

1197

22/5/25

SET :1

Unique Paper Code : 32161602
Name of the Paper : Plant Biotechnology
Name of the Course : B.Sc. (H) Botany
Semester : VI

Duration : 3 Hours

Maximum Marks: 75

Instructions for the Candidates

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

1. (a) Define the following:

5

- i. Isoschizomers
- ii. Totipotency
- iii. Cybrids
- iv. Expression vectors
- v. Cosmid



(b) Expand the following:

5

- i. 2,4-D
- ii. pBR
- iii. Taq
- iv. pUC
- v. PAGE

(c) Fill in the blanks (any five).

5

- i. The technique used to amplify molecule of DNA is called -----
- ii. ----- is used to localize specific DNA sequences on chromosomes.
- iii. Shoot tip explants are used to recover ----- plants through tissue culture techniques.
- iv. ----- is used to confirm the identity of criminals.
- v. The insertion of gene for production of pigment ----- sourced from petunia, has been used to produce Moondust carnations
- vi. ----- are restriction enzymes that recognize and bind to the same nucleotide sequence in DNA and cut at the same site.

2. Differentiate between (any three):

3x5=15

- i. RAPD and RFLP
- ii. Microinjection and electroporation
- iii. Haploid plantlets and triploids
- iv. Primary and secondary metabolites
- v. Organogenesis and somatic embryogenesis

3. (a) Write a brief note on PCR mediated gene cloning 5
 (b) Describe types of Restriction Endonucleases and their applications 5
 (c) Discuss in brief the use of probes - oligonucleotide and heterologous in clone identification. 5
4. (a) What are various components of nutrient medium used in plant tissue culture? Describe the role of phytohormones/growth regulators for organogenesis? 8
 (b) Write in detail about generation of a transgenic crop developed for the purpose of biofortification. 7
5. Write short notes on (*any three*): 3x5=15
 i. Protoplast isolation
 ii. Superbug
 iii. Glyphosate tolerant plants
 iv. Southern Hybridization
 v. Reporter genes
6. (a) What are synthetic seeds? Briefly explain their production and applications. 8
 (b) Briefly describe any two methods of direct gene transfer in plants. 7
7. (a) Describe briefly the following terms 5x2=10
 i. Ti Plasmid
 ii. cDNA library
 iii. Blue-White Screening
 iv. Biosafety concerns regarding transgenic crops
 v. Cryopreservation
- (b) The following set of fragments were obtained in single and double digest reactions on a plasmid, when treated with EcoRI and BamHI.
- | | | |
|--------------------------------|---|-------------------------|
| EcoRI | : | 6.5kb 7.5kb |
| BamHI | : | 5.0kb 9.0kb |
| Double digest (EcoRI + BamHI): | | 2.0kb 3.0kb 3.5kb 5.5kb |
- Construct a restriction map of the plasmid using the given data. 5

1199

27/5/25

Roll No. :



Sl. No. of Q. paper :
Unique Paper Code : 32167608
Name of the Paper : Bioinformatics
Name of the Course : B.Sc. (Hons.) Botany
Semester : VI
Duration: 3 hours

Maximum Marks: 75

Instructions for the Candidates:

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

I. (a) Expand the following (**any five**):

- (i) PMC
- (ii) CDS
- (iii) INSDC
- (iv) EBI
- (v) NIH
- (vi) GTOP
- (vii) QSAR

5X1=5

(b) Define the following (**any five**):

- (i) Proteomics
- (ii) SAKURA
- (iii) Query Sequence
- (iv) Promoter
- (v) Microarray
- (vi) Dendrogram
- (vii) Expressed Sequence Tags

5X1=5

(c) Write an example of each (**any five**):

5X1=5

- (i) Microarray Database
- (ii) Structure Database
- (iii) Literature Database
- (iv) Metabolic Database
- (v) Chemical Database
- (vi) Disease Database

2. Write short notes on (**any three**):

3X5=15

- (vii) RasMol
- (viii) NGS and WGS
- (ix) DDBJ
- (x) Drug Bank
- (xi) PubMed

3. Differentiate between **any three** of the following

3X5=15

- (i) Needleman –Wunsch and Smith-Waterman algorithm
- (ii) FASTA and BLAST
- (iii) Rooted and Unrooted phylogenetic tree
- (iv) Maximum parsimony and Maximum likelihood methods
- (v) Primary and Secondary data bases

4. (a) What is the scope of Bioinformatics in functional genomics and crop improvement?

