Total No. of Questions : 6] **SEAT No. :**

P1571 **[Total No. of Pages : 1**

[4138] - 46
M.Sc.
BIOTECHNOLOGY
BT - 46 : Genomics and Proteomics
(2005 Pattern) (Sem. - 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) Explain the concept and methodology of genomics. **[10]**

Q2) Explain **[10]**

a) Scope of functional genomics.

b) Application of Transcriptomics.

Q3) Write notes on **[10]**

a) Pharmacogenomics

b) Structural genomics

SECTION - II

Q4) Enlist the methodologies of proteomics and explain any one. **[10]**

Q5) Explain with the help of appropriate example, application of proteomics. **[10]**

Q6) Write notes on **[10]**

a) Structural proteomics.

b) Computational approach to understand protein - protein interactions.

♦♦♦♦

Total No. of Questions : 6] **SEAT No. :**

P1572 **[Total No. of Pages : 1**

[4138] - 47
M.Sc.
BIOTECHNOLOGY
BT - 47 Immunotechnology
(2005 Pattern) (Sem. - 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 two sections should 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) Explain the role of T - cells in allograft rejection. **[10]**

Q2) Explain the application of stem cell technology in therapeutics. **[10]**

Q3) Write notes on **[10]**

a) Advantages of recombinant vector vaccine.

b) HAT selection.

SECTION - II

Q4) Explain any one autoimmune system. **[10]**

Q5) Discuss the advantages and limitations of transgenic models used for immunological studies. **[10]**

Q6) Write notes on **[10]**

a) Jerne's Network theory.

b) Immunodiagnostics.

♦♦♦♦

Total No. of Questions : 4]

SEAT No. :

P822

[Total No. of Pages : 1

[4138] - 24
M.Sc.
BIOTECHNOLOGY
BT - 23 b : Virology
(Sem. - II) (2005 Pattern)

Time : 1 1/2 Hours] *[Max. Marks : 40*

Instructions to the candidates:

1) ***Question No. 1 is compulsory. Out of the remaining attempt 2 questions.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***

Q1) Give the strategy for propagation of the animal and plant viruses. **[10]**

Q2) a) Describe the process of vaccine development against a virus. **[8]**

b) Explain the use of virus in gene therapy. **[7]**

Q3) a) Distinguish between: **[10]**

i) RNA and DNA virus.

ii) Immunodiagnosis and molecular diagnosis.

b) Describe the morphology of Retroviruses. **[5]**

Q4) a) Comment upon the antiviral drugs and their targets in viruses. **[5]**

b) Give the importance of Si RNA in genetic engineering. **[5]**

c) Describe the techniques used to study the viruses. **[5]**

Total No. of Questions : 4]

SEAT No. :

P823

[Total No. of Pages : 1

[4138] - 25
M.Sc.
BIOTECHNOLOGY
BT - 24 : Immunology
(Sem. - II) (2005 Pattern)

Time : 1 1/2 Hours] *[Max. Marks : 40*

Instructions to the candidates:

1) ***Question No. 1 is compulsory. Out of the remaining attempt 2 questions.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***

Q1) Explain the components of immune system. Add a note on structure of antibody. **[10]**

Q2) a) Give the major events in the primary and secondary immune responses. **[8]**

b) Explain the MHC I gene & comment on polymorphism in it. **[7]**

Q3) Write notes on: **[15]**

a) Immunological disorders.

b) Complement System.

c) Epitopes and paratopes.

Q4) Distinguish between: **[15]**

a) B - cell and T - Cell ontogeny.

b) Techniques in humoral & cellular immunology.

c) Immunogenicity and antigenicity.

Total No. of Questions : 4]

SEAT No. :

P824

[Total No. of Pages : 1

[4138] - 26
M.Sc. (Sem. - II)
BIOTECHNOLOGY
BT - 25 : Bioinformatics
(2005 Pattern)

Time : $1\frac{1}{2}$ *Hours]* *[Max. Marks : 40*

Instructions to the candidates:

1) ***Question No. 1 is compulsory. Out of the remaining attempt 2 questions.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***

Q1) Why protein structure prediction is important? Give full account of structure prediction using computational methods. **[10]**

Q2) a) FASTA tool is used for global alignment. Justify. **[5]**

b) Explain methods used in structural analysis of proteins. **[5]**

c) Write an importance of Genome databases in Bioinformatics data management. **[5]**

Q3) Write short notes on: **[15]**

a) SCOP.

b) EMBL.

c) Pairwise alignment.

Q4) a) Give full account of gene prediction methods. **[8]**

b) What is bioinformatics? Give its application in various fields. **[7]**

Total No. of Questions : 4]

SEAT No. :

P826

[Total No. of Pages : 1

[4138] - 32
M.Sc.
BIOTECHNOLOGY
BT - 32 : Fundamentals of Genetics Engineering
(Sem. - III) (Theory) (2005 Pattern)

Time : 1 1/2 Hours] *[Max. Marks : 40*

Instructions to the candidates:

1) ***Question No. 1 is compulsory.***
2) ***Attempt any two from the remaining questions.***
3) ***Provide sketch wherever necessary.***
4) ***Marks are given in parentheses.***

Q1) Attempt **any two** of the following: **[2 x 5 = 10]**

a) Give a brief account single gene cloning.

b) Write a short note on southern blot.

c) Briefly describe BACs and YACs.

