

[This question paper contains 4 printed pages.]

Your Roll No.....

Sr. No. of Question Paper : 1490
Unique Paper Code : 42161101
Name of the Paper : Biodiversity (Microbes, Algae,
Fungi and Archegoniatae)
Name of the Course : B.Sc. (Prog.) Life Science
(CBCS)
Semester : 1
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 questions carry equal marks.
4. All parts of a question must be answered together.
5. Draw diagrams wherever required.

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

(i) Pseudoelaters

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- (ii) Heterocysts
- (iii) Cleistothecium
- (iv) Uredospores
- (v) Transduction
- (vi) Gemma cups
- (vii) False indusium
- (viii) Transfusion Tissue

(b) Match the following : (1×5=5)

- | | |
|------------------------------------|--------------------------|
| (i) Cup shaped chloroplast | (a) <i>Selaginella</i> |
| (ii) Glossopodium | (b) <i>Cycas</i> |
| (iii) Accessory transfusion tissue | (c) <i>Pinus</i> |
| (iv) Ovuliferous scale | (d) <i>Alternaria</i> |
| (v) Multicellular Conidia | (e) <i>Chlamydomonas</i> |

(c) Fill in the blanks : (1×5=5)

- (i) Chilgoza is obtained from

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- (ii) Viruses comprise of nucleic acid as central and protein coat called
- (iii) Horse tail is the common name of
- (iv) Winged Pollen grain occurs in
- (v) Perfect stage of *Penicillium* is called

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

- (a) Antheridiophore and Archegoniophore of *Marchantia*
- (b) Transformation and Transduction in Bacteria
- (c) Lytic and Lysogenic cycle
- (d) Long and Dwarf shoots of *Pinus*
- (e) Mega and Microsporangium of *Selaginella*
- (f) Ectomycorrhiza and Endomycorrhiza
- (g) Ascomycetes and Basidiomycetes

3. Draw well labelled diagram (any three): (3×5=15)

- (a) E.M of *Chlamydomonas*
- (b) L.S of ovule of *Cycas*

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- (c) L.S of sporophyte of *Anthoceros*
- (d) T.S. of internode of *Equisetum*
4. Write short notes (any three) : (3×5=15)
- (a) Bacterial conjugation
- (b) Economic importance of Algae
- (c) Gemma cup of *Marchantia*
- (d) Heterospory and seed habit in *Selaginella*.
5. (a) Briefly describe the general characteristics of gymnosperms and discuss the reproduction in *Pinus*. (10)
- (b) Why Pteridophytes are better adapted to dry land than Bryophytes. (5)
6. (a) Discuss the stages of life cycle of *Puccinia* on *Berberis* host along with its symptoms. (8)
- (b) Explain with illustration the sexual reproduction of *Vaucheria*. (7)

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

- (i) Heterocyst
- (ii) Symbiosis
- (iii) Vesicle
- (iv) Biocontrol
- (v) Inoculum
- (vi) Rhizosphere

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

- (i) BGA
- (ii) FYM
- (iii) IARI
- (iv) GMO
- (v) NPOF
- (vi) PGPR

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(c) Match the following: (10×1=10)

- | | |
|--|--------------------------------|
| (i) Azolla-Anabaena | (a) Algalization |
| (ii) Hartig net | (b) Orchid.mycorrhiza |
| (iii) Symbiotic nitrogen fixing bacterium | (c) <i>Bacillus megaterium</i> |
| (iv) Phosphate solubilising bacterium | (d) <i>Frankia</i> |
| (v) Pelotons | (e) <i>Glomus</i> |
| (vi) Fuller's earth | (f) <i>Nostoc</i> |
| (vii) Free living nitrogen fixer | (g) Ectomycorrhiza |
| (viii) An actinomycete | (h) Rice cultivation |
| (ix) Addition of blue green algae to rice fields | (i) <i>Rhizobium</i> |
| (x) Arbuscular mycorrhiza | (j) Carrier material |

2. Write short notes on the following (any four): (5×4=20)

- (i) Actinorhizal symbiosis

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- (ii) Carrier based inoculants
- (iii) Green revolution
- (iv) Biological nitrogen fixation
- (v) Any one type of composting method

3. (a) Explain the method of isolation and mass multiplication of *Azotobacter* and its role in agriculture. (10)

OR

Write the key characteristics of organic farming. Discuss the environmental impacts of conventional farming.

- (b) What are the different types of mycorrhizae? Enumerate their benefits in sustainable agriculture. (10)

OR

Discuss the key characteristics of blue green algae and their application in rice cultivation.

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Your Roll No.....

Sr. No. of Question Paper : 1037

D

Unique Paper Code : 2162011102

Name of the Paper : Cell Biology: Organelles and
Biomolecules

Name of the Course : Botany

Semester : 1

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.

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

(i) Gunter Blobel and David Sabatini proposed
the _____

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- (ii) Marker enzyme for mitochondria is _____
 - (iii) _____ is a lysosomal storage disease.
 - (iv) A non-membranous cell organelle is _____.
 - (v) Fluid mosaic model of plasma membrane model is proposed by _____.
 - (vi) Disulphide bonds are formed in _____.
- (b) Define any five (1×5=5)
- (i) Reducing sugars
 - (ii) Hydrogen bonds
 - (iii) Chromatin
 - (i) Essential Fatty Acids
 - (ii) Nucleoid
 - (iii) Heterophagy
- (c) Write at least one contribution of the following scientists (1×5=5)
- (i) Linn Margulis

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- (ii) Rosalind Franklin
 - (iii) C Benda
 - (iv) George Palade
 - (i) Fritz Lipmann
 - (ii) Christian De Duve
 - (iii) Camillo Golgi
2. Differentiate between any three (5×3=15)
- (i) Prokaryotic and eukaryotic cell
 - (ii) RER and SER
 - (iii) Primary and Secondary cell wall
 - (iv) Microtubule and Microfilament
 - (v) Mitosis and Meiosis
3. Write short notes on any three (5×3=15)
- (i) Nuclear Pore Complex
 - (ii) ATP as energy currency molecule
 - (iii) Peroxisome
 - (iv) Semi-autonomous nature of chloroplast

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4. Draw Ultrastructures of

(5×3=15)

- (i) Mitochondria
- (ii) Nucleus
- (iii) Fluid Mosaic Model

5. Attempt any three

(5×3=15)

- (i) Explain the process of regulation of cell cycle.
- (ii) Give an account of polymorphic forms of lysosomes.
- (iii) What are the constituents of cell wall? Describe its structure and function.
- (iv) Explain the role of microtubule in the transport of macromolecules and organelles in the cytoplasm

6. Attempt any three

(5×3=15)

- (i) Describe the various levels of protein structure.
- (ii) What are the salient features of DNA structure?
- (iii) Write a note on lipids as cell membrane constituents.
- (iv) Write a note of biological significance of chemical bonds.