4+4=8

(b) What are Nucleotide databases? Discuss the main features and tools of NCBI.

1+6=7

5. (a) What are the different types of Protein databases? Discuss the main features of either PDB or PIR.

2+6=8

(b) What do you understand by sequence alignment? Differentiate between PAM and BLOSUM matrices.

2+5=7

6. (a) Explain the Quantitative Structure-activity relationship (QSAR) techniques in drug discovery.

4+4=8

(b) Write a note on the aim and scope of bioinformatics. Enlist and explain its branches.

3+4=7

15016



May 2025

[This question paper contains 2 printed pages.]

Your Roll No.....

J

Sr. No. of Question Paper : 5505

Unique Paper Code : 2162013601

Name of the Paper : Plant Biotechnology

Name of the Course : **Botany: DSC 16**

Semester : VI

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 number **one** is compulsory.
4. Attempt all parts of a question together.



1. Answer the following questions

(15)

- (a) Expand the following (**any five**)

(1×5=5)

- | | |
|-------------|-------------|
| (i) GUS | (ii) TALEN |
| (iii) NIPGR | (iv) CRISPR |
| (v) pUC | (vi) IAA |

- (b) Match the following (**any five**) :

(1×5=5)

(i) Androgenesis	a) Gottlieb Haberlandt
(ii) Enzymatic method for protoplast isolation	b) Anand Mohan Chakrabarty
(iii) Father of Plant Tissue Culture	c) E. C. Cocking
(iv) Scorable marker	d) Sipra Guha and S.C. Maheshwari
(v) Superbug	e) GFP gene
(vi) Selectable marker	f) <i>nptII</i> gene

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

(1×5=5)

- | | |
|-----------------|---------------------------|
| (i) Explant | (ii) Redifferentiation |
| (iii) Probe | (iv) Alkaline Phosphatase |
| (v) Totipotency | (vi) Protoplast |

P.T.O.

2. Differentiate between the following (**any three**) : (5×3=15)
- (i) Direct gene transfer and Indirect gene transfer
 - (ii) Cloning vector and Expression vector
 - (iii) Blunt-end and Sticky-end restriction endonucleases
 - (iv) Somatic hybrid and Cybrids
 - (v) Selectable marker genes and Reporter genes.
3. Write short notes on the following (**any three**) : (5×3=15)
- (i) Edible vaccines
 - (ii) Restriction endonucleases
 - (iii) Agrobacterium-mediated transformation
 - (iv) Somatic embryogenesis
 - (v) Biosafety of transgenic plants
4. Discuss in detail. (15)
- (a) Give detailed account of the process involved in development of transgenic Bt-cotton with the help of suitable diagram. Discuss its advantages and limitations. (8)
 - (b) Enumerate the detailed process of protoplast isolation and culture, along with its applications. (7)
5. Answer the following questions : (15)
- (a) A researcher working with a gene obtained the following DNA fragment sizes after digestion with the restriction enzymes EcoRI and HindIII:
 - EcoRI: 8.5 kb, 5.0 kb, 3.0 kb
 - HindIII: 9.5 kb, 6.0 kb, 1.0 kb
 - EcoRI + HindIII (double digestion): 6.0 kb, 4.0 kb, 3.0 kb, 2.5 kb, 1.0 kbUsing the above data, construct a restriction map. (8)
 - (b) Draw well-labelled diagram of (**any two**) : (3.5×2=7)
 - (i) Biolistic gene gun
 - (ii) Androgenesis
 - (iii) YAC



[This question paper contains 2 printed pages.]

22/5/25
Your Roll No.....

Sr. No. of Question Paper : 5545

J

Unique Paper Code : 2162013602

Name of the Paper : Plant Biochemistry and Metabolism

Name of the Course : **Botany**

Semester : VI

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. Question Number **1** is compulsory. Answer **all** parts of a question together.

1. (a) Fill in the blanks : (5x1=5)

- (i) Chemiosmotic theory for the synthesis of ATP was proposed by _____ .
- (ii) The number of ATP produced when a molecule of acetyl-CoA is completely oxidized is equal to _____ .
- (iii) Enzyme that catalyzes the cleavage of isocitrate into glyoxylate and succinate in glyoxylate metabolism is _____ .
- (iv) Emission of light of higher wavelength light by chlorophyll pigments when exposed to blue light is called _____ .
- (v) Glycolysis takes place in _____ of the plant cell.