Q2) a) What do you understand by genomic libraries? Write briefly about cDNA library. **[10]**

b) How is the western blot performed? Discuss its applications. **[5]**

Q3) a) What is the importance of DNA sequencing? Describe any one method of DNA sequencing. **[10]**

b) What are chimeric constructs? Explain briefly. **[5]**

Q4) a) What are different methods of introducing DNA into cells? Explain advantages and disadvantages. **[10]**

b) What are DNA modifying enzymes? Explain their actions. **[5]**

Total No. of Questions : 4]

SEAT No. :

P827

[Total No. of Pages : 1

[4138] - 33
M.Sc. - II
BIOTECHNOLOGY
BT - 33 : Biological Chemistry - II
(Sem. - III) (2005 Pattern)

Time : $1\frac{1}{2}$ *Hours]* *[Max. Marks : 40*

Instructions to the candidates:

1) ***Question No. 1 is compulsory.***
2) ***Attempt any two questions from Q.No. 2 to Q.No. 4.***
3) ***Figures to the right indicate full marks.***
4) ***Draw neat diagrams wherever necessary.***

Q1) Write short notes on any 2 of the following: **[10]**

a) Western blotting.

b) Plate theory in chromatography.

c) Ramchandran Plot.

Q2) a) Give an account on hierarchy in protein structure and folding. **[8]**

b) Discuss the role of HPLC & GLC in analysis of biomolecules. **[7]**

Q3) a) Comment upon the dideony method for DNA sequencing. **[8]**

b) Explain the principle of gel filtration chromatography & briefly explain the term void volume. **[7]**

Q4) a) Explain 2D gel electrophoresis as an appropriate tool to study protein. **[8]**

b) Enlist the types of detectors used in spectroscopic techniques. Write a short note on any one of them. **[7]**

Total No. of Questions : 4]

SEAT No. :

P828

[Total No. of Pages : 1

[4138] - 34
M.Sc. (Sem. - III)
BIOTECHNOLOGY
BT - 34 : Biochemical Engineering
(Theory) (2005 Pattern)

Time : 1 1/2 Hours] *[Max. Marks : 40*

Instructions to the candidates:

1) ***Question number 1 (10 marks) is compulsory.***
2) ***Attempt any two questions (15 marks) from remaining.***

Q1) Write short notes on any four of the following: **[10]**

a) Shear rate.

b) Disc turbine impellors.

c) Casson body rheology.

d) Combined agitator and sparger.

e) Liquid liquid mass transfer.

f) Thermal boundry layer.

Q2) a) Discuss in brief the structured models. **[10]**

b) What are Newtonian and non Newtonian fluids? **[5]**

Q3) a) Which properties affect the rheology of fermented broth? **[5]**

b) What is an air lift fermentor? **[5]**

c) What is a fouling factor? **[5]**

Q4) a) Discuss the factors affecting cellular oxygen demand. **[5]**

b) Which physical processes in fermentor determines the bubble size? **[5]**

c) Discuss the flow patterns in an agitated tanks. **[5]**

Total No. of Questions : 6]

SEAT No.:

P1566

[Total No. of Pages : 1

[4138]-41
M.Sc. (Sem. - IV)
BIOTECHNOLOGY
BT - 41 : Structural Biology
(2005 Pattern)

Time : 1½ Hours] *[Max. Marks : 40*

Instructions to the candidates:

1) ***Attempt a total of four question 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) Explain principle, functioning and applications of fluorescence microscope. **[10]**

Q2) What is X-ray crystallography? Explain its applications in structural biology. **[10]**

Q3) Write notes on : **[10]**

a) Overhausser effect.

b) Nuclear shielding.

SECTION - II

Q4) What is fluorescence spectroscopy? Explain its use in analysis of structure of any one biopolymer. **[10]**

Q5) Explain the principles and functioning of NMR spectroscopy. **[10]**

Q6) Write notes on : **[10]**

a) Patterson function.

b) Ewald's sphere.

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Total No. of Questions : 6]

SEAT No.:

P1567

[Total No. of Pages : 1

[4138]-42
M.Sc.
BIOTECHNOLOGY
BT - 42 : Industrial Biotechnology
(2005 Pattern) (Sem. - IV)

Time : 1½ Hours] *[Max. Marks : 40*

Instructions to the candidates:

1) ***Attempt a total of four question selecting atleast two questions from each sectioin.***
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) Explain any one design of reactor used for immobilization of enzymes. **[10]**

Q2) What is biomethanation? Explain any one advanced technique used for the process. **[10]**

Q3) Write notes on : **[10]**

a) Large scale production of therapeutic proteins.

b) Super critical fluid extraction.

SECTION - II

Q4) Explain the technology for bioconversion of agricultural waste into useful products. **[10]**

Q5) Describe, with the help of a flow diagram, process of ethanol and by product manufacture from molasses. **[10]**

Q6) Write notes on : **[10]**

a) Microbial remediation of oil spill.

b) Intracellular enzymes.

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Total No. of Questions : 6]

SEAT No.:

P1568

[Total No. of Pages : 1

[4138]-43
M.Sc. (Sem. - IV)
BIOTECHNOLOGY
BT - 43 : Applications of Genetic Engineering
(2005 Pattern)

Time : 1½ Hours] *[Max. Marks : 40*

Instructions to the candidates:

1) ***Attempt a total four question 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) Explain, with appropriate examples, the application of plant genetic engineering in large scale production of pharmaceuticals. **[10]**

Q2) What is DNA finger printing? Enlist its applications and explain any one. **[10]**

Q3) Write notes on : **[10]**

a) Bioengineered crop.

b) Plantibodies.

SECTION - II

Q4) Explain the concept and scope of proteomics. **[10]**

Q5) Describe the method for obtaining a genetically engineered organisms for environmental clean up. **[10]**

Q6) Write notes on : **[10]**

a) Biosafety regulations for research in genetic engineering.

b) Gene therapy.

