[This question paper contains 6 printed pages.]

(13) Your Roll No. 2022

Sr. No. of Question Paper : 1106 A

Unique Paper Code : 32161601

Name of the Paper : Plant Metabolism

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

Semester : VI

Duration : 3 hours + 30 minutes 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, including question number **1**, which is compulsory.
3. Attempt all parts of a question together.

1. (a) Fill in the blanks **(any six)** : (6×0.5=3)

   (i) Conversion of ammonia to nitrite and then to nitrate is called _____ .

   (ii) Triacylglycerols are cleaved by _____ into glycerol and fatty acids.

P.T.O.

(iii) _____ catalyzes the first step in glycolysis pathway.

(iv) The enzyme succinate dehydrogenase is present on _____ of mitochondria.

(v) Charles Bames coined the term _____ in 1893.

(vi) Cramps caused by heavy exercise result in accumulation of _____ .

(vii) The synthesis of glucose from non-carbohydrate source is known as _____ .

(b) Briefly explain the following terms **(any four)** : (4×2=8)

(i) Hill's reaction

(ii) Bacteroids

(iii) Coupled reaction

(iv) Michaelis Constant (Km)

(v) RQ

(vi) α-oxidation

(c) Expand the following : (4×1=4)

(i) FAD

(ii) PEPC

(iii) DCPIP

(iv) PUFA

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

(a) Lock and key hypothesis and induced fit model

(b) Anabolism and Catabolism

(c) Substrate level phosphorylation and oxidative phosphorylation

(d) Saturated and unsaturated fatty acids

(e) Nitrate reductase and nitrite reductase

(f) Aerobic and anaerobic respiration

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

(a) Mobilization of lipids during seed germination

(b) Blackman's law of Limiting Factors

(c) Chemiosmotic mechanism of ATP synthesis

(d) Classification of enzymes

(e) Emerson enhancement effect and its significance

4. (a) Give the contributions of the following scientists **(any five)** : (5)

(i) TW Engelman

(ii) Hans Kornberg

(iii) E Racker

(iv) Peter Mitchel

(v) CB van Niel

(vi) Louis Pasteur

(b) Write a short note on synthesis and catabolism of sucrose. (5)

(c) Explain the flow of electron during light reaction of photosynthesis, with the help of flowchart. (5)

5. (a) Explain the various factors affecting enzyme activity. (8)

(b) Describe Pentose phosphate Pathway and give its significance. (7)

6. (a) Give an account of β-oxidation of fatty acids along with its energetics. (8)

(b) Discuss the amphibolic pathways of Citric acid cycle with the help of flow chart. (7)

7. (a) Explain the carbon fixation process in CAM plants. How is it different from C4 cycle? (8)

(b) Discuss in details the assimilation of ammonia by plants. (7)

8. (a) Give an outline of the Calvin cycle, showing the substrates, product and enzymes for each of the important steps. (8)

P.T.O.

(b) Discuss the process of ATP synthesis with reference to structure of ATP synthase and Boyer's conformational model. (7)

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15 **Your Roll No.** 2022

Sr. No. of Question Paper : 1169 **A**

Unique Paper Code : 32167601

Name of the Paper : Industrial and Environmental Microbiology

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

Semester : VI

Duration : 3 Hours Maximum Marks : 75

Instructions for Candidates

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

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

(i) _____ medium is designed to suppress the growth of some microorganisms while allowing the growth of others.

P.T.O.

(ii) _____ is an enzyme that hydrolyzes a-1,4 glycosidic linkages in starch.

(iii) The word _____ comes from the Latin verb 'fervere' which means to boil.

(iv) Industrial amino acids are obtained in _____ stage of microbial growth

(v) _____ is one of the common bacteria found in sewage.

(vi) Mixing or agitation of medium to maintain uniformity in a fermenter is achieved by _____

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

(i) Trickling filter

(ii) Sparger

(iii) Filter aids

(iv) Industrial Microbiology

(v) Lyophilization

(vi) Enriched medium

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

(i) PDA

(ii) NBAIM

(iii) ATCC

(iv) NRRL

(v) EMB

(vi) GRAS

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

(i) Ideal media for industrial fermentation

(ii) Enzymes used for industrial applications

(iii) Microbial growth phases

(iv) Role of microbes in environment

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

(i) Solid and liquid state fermentation

(ii) Filtration and centrifugation

P.T.O.

(iii) Casein and starch hydrolysis

(iv) Airlift and continuously stirred tank fermenter

4. (a) What are the various causes of water pollution? Discuss the various control measures to reduce it? (7)

(b) What are coliform bacteria? Elaborate upon the various steps used to detect the presence of coliform bacteria in drinking water. (8)

5. (a) Discuss different steps involved for recovery and purification of fermentation products? (8)

(b) Discuss in detail the industrial production of

(i) Ethanol

(ii) Citric acid useing microbes. (7)

6. (a) Discuss the role of microbes in sewage treatment. (8)

(b) Name at least four soil borne microbes. Discuss various methods for their isolation? (7)

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16 **Your Roll No.** 2022

Sr. No. of Question Paper : 1256 **A**

Unique Paper Code : 32167608

Name of the Paper : DSE Bioinformatics

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

Semester : VI

Duration : 3.5 Hours Maximum Marks : 75

Instructions for Candidates

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

1. (a) Give the full form **(any five)** : (1×5=5)

   (i) MIAME

   (ii) QSAR

   (iii) PDB

   (iv) PIR

P.T.O.

