

Sr. No of Q.P.: 1655  
Unique paper code: 2161601  
Name of the paper: Plant Metabolism  
Name of the Course: B.Sc. (H) Botany  
Semester: 6<sup>th</sup> VI

Time: 3 Hours

Maximum Marks: 75

**Instruction for Candidates**

(Write your Roll No. on the top immediately on receipt of this question paper)  
Answer five questions in all, including Q.No. 1 which is compulsory.

1. Define the following (any ten): 1.5x10=15
- (i) Kranz Anatomy
  - (ii) Redox Potential
  - (iii) Action Spectrum
  - (iv) Uncouplers
  - (v) Essential Fatty Acids
  - (vi) Anaplerotic reactions
  - (vii) Desaturases
  - (viii) Gluconeogenesis
  - (ix) Nitrite Reductase
  - (x) Allosteric Enzymes
  - (xi) Transamination
  - (xii) Substrate Level Phosphorylation
2. Differentiate between the following (any three): 5x3=15
- (i) C3 plants and C4 Plants
  - (ii) Anabolic and Catabolic Pathways
  - (iii) Cyclic phosphorylation and Non-cyclic phosphorylation
  - (iv) Respiration and photorespiration
  - (v) Symbiotic and non-symbiotic nitrogen fixation
3. Write short notes (any five): 3x5=15
- (i) Nitrogenase
  - (ii)  $\alpha$ -oxidation of fatty acids
  - (iii) Cyanide-resistant respiration
  - (iv) CAM plants
  - (v) Racker's experiment
  - (vi) ATP synthase
  - (vii) Regulatory enzymes
4. (i) Briefly discuss the organization and structure of the four major protein complexes of the thylakoid membrane. (8)
- (ii) Explain  $\beta$  oxidation of fatty acids. (7)
5. (i) Write the chemiosmotic mechanism of ATP synthesis. (8)
- (ii) Discuss glyoxylate cycle and its role in mobilization of lipids during seed germination. (7)



6. (i) Write the contribution of following scientists (any four): 2x4=8
- a) Van Niel
  - b) A.T. Jagendorf
  - c) Robin Hill
  - d) Robert Emerson
  - e) Peter Mitchell
- (ii) Discuss briefly the interaction of carbohydrate metabolism with lipid and protein metabolism (with suitable examples). (7)
7. (i) Describe oxidative decarboxylation of Pyruvate. (8)
- (ii) Discuss briefly covalent modulation of enzymes and its role in the regulation of metabolism. (7)

SETA

(14)

22/5/17

Sl. No. of Q.P.: 1656

Unique Paper Code : 2161602

Name of the Paper : Advanced Cell and Molecular Biology

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

Semester : VI

Duration : 3 Hours

Maximum Marks : 75



**Instructions for the candidates:**

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

Attempt Five questions in all including Question No. 1 which is compulsory.

Unique Paper Code : 2161602

Name of the Paper : Advanced Cell and Molecular Biology

Name of the Course : B.Sc. (Honours) Botany (FYUP)

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 <sup>total</sup> all, including Question No. 1 which is compulsory.

Comment on

Q1. (a) ~~Define~~ any five of the following:

5 (5x1)

- (i) Calmodulin
- (ii) Peptide bond
- (iii) Shine-Dalgarno Sequence
- (iv) Translocation
- (v) Polysome
- (vi) Myosin



(b) Give one <sup>major</sup> contribution of any five of the following scientists:

5 (5x1)

- (i) Christian de Duve

(ii) C. Zamenick

(iii) Ian Gibbons

(iv) Charles Yanofsky

*Yanofsky*

(v) Hartwell and Weinert

(vi) Thomas R. Cech

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

5 (5x1)

(i) CRP

(ii) ORF

(iii) SRP

(iv) RTKs

(v) UTR

(vi) NLS

Q. 2 Write notes on **any five**:

15 (5x3)