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Your Roll No.....

Sr. No. of Question Paper : 1058 C

Unique Paper Code : 32161101

Name of the Paper : Microbiology and Phycology

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

Semester : 1

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 parts of a question must be attempted together.
3. Illustrate your answers with suitable diagrams wherever necessary.
4. This question paper has six questions.
5. All questions carry equal marks.
6. Attempt any FIVE questions, including Question No. 1, which is compulsory.

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1. This question is compulsory

(a) Fill in the blanks (1×5=5)

- (i) _____ consists of small, circular single-stranded molecule of RNA and lacks any kind of capsids.
- (ii) _____ is the reserve food material found in the division Cyanophyta.
- (iii) The chief source of Carragenin is _____
- (iv) The blue green algae and red algae _____ flagella.
- (v) Species of _____ are responsible for the phenomenon of red snow.

(b) Briefly explain the following terms (2×5=10)

- (i) Coenobium
- (ii) Carpospore
- (iii) Mycoplasma
- (iv) Hormogonia
- (v) Conjugation in bacteria

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

- (a) Conceptacle and Receptacle of *Fucus*
- (b) Lytic and Lysogenic cycle
- (c) Unilocular sporangium and plurilocular sporangium
- (d) Gongrosira stage and Palmella stage

3. Draw labelled diagrams for any three of the following (5×3=15)

- (a) T-even bacteriophage
- (b) Chara L.S. Globule
- (c) *Fucus* -V.S. Female Conceptacle
- (d) Thallus of *Coleochaete* with spermocarp

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

- (a) Function and structure of Heterocyst

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- (b) Habit, structure and sexual reproduction in *Vaucheria*
- (c) Symptoms and control measures of any two plant viral diseases
- (d) Role of algae in environment, agriculture and biotechnology.
5. Discuss any three of the following (5×3=15)
- (a) Tobacco Mosaic Virus (TMV)
- (b) Triphasic lifecycle of *Polysiphonia*
- (c) Algal pigments and their significance in algal classification.
- (d) Bacterial cell wall
6. Explain any three of the following (5×3=15)
- (a) Distinguishing features of Rhodophyceae and Phaeophyceae
- (b) Asexual reproduction in *Nostoc*
- (c) Role of Bacteria in agriculture and industry
- (d) Formation of Daughter Colonies in *Volvox*.
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Your Roll No.....

Sr. No. of Question Paper : 1056 **D**
Unique Paper Code : 2162011103
Name of the Paper : Basic Laboratory and Field
Skills in Plant Biology
Name of the Course : B.Sc. (H) Botany (CBCS)
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

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

- (i) _____ holds the specimen in place between the coverslip and the slide.
- (ii) _____ is a device for ventilation while using chemicals producing toxic fumes.
- (iii) A _____ is defined as a concentrate solution to be diluted to some lower concentration for actual use.
- (iv) A _____ is a solid or liquid preparation used to propagate microorganisms under controlled conditions.
- (v) A characteristic that may differ from one individual to another in a population is called a _____.

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(vi) A computerized archive used for the storage and organization of data in such a way that information can be retrieved easily is known as a _____.

(vii) A value of $\log_{10} 100$ is _____.

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

(5×1=5)

- (i) A sample of five body weights (in pounds) is as follows: 116, 168, 124, 132, 110. The sample median is 130.
- (ii) In MS excel, the formula Average (number 1, number 2,) gives the mean of all values.
- (iii) A standard herbarium sheet is 10 × 20 cm in size.

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- (iv) Serial dilution is done to increase the number of bacterial cells per unit volume of a bacterial culture.
- (v) Formalin is an alternative name for an aqueous solution of formaldehyde.
- (vi) Condenser is a glass lens and used to gather the light coming from the source.
- (vii) The concentration of a substance present in a solution can be quantified by measuring light absorbed by it at a particular wavelength.
- (c) Match the following (5×1=5)

Column A	Column B
Electron microscope	Excel
Silver nitrate gel	Sterilization method
Autoclave	Normality
Pie chart	Ultrastructure
Gram equivalent	First-Aid

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2. Differentiate between the following (any 5) (3×5=15)
- (a) Compound microscope and Electron microscope
 - (b) Sample mean and Population mean
 - (c) LB medium and MS medium
 - (d) Micrometer and Haemocytometer
 - (e) MS Excel and MS Powerpoint
 - (f) Molar and Percent Solutions
3. Briefly describe the following (any five) (5×3=15)
- (a) Sampling methods
 - (b) Classes of laboratory chemicals
 - (c) Laminar Air Flow

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- (d) Replica plating
- (e) Stains in microscopy
- (f) Graphical representation of data

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

(3×5=15)

- (a) Identification, collection, cataloging and preservation of plant specimens
- (b) Bacterial culture techniques
- (c) Agarose Gel electrophoresis
- (d) Confocal microscopy
- (e) Biosafety measures

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5. Answer any three of the following: (3×5=15)

- (a) The height of Wheat plants in 10 plots is given below. Calculate the mean and standard deviation of the mean of the height of the wheat plant.

Plot number	1	2	3	4	5	6	7	8	9	10
Height (cm)	9	10	12	8	6	7	11	13	12	12

- (b) Explain disposal of hazardous chemicals and laboratory waste.
- (c) Diagrammatically explain image formation in Fluorescence microscope.
- (d) Discuss the pH of solutions and use of pH meter.
- (e) Draw a bar diagram for the following dataset.

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States	Rainfall (mm)
Delhi	617
Haryana	617
Arunachal Pradesh	2782
Punjab	649
Himachal Pradesh	1251
Assam	2818
Jammu & Kashmir	1011
Orissa	1489
Tamil Nadu	998
Tripura	1881

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Your Roll No.....

