

Total No. of Questions : 8]

SEAT No. :

**P1371**

**[5439]-11**

[Total No. of Pages : 2

**M.Sc.**

**BIOTECHNOLOGY**

**BT - 11 : Advanced Biological Chemistry  
(2008 Pattern) (Semester - I)**

*Time : 3 Hours]*

*[Max. Marks : 80*

*Instructions to the candidates:*

- 1) *Answer any two questions from 1 to 3 Section-I and any two question from 5 to 7 Section-II*
- 2) *Q. no. 4 & Q. no. 8 are compulsory.*

**SECTION - I**

- Q1)** a) Define secondary metabolites. Give its importance in agriculture. [8]  
b) Explain the basis of gel permeation chromatography give its applications. [8]

- Q2)** a) Define the term resolution, partition coefficient and selectivity factor in chromatography give the ways to determine it. [8]  
b) Explain the three prominent ways of metabolic regulation. [8]

- Q3)** a) Describe the steps involved in the shikimic acid pathway for secondary metabolites synthesis. [8]  
b) How can we use ultracentrifugation for separation of proteins. How does the shape of protein affects the sedimentation coefficient. [8]

- Q4)** Write short notes on : [8]  
a) Zone electrophoresis.  
b) Metabolic flux.  
c) Chemical shift.  
d) Concept of thermodynamics in biological system.

***P.T.O.***

## SECTION - II

- Q5)** Name any four major categories of secondary metabolites with their biosynthetic origin. Describe some key physical or identifying characteristics of each. **[16]**
- Q6)** a) Give a comparative account between two basic secondary structure of proteins. **[8]**  
b) Discuss the methods for manipulations in metabolic pathways for increased production of secondary metabolites. **[8]**
- Q7)** a) Explain the possible reasons for the increase in demand of natural products in recent times. **[8]**  
b) Protein is amino acid least commonly found in  $\alpha$ -helices and regularly found in  $\beta$ -helices. Justify. **[8]**
- Q8)** Write short notes on: **[8]**
- a) Homotropic & Heterotropic modification.
  - b) turnover of secondary metabolites.
  - c) Importance of hydrogen-bonding in protein structures.
  - d) Pharmacognosy.



Total No. of Questions : 8]

SEAT No. :

**P1372**

[Total No. of Pages : 2

[5439]-12

M.Sc.

**BIOTECHNOLOGY**

**BT - 12 : Molecular and Cell Biology**

**(2008 Pattern) (Semester - I)**

*Time : 3 Hours]*

*[Max. Marks : 80*

*Instructions to the candidates:*

- 1) *Attempt not more than 05 questions of which at least 02 questions must be from each section.*
- 2) *Answers to the two sections must be written in separate books.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right side indicate full marks.*
- 5) *All questions carry equal marks.*

**SECTION - I**

- Q1)** a) Describe the effects of glucagon on blood glucose. [8]  
b) Write a note on the structure of ATP synthase enzyme. [8]
- Q2)** a) What is photo respiration? Explain its significance. [8]  
b) Explain the role of different genes involved in Drosophila development. [8]
- Q3)** a) Explain the role of caspases in programmed cell death. [8]  
b) Enlist the phospholipids present in the plasma membrane and justify the statement, "Plasma membrane is asymmetric in nature". [8]
- Q4)** Write short notes on the following:
- a) Temperature regulation in reptiles. [4]
  - b) Non- cyclic photophosphorylation. [4]
  - c) Menstrual cycle. [4]
  - d) Hormones secreted by Pituitary gland. [4]

**P.T.O.**

## SECTION - II

**Q5)** Justify the following statements.

- a) “What you eat can change your gene expression”. [8]
- b) “White blood cells play many defensive role”. [8]

**Q6)** a) Explain “genetic code is redundant but not ambiguous”. [4]

b) Describe in detail the various post-transcriptional modifications in mRNA. [8]

c) How is the knowledge of mutation being used to combat the HIV infection. [4]

**Q7)** a) Enlist the differences between Amino-acyl tRNA synthetase-I and Amino-acyl tRNA synthetase-II. [8]

b) Describe in detail the role of translation initiation factors in eukaryotic cell. [8]

**Q8)** Write short notes on:

a) Natural selection [4]

b) Mutation [4]

c) Genetic drift [4]

d) X-linked immuno deficiencies [4]



Total No. of Questions : 8]

SEAT No. :