(v) MSA

(vi) NIH

(vii) ORF

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

Column 'A'	Column 'B'
(i) MegaBLAST	Unique identifier of a given protein or DNA sequence
(ii) TrEMBL	A web based sequence submission tool of NCBI
(iii) GCG	A PDB database which provides annotation and three-dimensional structure of protein sequences
(iv) Barcode	A computer-annotated protein sequence database supplementing the Swiss-Prot
(v) Accession number	Program for aligning long sequences
(vi) NRL_3D	Practical Extraction and Report Languages
(vii) PEARL	Genetic Computer Group

1256

(c) Define the following **(any Five)** : (1×5=5)

(i) SRS

(ii) Rooted and Unrooted Tree

(iii) Python

(iv) MEGA

(v) Conserved sequence

(vi) Rasmol

(vii) GeneScan

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

(a) NGS and WGS

(b) Sequence File formats

(c) Gene prediction methods

(d) Molecular docking

P.T.O.

(e) Transcriptomics

3. Differentiate the following **(any three)** :

(3×5=15)

(a) Cladogram and Phylogram

(b) PAM and BLOSUM

(c) BLAST and FASTA

(d) Genbank and Genpept

(e) CATH and SCOP

4. (a) Discuss metabolic pathways database and describe any two small molecule databases. (3+4=7)

(b) Discuss one protein sequence database and one protein structural databases? (4+4=8)

5. (a) What is sequence alignment? Explain pairwise and multiple sequence alignment with their significance. (2+6=8)

(b) Discuss different level of protein structures and describe computational method of protein structure prediction. (3.5+3.5=7)

6. (a) What do you understand by Computer-aided drug designing and also mention various phases of clinical trials? (5+2=7)

(b) What is Molecular phylogeny and compare Neighbour Joining, Maximum Parsimony and Maximum Likelihood methods of phylogeny reconstruction. (2+6=8)

7. (a) Give a comparative account on the various data submission and retrieval tools of NCBI and EMBL. (3.5+3.5=7)

(b) What do you understand by bioinformatics? Discuss its applications, scopes and limitations. (2+6=8)

8. (a) What do you understand by biological databases? Discuss about Primary, Secondary and Composite database. (2+6=8)

P.T.O.

(b) What do understand by sequence homology and explain local and global alignment with diagram? (2+5=7)

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Your Roll No. 2022

Sr. No. of Question Paper : 1351 **A**

Unique Paper Code : 32161602

Name of the Paper : Plant Biotechnology

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

Semester : VI

Duration : 3 Hours Maximum Marks : 75

Instructions for Candidates

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

1. (a) List any one contribution of the following Scientists **(any five)** (1×5=5)

(i) Ingo Portykus and Peter Beyer

(ii) Charles Amtzen

(iii) Anand Mohan Chakraborty

(iv) Werner Arber and Daniel Nathans

(v) Haberlandt

(vi) Guha and Maheshwari

(vii) E. C. Cocking

(b) Expand the abbreviations **(any five)** (1x5=5)

(i) EPSPS

(ii) *nptII*

(iii) GUS

(iv) CaMV 35S

(v) pBR 322

(vi) MCS

(vii) ICP

(c) Define **(any five)** (1×5=5)

(i) Superbug

(ii) Blue-White Screening

(iii) Isoschizomers

(iv) Artificial Chromosome Vectors

(v) Totipotency

(vi) Androgenesis

(vii) Plantibodies

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

(i) Phagemidsand Cosmids

(ii) Genomic DNA Library and cDNA Library

(iii) Microinjection and Electroporation

(iv) RAPD and RFLP

(v) Primary and Secondary Metabolites

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

(i) Methods of Screening of libraries for gene localization

(ii) Colony hybridization

(iii) cDNA library preparation

(iv) Cryopreservation

P.T.O.

(v) Transgenics for Biodegradable plastic production

4. (a) With the help of illustrations, describe the structure of a yeast artificial chromosome (YAC) cloning vector. Explain the process of gene cloning using a YAC vector. (4+6=10)

(b) What do you understand by molecular farming? How have transgenic plants been utilized to produce industrial enzymes? (5)

Or

Discuss about the development of transgenics for increasing the shelf life of tomatoes. (5)

5. (a) Describe in detail the process that led to the development of transgenic Bt cotton. What are its advantages and limitations? (7+3=10)

(b) Give a short account of the ethical concerns associated with the development and release of transgenic crops. (5)

Or

Taking one suitable example, illustrate how transgenics have been useful in horticulture. (5)

6. (a) Give a detailed account of the reporter genes used for the selection of transgenics. (12)

(b) Mention the essential requirements for performing a PCR reaction. (3)

Or

Discuss the advantages of artificial seeds. (3)

7. (a) Give a detailed account of the types, biological role and applications of restriction endonucleases. (10)

Or

A linear DNA molecule is subjected to single and double digestions with restriction endonucleases, and the following results are obtained: (10)

Enzymes	Fragment Sizes (in kb)
EcoRI	8.5, 5.0, 3.0
HindIII	9.5, 6.0, 1.0
EcoRI and HindIII	6.0, 4.0, 3.0, 2.5, 1.0

Draw the restriction map defined by these data.

(b) Briefly enumerate the applications of plant tissue culture. (5)