Sr. No. of Question Paper : 1507 **D**

Unique Paper Code : 2162521101

Name of the Paper : Plant Diversity and Systematics

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

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, first question is compulsory.
3. All questions carry equal marks.
4. Attempt all parts of the questions together.

1. (a) Fill in the blanks : (1×5=5)

(i) Engler and Prantl's classification is
_____ system of classification.

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- (ii) Spiral arrangement of the chloroplast is characteristic feature of algae _____.
- (iii) _____ is also called black bread mold.
- (iv) The _____ cycle ends with the death or lysis of the bacterial cell.
- (v) Determinate or monotelic inflorescence is also called _____.

(b) Match the following : (1×5=5)

- | | |
|-------------------------|---------------------|
| (i) <i>Nostoc</i> | (a) Cyathium |
| (ii) <i>Pinus</i> | (b) Lysogenic cycle |
| (iii) <i>Marchantia</i> | (c) Heterocyst |
| (iv) Prophage | (d) Needle |
| (v) Euphorbiaceae | (e) Scales |
- (c) Define the following (Any five) : (1×5=5)

- (i) Akinetes
- (ii) Isotype
- (iii) False indusium

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- (iv) Zygosporangium
- (v) Spike
- (vi) Elaters

2. (a) Write short notes (Any three) : (3×3=9)

- (i) APG
- (ii) Mycoplasma
- (iii) Fairy rings
- (iv) Dwarf shoot

(b) Explain Bentham and Hooker system of classification. (6)

3. (a) Draw well labelled diagram of the following (Any two) : (2×5=10)

- (i) V.S. thallus of *Marchantia* through gemma cup
- (ii) Bacterial cell
- (iii) Part of magnified coenobium in *Volvox*

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(b) Describe sexual mode of reproduction in *Spirogyra*. (5)

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

(i) Conjugation and transduction

(ii) Gram-positive and Gram-negative bacteria

(iii) Lytic and lysogenic cycle

(iv) Artificial and natural classification

(v) Eusporangiate and Leptosporangiate

5. (a) Discuss the Principle of priority with its limitations. Explain the requirement of valid publication of scientific name of plants. (7.5)

(b) Describe in brief about various modes of reproduction in *Rhizopus*. (7.5)

(2000)

(A) (3)

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Your Roll No.....

Sr. No. of Question Paper : 1372 C

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. Question no. 1 is compulsory, attempt five questions in all.
3. Draw well labelled diagrams wherever required and answer all parts of question

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

(i) Casparian strips

(ii) Bulliform cells

(iii) Exodermis

(iv) Plasmodesmata

(v) Dendrochronology

(vi) Callose

(b) Match the following: (5×1=5)

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(1) Commercial cork (a) *Trochodendron*

(2) Raphides (b) *Quercus suber*

(3) Lateral root (c) *Helianthus stem*

(4) Endarch xylem (d) *Pericycle*

(5) Veselless angiosperm (e) *Calcium oxalate*

(c) Give suitable examples where following are present (Any five) (5×1=5)

(i) Brachysclereids

(ii) Amphicribal vascular bundle

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(iii) Angular collenchyma

(iv) Druses

(v) Lysigenous cavity

(vi) Anisocytic stomata

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

(i) Applications of Plant Anatomy in Forensic science

(ii) Kranz Anatomy

(iii) Reaction wood

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(iv) Phloem as a dynamic tissue

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

(i) Heart wood and sap wood

(ii) Vessels and tracheids

(iii) Collenchyma and parenchyma

(iv) Articulated and non-articulated laticifers

(v) Cutinization and cuticularization

(vi) Paratracheal and apotracheal parenchyma

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4. Draw well labelled diagrams of (Any three): (5×3=15)

(i). T.S. Periderm showing lenticels

(ii) T.S of Dicot stem

(iii) V.S of *Nerium leaf*

(iv) L.S. Xylem Vessels showing tyloses

5. (a) Early and late wood are formed as a result of seasonal activity of the cambium. Justify the statement with the help of well labelled diagrams.

(8)

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(b) Included phloem is the outcome of anomalous secondary growth. Elaborate the statement citing suitable example with the help of well labelled diagram. (7)

6. (a) Classify stomata according to Metcalfe and Chalk along with well labelled diagrams and examples. (8)

(b) Explain briefly with the help of well labelled diagrams the process of secondary growth in dicot roots (7)

7. (a) Along with suitable examples, describe the anatomical adaptations shown in hydrophytes. (8)

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(b) Explain the organization of root apex with the help of any three suitable theories. Illustrate with well labelled diagrams. (7)

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Your Roll No.....

Sr. No. of Question Paper : 1672

C

Unique Paper Code : 42163302

Name of the Paper : Biofertilizers

Name of the Course : Life Sciences

Semester : III

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. This question paper has 7 questions.
3. Attempt 5 questions in all.
4. Question No. 1 is compulsory.
5. All questions carry equal marks except Q. No 1.
6. Answer all parts of a question together.
7. Illustrate your answers with suitable diagram wherever necessary.

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1. (a) Fill in the blanks : (5×0.5=2.5)

- (i) Biological nitrogen fixation was discovered by
- (ii) The algae has symbiotic association with azolla.
- (iii) Mycorrhiza helps plants to absorb
- (iv) Vermicast is the of earthworm.
- (v) The waste that can be degraded by microorganism are called as

(b) Give the example of the following :

(5×0.5=2.5)

- (i) Free living N₂ fixing biofertilizer
- (ii) PGPR
- (iii) AM fungi
- (iv) Associative symbiotic biofertilizer
- (v) Green manure

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(c) Define the following : (5×1=5)

- (i) Inoculants
- (ii) Green manure
- (iii) Curing
- (iv) Algalization
- (v) Vesicle

2. What are major types of bio fertilizers used in agriculture? How are they beneficial over chemical fertilizers? (7)

3. (a) Discuss the Anabaena- Azolla association. (3.5)

(b) Write an explanatory note on *Rhizobium* isolation and culture technique. (3.5)

4. Write short notes on any two of the following :- (3.5×2=7)

(a) Organic fertilizers

(b) Recycling of industrial waste

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5. Describe in detail about the types of mycorrhizal association. Write a detailed note on influence of VAM on growth and yield of crop plant. (7)
6. Discuss in detail about the symbiotic and asymbiotic nitrogen fixation. (7)
7. What is vermicomposting? Discuss the process and preparation of vermicompost. (7)

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[This question paper contains 4 printed pages.]