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Total No. of Questions : 6]

SEAT No. :

P1569

[Total No. of Pages : 1

[4138]-44
M.Sc. (Sem. - IV)
BIOTECHNOLOGY
BT-44 : Plant Biotechnology
(2005 Pattern)

Time :1½ Hours] *[Max. Marks :40*

Instructions to the candidates:

1) ***Answer a total of four question, 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) Explain with the help of appropriate examples, the use of micropropagation in horticulture. **[10]**

Q2) What is biotransformation? How is it employed for qualitative and quantitative improvement in secondary metabolites? **[10]**

Q3) Write notes on : **[10]**

a) Somaclonal variation.

b) Advantages of endosperm culture.

SECTION - II

Q4) Explain the advantages of in vitro androgenesis in agriculture. **[10]**

Q5) What is pathogen Indexing? Explain its significance in commercial micropropagation. **[10]**

Q6) Write notes on : **[10]**

a) Synthetic seed.

b) Antisense RNA technology.

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Total No. of Questions : 6]

SEAT No. :

P1570

[Total No. of Pages : 1

[4138]-45
M.Sc.
BIOTECHNOLOGY
BT-45 : Chemical Synthesis and Screening in Biotechnology
(2005 Pattern) (Sem. - 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 two sections should 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) Explain the stages of synthesis and purification of oligopeptides. **[10]**

Q2) Explain any one strategy for development and screening of drug. **[10]**

Q3) Write notes on : **[10]**

a) Applications of synthetic polysaccharide.

b) Oligonucleotides in diagnostics.

SECTION - II

Q4) Explain the advantages and applications of high throughput screening. **[10]**

Q5) Explain any one method of synthesis of oligonucleotide. **[10]**

Q6) Write notes on : **[10]**

a) Importance of linker.

b) Applications of synthetic oligopeptides.

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Total No. of Questions : 8]

SEAT No. :

P816

[Total No. of Pages : 2

[4138] - 11
M.Sc. (Sem. - I)
BIOTECHNOLOGY
BT - 11 : Biological Chemistry - I
(2005 Pattern)

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) a) Define the terms Macromolecule and Biomolecule. State their salient features. **[8]**

b) What are amino acids? Mention their properties. What is their biological function? **[8]**

Q2) What are lipids? What is their chemical composition? Explain the biochemical turnover of lipids in plants. **[16]**

Q3) What are enzymes? State at least two schemes of classification of enzymes. Add a note on function of coenzyme and cofactor in biological activity of an enzyme. **[16]**

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

a) Glycogen metabolism.

b) Allostery.

SECTION - II

Q5) State the principles of spectroscopy. Mention the types of spectroscopy and explain any one. **[16]**

P.T.O.

Q6) State the principles of electrophoresis. Mention the types of electrophoresis and explain any one. **[16]**

Q7) What is a gene? Explain its organisation and structure. **[16]**

Q8) Write notes on: **[16]**

a) Post translational modification of protein.

b) DNA replication in eukaryotes.

Total No. of Questions : 8]

SEAT No. :

P817

[Total No. of Pages : 2

[4138] - 12
M.Sc.
BIOTECHNOLOGY
BT - 12 : Cell Biology
(2005 Pattern) (Sem. - I)

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) Explain a living eukaryotic cell as a structurally and functionally organised system. **[16]**

Q2) Illustrate the micromorphology of a cell as revealed through transmission electron microscopy. **[16]**

Q3) Explain the molecular organisation of biomembranes add a note on structure - function relationship. **[16]**

Q4) Write explanatory notes on: **[16]**

a) Signal transduction.

b) Cell signalling.

SECTION - II

Q5) Explain the cell-cell and cell matrix interactions. **[16]**

Q6) What is meant by cell lineage? How is it maintained? Explain in the context of developmental biology. **[16]**

P.T.O.

Q7) Explain biogenesis of plastids. Enlist the types of plastids and explain ultrastructure of a chloroplast. **[16]**

Q8) Write explanatory notes on: **[16]**

a) Structure and function of plasmodesmata.

b) Cytosenescence in plant cells.

Total No. of Questions : 8]

SEAT No. :

P818

[Total No. of Pages : 2

[4138] - 13
M.Sc. (Sem. - I)
BIOTECHNOLOGY
BT - 13 : Quantitative Methods
(2005 Pattern)

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) Explain the types of distribution - Binomial, Poisson and normal. Add a note on their characteristics. **[16]**

Q2) Enlist the tests of significance. Explain any two such tests and state their application. **[16]**

Q3) What is calculus? Explain differential and integral calculus and their application in biomathematics. **[16]**

Q4) Write explanatory notes on: **[16]**

a) Applications of differential equations in chemistry.

b) Randomized block design.

SECTION - II

Q5) Enlist the basic units of a basic computer system. Mention the function of each unit. **[16]**

Q6) Explain the concept of operating system. Mention various operating systems and state the advantages and limitations of any two systems. **[16]**

P.T.O.

Q7) Explain: **[16]**

a) Virus in the context of a computer system.

b) Search engines and their use.

Q8) Write explanatory notes on: **[16]**

a) Modem.

b) Network Security.