**P1373**

[5439]-13

[Total No. of Pages : 1

**M.Sc.**

**BIOTECHNOLOGY**

**BT-13 : Environmental Biotechnology**

**(2008 Pattern) (Semester-I)**

*Time : 3 Hours]*

*[Max. Marks : 80*

*Instructions to the candidates:*

- 1) *Attempt a total of five questions selecting atleast two questions from each section.*
- 2) *Answers to the two sections must be written in separate answer books.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right indicate full marks.*

**SECTION-I**

**Q1)** Compare and contrast various aspects of nuclear energy, chemical energy and bio-energy as non-conventional energy sources. **[16]**

**Q2)** Write explanatory notes on:

- a) Water quality standards **[8]**
- b) Noise pollution and it's control **[8]**

**Q3)** Explain in detail bacteriological analysis of soil. Comment on problems associated with use of insecticides and pesticides. **[16]**

**Q4)** a) Explain physicochemical analysis of soil. **[8]**  
b) Comment on municipal solid waste management strategies. **[8]**

**SECTION-II**

**Q5)** What is remote sensing? Explain in detail types and applications of remote sensing. **[16]**

**Q6)** Write explanatory notes on:

- a) Conservation Biotechnology **[8]**
- b) ISO 14000 standard series **[8]**

**Q7)** Explain in detail biological treatment of waste water. **[16]**

**Q8)** a) Enlist various methods of phytoremediation. Explain any one in detail. Add a note on it's applications. **[8]**

b) What is EIA? Comment on it's importance. **[8]**



Total No. of Questions : 8]

SEAT No. :

**P1374**

**[5439]-21**

[Total No. of Pages : 2

**M.Sc.**

**BIOTECHNOLOGY**

**BT-21 : GENETIC ENGINEERING**

**(2008 Pattern) (Semester - II)**

*Time : 3 Hours]*

*[Max. Marks : 80*

*Instructions to the candidates:*

- 1) *Attempt not more than 5 questions of which 2 questions must be from each Section.*
- 2) *Answer to the two Sections should be written in separate answer book.*
- 3) *Figures to the right indicate full marks.*
- 4) *Draw neat diagrams wherever necessary.*

**SECTION - I**

**Q1)** Write short notes on-

**[16]**

- a) Alkaline phosphatases and ligases
- b) Genomic DNA library
- c) Cosmid
- d) Transformation

**Q2)** a) Describe a typical yeast expression vector with one example.

**[8]**

- b) Describe the expression of any two industrially important products using recombinant DNA technology.

**[8]**

**Q3)** a) Describe Southern blot technique and give its importance.

**[8]**

- b) Describe the methods used for screening c DNA libraries.

**[8]**

**Q4)** a) Give the importance of DNases and RNases in genetic engineering.

**[8]**

- b) Write notes on shuttle vectors with examples.

**[8]**

**P.T.O.**

**SECTION - II**

**Q5)** Write short notes on **[16]**

- a) Taqman probes
- b) RFLP
- c) Primer designing for PCR
- d) Genetic diseases

**Q6) a)** Explain Sanger's method of DNA sequencing. **[8]**

b) Write notes on genetically engineered Biotherapeutics. **[8]**

**Q7)** Write self-explanatory notes on

a) RT-PCR **[8]**

b) Ex-vivo Gene therapy **[8]**

**Q8) a)** Explain the various factors which affect polymerase chain Reaction. **[8]**

b) Describe Viral gene delivery systems. **[8]**

✓   ✓   ✓

Total No. of Questions : 8]

SEAT No. :

[Total No. of Pages : 2

**P1375**

**[5439]-22**

**M.Sc.**

**BIOTECHNOLOGY**

**BT - 22 : Bioinformatics**

**(2008 Pattern) (Semester - II)**

*Time : 3 Hours]*

*[Max. Marks : 80*

*Instructions to the candidates:*

- 1) *Attempt a total of five questions selecting at least two questions from each section.*
- 2) *Answers to the sections must be written on separate answer books.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right indicate full marks.*

**SECTION - I**

**Q1)** Define Bioinformatics. Explain its scope in various fields, mention the tools of bioinformatics. **[16]**

**Q2)** a) What are biological databases. Enlist publicly available databases. Explain any one in detail. **[8]**

b) Explain SCOP & CATH database in detail. **[8]**

**Q3)** a) What is immunoinformatics? Describe epitope prediction. **[8]**

b) Define Homology modeling. Write steps involved in homology modeling. **[8]**

**Q4)** Write a note on **[16]**

a) Energy optimization methods.

b) Structure base drug designing.