(i) Inhibitors of protein synthesis

(ii) Receptor mediated endocytosis

(iii) G-protein

(iv) Release factor

(v) Charging of tRNA

(vi) Attenuation

Q. 3 (a) What is lac operon? Explain the role of cyclic AMP in the synthesis of  $\beta$ -galactosidase?  
(10) 

(b) Describe the process of protein trafficking through the endomembrane system. (5)

Q. 4 (a) Explain the mechanism of gene regulation by RNAi? (10)

(b) Elaborate on the protein export through the Nuclear Pore Complex. (5)

Q. 5 (a) Describe the various steps of the ~~initiation~~ *elongation and termination* of translation in prokaryotes? (10)

(b) Explain the role of riboswitches in expression of a gene? (5)

Q.6 Attempt the following:

15(3x5)

(a) Role of cyclins in the regulation of cell cycle.

(b) Role of NO as an intracellular signaling molecule

(c) Uptake of proteins in chloroplast

Q.7 Differentiate between **any five** of the following:

15 (5x3)

(i) Endocrine and Paracrine signaling

(ii) Microtubules and Microfilaments

(iii) Base excision repair and Nucleotide excision repair

(iv) TIM complex and TOM complex

(v) Homeodomain proteins and Helix Loop Helix proteins

(vi) Entropic catalysis and Substrate assisted catalysis

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*This question paper contains 4 printed pages.*

Your Roll No. ....

28/5/17

**Sl. No. of Ques. Paper: 1657**

**F-8**

**Unique Paper Code : 2161603**

**Name of Paper : Plant Biotechnology**

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

**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.*

**1. (a) Define:**

- (i) Totipotency
- (ii) Microprojectile bombardment
- (iii) Reporter gene
- (iv) Edible vaccines
- (v) Isoschizomers.

1×5=5

**(b) Expand the following:**

- (i) pUC
- (ii) NPT II
- (iii) GFP
- (iv) 2,4-D



P.T.O.

(v) HAC. 1×5=5

(c) State whether the following are True or False:

- (i) The delayed ripening tomato was created by biotechnological strategies to silence the *β-galactosidase* gene.
- (ii) Moondust carnations have been produced by insertion of a petunia gene for production of pigment delphinidin.
- (iii) A plasmid is always circular piece of DNA which is dependent on host for replication.
- (iv) Type-I restriction endonucleases are most commonly used restriction endonucleases in molecular biology experiments.
- (v) PCR can be used for cloning of a particular gene. 1×5=5

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

- (a) Organogenesis in tissue culture
- (b) Virus free plants
- (c) Bacterial transformation
- (d) Types of probes used for screening clones
- (e) Golden rice. 5×3=15

3. (a) Discuss briefly physical methods of gene delivery. 5
- (b) Discuss PCR as a technique and its components in amplification of DNA. 5

- (c) Describe in brief the techniques of cryopreservation and its applications. 5
4. (a) Describe the use of restriction enzymes in *r*DNA technology. 5
- (b) What is the role of plant growth regulators in plant tissue culture? 5
- (c) Diagrammatically explain the steps involved in preparation of a *c*DNA library. 5
5. Differentiate between (any *three*):
- (a) Somatic embryogenesis and Zygotic embryogenesis
- (b) Plasmids and Cosmids
- (c) Cloning and Expression vectors
- (d) pBR322 and pUC series of vectors. 5×3=15
6. Describe briefly the following (any *three*):
- (a) YAC
- (b) Colony hybridization
- (c) Humulin
- (d) Phagemid
- (e) Androgenesis. 5×3=15
7. (a) Justify the statement: "Surge in biotechnology in  
P. T. O.

developing new improved organisms also led to major biosafety concerns.” 5

- (b) Differentiate between the cointegrate and binary vector strategy of Ti plasmid mediated transformation. 5
- (c) Explain briefly the technique of protoplast fusion and its use. 5

No. of Question Paper: 1658

Unique Paper Code: 2161604

Name of the Paper: Functional Plant Biology

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

Semester: VI

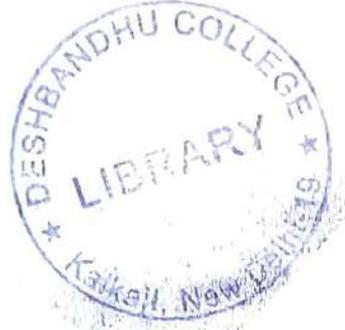
Duration: 3 Hours

Maximum Marks: 75

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

Q1.(a) Define the following (any five):