Total No. of Questions : 6]

SEAT No. :

P819

[Total No. of Pages : 2

[4138] - 21
M.Sc.
BIOTECHNOLOGY
BT - 21 : Molecular Biology
(Sem. - II) (2005 Pattern)

Time : 3 Hours] *[Max. Marks : 80*

Instructions to the candidates:

1) ***Question No. 1 is compulsory. Out of the remaining attempt 4 questions.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***

Q1) a) Discuss the mechanism of homologous recombination. **[5]**

b) Comment on the organization of viral genomes. **[5]**

c) Explain the mechanism by which protoxcogenes can become oxcogenic. **[5]**

d) Describe the method for sex determination in Drosophilla. **[5]**

Q2) a) Explain the gene sequence complexity between prokaryotes and Eukaryotes. **[8]**

b) Enlist the enzymes involved in the DNA modification. Add a note on DNA methylation and its importance. **[7]**

Q3) a) Explain the post transcriptional modification of RNA in Eukaryotes. **[5]**

b) Explain the mechanism of translation in Prokaryotes. **[5]**

c) Discuss the chloroplast genome with reference to nuclear genome. **[5]**

Q4) Write short notes on: **[15]**

a) Homeotic transformation.

b) Cot curve.

c) D Nase I foot printing.

P.T.O.

Q5) a) Explain the molecular basis of development in animals. **[7]**

b) Genetic code is redundant & degenerate. Justify. **[8]**

Q6) a) Discuss the different models of DNA replication. **[7]**

b) What are the physical & chemical agents causing DNA damage. Add a note on repair mechanism for it. **[8]**

Total No. of Questions : 4]

SEAT No. :

P820

[Total No. of Pages : 1

[4138] - 22
M.Sc. (Sem. - II)
BIOTECHNOLOGY
BT - 22 : Genetics
(2005 Pattern)

Time : 1 1/2 Hours] *[Max. Marks : 40*

Instructions to the candidates:

1) ***Question No. 1 is compulsory. Out of the remaining attempt 2 questions.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Your answers will be valued as a whole.***

Q1) Write short notes on any four of the following: **[4 x 2.5 = 10]**

a) Co-dominance.
b) Molecular clock.
c) Genetic death.
d) Heterosis.
e) 'Knock-out' mice.

Q2) a) Explain the control of gene expression in bacteria with tryptophan operon. **[5]**

b) Illustrate on Gene mapping in bacteria. **[5]**

c) Give an account of transposable and is elements in organisms. **[5]**

Q3) a) Define 'Epistasis'. Explain with suitable example. **[5]**

b) 'External Environment plays an important role in expression of genes'. Discuss with suitable examples. **[5]**

c) Enlist types of likages. Discuss physical basis of linkage. **[5]**

Q4) a) Give an account of types of mutations. **[5]**

b) Explain any one mode of DNA transfer in bacteria. **[5]**

c) Write a note on detection of DNA damage at molecular level. **[5]**

Total No. of Questions : 4]

SEAT No. :

P821

[Total No. of Pages : 1

[4138] - 23
M.Sc. (Sem. - II)
BIOTECHNOLOGY
BT - 23 a : Microbiology
(Theory) (2005 Pattern)

Time : 1 1/2 Hours] *[Max. Marks : 40*

Instructions to the candidates:

1) ***Question No. 1 is compulsory. Out of the remaining attempt 2 questions.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***

Q1) a) Give the importance of the nutrients used in a microbiological media. **[5]**

b) Explain the pathogenesis of Mycobacterium tuberculosis. **[5]**

Q2) a) What is growth curve? Discuss the different phases in the growth of bacteria with its kinetics. **[8]**

b) Differentiate between the dry heat & wet heat sterilization. **[7]**

Q3) Write short notes on: **[15]**

a) Biotransformation.

b) Maintainance energy.

c) Multiple drug resistance.

Q4) a) Comment upon the nutrient uptake and ATP formation during the bacterial growth. **[5]**

b) Give the applications of PCR technology in the diagnostic microbiology. **[5]**

c) Discuss the precautions to be taken during the handling of pathogens. **[5]**

Total No. of Questions : 8]

SEAT No. :

P825

[Total No. of Pages : 2

[4138] - 31

M.Sc. (Sem. - III)

BIOTECHNOLOGY

BT - 31 : Tissue Culture (Plant & Animal)

(2005 Pattern)

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 should 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 transgenic plants? Explain the methodology used for the production of transgenic plant with suitable example. **[16]**

Q2) a) Give an account of types and applications of somaclonal variations in brief. **[8]**

b) Role of haploids and triploids plant breeding. **[8]**

Q3) a) Write a note on Skoog-Miller ratio. **[8]**

b) Mention the mode and mechanism of cytokinins in PTC. **[8]**

Q4) a) Explain the different ways for the production of in vitro secondary metabolites. **[8]**

b) Describe the types of cell suspension culture. Add a note on growth pattern during this type of culture. **[8]**

SECTION - II

Q5) a) Comment on the methods used for genetic manipulation of animal cells. **[8]**

b) Explain the procedure for the development of primary culture & comment on its characteristics. **[8]**

P.T.O.

Q6) a) Animal cell lines are used as a screening system for cylolonicity of drugs. Justify. **[8]**

b) Give an account on the methods used for storage & transport of animal cell lines. **[8]**

Q7) a) Discuss the response of tropic factors on cell and organ culture. **[8]**

b) Explain the significance of flow cytometer in separation of animal cell types. **[8]**

Q8) Write short notes on: **[16]**

a) Cell hybridization.

b) Cross contamination.

c) Viral sensitivity of cell lines.

d) Importance of serum.

Total No. of Questions : 6]

SEAT No. :

P829

[Total No. of Pages : 1

[4138] - 35
M.Sc.
BIOTECHNOLOGY
BT - 35 : Pleuripotent Cell Technologies and Reproduction
(Sem. - III) (2005 Pattern)

Time : $1\frac{1}{2}$ *Hours]* *[Max. Marks : 40*

Instructions to the candidates:

1) ***Attempt a total of four 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) Enlist the stages and processes during early development in animals. Explain any one. **[10]**

Q2) a) Explain with the help of a suitable example, differentiation of any one cell type in animals. **[5]**

b) Illustrate the ultrastructure of a male gamete of any one animal system. **[5]**

Q3) Write notes on: **[10]**

a) Embryonic stem cells-special features.

b) Cell lineages in C. elegans.