Your Roll No.....

Sr. No. of Question Paper : 1400

C

Unique Paper Code : 32161302

Name of the Paper : Economic Botany(LOCF)

Name of the Course : B.Sc. (H) 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. Attempt any five questions.
3. All questions carry equal marks.
4. Question no. 1 is compulsory.

1. (a) Give the botanical names of any five of the following : (5×1=5)

- (i) The source of "Shahi Zafran"
- (ii) Leaf fibres used in making tea bags
- (iii) A major plant source used as a substitute of coffee
- (iv) Leaf used in making bidi
- (v) Plant roots used for making screens in coolers
- (vi) Source of broth used for microbial cultures

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(b) Define any five of the following terms :

- (i) Retting
- (ii) Ratooning
- (iii) Iodine number
- (iv) Lancing
- (v) Caryopsis
- (vi) Pharmacology

(5×1=5)

(c) Expand and write the place where the institutes are located (any five) :

- (i) ICRISAT
- (ii) RRIM
- (iii) IARI
- (iv) SBI
- (v) CIMAP
- (vi) IRRI

(5×1=5)

2. Differentiate between the following (any three) :

- (i) Essential oils and Fatty Oils
- (ii) Black Tea and Green Tea
- (iii) Flue curing and Sun curing
- (iv) White Jute and Tossa Jute
- (v) Indica and Japonica Rice
- (vi) Millets and Cereals

(3×5=15)

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3. Draw labelled diagrams of any three of the following. Write botanical name and family also. (3×5=15)

- (i) L.S. cotton seed
- (ii) L.S. Clove flower bud
- (iii) T.S. Hesperidium
- (iv) L.S. wheat grain

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

- (i) Products and By-products of sugarcane industry
- (ii) Extraction methods of fatty oils
- (iii) Importance of legumes
- (iv) Cannabis as multipurpose crop
- (v) Green Revolution

5. (a) What is tapping? Explain different types of tapping and processing of rubber. (1+6+2=9)

(b) Write botanical name, family, part used and active constituents of any three of the following. (3×2=6)

- (i) Poppy
- (ii) Saffron
- (iii) Fever bark tree
- (iv) Tea

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6. (a) Explain Vavilov's work on origin of cultivated plants. List all the centres of origin with examples. (2+8=10)
- (b) Which state in India is the chief producer for the following (*any five*): (5×1=5)
- (i) Black pepper
 - (ii) Cotton
 - (iii) Coconut
 - (iv) Groundnut
 - (v) Rubber
 - (vi) Wheat
7. (a) What is retting? Explain the process of retting taking jute as an example. Write economic importance of jute. (1+5+2=8)
- (b) Match the following : (7×1=7)
- | | |
|-------------------------|-------------------------------|
| (i) Golden tip | 1. Mustard |
| (ii) Solanin | 2. <i>Linum usitatissimum</i> |
| (iii) Multipurpose crop | 3. Potato |
| (iv) Corymbose raceme | 4. Tea |
| (v) Flax | 5. <i>Glycine max</i> |
| (vi) Wonderbean | 6. Clove |
| (vii) Eugenol | 7. Coconut |

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Your Roll No.....

Sr. No. of Question Paper : 1418 C

Unique Paper Code : 32161303

Name of the Paper : Genetics

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 Questions carry equal marks.
3. Question No. 1 is compulsory.
4. Attempt five questions in all including Question No. 1.

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

(i) Pseudodominance

(ii) Frameshift mutation

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(iii) Trisomy

(iv) Epigenetics

(v) Dicentric chromosome

(vi) Transposon (1×5=5)

(b) Give one contribution of (any five) of the following

(i) Carl Correns

(ii) Barbara McClintock

(iii) Sutton and Boveri

(iv) R. C. Punnett

(v) Hugo de Vries

(vi) Alfred Strutevant (1×5=5)

(c) Fill in the blanks:

(i) Human females have _____ linkage groups.

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(ii) Double monosomy is represented as _____.

(iii) Short legged breed of sheep was named as _____ by Seth Wright.

(iv) _____ is an example of sex- linked recessive trait.

(v) When a gene affects many aspects of phenotype, it is said to be _____. (1×5=5)

2. Write short notes on (any five) of the following

(i) Photoreactivation repair

(ii) Base Analogs

(iii) Dominant Epistasis

(iv) *cis trans* complementation test

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(v) Retrotransposons

(vi) Reciprocal translocation

(vii) Mitochondrial inheritance in Yeast (3×5=15)

3. Differentiate between (any five):

(i) Penetrance and Expressivity

(ii) Codominance and Incomplete Dominance

(iii) Test cross and Reciprocal cross

(iv) Paracentric and Pericentric inversion

(v) Allopatric and Sympatric speciation.

(vi) Down's syndrome and Klinefelter's syndrome

(3×5=15)

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4. (a) In pea plant, Tall (T) is dominant over dwarf (t). Yellow seed (Y) is dominant over green (y) and Round seed (R) is dominant over wrinkled seed (r). A homozygous dwarf, green and wrinkled pea plant is crossed to a homozygous tall, yellow and round plant. Using forked line method give the genotypes and phenotypes of parents, F₁ and F₂ progenies. (8)

(b) Give an account of the inheritance of Kappa particles in *Paramecium* with diagrams. (7)

5. (a) In a population of 5000, cystic fibrosis is seen in 125 individuals. How many individuals in the population are the carrier of the gene for cystic fibrosis? (5)

(b) Mutations are caused by both environmental and chemical insults. Describe how chemical mutagens induce mutations. Give two examples of useful induced mutations in crop improvement. (10)

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6. (a) An individual heterozygous at three gene loci Aa , Nn , Rr is crossed with the homozygous recessive parent $aa\ nn\ rr$. The frequency of progeny with different genotypes is as follows:

ANR	347
ANr	52
Anr	357
AnR	90
AnR	49
AnR	6
a NR	92
a Nr	7
Total progeny	1000

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- (i) Which classes represent the parental types? (2)
- (ii) Which classes reflect the occurrence of single cross overs and double cross overs? (2)
- (iii) Construct the genetic map of the 3 loci involved indicating both map distance and correct gene sequence. (5)
- (iv) What is the coefficient of coincidence involved? Also find out the degree of interference. (3)
- (b) What is Position effect? Explain with the help of a suitable example. (3)
7. (a) Explain the inheritance of skin color in humans (5)
- (b) What do you understand by ABO blood group series? Explain its genetic basis of inheritance. (5)

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(c) How can you distinguish between the terms haploidy and monoploidy? How can haploids be produced and utilized in plant breeding? (5)

[This question paper contains 4 printed pages.]