- i. Abiotic stress
- ii. Query
- iii. Chaperones
- iv. Clade
- v. Phytoalexins
- vi. Gap penalty



(5x1=5 marks)

(b) Expand the following: (any five)

- i. MALDI
- ii. EST
- iii. JA
- iv. INSDC
- v. OTU
- vi. HSP

(5x1=5 marks)

(c) Fill in the blanks:

- i. \_\_\_\_\_ simultaneously activate specific stress response pathways and suppress other pathways that are not needed or could even damage the plant during stress.
- ii. \_\_\_\_\_ mechanisms lead to heritable protection against stress.
- iii. Sequences that ~~differ because they are found in different species~~ are called \_\_\_\_\_ *(are related by speciation event)*
- iv. \_\_\_\_\_ depict the amount of evolutionary change that has occurred along different branches.
- v. \_\_\_\_\_ is a Literature database.
- vi. 2-D gel electrophoresis separates proteins on the basis of their \_\_\_\_\_ and \_\_\_\_\_.

(5x1=5 marks)

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

- i. Osmotic adjustment
- ii. Types of standard BLAST
- iii. Reactive oxygen species
- iv. Salient features of Human genome project
- v. Site-directed mutagenesis

(3x5=15 marks)

Q.3. Differentiate between: (any three)

- i. Acclimation and Adaptation
- ii. Chromosome walking and chromosome jumping
- iii. Local sequence alignment and Global sequence alignment

- iv. BankIt and Sequin
- v. Prokaryotic and Eukaryotic genome

(3x5=15 marks)

Q.4. (a) What is hypersensitive reaction? Discuss its role in response to environmental stress.

(b) Briefly describe features of a biological database.

(c) ~~Define~~ Systems Biology. Enumerate its applications.

(3x5=15 marks)

Q.5. (a) Give <sup>a</sup>brief account of heat stress in plants and describe the survival strategies <sup>adaptive</sup> adapted to cope up with it.

(b) Describe a methodology to find differences at transcriptome level between a stressed and control plant.

(c) Classify the databases on the basis of type of data. Give at least one example of each category.

(5x3=15 marks)

Q.6. (a) Discuss the role of Jasmonates as signaling agent in plant defense response.

(b) Explain clone by <sup>-</sup> <sup>-</sup> clone method of genome sequencing. Draw suitable diagrams.

(8 marks)

(7 marks)

Q7) Explain the following:

(a) Membrane composition in chilling sensitive and chilling resistant plants.

(b) Scoring Matrices with emphasis on PAM.

(c) *Arabidopsis* as a model organism.

(5x3= 15 marks)

[This question paper contains 4 printed pages.]

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MAY 2017

Your Roll No.....

Sr. No. of Question Paper : 680 G  
Unique Paper Code : 107693  
Name of the Paper : Genetics and Genomics II (GGHT 602)  
Name of the Course : **B.Sc. (Hons) Anthropology, Biochemistry, Biomedical Sciences, Botany, Microbiology and Zoology**  
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** question in all including **Question No. 1** which is compulsory.

1. (a) Define the following
  - (i) Target site duplication
  - (ii) Competent cells
  - (iii) Selection coefficient



(5)

P.T.O.

(iv) Reverse Genetics

(iv) Clade

(b) Describe the function of the following : (3)

(i) Transposase

(ii) Resistance transfer factor

(iii) F factor

(c) Distinguish between: (8)

(i) Local and Global Sequence Alignment

(ii) Temperate and Virulent phages

(iii) Auxotroph and Prototroph

(iv) Genomics and Proteomics

(d) Expand the abbreviations: (4)

(i) EST

(ii) SINE

(iii) UTR

(iv) LTRs.