SECTION - II

Q4) Mention embryonic stem cell technologies explain any one. **[10]**

Q5) a) Explain the applications of knockout models. **[5]**

b) Outline the procedure of gene therapy. **[5]**

Q6) Write notes on: **[10]**

a) Pleuripotency.

b) Commitment as a developmental process.

Total No. of Questions : 8]

SEAT No. :

P830

[Total No. of Pages : 2

[4138] - 101
M.Sc. (Sem. - I)
BIOTECHNOLOGY
BT - 11 : Advanced Biological Chemistry
(2008 Pattern)

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) What are the attributes of a macromolecule? Describe the characteristics of biomolecules Mention, Schematically, pathway of synthesis or degradation of any one biomolecule. **[16]**

Q2) Explain 'acid base balance' in the context of a living system. How is such balance maintained in plant cell / animal cell /microbial cell? **[16]**

Q3) a) Enlist various types of chromatography. Explain any one as a separation technique? **[8]**

b) What is NMR? How does it help in determination of the structure of biomolecules? **[8]**

Q4) Write explanatory notes on:

a) Scope of metabolomics. **[8]**

b) Secondary Metabolites in therapeutics. **[8]**

P.T.O.

SECTION - II

Q5) What are soluble proteins? Explain their physico chemical properties. **[16]**

Q6) Enlist the factors responsible for stability and flexibility of protein structure. Explain the mechanism of maintenance of stability of proteins. **[16]**

Q7) Explain the types of interactions between protein and any one type of biomolecule cite appropriate example and state the mechanism of such interaction. **[16]**

Q8) Write explanatory notes on: **[16]**

a) Analytical methods of phytochemical investigation of natural products.

b) Phytochemical variation in species.

Total No. of Questions : 8]

SEAT No. :

P831

[Total No. of Pages : 2

[4138] - 102
M.Sc. (Sem. - I)
BIOTECHNOLOGY
BT - 12 : Molecular and Cell Biology
(2008 Pattern)

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 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) Explain with the help of an appropriate diagram the molecular structure of cell membrane. Enlist the functions of the cell membrane. **[16]**

Q2) Explain the mechanism of communication between cells and their environment. **[16]**

Q3) Enlist the membrane bound cell organelles. Explain ultra-structural organisation and functions of any one. **[16]**

Q4) Write explanatory notes on: **[16]**

a) Peculiar features of cells specialized for transport in plants.

b) Nutritional regulation of plant cell development.

SECTION - II

Q5) a) Describe the structure of a microspore of flowering plant. **[8]**

b) Explain the mechanism of cell to cell transport through parenchymatous ground tissue in plants. **[8]**

P.T.O.

Q6) a) Enlist the check points during cell division cycle. Explain molecular events at any two check points. **[8]**

b) Explain in brief differential gene expression during embronal development in plants. **[8]**

Q7) a) Mention the mechanisms of defence developed by a cell against pathogenic attack. Explain any one. **[8]**

b) What are X-linked immunodefficiencies? Explain one of them. **[8]**

Q8) Write explanatory notes on: **[16]**

a) Pharmacogenomics.

b) Genetic variability and evolution.

Total No. of Questions : 8]

SEAT No. :

P832

[Total No. of Pages : 2

[4138] - 103
M.Sc. (Sem. - I)
BIOTECHNOLOGY
BT - 13 : Environmental Biotechnology
(2008 Pattern)

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 in separate answer books.***
3) ***Neat diagrams must be drawn wherever necessary.***
4) ***Figures to the right indicate full marks.***

SECTION - I

Q1) What is bioenergy? How does it differ from chemical energy? Enlist the sources of bioenergy and explain the mechanism/process of harvesting bioenergy. **[16]**

Q2) What are genetically modified plants? Explain with appropriate examples the use of such plants to minimise soil pollution / contamination. **[16]**

Q3) Enlist the microbiological parameters for assessment of soil. Explain any one. **[16]**

Q4) Write explanatory notes on:

a) Biological treatment of municipal solid waste. **[8]**

b) Biomaterials as better alternative for non degradable materials. **[8]**

SECTION - II

Q5) What is bioremediation? Enlist different techniques of bioremediation. Explain any two techniques. Cite appropriate examples. **[16]**

P.T.O.

Q6) State the fundamentals of biological treatment of waste water. Explain any one advanced method of waste water treatment. **[16]**

Q7) What is conservation biotechnology? Enlist the methods of ex-situ conservation based on biotechnologies. Explain any one. **[16]**

Q8) Write explanatory notes on:

a) Bioindicators for detection of pollution. **[8]**

b) Significance of EIA. **[8]**

Total No. of Questions : 8]

SEAT No. :

P833

[Total No. of Pages : 2

[4138] - 201
M.Sc. (Sem. - II)
BIOTECHNOLOGY
BT - 21 : Genetic Engineering
(2008 Pattern)

Time : 3 Hours] *[Max. Marks : 80*

Instructions to the candidates:

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

SECTION - I

Q1) Write short notes on: **[16]**

a) Phage as a vector.

b) Replicon.

c) Alpha complementation.

d) Synthetic promoter used in expression vector.

Q2) a) Compare and contrast between insertional and replacement expression vector. Give example of each vector. **[8]**

b) Enlist and discuss the probes used for screening gene libraries. **[8]**

Q3) Describe the ideal characteristics of a vector used in genetic engineering. Add a note on genetic elements essential for expression of a protein. **[16]**

Q4) a) With a suitable example discuss the expression of industrially important recombinant proteins in prokaryotes. **[8]**

b) Comment upon the DNA modifying enzymes used in genetic engineering. Add a note on significance of single, double & partial digestion of DNA by restriction enzymes. **[8]**

P.T.O.

