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[This question paper contains 4 printed pages]

Your Roll No. : 2019

Sl. No. of Q. Paper : **2198** **IC**

Unique Paper Code : 32161602

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

Name of the Paper : Plant Biotechnology

Semester : VI

Time : 3 Hours

Maximum Marks : 75

Instructions for Candidates :

- (a) Write your Roll No. on the top immediately on receipt of this question paper.
- (b) Attempt any **FIVE** questions in **all**.
- (c) Question **No.1** is compulsory.

1. (a) Fill in the blanks : 5
- (i) Artificial seed is generally encapsulated by
 - (ii) Flavr savr tomato was developed by biotechnology company.
 - (iii) The genetically modified organism developed for bioremediation by A. M. Chakraborty is known as

- (iv) is known as the Father of Plant Tissue Culture.
- (v) The bacterial cells are made competent for uptake of foreign DNA by treatment with

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

- (i) HGH
- (ii) NBPGR
- (iii) GGDP
- (iv) MAC
- (v) GFP
- (vi) PEG

(c) Match the following : 5

- | | |
|---------------------------|--------------------------------|
| (i) Lipase | Eli-Lilly |
| (ii) Protoplast isolation | Kary Mullis |
| (iii) Ligase | Stain remover
in detergents |
| (iv) PCR | Seals nicks in
DNA |
| (v) Humulin | E. C. Cocking |

2. (a) Briefly discuss **any three** of the following : 3×3=9

- (i) Production of secondary metabolites by tissue culture
- (ii) Roundup ready soyabean

(iii) Microprojectile bombardment

(iv) Reporter genes

(b) Give the contributions of any **three** :

2×3=6

(i) Sipra Guha & S. C. Maheshwari

(ii) T. Murashige

(iii) F. Laibach

(iv) Morel & Martin

3. Write short notes on any **three** :

3×5=15

(i) Screening of DNA library to obtain gene of interest by colony hybridization

(ii) Cryopreservation

(iii) Edible vaccines

(iv) Phagemid

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

5×3=15

(i) Plasmid and Cosmid

(ii) Cybrid & Hybrid

(iii) Micropropagation and vegetative propagation

(iv) Genomic DNA library and cDNA library

(v) Electroporation and microinjection

(vi) BAC and YAC

5. (a) Describe the structure of Ti plasmid. With suitable illustrations explain *Agrobacterium*-mediated transformation via cointegrate **OR** binary vector approach. 4+6=10
- (b) Discuss the role of growth regulators in plant tissue culture. Name any **two** commonly used auxins and cytokinins each. 3+2=5
6. (a) (i) What are restriction endonucleases? Give **two** examples with their restriction sites. 5
- (ii) How are restriction endonucleases used in recombinant DNA technology? Explain with suitable diagram. 5
- (b) Give the components of an ideal cloning vector. What is an expression vector? 3+2=5
7. (a) Describe the strategy by which golden rice was developed. 9
- (b) Discuss the bioethical issues related to the use of GM crops. 6

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Roll No.

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S. No. of Question Paper : 2541

2019

Unique Paper Code : 32167608/42167905 IC

Name of the Paper : Bioinformatics

Name of the Course : B.Sc. (Hons.) Botany/
B.Sc. (Prog.) : DSE-2B

Semester : VI

Duration : 3 Hours

Maximum Marks : 75

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

Attempt five questions in all.

Question No. 1 is compulsory.

Attempt all parts of a question together.

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

(i) Affine Gap Penalty.

(ii) Scoring Matrix

(iii) Xenologous

(iv) Genomics

(v) ClustalX

(vi) Phylogram.



P.T.O.

(b) Expand of the following (any *five*) :

5×1=5

(i) NIH

(ii) SNP

(iii) EST

(iv) PHYLIP

(v) QSAR

(vi) OTU.

(c) Give an example of each :

5×1=5

(i) Metabolic database .

(ii) Composite database .

(iii) Chemical database

(iv) Disease database

(v) Gene expression database.

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

5×3=15

(a) Primary and secondary database

(b) BLASTx and BLASTn

- (c) BankIT and Sequin
- (d) PAM and BLOSUM
- (e) Monophyletic and Polyphyletic trees
- (f) Accession number and Version number.

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

- (a) Salient features of Swiss-Prot
- (b) Resources of DDBJ
- (c) Sequence submission to EMBL
- (d) Bioinformatic analysis of microbial genome
- (e) Branches of bioinformatics.

4. (a) Comment on the role of structural bioinformatics in drug discovery. 9

(b) Give an account of various resources available at DDBJ. 6

5. (a) Give a brief account of information available in biological databases. 9

(b) Elaborate sequence retrieval system of NCBI. 6

6. (a) Comment on molecular phylogeny and give comparative account of Maximum Parsimony, Maximum Likelihood and Neighbor Joining method of phylogenetic tree construction. 9
- (b) What is multiple sequence alignment ? Enumerate its significance. 6
7. (a) Provide an overview of bioinformatics use in biology. 9
- (b) Write characteristic features of PIR. 6

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Roll No.