(e) Write important contributions of the following: (4)

(i) Davis Bernard

(ii) Seymour Benzer

(iii) Craig J. Venter

(iv) Th. Dobzhansky

(f) Fill in the blank with appropriate word: (3)

(i) The bithorax mutation in *Drosophila* is an example of a \_\_\_\_\_ mutation.

(ii) Lederberg and Zinder used \_\_\_\_\_ as an organism in the transduction experiment.

(iii) A map based on recombination frequency is called \_\_\_\_\_ map.

2. (a) With suitable diagram, describe phage  $\lambda$  mediated specialized transduction.

(b) Explain Hfr. Describe conjugation process between Hfr and F bacteria. (6+6)

3. (a) With suitable diagrams explain the distinctive features of various types of prokaryotic transposable elements.

(b) Describe the role of transposons in genome organization. (9+3)

4. (a) Describe key features of *Drosophila melanogaster* which allow it to be used as a model organism.

(b) Describe the function of homeotic genes in plants and animals.

(c) Write the phenotype of the following homeotic mutants of *Arabidopsis*

- (i) Loss of B function
  - (ii) Loss of C function
  - (iii) Loss of A function
  - (iv) Complete loss of A, B, and C functions (4+4+4)
5. (a) Differentiate between 'Bottleneck effect' and 'Founder effect'.
- (b) Explain 'Allopatric speciation' with the help of suitable examples.
- (c) The incidence of recessive albinism in a human population is 0.0004. If mating for this trait is random in the population, find out the frequency of the recessive allele and carriers. (4+4+4)
6. (a) Explain and compare 'Structural Genomics' and 'Functional Genomics'.
- (b) Give a comparative account of distinctive features of eukaryotic and prokaryotic genome. (6+6)
7. Write short note on **any three** of the following:
- (a) Retrotransposons
  - (b) Human Genome Project
  - (c) NCBI
  - (d) Hardy-Weinberg's law (4+4+4)

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This question paper contains 3 printed pages]

12/5/17

Roll No.

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S. No. of Question Paper : 717

Unique Paper Code : 216601

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Name of the Paper : Plant Metabolism and Biochemistry

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

Semester : VI

Duration : 3 Hours

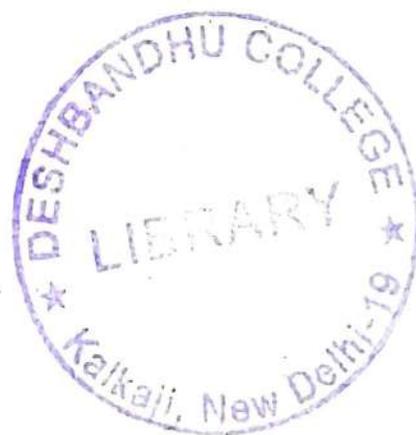
Maximum Marks : 75

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

Attempt five questions in all, including question no. 1 which is compulsory. All questions carry equal marks.

1. (a) Explain the following (any five) : 5×2=10

- (i) Km
- (ii) Photosystem II
- (iii) RQ
- (iv) Red Drop Effect
- (v) Coupled reactions
- (vi) Nitrification
- (vii) Active Site.



P.T.O.

- (b) Write down the major contribution of the Scientists  
(any five) : 5×1=5
- (i) R. Hill
  - (ii) Koshland
  - (iii) Melvin Calvin
  - (iv) Van Niel
  - (v) P. Mitchell
  - (vi) Hatch and Slack
2. (a) Give a detailed account of regulatory enzymes. 8
- (b) Elaborate on the electron transport chain in mitochondria. 7
3. Differentiate between the following (any three) : 3×5=15
- (i) Action spectrum and Absorption spectrum
  - (ii) Cyclic and Non-cyclic Photophosphorylation
  - (iii) Catabolic and Anabolic reactions
  - (iv) Nitrate reductase and Dinitrogenase
4. Write short notes on the following (any three) : 3×5=15
- (i) Leghemoglobin
  - (ii) Synthesis of fatty acids
  - (iii) Structure of starch
  - (iv) Secondary metabolites
  - (v) Emerson enhancement effect and its significance