SECTION - II

Q5) a) Explain with a suitable example, method of protoplast fusion for gene transfer in plants. What are the advantages & disadvantages. **[8]**

b) What are the different methods used for physical mapping of genomes. How is it different from genetic mapping. **[8]**

Q6) a) Define genetically modified organisms. Explain with a suitable example of modified animal for vaccine production. **[8]**

b) Describe how the automated DNA sequencing has revolutionarised the study of human genome project. **[8]**

Q7) a) Give the principle & describe the phases of a typical polymerase reaction. Discuss the problems associated with it. **[12]**

b) How are the viral vectors useful in the treatment of genetic disorders. **[4]**

Q8) Write short notes on: **[16]**

a) Conditional knockout.

b) Random amplified Polymorphic DNA.

c) Hot start PCR.

d) Mus musculus (mice) model to study disorders.

Total No. of Questions : 8]

SEAT No. :

P834

[Total No. of Pages : 2

[4138] - 202
M.Sc. (Sem. - II)
BIOTECHNOLOGY
BT - 22 : Bioinformatics
(2008 Pattern)

Time : 3 Hours] *[Max. Marks : 80*

Instructions to the candidates:

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

SECTION - I

Q1) Write short notes on: **[16]**

a) Molecular docking.

b) Homology based gene prediction.

c) PHI BLAST.

d) Importance of 3D structure visualization tools.

Q2) a) Biological databases are the source of scientific information. Justify. **[8]**

b) What is energy minimization? Explain any one method used for energy minimization of protein. **[8]**

Q3) a) Discuss the role of the small molecule data base and chemical information in drug designing. **[8]**

b) What is substitution matrix? Explain the formation of BLOSUM 62. **[8]**

Q4) a) Define sequence alignment. Explain the types of algorithms used for sequence alignment. **[8]**

b) Give a comparative account on structural and sequential motifs. **[8]**

P.T.O.

SECTION - II

Q5) You are provided with two sequences with same function, one normal and one diseased. Write the road map for comparative structural analysis of the given sequences. Explain the tools used for each step with justification. **[16]**

Q6) a) Explain the methods used to predict epitope using bioinformatics tools. **[8]**

b) Enlist and explain the tools used for structural classification of proteins. **[8]**

Q7) a) Why is the 3D structure prediction necessary for protein analysis? Describe homology modelling. **[8]**

b) What is business model? Enlist and explain any one strategy used in Bioinformatics business. **[8]**

Q8) Write short notes on: **[16]**

a) Rule of five for drug molecule validation.

b) PDB.

c) CATH.

d) Microarray for gene expression.

Total No. of Questions : 8]

SEAT No. :

P835

[Total No. of Pages : 2

[4138] - 203
M.Sc. (Sem. - II)
BIOTECHNOLOGY
BT - 23 : Plant Biotechnology
(2008 Pattern)

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 on separate answer books.***
3) ***Neat diagrams must be drawn wherever necessary.***
4) ***Figures to the right indicate full marks.***

SECTION - I

Q1) a) Explain the biotechnological interventions for qualitative and quantitative improvement in yeast and filamentous fungi. **[8]**

b) Explain how somaclonal variations has helped the modern crop improvement programs. **[8]**

Q2) a) Most primitive plant types of algae can be exploited for the technology development. Justify. **[8]**

b) Describe the steps involved in micropropagation of a commercial crop plant. What are the factors influencing the micropropagation. **[8]**

Q3) a) Define and explain in vitro haploid production using techniques known to you with suitable examples. **[8]**

b) Explain the need for and technology used for plant derived vaccines. **[8]**

Q4) Write short notes on: **[16]**

a) Seed testing and certification.

b) Landmarks in plant biotechnology.

c) Vermiculture and Vermicomposting.

d) Biopesticides.

P.T.O.

SECTION - II

Q5) Give a comparative account for crop improvement using the conventional methods and the modern biotechnological methods. Add a note on biosafety precautions taken while releasing transgenic crops. **[16]**

Q6) a) Give the difference between Tolerance and Resistant. Discuss the approach used for BT cotton. **[8]**

b) How is the antisenes RNA technology used for production of transgenic plant varieties. **[8]**

Q7) a) Explain the method for cell suspension culture. How is it beneficial for the production of secondary metabolites. **[8]**

b) Describe the process for phyloremediation of pollutants in sewage and effluent water. **[8]**

Q8) Write short notes on: **[16]**

a) Methods for transgenic selection.

b) Ti plasmid.

c) Microprojectile bombardment for gene transfer.

d) Plant growth regulation.

Total No. of Questions : 8]

SEAT No. :

P836

[Total No. of Pages : 2

[4138] - 301
M.Sc. (Sem. - III)
BIOTECHNOLOGY
BT - 31 : Animal Biotechnology
(2008 Pattern)

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) Enlist the methods of purification of embryonic and adult stem cells. Explain any one method each for embryonic and adult stem cells. Add a note on application of embryonic stem cells in transplantation. **[16]**

Q2) Mention the types of animal cell culture. Describe the procedure of maintenance of any one type. Add a note on its growth kinetics. **[16]**

Q3) What contributes to the productivity of livestock? Mention the methods of artificial breeding of live stock animals. State advantages and hazards of artificial breeding. **[16]**

Q4) Write explanatory notes on: **[16]**

a) Gene banking.

b) Characterization of stem cells.

SECTION - II

Q5) What is IVF? Mention the critical steps in the procedure. Add a note on embryo transfer. **[16]**

P.T.O.