***P.T.O.***



## SECTION - II

**Q5)** a) Explain Ramchandran plot. [8]

b) Explain pairwise sequence alignment & multiple sequence alignment. [8]

**Q6)** Write a note on

a) Gene expression informatics. [8]

b) Chemoinformatics. [8]

**Q7)** a) Explain protein folding-structure - function relationship. [8]

b) Explain computer-based research in bioinformatics. [8]

**Q8)** a) Write a note on NCBI. [8]

b) Explain bioinformatics business model. [8]



Total No. of Questions : 8]

SEAT No. :

[Total No. of Pages : 2

**P1376**

**[5439]-23**

**M.Sc. - I**

**BIOTECHNOLOGY**

**BT - 23 : Plant Biotechnology**

**(2008 Pattern) (Semester - II)**

*Time : 3 Hours]*

*[Max. Marks : 80*

*Instructions to the candidates:*

- 1) *Attempt a total of five questions selecting at least two from each section.*
- 2) *Answers to the two sections must be written on separate answer books.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right indicate full marks.*

**SECTION - I**

**Q1)** What are suspension cultures? How are they initiated from callus? Give the various methods used to measure cell growth. Add a note on applications of suspension cultures. **[16]**

**Q2) a)** Discuss the advantages of plant tissue culture over conventional methods of crop improvement. **[8]**

b) Give the uses of fungi. Explain the various strategies used for qualitative improvement of commercially important fungi. **[8]**

**Q3) a)** What is somatic embryogenesis? Write a note on biochemical and molecular changes during somatic embryogenesis. **[8]**

b) What are haploids? Explain the use of haploids in plant breeding with suitable examples. **[8]**

**Q4)** Write notes on any two : **[16]**

a) Significance of hardening/acclimatisation in micropropagation.

b) Single cell protein

c) Synthetic seeds

**P.T.O.**

## SECTION - II

- Q5)** a) What is abiotic stress? Explain the use of transgenics in generation of drought tolerance in plants with available example. [8]  
b) Transgenics can be used to increase photosynthetic efficiency-Justify.[8]
- Q6)** a) Explain the various approaches used to increase production of secondary metabolites in vitron cultures with suitable examples. [8]  
b) What is protoplast fusion? Distinguish between somatic hybrids and cybrids. [8]
- Q7)** a) Elaborate on the use of transgenic in quality improvement of lipids. [8]  
b) Write a note on mass multiplication of economically important horticulture plants. [8]
- Q8)** Write notes on any two: [16]  
a) Edible vaccines.  
b) Antisense RNA technology in transgenic.  
c) Plant Biotechnology for improvement of pharmaceuticals.



Total No. of Questions : 8]

SEAT No. :

**P1377**

**[5439]-31**

[Total No. of Pages : 2

**M.Sc. - II**

**BIOTECHNOLOGY**

**BT - 31 : Animal Biotechnology**

**(2008 Pattern) (Semester - III)**

*Time : 3 Hours]*

*[Max. Marks : 80*

*Instructions to the candidates:*

- 1) *Attempt a total of five questions selecting at least two questions from each section.*
- 2) *Answers to the two sections must be written on separate answer books.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right indicate full marks.*

**SECTION - I**

**Q1)** Describe different breeding systems in dairy animals. Add a note on factors which affect fertility in artificial breeding. **[16]**

**Q2)** a) What is organ culture? Describe organ culture in brief with its advantages and disadvantages . **[8]**

b) Explain growth kinetics of cell suspension cultures. **[8]**

**Q3)** Explain **[16]**

a) Cell sorting

b) Gene banking

**Q4)** Write explanatory notes on any two of the following. **[16]**

a) Methods of Tissue disaggregation.

b) Applications of Transgenic Animals.

c) Assessment of Proliferative Heterogeneity of stem cells.

***P.T.O.***

## SECTION - II

- Q5)** Describe the method of Artificial insemination. Give the advantages and disadvantages of artificial insemination. [16]
- Q6)** Explain different methods of generate chimeric organisms. [16]
- Q7)** a) Mention the advantages and limitations of IVF. [8]  
b) Describe the bioethical problems associated with transgenic animals.[8]
- Q8)** Write explanatory notes on any two of the following: [16]
- a) Embryonic stem cells
  - b) Embryo transfer technique
  - c) Cross contamination in ATC.



