Enzymes for oxidative phosphorylation are present on the ..... of mitochondria.

(iii) The reticular network which traverses the cytoplasm is known as ....

(iv) Digestion of old cell organelles like mitochondria is called .....

(v) The stage at which crossing over of chromosomes takes place during meiosis I is called.....

(vi) Hydrophobic proteins tend to have ..... structure

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

(a) B DNA and Z DNA

(b) Microfilament and Intermediate Filament

(c) Primary, Secondary and Tertiary Lysosome

(d) Heterchromatin and Euchromatin

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

(a) Semiautonomous Organelles

P.T.O.

(b) Cell Wall

(c) Biological Significance of Hydrogen Bonds

(d) Structure and Function of ATP

4. Draw well labelled ultrastructure of any **three** : (5×3=15)

(a) Fluid mosaic model

(b) Chloroplast

(c) Nuclear Pore complex

(d) Flagella

5. (a) Garbage disposal or suicidal bags is a popular expression for one of the cell organelle. Name the organelle and comment on its function.

(b) Golgi apparatus is the export house of the cell. Comment.

(c) Explain the process of regulation of cell cycle in eukaryotes. (5×3=15)

6. (a) What is the role of mitosis in living organisms.

(b) What is the importance of protein glycosylation and where does it take place?

(c) Write an account of structure and function of nucleolus. (5×3=15)

[This question paper contains 8 printed pages.]

Your Roll No.....

Sr. No. of Question Paper : 1280 **I**

Unique Paper Code : 2163012002

Name of the Paper : Biostatistics & Bioinformatics for Plant Sciences

Name of the Course : **Botany (DSE)**

Semester : III

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 **Part A** and **Part B** on separate answer sheets.
3. Question no. **1** is compulsory of **both** the sections.
4. Attempt **three** questions from **Part A** and **three** questions from **Part B** including compulsory Q. No. **1** of **both** the sections.
5. Attempt All parts of a question together.
6. Use of simple calculator allowed.

P.T.O.

Part A

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

(i) NCBI

(ii) PDB

(iii) BLAST

(iv) MEGA

(v) OTU

(vi) MSA

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

(i) _____ is an example of a literature database.

(ii) _____ is the predictive stem of bioinformatics which with the aid of mathematical modeling, simulation and data analysis generates predictive models of experimentally generated biological data.

(iii) A _____ is any maximal consecutive run of spaces in a single sequence in a given alignment.

(iv) A _____ is a group of organisms that includes a common ancestor and all of its descendants.

(v) _____ pioneered the use of computers to sequence proteins and nucleotides, creating one of the first bioinformatics databases.

(vi) _____ is a manually curated plant peptide database.

2. Write the differences between the following **(any two)** (2×5=10)

(i) Primary database and Secondary database

(ii) Global sequence alignment and Local sequence alignment

(iii) Sequence identity and Sequence similarity

(iv) Rooted and Unrooted phylogenetic trees

3. Write short notes on following **(any two)** (2×5=10)

(i) Concept of sequence alignment

(ii) Applications of bioinformatics in crop improvement

(iii) PubChem database

4. What is molecular phylogeny? Explain any two methods of construction of phylogenetic trees and highlight the key differences between them.

(2+4+4=10)

Part B

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

(i) _____ is the number of data falling within a class interval.

(ii) When the correlation coefficient r = 0 it is said to be _____

(iii) The Student's t-values can theoretically range from _____ to _____

(iv) Data collected by questionnaires and surveys are a type of _____

(v) _____ is an example of nonparametric test.

(vi) _____ is the simplest and frequently used method of diagrammatic representation of data.

(vii) Continuous variables are represented by _____ .

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

(i) Sample must always be a true representative of the whole population.

(ii) Type I error occur when a statistical test rejects a true null hypothesis.

(iii) Value of t-test distribution range between 0 to 1.

(iv) The t-distribution approaches the normal distribution as the number of degrees of freedom decreases.

(v) Range is not a measure of central tendency.

(vi) Mean is the preferred measure of central tendency.

2. Differentiate between **(any two)** (2×5=10)

(i) Histogram and Pie chart

(ii) Grouped and Ungrouped Data

(iii) Null and alternate hypothesis

3. Write short notes on the following with suitable examples **(any two)** (2×5=10)

(i) Quartile deviation

(ii) Chi- square test

(iii) Spearman's coefficient of correlation

4. Define measures of dispersion. Ten samples of the *Ipomoea* plant were taken for their nitrogen content. Calculate the standard deviation, and standard error to assess the variability in the data and the reliability of the mean. Interpret your findings.