(b) Expand the following : (5x1=5)

- (i) FAD
- (ii) LHC
- (iii) GTP
- (iv) RUBISCO
- (v) ACP

P.T.O.

- (c) Define (**Any five**) (5x1=5)
- (i) Reaction centre
 - (ii) Alpha oxidation
 - (iii) Apoenzyme
 - (iv) Absorption Spectrum
 - (v) Michaelis Menten Constant
 - (vi) Fermentation
 - (vii) Saturated fatty acids
2. Differentiate between the following (**Any five**) : (5x3=15)
- (a) Cyclic and non-cyclic photophosphorylation
 - (b) Competitive and allosteric enzyme inhibition
 - (c) Substrate level phosphorylation and oxidative phosphorylation
 - (d) Nitrate reductase and nitrite reductase
 - (e) Light reaction and dark reaction of photosynthesis
 - (f) Synthesis of sucrose and starch
3. Write short notes on the following (**Any three**) : (5x3=15)
- (a) Coupled reaction
 - (b) Ammonia assimilation
 - (c) Photorespiration
 - (d) Emerson enhancement effect
 - (e) Cyanide resistant respiration
4. (a) Explain the carbon fixation process in C₄ plants. How is it different from C₃ plants? (8)
- (b) Describe the Citric acid cycle (with the help of flowchart). (7)
5. (a) Explain oxidative pentose phosphate pathway through a schematic diagram. Give its significance to plants. (8)
- (b) Discuss the process of Beta-oxidation of fatty acids in a plant cell. (7)

[This question paper contains 4 printed pages.]

27/5/25 ✓

Your Roll No.....

Sr. No. of Question Paper : 5565

J

Unique Paper Code : 2162013603

Name of the Paper : Advanced Tools and Analytical Techniques in Plant Biology

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

Semester : VI

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 questions carry equal marks



1. (a) Write the role of **(any five)**: (5)

(i) Bis-acrylamide in PAGE

(ii) Monochromator

(iii) Immersion oil

(iv) Electron gun

P.T.O.

(v) Osmium tetroxide

(vi) Primer

(b) True or false (**any five**): (5)

(i) Separation of molecules in paper chromatography is based on liquid-liquid partitioning.

(ii) SEM require higher electric power (voltage) than TEM.

(iii) In isopycnic centrifugation the maximum density in the gradient exceeds the density of the particles to be separated.

(iv) Western blotting is used for the separation and analysis of RNA.

(v) Both, *Taq* and *Pfu* DNA polymerase are thermostable.

(vi) G-banding shows darker bands at G/C rich region of the chromosome.

(c) Match the following: (5)

(i) Spectrophotometer (a) Tswett

(ii) Electron Microscope (b) Edwin

(iii) Chromatography (c) Knoll and Ruska

(iv) Ultracentrifugation (d) Beer and Lambert

5565

3

(v) Southern blotting

(c) Svedberg

2. Discuss the following (**any three**): (3x5= 15)

- (a) Selection of cuvette during Visible, UV and IR spectrophotometry.
- (b) How and why temperature, pH and osmotic potential are regulated during tissue homogenization?
- (c) What is centrifugation force? Discuss the factors on which it depends.
- (d) FISH Technique and its application.

3. Discuss the following (**any three**): (3x5= 15)

- (a) Discuss the importance and limitations of freeze fracture technique.
- (b) What is negative staining? Give an example.
- (c) Selection of sucrose or caesium chloride as density gradient medium.
- (d) Discuss the key steps involve in PCR Technique

4. (a) With the help of suitable diagram briefly discuss the principle, functioning and applications of Column chromatography. (10)

(b) What are radioisotopes? Name any three radioisotope elements used in biological research. Give an example for each. (5)

P.T.O.

5. (a) What is DNA polymorphism? Briefly explain the techniques and applications of RFLP, and AFLP. (10)
- (b) Role of SDS and TEMED in PAGE. (5)
6. What are the differences between Southern, Northern, and Western blotting techniques? Briefly describe their applications. (15)

[This question paper contains 4 printed pages.]

02/6/25 R

Your Roll No.....

Sr. No. of Question Paper : 8047

J

Unique Paper Code : 2163010009

Name of the Paper : RESEARCH METHODOLOGY

Name of the Course : Botany

Semester : VI

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. All parts of a question should be answered together.
5. Draw graphics wherever required.

1. (a) Name the appropriate research tool/method (any five): (1x5 = 5)

(a) A commonly used data analysis software/package.