Your Roll No.....

Sr. No. of Question Paper : 1678 C
Unique Paper Code : 32163302
Name of the Paper : Intellectual Property Rights
Name of the Course : BSc. (H) Botany: Skill
Enhancement Course
Semester : III
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 5 questions in all.
3. Question 1 is compulsory
4. Attempt all parts of a question together.

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

(i) WTO

(ii) TRIPS

(iii) TKDL

(iv) WIPO

(v) NGB

(vi) GATT

(b) State whether the following statements are True or False (any five) (1×5=5)

(i) A Patent application can be updated after it has been filed to incorporate new features.

(ii) Customs authorities have no role in enforcement of Intellectual Property Rights.

(iii) BMW is an example of brand Trademark.

(iv) Coorg orange is an example of GI.

(v) The Industrial Design Headquarter patent office is at Kolkata.

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(vi) The use of bio resources by the, Multinational companies and other organizations without any systematic approval from a nation or its related people is known as Bioprospecting.

2. Explain how patents can be registered in India with the help of suitable flowchart. What are the basic criteria of Patenting? (7)

3. Differentiate between (any Two): (2×3.5=7)

(a) Infringement of Trademarks and Passing-off

(b) Bio-prospecting and Bio-piracy

(c) Process and Product patent

4. (a) What has led to the establishment of TKDL by the Government of India? Discuss the setup of TKDL. (5)

(b) What is a domain name? What are the safeguards provided to protect domain names under IPRs. (2)

5. What is a Database? List various Biological Databases. Discuss the objectives and provisions of Database protection under IPR laws. (7)

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6. List the classes of work for which Copyright protection is available in India. What amounts to Copyright infringement? Discuss the protective measures provided against copyright infringements under copyright laws. (7)

(1500)

[This question paper contains 8 printed pages.]

Your Roll No.....

Sr. No. of Question Paper : 1714 C

Unique Paper Code : 42164301

Name of the Paper : Plant Anatomy and Embryology

Name of the Course : B.Sc. (programme) Life Science

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. Attempt Section A and Section B on separate sheets.
3. All parts of a question must be answered together.
4. Supplement your answer with well labelled diagram.

P.T.O.

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SECTION A
(37 marks)

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

1. (a) Fill in the blanks (Any four) (4+3=7)
- (i) _____ In collenchyma the thickening material is deposited on the walls bordering the intercellular spaces.
 - (ii) The protoxylem vessels generally have _____ and _____ thickening.
 - (iii) The histogen theory was given by _____
 - (iv) Epidermis that develops multiseriate tissue is called _____
 - (v) Plants growing immersed in water are called _____

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(vi) The wall thickening impregnated with suberin and lignin on the radial and transverse walls of endodermis is called _____

(b) Define the following terms (any three)

- (i) Chlorenchyma
 - (ii) Quiescent centre
 - (iii) Hypostomatic leaf
 - (iv) Bulliform cells. (1×3=3)
2. Differentiate between any three of the following : (3×5=15)
- (a) Sclereids and fibres
 - (b) Isobilateral and dorsiventral leaf
 - (c) Storied and Non-storied cambium
 - (d) Heart wood and Sap wood
 - (e) Monocot and dicot root

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3. Write short notes on any three of the following:

(5×3=15)

- (a) Sclerenchyma
- (b) Cytological zonation
- (c) Vascular Cambium
- (d) Secondary growth in stem
- (e) Seasonal activity of cambium

4. (a) What are meristematic tissues? Describe different types of meristematic tissues with example.

(7+8=15)

OR

Define xerophytes. What adaptive features they possess to withstand that environment? (7)

(b) Give a brief account of various theories to describe shoot apical meristem.

OR

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Describe Metcalfe and Chalk theory and different types of structural configuration proposed by them. (8)

SECTION B

(38 MARKS)

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

1. Fill in the blanks (any eight): (1×8=8)

- (a) The phenomenon of double fertilization was given by _____
- (b) Pollination by bats is known as _____
- (c) Ubisch bodies are produced by _____ tapetum.
- (d) A small opening at the apical end of the ovule is known as _____

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- (e) The condition where the stigma loses its receptivity by the time the anthers of the same flower dehisce is known as _____
- (f) The phenomenon which involves fusion of nucleus of one of the sperms with the polar nuclei is called _____
- (g) The basal region of an ovule where funiculus is attached is called as _____
- (h) Geitonogamy and xenogamy are the types of _____ pollination.
- (i) Finger like projections present in synergid cells are called as _____
- (j) _____ type of embryo sac is genetically most heterogenous.
2. Differentiate between any **three** of the following :
(5×3=15)
- (a) Dichogamy and herkogamy
- (b) Self pollination and cross pollination

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- (c) Amoeboid and secretory tapetum
- (d) Monosporic and tetrasporic embryo sac
- (e) Dicot and monocot embryo
3. Write short notes on any **three** of the following :
(3×5=15)
- (a) Egg apparatus
- (b) Male germ unit
- (c) Double fertilization and triple fusion in angiosperms
- (d) Name any five eminent embryologists along with their significant contributions
- (e) Anther at dehiscence stage
4. Give a detailed account of different types of endosperm with examples. Discuss embryo-endosperm relationship.

OR

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Discuss different seed dispersal mechanisms and its adaptations in plants. (15)

(2000)

[This question paper contains 4 printed pages.]

Your Roll No.....