Q6) a) What are germ cells? How are they stored? **[8]**

b) Mention the advantages and limitations of IVF. **[8]**

Q7) What is a transgenic animal? Explain the procedure to develop a transgenic animal. **[16]**

Q8) Write explanatory notes on: **[16]**

a) Hazards of transgenic animals.

b) Applications of transgenic animals.

Total No. of Questions : 8]

SEAT No. :

P837

[Total No. of Pages : 2

[4138] - 302
M.Sc. (Sem. - III)
BIOTECHNOLOGY
BT - 32 : Fermentation Technology
(2008 Pattern)

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 each 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) Give an account of fermenter design and its importance. **[16]**

Q2) a) What is KLa? Describe different factors affecting it. **[8]**

b) Give a brief account of importance of immobilized cell reactors. **[8]**

Q3) a) Discuss the role of areation and agitation in large scale fermentation unit. **[8]**

b) Give a comparative account of development of cultivation system for aerobes and anaerobes. **[8]**

Q4) Write short notes on any four of the following: **[16]**

a) Role of Pre-cursors and inducers in fermentation.

b) Applications of molecular engineering in medicine with suitable examples.

c) Mutation as an agent for strain improvement.

d) Applications of Lactic acid bacteriain bioprocesses.

e) Aseptic operations and containment.

P.T.O.

SECTION - II

Q5) Explain in detail, types of bioreactors with suitable diagram. Add a notes on its different applications. **[16]**

Q6) a) What is solvent extraction? Write a short notes on its various types. **[8]**

b) Describe the downstream processing for production of any amino acid. **[8]**

Q7) a) Discuss the role of microbes as biocontrol agent. **[8]**

b) State the applications of biotransformation in waste management. **[8]**

Q8) Write short notes on any four of the following: **[16]**

a) Biomethanation system and its application.

b) Methods of Biotransformation.

c) Volumetric Mass transfer Co-efficient.

d) In-situ sterilization.

e) Hollow fiber react.

Total No. of Questions : 6]

SEAT No. :

P838

[Total No. of Pages : 1

[4138] - 303
M.Sc. (Sem. - III)
BIOTECHNOLOGY
BT - 33 a : Principles of Virology
(2008 Pattern)

Time : 1 1/2 Hours] *[Max. Marks : 40*

Instructions to the candidates:

1) ***Attempt a total of four 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) a) Explain in brief a scheme of classification of viruses. **[5]**

b) Illustrate the steps involved in replication of a virus. **[5]**

Q2) Explain the infection cycle of a virus with respect to adsorption, decapsidation, replication and budding off. **[10]**

Q3) Write notes on: **[10]**

a) Infectivity assays.

b) Vaccines (viral).

SECTION - II

Q4) What is meant by epidemiology? Mention the principles and scope of epidemiology? **[10]**

Q5) Enlist at least three plant viruses. Illustrate structure of any one. Mention the pathogenic effects of the virus. **[10]**

Q6) Write notes on: **[10]**

a) Swine flu.

b) Bacteriophage.

Total No. of Questions : 6]

SEAT No. :

P839

[Total No. of Pages : 1

[4138] - 304
M.Sc. (Sem. - III)
BIOTECHNOLOGY
BT - 33b : Advanced Immunology
(2008 Pattern)

Time :1½Hours] ***[Max. Marks :40***

Instructions to the candidates:

1) ***Attempt a total of four 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) What is meant by Immunity? How is it developed? Distinguish between the mechanisms of innate and induced immunity. **[10]**

Q2) Give a concise account of cell-cell interactions and signal transduction during immune response. **[10]**

Q3) Write notes on **[10]**

a) Techniques of molecular Immunology.

b) Transplant immunology.

SECTION - II

Q4) Explain the use of transgenic animals in immunological studies. **[10]**

Q5) Explain with appropriate examples immuno diagnostic procedures. **[10]**

Q6) Write notes on: **[10]**

a) Use of stem cell technology in immunology.

b) Attenuated Vaccines.

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Total No. of Questions : 8]

SEAT No. :

P840

[Total No. of Pages : 2

[4138] - 401
M.Sc.
BIOTECHNOLOGY
BT - 41 : Genomics and Proteomics
(2008 Pattern) (Sem. - IV)

Time :3Hours] ***[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 in separate answer books.***
3) ***Neat diagrams must be drawn wherever necessary.***
4) ***Figures to the right indicate full marks.***

SECTION - I

Q1) Elaborate the concept of structural Genomics. **[12]**

Q2) Explain the strategies for sequencing the entire genome of an organism. **[12]**

Q3) Explain **[12]**

a) Procedure for sequence data analysis.

b) Global analysis of gene expression.

Q4) Write explanatory notes on: **[12]**

a) Pharmacogenomics.

b) Toxicogenomics.

SECTION - II

Q5) What is Proteomics? Justify the recognition of structural proteomics and functional proteomics as separate branches. **[12]**

P.T.O.

Q6) Enlist the methodologies of proteomics and explain any one in detail. **[12]**

Q7) Explain with suitable example the computational approach to 'protein-protein interaction' analysis. **[12]**

Q8) Write explanatory notes on **[12]**

a) Proteomics and drug development.

b) Characterization of novel protein.

Total No. of Questions : 8]

SEAT No. :

P841

[Total No. of Pages : 2

[4138] - 402
M.Sc.
BIOTECHNOLOGY
BT - 42 : Legal and Ethical aspects in Biotechnology and IPR
(2008 Pattern) (Sem. - IV)

Time :3Hours] ***[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 books.***
3) ***Neat diagrams must be drawn wherever necessary.***
4) ***Figures to the right indicate full marks.***

SECTION - I

Q1) Enlist the intellectual property rights. Mention the authorities that are competent to confer such rights. **[12]**

Q2) Explain the background scope and limitations of a biotechnology patent with suitable example. **[12]**

Q3) Mention important clauses of the Indian Patent Act as applicable to a patent on biological product. **[12]**

Q4) Write explanatory notes on: **[12]**

a) Software copyright.

b) Registration of an Industrial design.