(b) Statistical test for comparing means of two groups.

(c) An author-date format used for citations.

(d) A bibliographic database for science that retrieves author information.

(e) A plagiarism checking software/tool.

(f) A method of data collection.

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

(a) The _____ section is where the author thanks individuals or organizations that helped with the research.

(b) Any attempt/s where exclusive permission from the copyright owner is not sought is referred to as _____

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

(d) Identification of _____ is the first step in any research process.

(e) Data is often presented visually using _____ and _____

(f) The _____ strategy is used to choose a subset of population under study for data collection.

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

(a) Plagiarism

(b) Citation

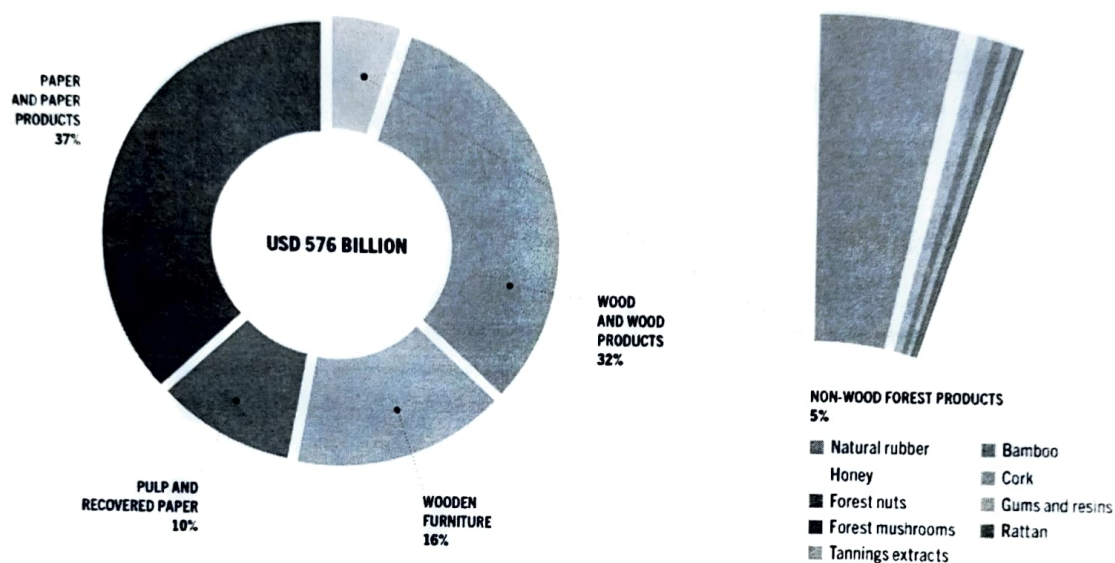
(c) Geographical Indication

(d) Validation

(e) Research Design

2. (a) Define research and discuss the different methods of data collection with suitable examples. (10)
- (b) Explain the Protection of Plant Varieties and Farmers' Rights Act in India with reference to intellectual property rights. (5)
3. Write short notes for any three (cite examples): (3x5 = 15)
- (a) Data representation
- (b) Literature review and its significance
- (c) Biopiracy
- (d) Importance of grants and fellowships in research
4. Differentiate between the given terms (*any three*): (3x5 = 15)
- (a) Research Methods and Research Methodology
- (b) Trademark and Copyright
- (c) Research Paper and Review Paper
- (d) Correlation and Regression
5. Discuss the key features of the IMRAD format of research paper explaining the content of each section. (15)
6. Answer the following questions based on the following graphic:
- (a) Write a paragraph explaining the graphic (200 words). (9)
- (b) Interpret the data highlighting key findings. (6)

SHARE OF GLOBAL FOREST PRODUCT EXPORTS, BY PRODUCT CATEGORY, 2022



NOTE: Wood = unprocessed wood (roundwood, also called "wood in the rough"; it includes logs, pulpwood, other industrial roundwood and woodfuel); wood products = all transformed/processed products except furniture (charcoal, chips, pellets and briquettes, sawnwood, panels and further processed wood products such as prefabricated wooden houses, doors and window frames). Wooden furniture is also a wood product but is shown here as a separate category.

SOURCES: FAO. 2023. FAOSTAT: Forestry Production and Trade. [Accessed on 29 December 2023]. <https://www.fao.org/faostat/en/#data/FO>.
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<https://comtradeplus.un.org/>