Sr. No. of Question Paper : 1887 C

Unique Paper Code : 32165301

Name of the Paper : Plant Physiology and Metabolism

Name of the Course : Generic Elective - Botany CBCS

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. Attempt **five** questions in all, including question number **1** which is compulsory

1. (a) Match the following : (1×5=5)

- | | |
|----------------|------------------------------|
| (i) ABA | (a) Rooting hormone |
| (ii) Auxin | (b) Delay senescence |
| (iii) Ethylene | (c) Stress hormone |
| (iv) Cytokinin | (d) Bolting in rosette plant |
| (v) GA | (e) Gaseous hormone |

P.T.O.

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(b) Fill in the blanks : (1×5=5)

- (i) Nitrogenase activity is irreversibly inhibited by _____.
- (ii) The highest value of water potential is _____.
- (iii) _____ and _____ are the examples of macro and micronutrients respectively.
- (iv) Release of oxygen during photosynthesis is due to the photolysis of _____.
- (v) _____ is a short day plant (SDP).

(c) Give an example for each of the following :

(1×5=5)

- (i) Compatible solute
- (ii) Antitranspirant
- (iii) Metal present in nitrate reductase
- (iv) Coenzyme
- (v) Accessory pigment

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

(a) Guttation and Transpiration

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(b) Competitive and non-competitive enzyme inhibition

(c) Cyclic and non-cyclic electron transport chains

(d) Respiration and photorespiration

3. Write short note on : (3×5=15)

(a) Criteria for essentiality of elements

(b) Anaerobic respiration

(c) Vernalization

(d) Phytochrome

(e) Water potential

4. Explain ANY THREE of the following : (5×3=15)

(a) Substrate level phosphorylation with example

(b) CAM plants

(c) Physiological role of Auxin

(d) Role and deficiency symptoms of any two mineral nutrients

P.T.O.

5. (a) Explain the mechanism of stomatal opening and closing with reference to proton transport theory. (8)
- (b) Briefly explain the pressure flow hypothesis of phloem translocation. (7)
6. (a) With the help of suitable diagram, explain how C4 plants concentrate CO_2 around RUBISCO. (8)
- (b) Discuss the chemiosmotic model of ATP synthesis with suitable diagram. (7)
7. (a) Explain the process of root nodulation in symbiotic nitrogen fixation with the help of well labeled diagram. Write the role of Dinitrogenase and Leghaemoglobin. (8)
- (b) Discuss the fate of pyruvate during respiration. (7)

[This question paper contains 8 printed pages.]

Your Roll No.....

Sr. No. of Question Paper : 1091 C

Unique Paper Code : 32167503

Name of the Paper : Analytical Techniques in
Plant Sciences

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. Attempt all parts of a question together

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

(i) The pore size can be regulated by increasing or decreasing the concentration of _____ in AGE.

(ii) _____ is the commonly used material as stationary phase in thin layer chromatography.

(iii) The marker enzyme for mitochondria is _____

(iv) The magnification of a microscope having 4X ocular lens and a 40X objective lens would be _____X.

(v) Osmium tetroxide is used in electron microscopy as a _____

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(vi) DNA molecules are immobilized on a _____ in Southern blotting technique.

(b) Expand (any five) (1×5=5)

(i) SDS-PAGE

(ii) EtBr

(iii) HPLC

(iv) RCF

(v) TEM

(vi) ELISA

(c) Name the technique used for the following (any five) (1×5=5)

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- (i) To isolate chloroplast from the spinach leaves.
- (ii) To separate monosaccharide sugars with different carbon numbers from the mixture.
- (iii) To detect the presence of specific protein in a cell.
- (iv) To determine the 3-D structure of proteins.
- (v) To confirm the presence of a specific DNA sequence.
- (vi) To examine the detailed surface topography of microscopic specimens.

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

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- (i) Density-gradient centrifugation
- (ii) X-ray crystallography
- (iii) Ion exchange chromatography
- (iv) Autoradiography

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

- (i) Chromosome banding and painting
- (ii) Northern and Southern blotting
- (iii) Positive and Negative staining
- (iv) Thin layer chromatography and Column chromatography
- (v) Sucrose and Caesium chloride gradient chromatography

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(vi) Light and Electron microscopy

4. Explain the following along with its applications in biological sciences (**any three**) (5×3=15)

(i) FISH

(ii) Agarose gel electrophoresis

(iii) FACS

(iv) UV-Visible Spectrophotometer

5. (i) Explain the principal and application of molecular sieve and affinity chromatography? (8)

(ii) What is "resolution". Describe different factors that influence the resolution and resolving power of a microscope. (7)

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6. (i) Name five radioactive elements used in biological research along with their applications. (5)

(ii) Explain the following briefly (2.5×4=10)

(a) Role of APS and TEMED in PAGE.

(b) Why vacuum is required in electron microscopy but not in light microscopy?

(c) Role of monochromator in spectrophotometer.

(d) What is the significance of positioning of metal emitting electrode at an angle to the specimen in shadow casting?

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

(i) Sample preparation in electron microscopy

(ii) Mass spectrometry

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(iii) Analytical centrifugation

(iv) Western blotting

[This question paper contains 8 printed pages.]

Your Roll No.....

Sr. No. of Question Paper : 1187 C
Unique Paper Code : 32167502
Name of the Paper : Biostatistics
Name of the Course : **Botany : DSE for Hons**
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 any five questions in all.
3. Question number **one** is compulsory
4. Nonscientific calculator allowed, statistical tables provided by the college may be used if required.

1. (a) Define (Any Five) : (1×5=5)

(i) Ordinal scale of measurement

(ii) Descriptive statistics

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- (iii) Relative frequency
- (iv) Bivariate analysis
- (v) Parametric test
- (vi) Class interval

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

- (i) Measure of asymmetry in a distribution is given by _____.
- (ii) In _____, numerical data is depicted on the geographical map.
- (iii) Chance of rejecting a true null hypothesis is known as _____.
- (iv) _____ is the measure of central tendency, which can be located graphically through ogive / cumulative frequency curve.

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- (v) Probability of rare events (e.g. chance of happening of accident on road) will fit best to the _____ distribution.
- (vi) _____ is the most suitable measure of central tendency for speed, ratio, and percentage.

(c) Match the following : (1×5=5)

(i) Q_2	(a) Carl Gauss
(ii) Leaf size	(b) F-test
(iii) Hospital records	(c) Continuous variable
(iv) Significance of difference between two variances	(d) Median
(v) Normal Distribution	(e) Secondary data

2. Discuss the following (Any Three) : (5×3=15)

- (a) Describe application of statistics in different

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fields of biology. What are major limitations of biostatistics?