Total No. of Questions : 8]

SEAT No. :

[Total No. of Pages : 2

**P1378**

**[5439]-32**

**M.Sc.**

**BIOTECHNOLOGY**

**BT - 32 : Fermentation Technology**

**(2008 Pattern) (Semester - III)**

*Time : 3 Hours]*

*[Max. Marks : 80*

*Instructions to the candidates:*

- 1) *Attempt a total of five questions selecting atleast 2 questions from each section.*
- 2) *Answers to the two sections must be written in separate books.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right indicate full marks.*

**SECTION - I**

**Q1) a) Discuss the kinetics of product formation in Batch culture. [8]**

b) Explain in detail the construction and working of a stirred Tank Bio reactor. [8]

**Q2) Describe the measurement and control of temperature and Dissolved oxygen in a fermentation process. [16]**

**Q3) a) Discuss the application of Genetic Engineering in strain improvement. [8]**

b) Explain the application of microbes as chemical factories. [8]

**Q4) Write explanatory notes on any two of the following: [16]**

- a) Spargers
- b) Inoculum build up
- c) Bubble column Bioreactor

***P.T.O.***

## SECTION - II

**Q5)** With the help of neat labelled diagram, explain the downstream processing of any one vaccines. **[16]**

**Q6) a)** Explain the role of auxotrophic mutants in strain improvement. **[8]**

b) Explain gas-liquid mass transfer in aerobic fermentation. **[8]**

**Q7) a)** Explain the construction and working of hollow fibre reactor. **[8]**

b) Define fluid rheology. Discuss the rheological properties of fermentation broths. **[8]**

**Q8)** Write explanatory notes on any two of the following: **[16]**

a) Biomethanation

b) Recovery of enzyme from fermentation broth.

c) Feed back regulation for control of Branched pathways.



Total No. of Questions : 6]

SEAT No. :

**P1379**

[Total No. of Pages : 1

[5439]-33

M. Sc.

**BIOTECHNOLOGY**

**BT - 33A : Principles of Virology  
(2008 Pattern) (Semester - III)**

*Time : 1½ Hour]*

*[Max. Marks : 40*

*Instructions to the candidates:*

- 1) *Attempt a total of four questions selecting atleast two questions from each section.*
- 2) *Answers to the section must be written on separate answer books.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right indicate full marks.*

**SECTION - I**

- Q1)** a) With neat labelled diagram describe structure of HIV. [5]  
b) Describe concept of ID<sub>50</sub>. [5]

**Q2)** Answer the following :

- a) With neat labelled diagram describe replication of T<sub>4</sub> Phage. [5]  
b) Give mode of action of [5]  
i) Acyclovir ii) Azidothymidine

- Q3)** a) What is reassortment Vaccine? Give suitable example. [5]  
b) Comment on importance of immunodiagnostic techniques in Virology. [5]

**SECTION - II**

- Q4)** a) Define : Prevalance, mortality, Incidence, Epidemics. [5]  
b) Give reasons for emergence and reemergence of Viruses. [5]

- Q5)** a) Comment on Pathogenesis of Varicella Zooster Virus. [5]  
b) Give an account on economical effects of plant Viruses. [5]

- Q6)** Write short note on : [10]  
a) Different phases of clinical trials.  
b) FMD Virus.





Total No. of Questions : 6]

SEAT No. :

**P1380**

**[5439]-34**

[Total No. of Pages : 1

**M.Sc.**

**BIOTECHNOLOGY**

**BT - 33B : Advanced Immunology**

**(2008 Pattern) (Semester-III)**

*Time : 1½ Hours]*

*[Max. Marks : 40*

*Instructions to the candidates:*

- 1) *Attempt a total of four questions selecting atleast two questions from each section.*
- 2) *Answer to the two sections should be written in seperate answer book.*
- 3) *Neat diagram must be drawn wherever necessary.*
- 4) *Figures to the right indicate full marks.*

**SECTION-I**

- Q1)** a) Explain activation of cytotoxic T cells and process of CTL mediated immune response. [5]  
b) Explain pathophysiology of systemic lupus erythromatosus. [5]
- Q2)** Answer the following: [10]  
a) Explain complement activation pathway in innate immunity.  
b) Explain any one technique in molecular immunology.
- Q3)** a) What is graf Vs host reaction. [5]  
b) Give an account of primary lymphoid organs. [5]

**SECTION-II**

- Q4)** a) Comment on various animal models used and their application in immunological studies. [5]  
b) Define : Chimeric antibodies. Describe their types in brief [5]
- Q5)** Answer the following: [10]  
a) Explain use of labels in immunodiagnostics.  
b) What are stem cells? How stem cells can be used in treatment of diseases.
- Q6)** Write short note on: [10]  
a) Polyvalent Vaccines.  
b) Phage display.