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S. No. of Question Paper : 2634

Unique Paper Code : 32167601

IC

Name of the Paper : Industrial and Environmental Microbiology

Name of the Course : B.Sc. (Hons.) Botany : DSE-3

Semester : VI

Duration : 3 Hours

Maximum Marks : 75

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

Attempt five questions in all and Q. No. 1 is compulsory.

All questions carry equal marks.

Attempt all parts of a question together.

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

(i) Ectomycorrhizae produces enzyme during the process of association.

(ii) Impellers are an essential part of the

(iii) Oxygen suppresses processes.

(iv) Organism responsible for Casein Hydrolysis is.....

P.T.O.

- (v) medium is used for the
Suppression of unwanted microbes.
- (vi) Sulphur cycle was studied first time in the
organism
- (b) Define the following any *five* of the following : $5 \times 1 = 5$
- (i) Bioreactor
 - (ii) Sparger
 - (iii) Lypholization
 - (iv) COD
 - (v) Autoclave
 - (vi) Bacteroid
 - (vii) Sauekraut.
- (c) Expand the following any *five* of the following : $5 \times 1 = 5$
- (i) TDS
 - (ii) CFU
 - (iii) IMTECH
 - (iv) NRRL
 - (v) LB
 - (vi) YEMA.

2. Write short notes on any *three* of the following : $3 \times 5 = 15$
- (i) AM and its significance
 - (ii) Chemical methods of cell disruption
 - (iii) Bioremediation of soil
 - (iv) Air lift fermenter.
3. (a) Discuss in detail the industrial production and estimation of antibiotic Penicillin. 10
- (b) What are the sources and factors responsible for water pollution ? 5
4. (a) Enumerate the different types of microbes present in air and discuss methods for their isolation. 5
- (b) Microorganisms act as indicators of water quality. Comment. 5
- (c) Define Environmental Microbiology. What is its scope ? Comment. 5
5. (a) Explain the role of microbes in domestic waste treatment. 7
- (b) Explain different methods of enzyme immobilization. Write its advantages and applications. 8

6. (a) What are the characteristics of an ideal production medium ? Discuss. 7
- (b) Explain in brief any *two* types of bioreactors studied by you. 8
7. (a) Discuss various methods to detect *Coliform* in water. 10
- (b) Explain the Sulphur cycle with suitable diagram. 5

Or

Explain the various steps and processes involved in recovery of the industrial products. 15

Sl No of Q.P: 3555A

~~SET-A~~

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2019

Unique paper code: 107693

Name of the paper: Genetics and Genomics II, GGHT 602

Name of the course: B.Sc. (H) Zoology, Botany, Anthropology, Microbiology, Biochemistry, Biomedical Sciences ~~II~~

Semester: VI

Duration: 3 hours

Maximum Marks: 75

I

Instructions for Candidates

1. Write your Roll no. on the top immediately on receipt for this question paper.
2. Answer five questions in all.
3. Question 1 is compulsory.

Q.1 a) Define any **five** of the following terms:

(5x1=5)

- i. Allele
- ii. Sexduction
- iii. Conjugation
- iv. Indel
- v. Hybrid dysgenesis
- vi. Retro-transposons
- vii. Inbreeding depression

b) Differentiate between any **five** the following pairs:

(5x2=10)

- i. Simple and Composite transposon
- ii. Sequence Identity and Sequence Similarity
- iii. Transformation and Transduction
- iv. Genomics and Proteomics
- v. Prokaryotic and Eukaryotic genome
- vi. Sympatric and Allopatric Speciation
- vii. Episomes and Plasmids

c) State the contributions of: (any **two**)

(2x1=2)

- i. Barbara McClintock
- ii. E Wollman and F Jacob
- iii. J Lederberg and N Zinder

d) Expand any **four** of the following-

(4x1=4)

- i. LINEs
- ii. VNTR
- iii. ORF

(1)

iv. DTRs

v. NCBI

e) Enumerate the features that allow the following organisms to serve as model systems in biology (any **two**) (2x2=4)

- i. *Sachharomyces cerevisiae*,
- ii. *Arabidopsis thaliana*
- iii. *Drosophila melanogaster*

f) Cystic fibrosis is an autosomal recessive disorder with an incidence 4 in 10,000 in people of northern European ancestry. Calculate all the genotypic frequencies assuming that this population is under Hardy-Weinberg equilibrium. (2)

Q.2 Explain generalized and specialized transduction (include suitable diagrams). (12)

Q.3a) State the principle of Hardy-Weinberg Equilibrium. What are the basic assumptions of this theorem? (2+4=6)

b) Explain the role of Zygotic genes during development of *Drosophila*. (6)

Q 4 a) Give an account of Ac-Ds system in maize. (6)

b) How is Interrupted mating technique employed for gene mapping in bacteria? (6)

Q 5 a) Define bioinformatics. Briefly describe various types of databases. (8)

b) What are the key characteristics for identifying ORF from a given sequence? (4)

Q.6 Discuss the reproductive isolative mechanisms and their role in speciation. (12)

Q.7 Write short notes on any **three**:

(4,4,4)

- a) Microarray
- b) Genetic Drift
- c) Gene annotation
- d) Class ABC genes of *Arabidopsis*
- e) Homeotic genes

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Roll No.....