(b) Define tabulation of data and mention its merits. Describe different types of tables with the help of suitable examples.

(c) Enumerate important features of bar diagram. Explain various types of bar diagram with the help of suitable examples.

(d) Describe primary data. Explain questionnaire and interview-based method of data collection.

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

(a) Quartile deviation and standard deviation

(b) Cluster sampling and quota sampling

(c) Interval and ratio scale

(d) Diagrammatic and Graphical presentation of data

(c) Chronological and geographical data

4. (a) Prepare frequency polygon from the following data. (3)

Class Interval	10 - 20	20 - 30	30 - 40	40 - 50	50 - 60
Frequency	6	11	17	9	4

- (b) What is coefficient of variation? Price of rice and bajra in different years is given below. Find out which grain has more stable price. (5)

Years	2018	2019	2020	2021	2022
Rice	20	22	19	23	16
Bajra	10	20	18	12	15

- (c) Define mode, and enumerate its merits and demerits. Calculate mode for the following data applying grouping method. (7)

No. of fruit/plant (x)	7	8	9	10	11	12	13	14	15	16	17
Frequency	47	54	58	60	66	64	55	40	69	53	45

5. (a) Explain null and alternative hypothesis. Lay down hypotheses and perform appropriate hypothesis test for the following data to find out whether the goat fed with two different diets (A and B) exhibit significant different in their weights (at 5% level of significance). (6)

Weight of goats fed with diet A (kgs)	25	32	30	32	26	14	32	-	-	-
Weight of goat fed with diet B (kgs)	34	34	22	30	42	31	40	30	32	35

- (b) A fertilizer packing machine claims to deliver 12 kg in each of the packing bags. After packing, ten random bags were weighed by a machine-inspector and found their weights as 11, 14, 13, 12, 13, 12, 13, 14, 12, 11 kg. Find out whether the machine could be declared defective at 5% level of significance. (4)

- (c) In a city, the accidents were reported below on the basis of days in week. Calculate if number of accidents are significantly different from each other at 5% level of significance. (5)

Days	Mon	Tue	Wed	Thu	Fri	Sat	Sun
No. of accidents	15	17	12	10	14	20	17

6. (a) Differentiate between Karl Pearson's and Spearman's rank correlation coefficient. Calculate Spearman's rank correlation coefficient (ρ) for ranks obtained by ten students in mathematics and statistics as tabulated below: (7)

Mathematics	7	8	2	1	9	9	12	11	4	10	6	5
Statistics	6	4	1	3	11	12	12	10	5	9	7	8

- (b) Enumerate similarities between correlation and regression. From the following data (of age of husband and wife) calculate the regression

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equation. Predict wife's age, when husband's age is 33 years. (8)

Wife's age (years)	18	20	22	23	27	28	30
Husband's age (years)	23	25	27	30	32	31	35

(1500)

[This question paper contains 4 printed pages.]

Your Roll No.....

Sr. No. of Question Paper : 1578 C

Unique Paper Code : 42167902

Name of the Paper : Cell and Molecular Biology

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

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. All Questions carry equal marks.
3. Question No. 1 is compulsory.
4. Attempt five questions in all including Question No. 1.

1. (a) Define (any five)

(i) Promoter

(ii) Repressor

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(iii) Processivity

(iv) Intron

(v) Nucleosome

(vi) Transcription (1×5=5)

(b) Give one contribution of (any five)

(i) John Cairns

(ii) Francis Crick

(iii) Friedrich Miescher

(iv) R. W. Holley

(v) Fraenkel Conrat

(vi) Singer and Nicolson (1×5=5)

(c) Match the following enzymes with the cell organelle in which they are localized.

(i) Rubisco (a) Mitochondria

(ii) Acid Phosphatase (b) ER

(iii) Succinic dehydrogenase (c) Nucleus

(iv) DNA polymerase (d) Chloroplast

(v) Cytochrome b_5 oxidase (e) Lysosome

(1×5=5)

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2. Differentiate between (any five):

(i) SEM and TEM

(ii) Mitosis and Meiosis

(iii) Lysosome and Peroxisome

(iv) B DNA and Z DNA

(v) Facultative and Constitutive Heterochromatin

(vi) Active and Passive Transport (3×5=15)

3. Write short notes on (any three):

(i) Nucleosome model

(ii) Cell cycle and its regulation

(iii) Lac operon

(iv) End replication of linear DNA

(v) Fluorescence microscopy (3×5=15)

4. Draw well labelled diagrams of the following (any three):

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- (a) Ultrastructure of Mitochondria
- (b) Nuclear Pore Complex
- (c) Fluid Mosaic model of cell membrane
- (d) E.M. of Bacteria and T₂ Bacteriophage

(5×3=15)

5. (a) Give a detailed account of translation in prokaryotes with the help of suitable diagrams. (7)
- (b) Discuss the role of Golgi apparatus in processing, packaging and sorting of proteins. (8)
6. (a) Explain the mechanism of Attenuation in Tryptophan operon. (7)
- (b) Chloroplast and Mitochondria are semi-autonomous organelles. Justify the statement giving their structure and evidences in its support. (8)

(1500)

[This question paper contains 4 printed pages.]

Your Roll No.....

Sr. No. of Question Paper : 1441 C
Unique Paper Code : 42163512
Name of the Paper : Ethnobotany
Name of the Course : B. Sc. (P) Life Science -
SEC
Semester : V
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 five** questions in all, first question is compulsory
3. Attempt all parts of the questions together

1. (a) Define the following (1×5=5)

(i) *In situ* conservation

(ii) Herbarium

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(iii) Bio-prospecting

(iv) TKDL

(v) Ethno-pharmacology

(b) Answer the following (1×5=5)

(i) What are sacred groves?

(ii) Name any two plants used in religious ceremonies of tribals.

(iii) Illustrate AYUSH

(iv) Name any two ethnobotanical plants which are examples of bio-piracy.

(v) Who is known as father of modern ethnobotany ?

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2. Write botanical name, family, plant part and ethnobotanical uses of the following (any two) (2×3.5=7)

(i) Ashwagandha

(ii) Karanj

(iii) Tulsi

3. Write short notes on the following (any two) (2×3.5=7)

(i) Cultural and religious practices

(ii) Ancient Literature

(iii) Conservation of plant genetic resources.