✓ ✓ ✓

Total No. of Questions : 8]

SEAT No. :

[Total No. of Pages : 1

**P1381**

**[5439]-41**

**M.Sc.-II**

**BIOTECHNOLOGY**

**BT41 : GENOMICS & PROTEOMICS**

**(2008 Pattern) (Semester - IV)**

*Time : 3 Hours]*

*[Max. Marks : 60*

*Instructions to the candidates:*

- 1) *Attempt any five questions in total with at least 2 from each section.*
- 2) *Figures to the right indicate full marks.*

**SECTION - I**

**Q1)** What are microarrays? Explain DNA microarrays. Add a note on its applications. **[12]**

**Q2)** Write short notes on any two of the following. **[12]**

- i) NGS
- ii) Structural genomics
- iii) Model organisms in comparative genomics.

**Q3)** Explain with suitable example microarray in toxicogenomics studies. **[12]**

**Q4)** Describe different methods used in functional genomics. **[12]**

**SECTION - II**

**Q5)** Enlist various techniques used in proteomic and explain any one in detail. **[12]**

**Q6)** Describe principle and working of mass spectrometry. Give its application. **[12]**

**Q7)** Write short notes on (Any Two) **[2×6=12]**

- a) 2-D electrophoresis
- b) Applications of proteomics in drug development
- c) Protein : Protein interaction studies

**Q8)** a) Explain - Identification and characterisation of novel proteins. **[6]**

b) Explain in detail protein Microarray **[6]**

✓ ✓ ✓

Total No. of Questions : 8]

SEAT No. :

**P1382**

**[5439]-42**

[Total No. of Pages : 1

**M.Sc.**

**BIOTECHNOLOGY**

**BT-42: Legal and Ethical Aspects in Biotechnology and IPR  
(2008 Pattern) ( Semester - IV)**

*Time : 3 Hours]*

*[Max. Marks : 60*

*Instructions to the candidates:*

- 1) Attempt a total of five questions selecting atleast two questions from each section.*
- 2) Answers to the sections must be written on separate answer books.*
- 3) Neat diagrams must be drawn wherever necessary.*
- 4) Figures to the right indicate full marks.*

**SECTION - I**

- Q1)** What is intellectual property? Describe in detail various tools of intellectual property. **[12]**
- Q2)** Explain in detail, with the help of the flowchart, the procedure for applying and granting the patent. **[12]**
- Q3)** Describe the procedure for registration of copyright. Add a note on competent authority to grant copyright. **[12]**
- Q4)** Write explanatory notes on- **[12]**
- a) Law on industrial design.
  - b) Biotechnology Patents.

**SECTION - II**

- Q5)** Explain the patenting of biological material. Add a note on Budapest Treaty. **[12]**
- Q6)** Mention the salient features of TRIPS agreement. Give the role of WTO in intellectual property. **[12]**
- Q7)** Elaborate on plant breeder's and farmer's right act. Describe the criteria for the protection of plant variety. **[12]**
- Q8)** Write short notes on- **[12]**
- a) Berne convention
  - b) Legal protection to diversity.



Total No. of Questions : 6]

SEAT No. :

**P1383**

**[5439]-43**

[Total No. of Pages : 1

**M.Sc. - II**

**BIOTECHNOLOGY**

**BT - 43 : Clinical Research and Database Management**

**(2008 Pattern) (Semester - IV)**

*Time : 1½ Hours]*

*[Max. Marks : 40*

*Instructions to the candidates:*

- 1) *Attempt a total of four questions selecting atleast two questions from each section.*
- 2) *Answers to the sections must be written on separate answer books.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right indicate full marks.*

**SECTION - I**

**Q1)** What was the need to establish FDA? Discuss in detail the rights, duties and responsibilities of FDA. **[10]**

**Q2)** Explain in detail Preclinical Trials. Add a short note on requirement to conduct clinical trials as per schedule Y. **[10]**

**Q3)** Why database management is important? Explain query resolution process in detail. **[10]**

**SECTION - II**

**Q4)** Enlist important documents required in Clinical Research. Discuss essentials and maintenance of source documentation. **[10]**

**Q5)** Compare and contrast Phase - II and Phase - III Clinical Trials. Why it is important to conduct clinical trials. **[10]**

**Q6)** Write short notes on any two of the following: **[10]**

- a) Good Clinical Practices.
- b) Protocol Design and Development.
- c) Serious Adverse Event.