Sr. No. of question paper : 3561

Name of course : B. Sc. (Hons.) Botany

Scheme/Mode of Examinations: Semester: ✓

Name of the Paper: Reproductive Biology of Angiosperms

UPC/Subject Code: BTHT-611(216603)

Semester: VI

Duration: 3 hours

Maximum marks - 75

Instructions for candidates:

1. Write your roll number 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.

1 a) Associate the family with a distinctive embryological feature: (5 x 1 = 5)

- i) Cactaceae
- ii) Euphorbiaceae
- iii) Orchidaceae
- iv) Loranthaceae
- v) Cyperaceae

b) Match the following: (10x0.5 = 5.0)

Column A

- a. *S. Nawaschin*
- b. *Sasa paniculata*
- c. *Aristolochia elegans*
- d. *Quinchamalium chilense*
- e. *Ophrys speculum*

Column B

- i. Observed pollen tube in *Portulaca*
- ii. Five types of microspore tetrads
- iii. Highest number of antipodals
- iv. Double fertilization
- 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. G. B. Amici | x. Bambacioni effect |

c) Fill in the blanks. (5 x1 =5)

- i) Antipodals are absent in -----.
- ii) -----is formed by oxidative polymerization of carotenoids.
- iii) Adventive polyembryony is found in -----.
- iv) ----- are characteristic feature of Cyperaceae.
- v) *Citrus microcarpa* shows -----embryony.

2 Differentiate between the following (any five). (5 x3 = 15)

- i) Amoeboid and Secretory Tapetum
- ii) Monosporic and Bisporic type of embryo sac development
- iii) Porogamy and Chalazogamy
- iv) Simultaneous and successive wall formation
- v) SSI and GSI
- vi) Mixed pollination and bud pollination

3 a) Define pollen viability and briefly describe methods to test pollen viability. (5)

b) With the help of diagrams only, trace the development of *Oenothera* and *Peperomia* type of embryo sac. (2x2.5=5)

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

4 Write short notes on the following (any FIVE) : (5x3=15)

- i) Hypostase
- ii) Ruminant endosperm
- iii) Obturator
- iv) Egg apparatus
- v) Suspensor
- vii) Male germ unit

5 a) Draw well labelled diagram of the following:

(2x2.5 = 5)

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

ii) T.S. tetrasporangiate anther showing pollen tetrad stage

b) Write briefly about ultrastructure of pollen wall.

(5)

c) Explain the different factors affecting pollen germination *in vitro*.

(5)

6 a) Describe various types of suspensor haustoria in angiosperms.

(5)

b) Write in detail about the development of dicot embryo.

(5)

c) Define polyembryony . Give types of polyembryony. Discuss the practical applications of nucellar polyembryony.

(5)

7 Briefly describe the following:

(5x3=15)

i) NPC system

ii) Importance of pollen storage

iii) Characteristic features of ornithophilous plants

iv) Role of tapetum

v) Operculum

Sl. No. of Q.P. : 3562

(12)

2019

Unique Paper Code: 216605

Name of the Paper : Plant Biotechnology (BTHT – 612)

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

Semester : VI

Duration : 3 Hours

Maximum Marks: 75



Attempt any five questions in all Question no. 1 is compulsory

Q1. (A) Expand any five of the following:

5

- (a) *Bt*
- (b) RFLP
- (c) SDS
- (d) AGE
- (e) RAPD
- (f) pUC

(B) Give major contribution any five of the following scientists:

5

- (a) Haberlandt
- (b) Guha & Maheshwari
- (c) Miller Skoog
- (d) Kary Mullis
- (e) Alec Jeffery
- (f) Smith and Nathans

Q2. Write short notes on any three of the following:

3X5=15

- (a) Organogenesis
- (b) Electroporation
- (c) Herbicide resistant plants
- (d) DNA sequencing

(e) PCR

Q3. Differentiate between any five of the following

5X3=15

(a) Phagemid and Cosmid

(b) BAC and YAC

(c) Northern and Western Blotting

(d) Marker and Reporter Gene

(e) Somatic and Zygotic Embryogenesis

(f) AGE and PAGE

Q4. (b) Give two examples of transgenic crops. Describe the methodology involved in the production of any one.

3+5

(b) Write a note on microprojectile bombardment method of gene transfer and give its applications.

7

Q5. (a) Describe haploid production in plants with an example. Enumerate its applications in crop improvement.

4+4

(b) Explain the technique of cryopreservation. Give its applications.

5+2

Q6. (a) What are edible vaccines? Elaborate their methods of production and give their advantages.

7.5

(b) Define molecular markers. Discuss their applications in Biotechnology.

7.5

Q7. (a) Briefly discuss *Agrobacterium* mediated transformation.

7

(b) Enlist the steps involved in construction of genomic library with the help of suitable diagrams.

8