4. What is Ethnobotany ? Discuss ethnobotany as an interdisciplinary science. (7)

5. What is bio-piracy? How to protect interests of ethnic groups with reference to ethnobotany (7)

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6. What is ethnobotanical survey ? Explain the aim, role, requirement and procedures for ethnobotanical survey.

(7)

(1500)

[This question paper contains 8 printed pages.]

Your Roll No.....

Sr. No. of Question Paper : 1040 C

Unique Paper Code : 32161502

Name of the Paper : Plant Physiology

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

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. Answer all parts of a question together.
3. **Question Number 1** is compulsory.
4. Draw well-labeled diagrams wherever necessary.

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1. (a) Match the following:

- | | |
|----------------------|--------------------------|
| (i) Jasmonate | (a) Secondary metabolite |
| (ii) Zeatin | (b) Chelating agent |
| (iii) Antiauxin | (c) ABA |
| (iv) Antitranspirant | (d) TIBA |
| (v) EDTA | (e) Cytokinin |
- (1×5=5)

(b) Give one word for the following:

- (i) The technique of growing plants in aqueous (nutrient) culture-

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(ii) Pulling away of plasma membrane from the cell wall in a hypertonic solution-

(iii) Yellowing of leaves due to lack of chlorophyll-

(iv) Channels in the cell membrane for the passage of water-

(v) A gaseous hormone- (1×5=5)

(c) Give reasons for the following:

(i) Addition of solute in water decreases its water potential.

(ii) Germination in lettuce seed is promoted by red light.

P.T.O.

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- (iii) Some seeds germinate only when they pass through the gut of an animal.
- (iv) Removal of growing apex from the main axis results in faster growth of lateral branches.
- (v) Leaf discs incubated in cytokinin solution remain green. (1×5=5)
2. (a) What is photoperiodism? How are plants classified on the basis of their photoperiodic responses? (5)
- (b) Transpiration is a necessary evil. Comment. (5)
- (c) Discuss the mechanism of stomatal opening and closing with a suitable diagram. (5)

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3. Write short notes on the following (Any three)
- (i) Brassinosteroids
- (ii) Mycorrhizae
- (iii) Commercial applications of auxins
- (iv) Vernalization
- (v) Root pressure (5×3=15)
4. Differentiate between the following (Any five)
- (i) Antiport and symport
- (ii) Low fluence response (LFRs) and High irradiance responses (HIR)

P.T.O.

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- (iii) Transpiration and guttation
 - (iv) Active absorption and passive absorption
 - (v) Macro and micronutrients
 - (vi) Simple and facilitated diffusion (5×3=15)
5. (a) Define the different component of water potential and how are these correlated. (5)
- (b) Critically comment on the role of phytohormones in **any two** of the following:
- (i) Apical dominance
 - (ii) Bolting
 - (iii) Abscission (5)

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- (c) Discuss the discovery and the physiological role of Abscisic acid. (5)
6. (a) Explain the CO-FT model of flowering with suitable diagram. (5)
- (b) Describe the criteria of essentiality of an element. (5)
- (c) How does water form a continuous column from the root to the tree canopy? What happens if the column breaks? (5)
7. (a) Discuss the role of Gibberellic Acid in inducing seed germination in cereals. (5)
- (b) How does long-distance translocation in phloem take place? Explain. (5)

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(c) What are phytosiderophores? Discuss their role in nutrient uptake. (5)

(1500)

[This question paper contains 8 printed pages.]

Your Roll No.....

Sr. No. of Question Paper : 1004

C

Unique Paper Code : 32161501

Name of the Paper : Reproductive Biology of
Angiosperms

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 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.

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2

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.

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(b) Fill in the blanks (1×5=5)

- (i) Pollination that takes place with the help of beetles is called _____
- (ii) The expulsion of seed brought about by the turgidity is called _____
- (iii) The persistent nucellus 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 _____

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(c) Match the following: (0.50×10=5)

Column A

Column B

- | | |
|--|--|
| (a) <i>J. Hexlop-Harrison</i> | (i) Ultrastructure of egg apparatus |
| (b) <i>Sasa paniculata</i> | (ii) Five Types of microspore tetrads |
| (c) <i>Aristolochia elegans</i> | (iii) Highest number of antipodals |
| (d) <i>Quinchamalium chilense</i> | (iv) Pollen wall proteins |
| (e) <i>Ophrys speculum</i> | (v) Endothelial thickenings |
| (f) α -cellulose | (vi) Pollen viability |
| (g) 2,3,5 triphenyl tetrazolium chloride | (vii) Finger like projections in egg cell |
| (h) <i>Plumbago zeylanica</i> | (viii) Pseudocopulation |
| (i) <i>Fritillaria</i> | (ix) Synergid and antipodal haustoria both present |
| (j) <i>W.A. Jensen</i> | (x) Bambacioni effect |

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5

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

- (i) Importance of synergids
- (ii) Parthenocarpy
- (iii) Integumentary tapetum
- (iv) Hellobial endosperm
- (v) Nemece phenomenon
- (vi) Pollen Wall

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

- (i) Wet stigma and dry stigma
- (ii) Composite and Ruminant endosperm
- (iii) Egg cell and Synergids
- (iv) 2-celled and 3-celled pollens

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(v) Simultaneous and successive wall formation

(vi) Endothelium and endothecium

4. Briefly explain the following:

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

(b) List the various causes of polyembryony and explain any two types. (5)

(c) List five types of embryogeny and explain the Onagrad type. (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)

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(c) Elaborate on the importance of apomixis in crop improvement. (5)

6. (a) Describe the structure of mature Polygonum type of embryo sac with the help of labeled diagram. (5)

(b) Define self-incompatibility among plants and discuss the factors which are involved in establishing it. List any five methods which can overcome self-incompatibility among flowering plants and describe any one of them. (5)

(c) Discuss with diagrams any two methods of floral mechanisms that favor cross pollination. (5)

7. (a) Draw well-labelled diagram of the following: (2×2.5=5)

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

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(ii) T.S. of a tetrasporangiate anther showing pollen tetrad stage

(b) "Endosperm provides nutrition to embryo".

Elaborate the statement with suitable examples.

(5)

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

(5)