(2+6+2=10)

Sample replicas	1	2	3	4	5	6	7	8	9	10
Nitrogen (%)	3.52	3.54	3.34	3.58	3.46	3.39	3.59	3.62	3.57	3.49

[This question paper contains 4 printed pages.]

Your Roll No.....

I

Sr. No. of Question Paper : 1055

Unique Paper Code : 2162013501

Name of the Paper : Molecular Biology of the Cell

Name of the Course : **B.Sc. Botany NEP (UGCF-2022)**

Semester : V

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 five)** : (1×5=5)

   (i) Codon

   (ii) Split gene

(iii) Inducer

(iv) Primosome

(v) Okazaki fragment

(vi) Glycosylation

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

(i) ORF

(ii) PCNA

(iii) miRNA

(iv) TBP

(v) Tm

(vi) CRP

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

(i) Enzyme encoded by the *lacZ* gene.

(ii) Sequence of 5' and 3' splice site.

(iii) Enzyme involved in charging tRNA during protein synthesis.

(iv) Give the percentage of adenine present in a DNA molecule having 30% guanine in its base composition.

(v) RNA polymerase subunit required to initiate transcription in prokaryote.

(vi) Name the enzyme involved in removal of RNA primer during eukaryotic DNA replication process.

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

(a) A- DNA and B- DNA

(b) Topoisomerase-I and Topoisomerase-II

(c) Denaturation and Renaturation of DNA

(d) Negative and Positive Gene Regulation in *Lac* Operon

(e) Monocistronic and Polycistronic RNA

(f) Prokaryotic and Eukaryotic Ribosome

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

(a) Mechanism of splicing

(b) Attenuation in *Trp* operon

(c) Theta mode of DNA replication

(d) Central Dogma

(e) Transcription termination in eukaryotes

P.T.O.

4. (a) With a well labeled diagram, discuss the mechanism of initiation in prokaryotic translation and compare it with that of eukaryote. (8)

(b) Explain the salient features of genetic code. (5)

(c) Name two unusual bases present in tRNA. (2)

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

(a) With the help of a well labelled diagram, explain the mechanism of RNA interference.

(b) How did Fraenkel – Conrat proved that RNA is genetic material in some viruses?

(c) What are consensus sequences? Explain them with reference to prokaryotic and eukaryotic promoter regions.

6. (a) Discuss the mechanism of transcription termination in prokaryotes. (8)

(b) With a well labelled diagram, discuss end replication in eukaryotes. (7)

[This question paper contains 4 printed pages.]

Your Roll No.....

Sr. No. of Question Paper : 1093 **I**

Unique Paper Code : 2162013502

Name of the Paper : Reproductive Biology of Angiosperms

Name of the Course : **Botany**

Semester : V

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 Number 1 which is compulsory.
3. All parts of a question must be answered together.
4. All questions carry equal marks.
5. Draw well-labelled diagrams and write the botanical names wherever necessary.

P.T.O.

1. (a) Give significant contributions of the following (**Any two**): (2×2.5=5)

(i) Jensen

(ii) S.G. Nawaschin

(iii) P. Maheshwari

(b) Name the species/ plant in which the following occurs: (1×5=5)

(a) Largest seed

(b) Pseudo embryo sac

(c) Smallest angiosperm flower

(d) Cleistogamous flowers

(e) Tristyly

(c) Fill in the blanks: (1×5=5)

(i) Pseudomonads are characteristic of family _____.

(ii) In Litchi, the edible part is _____.

(iii) Ruminate endosperm is found in _____.

(iv) _____is responsible for crowding effect in pollen germination.

(v) Reproductive barriers can be overcome by intra-ovarian pollination in members of the family _____.

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

(i) Homomorphic and Heteromorphic Incompatibility

(ii) Amoeboid and Secretory tapetum

(iii) Monosporic and Tetrasporic embryo sac development

(iv) Endothecium and endothelium

(v) Ornithophily and Anemophily

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

(a) Elaborate upon the significance of reproductive biology in the conservation of plants.

(b) How is a seed designated as a storage organ? Explain with relevant examples.

P.T.O.

(c) Short-distance transport occurs in various embryological tissues. Comment.

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

(i) Female Germ Unit

(ii) NPC system

(iii) Polyembryony

(iv) Endosperm haustoria

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

(i) T.S. of a mature anther

(ii) Bitegmic, anatropous ovule with *Fritillaria* type embryo sac

(iii) Steps involved in the entry of pollen tube in the embryo sac

(iv) Ultrastructure of Egg Cell

6. (a) Trace the development of a typical dicot embryo and elaborate on embryo patterning. (8)

(b) What is a Male Germ Unit, and why is it important in double fertilization? (7)