Total No. of Questions : 3]

SEAT No. :

[Total No. of Pages : 1

**P1384**

**[5439]-44**

**M.Sc. - II**

**BIOTECHNOLOGY**

**BT - 44A : Nanobiotechnology**

**(2008 Pattern) (Semester - IV)**

*Time : 1½ Hours]*

*[Max. Marks : 40*

*Instructions to the candidates:*

- 1) *All questions are compulsory.*
- 2) *Figures to the right indicate full marks.*

**Q1)** Write short notes on (any 4):

**[20]**

- a) Synthesis of nanoparticles using chemical vapour Deposition.
- b) Spectroscopic analysis of nanoparticles.
- c) Applications of nanoparticles in physical sciences.
- d) Recent trends in Nanobiotechnology.
- e) Different parameters affecting size of nanoparticles.
- f) Functionalisation of nanoparticles.

**Q2)** Answer the following (any one):

**[10]**

- a) Discuss characterisation of nanomaterials using Electron microscopy.
- b) Explain the merits and demerits of physical methods of synthesis of nanomaterials.

**Q3)** Answer the following (any one):

**[10]**

- a) Nanotechnology has immense applications in Biosensors. Justify.
- b) Explain Biological methods of synthesis of nanomaterials.



Total No. of Questions : 8]

SEAT No. :

**P1385**

**[5439]-45**

[Total No. of Pages : 2

**M.Sc. - II**

**BIOTECHNOLOGY**

**BT - 44b : Stem Cell Technology and Regenerative Medicines  
(2008 Pattern) (New) (Semester - IV)**

*Time : 3 Hours]*

*[Max. Marks : 60*

*Instructions to the candidates:*

- 1) Attempt a total of five questions selecting at least two questions from each sections.*
- 2) Answers to the sections must be written on separate answer books.*
- 3) Neat diagrams must be drawn wherever necessary.*
- 4) Figures to the right indicate full marks.*

**SECTION - I**

**Q1)** Describe molecular events happening during fertilization. **[12]**

**Q2)** a) Explain in brief slow and fast block of polyspermy. **[6]**

b) Write a brief note on post fertilization changes in a zygote. **[6]**

**Q3)** a) Write a note on cleavage process after fertilization. **[6]**

b) Explain the role of establishment of cell lineage in determining fate of developing embryo. **[6]**

**Q4)** Write explanatory notes on any two of the following: **[12]**

a) Embryonic stem cell

b) Pattern formation

c) Competence and Induction

**P.T.O.**

## SECTION - II

**Q5)** Describe in detail various types of stem cells and their general properties. [12]

**Q6)** What are Knock out mice? Write a note on applications of Knock out mice. [12]

**Q7)** Why is human cloning banned? Write in brief bioethical issues related to it. [12]

**Q8)** Write an explanatory notes on any two of the following: [12]

- a) Stem cell therapy
- b) Transgenic animals
- c) Mesenchymal stem cells



Total No. of Questions : 8]

SEAT No. :

**P1386**

**[5439]-46**

[Total No. of Pages : 2

**M.Sc.**

**BIOTECHNOLOGY**

**BT - 44C : Agricultural Biotechnology**

**(2008 Pattern) (Semester - IV)**

*Time : 3 Hours]*

*[Max. Marks : 60*

*Instructions to the candidates:*

- 1) *Attempt a total of five questions selecting at least two questions from each section.*
- 2) *Answers to the sections must be written on separate answer book.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right indicate full marks.*

**SECTION - I**

**Q1)** Write short notes on any two :

**[12]**

- a) Endosperm culture
- b) Gametoclonal variation
- c) Homozygous plants

**Q2)** What do you understand by embryo rescue technique? Explain various methods for embryo rescue & add notes on its application.

**[12]**

**Q3)** Describe multiplication of variety of oil seed crop by micropropagation with suitable example.

**[12]**

**Q4)** Explain phenomena of apomixis with suitable example and write its significance with respect to agriculture .

**[12]**

**P.T.O.**



## SECTION - II

**Q5)** Write short notes on: **[12]**

a) Biopesticides

b) Virus indexing

**Q6)** What are transgenic crop? Explain methods for obtaining herbicide resistant crop in detail. **[12]**

**Q7)** What are bioreactor? How bioreactor system is used for scaling up of plant production? **[12]**

**Q8)** Explain in detail the role of molecular markers in large scale production of commercially important plants. **[12]**