5. Write explanatory notes on (any *three*) : 3×5=15
- (i) Krebs Cycle
  - (ii) C<sub>4</sub> pathway
  - (iii) Factors affecting enzyme activity
  - (iv) Root nodulation in legumes
6. (a) Explain the synthesis of ATP based on Chemiosmotic hypothesis. 7
- (b) Provide an account of Calvin cycle with the help of flow diagram mentioning the enzymes involved. 8
7. (a) Write a note on the Crassulacean Acid Metabolism. 5
- (b) Give an account of Enzyme Inhibition. 5
- (c) Explain the three fates of pyruvate. 5

This question paper contains 4 printed pages]

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15/5/17

Roll No.

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S. No. of Question Paper : 718

Unique Paper Code : 216603

G

Name of the Paper : Reproductive Biology of Angiosperms :

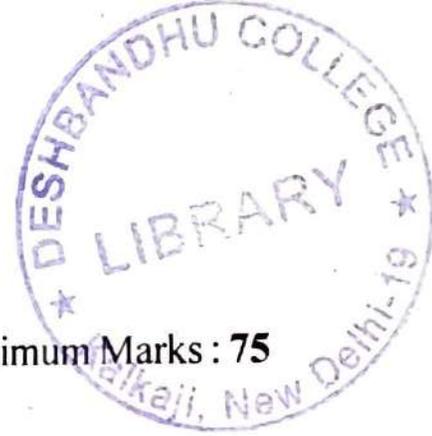
BTHT-611

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

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, including question no. 1 which is compulsory. All the parts of a question must be attempted together. Draw well-labelled diagrams wherever necessary.

1. (a) Fill in the blanks : 6×1=6
- (i) Absence of distinct ovule is a characteristic feature of ..... family.
- (ii) Microspore mother cells are generally surrounded by an impermeable wall made of .....
- (iii) Vacuolated micropylar region is present in ..... cell of embryo sac.

P.T.O.

- (iv) Endosperm haustoria are generally found in ..... type of endosperm.
- (v) Rejection reaction during GSI generally takes place in ..... part of pistil.
- (vi) TTC is a compound used to test .....
- (b) Write any *one* important contribution of the following embryologists : 3×1=3
- (i) W. A. Jensen
  - (ii) P. Maheshwari
  - (iii) G. B. Amici
- (c) Define (any *six*) : 6×1=6
- (i) Polyspory
  - (ii) Filiform apparatus
  - (iii) Syngamy
  - (iv) Cheiropterophily
  - (v) Aril
  - (vi) Xenogamy
  - (vii) Endothelium
  - (viii) Parasexual hybridization
  - (ix) Apomixis

2. Differentiate between (any *three*) : 3×5=15
- (a) Amoeboid and glandular tapetum
  - (b) Tetrasporic and bisporic embryo sac development

- (c) Exine and intine
- (d) Nuclear and helobial endosperm development
- (e) Cleavage polyembryony and adventive polyembryony

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

- (a) Antipodals
- (b) Suspensor
- (c) Endosperm
- (d) Apospory
- (e) Microsporogenesis

4. Comment on (any *two*) : 2×7.5=15

- (i) Homomorphic self-incompatibility
- (ii) Development of Polygonum type of embryo sac
- (iii) Role of tapetum in pollen development

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

- (a) Describe in detail, any *two* methods of pollen storage.
- (b) Write a note on role of synergids in the process of fertilization.
- (c) Elaborate on the importance of apomixis in crop improvement.
- (d) Enumerate the characteristic features of plants pollinated by wind.

6. Attempt the following (any *three*) : 3×5=15
- (a) Write briefly on the factors affecting pollen germination.
  - (b) Draw well-labelled diagrams of :
    - (i) T.S. tetrasporangiate anther at microspore mother cell stage
    - (ii) L.S. anatropous, bitegmic ovule with Polygonum type of embryo sac.
  - (c) Describe the development of dicot embryo from a zygote
  - (d) Elaborate on any *two* methods to overcome sexual incompatibility in plants.