SECTION - II

Q5) State major changes in Indian patent system due to impact of TRIPS. **[12]**

P.T.O.

Q6) Explain the rights conferred on a patentee by a compentent authority. Add a note on benefits and validity of a patent. **[12]**

Q7) Mention any one industrial design relevent to biotech procedure. How would you proceed to protect the design as an IPR? **[12]**

Q8) Write explanatory notes on **[12]**

a) Plant breeders rights and their protection.

b) Budapest treaty.

Total No. of Questions : 6] **SEAT No. :**

P842 **[Total No. of Pages : 1**

[4138] - 403
M.Sc.
BIOTECHNOLOGY
BT - 43 : Clinical Research and Database Management
(2008 Pattern) (Sem. - IV)

Time :1½Hours] ***[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 in separate answer books.***
3) ***Neat diagrams must be drawn wherever necessary.***
4) ***Figures to the right indicate full marks.***

SECTION - I

Q1) What is FDA? What are its the rights, responsibilities and duties. **[10]**

Q2) Justify the importance of preclinical trials during the course of discovery to marketing of a drug. **[10]**

Q3) Write notes on **[10]**

a) Legislations that govern the process of clinical research.
b) Development of medical device.

SECTION - II

Q4) Explain the development and design of a protocol for clinical research. **[10]**

Q5) State the principles of data management and query resolution with reference to clinical research. **[10]**

Q6) Write notes on: **[10]**

a) Essentials of source documentation.
b) Reporting non serious adverse events.

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Total No. of Questions : 6]

SEAT No. :

P843

[Total No. of Pages : 1

[4138] - 404
M.Sc. (Sem. - IV)
BIOTECHNOLOGY
BT - 44a : Nanobiotechnology
(2008 Pattern)

Time :1½Hours] ***[Max. Marks :40***

Instructions to the candidates:-

1) ***Attempt a total of four 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) What does the prefix 'nano' in the word nanotechnology indicate? Mention in brief the scope of nanoscience in modern biology. **[10]**

Q2) Enlist the applications of nanoparticles in chemical sciences. Explain any one with the help of suitable example. **[10]**

Q3) Write notes on **[10]**

a) Nanowires and their application.

b) Activation of nanoparticles for biological application.

SECTION - II

Q4) What are biomolecules? Why do these function as nanostructures? Explain with appropriate example, application of a biomolecule in gene therapy. **[10]**

Q5) a) Explain how nanostructures are useful as effective biosensors. **[5]**

b) How are nanostructures synthesized in living organisms? **[5]**

Q6) Write notes on: **[10]**

a) Synthesis of nanoparticles in abiotic component of nature.

b) Use of nanostructures in drug delivery.

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Total No. of Questions : 8]

SEAT No. :

P844

[Total No. of Pages : 2

[4138] - 405
M.Sc. (Sem. - IV)
BIOTECHNOLOGY
BT - 44b : Stem Cell Technology and Regenerative Medicines
(2008 Pattern)

Time :3Hours] ***[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 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) Explain the developmental events that transform an egg into a Zygote. **[12]**

Q2) Explain the contribution of metabolic activation and cytoplasmic rearrangement to early development in animals. **[12]**

Q3) Explain **[12]**

a) Initiation and function of cell lineages.

b) Factors that control pattern formation.

Q4) Write notes on: **[12]**

a) Cell differentiation.

b) IVF and its applications.

SECTION - II

Q5) What are stem cells? How do these differ from other somatic cells? Mention the types of stem cells. **[12]**

P.T.O.

Q6) Mention the importance of stem cells in biotechnology. Explain any one embryonic stem cell based technology with respect to product (s) and application. **[12]**

Q7) What is meant by cloning? Mention some case studies from animal Kingdom. Explain any one with respect to Methodology, advantages and limitations.**[12]**

Q8) Write notes on: **[12]**

a) Gene therapy.

b) Bioethical issues related to human cloning.

Total No. of Questions : 8]

SEAT No. :

P845

[Total No. of Pages : 2

[4138] - 406
M.Sc. (Sem. - IV)
BIOTECHNOLOGY
BT - 44c : Agricultural Biotechnology
(2008 Pattern)

Time :3Hours] ***[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 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 anther culture and pollen culture with respect to methodology, products efficiency and applicability in agricultural biotechnology. **[12]**

Q2) What is meant by embryo rescue? Mention in vitro method of embryo rescue. Describe application of embryo rescue in agriculture. **[12]**

Q3) a) What are triploids? Explain the method of in vitro production of triploids. Add a note on the application of triploids in agriculture. **[6]**

b) What are apomicts? What is their significance in agriculture? Cite appropriate examples. **[6]**

Q4) Write notes on: **[12]**

a) Micropropagation of a pulse crop.

b) Somaclonal variations and their applications.

P.T.O.

SECTION - II

Q5) What is a bioreactor? How is it used to scale up multiplication of commercially important plants? **[12]**

Q6) a) What is marker assisted technology? What is its role in large scale production of plants? **[6]**

b) What is virus indexing? What is its significance in micropropagation? **[6]**

Q7) What are transgenic crops? What are the advantages of such crops? Outline the method of obtaining such crop for a specific attribute. **[12]**

Q8) Write notes on: **[12]**

a) Metabolic engineering.

b) Biopesticides.