Total No. of Questions : 3]

SEAT No. :

P554

[Total No. of Pages : 2

[4338]-12
M.Sc. (Semester - I)
BIOTECHNOLOGY
BT - 12 : Cell Biology
(Theory) (2005 Pattern)

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

Instructions to the candidates:

1) ***All questions are compulsory.***
2) ***Figures to the right indicate full marks.***
3) ***Draw neat labelled diagrams wherever necessary.***

Q1) Answer in short : **[20]**

a) Describe the term glyoxysome.

b) What is the endosymbiotic theory?

c) How do plasmodesmata help in the transfer of plant viruses?

d) Define the term annulus.

e) Describe anterograde transport in brief.

f) What is the function of proteasomes?

g) Comment on the role of cellulose microfibrils in maintaining turgor pressure of plant cells.

h) Differentiate between ER cisternae and ER lumen.

i) With suitable examples explain the term "transmembrane protein".

j) Discuss the role of the contractile ring in cytokinesis briefly.

Q2) Attempt any two : **[30]**

a) Write short notes on :
   i) Cyclic electron flow and its role in a plant cell.
   ii) The role of different molecules in cell cycle arrest at the DNA damage check points.

b) Answer the following :
   i) What is treadmilling? Explain the role of GTP in microtubule polymerization.
   ii) What are the advantages of embryonic stem cells over adult stem cells in therapeutic cloning?

c) Elucidate the role of the following :
   i) Proplastids and Etioplasts in the development of chloroplasts.
   ii) APC in separation of sister chromatids.

P.T.O.

Q3) Attempt any three **[30]**

a) Explain the principle of confocal microscopy and add a note on its use in Biology.

b) With the help of a diagram explain the death receptor pathway of apoptosis.

c) How do cytoplasmic structures predict the plane of cell division before mitosis begins in plant cells?

d) What are the characteristic features of nucleoporins that make up the nuclear pore complex?

e) Describe the role of pRb as a tumor suppressor protein in regulating cell cycle.

♦♦♦♦

Total No. of Questions : 3]

SEAT No. :

P555

[Total No. of Pages : 2

[4338]-13
M.Sc. (Semester - I)
BIOTECHNOLOGY
BT - 13 : Quantitative Methods
(2005 Pattern)

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

Instructions to the candidates:

1) ***All questions are compulsory.***
2) ***Figures to the right indicate full marks.***
3) ***Use of Non - programmable calculator is allowed.***

Q1) Attempt the following all subquestions :

a) Explain the "FUNCTIONAL BLOCK DIAGRAM" of computer. **[10]**

b) Explain the following terms with suitable example : **[5]**

i) Population

ii) Sample.

Also explain "simple random sampling method".

c) A thermometer reading 75°F is taken out, where the temperature is 20°F. 4 minutes later, the reading is 30°F. Find the thermometer reading 7 minutes after the thermometer was brought outside. **[5]**

Q2) Attempt any TWO of the following.

a) i) Explain any two "OUTPUT" devices. **[10]**

ii) Compute median and mode for the following data : **[5]**

Age in years	20-29	30-39	40-49	50-59	60-69	70-79	80-89
No. of patients	55	93	113	90	85	72	34

b) i) What is an "OPERATING SYSTEM"? Explain its functions. **[10]**

ii) Estimate the missing term using the relation between Δ & E. **[5]**

x	0	1	2	3	4
y	1	3	9	–	81

P.T.O.

c) i) Describe four different "NETWORK TOPOLOGIES". **[10]**

ii) Write the test procedure for testing "Independence of two attributes". **[3]**

iii) Show that the following differential equation is exact. **[2]**

$$(3xy^2 - x^2)dx + (3x^2y - 6y^2 - 1)dy = 0$$

Q3) Attempt any THREE of the following.

a) i) Describe "OSI reference Model" in brief. **[5]**

ii) A random sample of 40 emergency reports was selected from the files of an ambulance service. The mean time (computed from sample) required for ambulance to reach their destinations was 13 minutes with standard deviation 3 minutes.
However the ambulance service claims average time to reach destination 10 minutes.
At 5% level of significance, what is your conclusion? **[5]**

b) i) Distinguish between "RAM" and "ROM". **[5]**

ii) Solve the following system of linear equations using matrix inversion : **[5]**
$x + 3y + 3z = 2$; $x + 4y + 3z = 1$; $x + 3y + 4z = 3$.

c) i) Write a note on "UNIX" operating system. **[4]**

ii) Define the following terms : **[2]**
1) Level of significance.
2) Test statistic.

iii) Evaluate $\int_0^2 x^3 e^{x^2} dx$. **[4]**

d) i) Explain different services of "INTERNET". **[4]**

ii) In a study of obesity the following results were obtained from samples of males and females between ages of 20 and 75 years. **[4]**

	No. of observations	No. of overweight
Male	150	21
Female	200	48

Can we conclude from these data that in the sampled populations there is a difference in proportions, who are overweight? (use $\alpha = 5\%$).

iii) Find $\frac{dy}{dx}$ if, $y = e^x(2x^3 - 1)$ **[2]**

♦♦♦♦

Total No. of Questions : 6]

SEAT No. :

P556

[Total No. of Pages : 2

[4338] - 21
M.Sc. (Semester - II)
BIOTECHNOLOGY
BT-21 : Molecular Biology
(2005 Pattern)

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

Instructions to the candidates :

1) ***Question Nos. 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) Give the importance of DNA repair mechanisms. **[5]**

b) Explain the genetic code used for protein synthesis. **[5]**

c) Differentiate between the protooncogenes and oncogenes. **[5]**

d) Explain chromatin remodelling in relation to gene expression. **[5]**

Q2) a) Give the mechanism of action of DNA Polymerase during replication. Add a note on the types of polymerases. **[8]**

b) Discuss the mitochondrial genome with reference to nuclear genome. **[7]**

Q3) a) How is the mechanism of translation in prokaryotes different from eukaryote **[8]**

b) Explain the enzymes involved in DNA modification. Give their importance. **[7]**

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

a) Sequence complexicity in eukaryote

b) Chemical agents causing DNA damage.

c) DNA melting and buoyant density.

P.T.O.

Q5) a) Describe the techniques used to understand DNA - protein interaction. **[8]**

b) Describe the homeotic gene complexes that determine pattern formation in Drosophillo. **[7]**

Q6) a) Define recombination. Give a comparative between homologous and non - homologous recombination. **[8]**

b) Explain the structure and mechanism of action of RNA polymerases. **[7]**

♦♦♦♦

Total No. of Questions : 4]

P557

SEAT No. : ____

[Total No. of Pages : 1

[4338] - 22
M.Sc. (Semester - II)
BIOTECHNOLOGY
BT - 22 Genetics
(2005 Pattern)

Time : 1½ Hours] ***[Max. Marks :40***

Instructions to the candidates :

1) ***Question No. 1 is compulsory. Out of 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 × 2.5 = 10]**

a) Law of Independent Assortment.

b) Hardy - Weinberg law

c) Polyploidy

d) Incomplete dominance

e) Prototrophs

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

b) What is linkage? Explain how it can be used for gene mapping. **[5]**

c) Explain IS elements in bacteria. **[5]**

Q3) a) Define gene interaction. Explain any one gene interaction with suitable example. **[5]**

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

c) Define linkage and crossing over. Add a note on double crossovers. **[5]**

Q4) a) Enlist chemical mutagens. Discuss the mechanism of action any typical mutations caused by any one of them. **[5]**

b) Define transformation. Explain the formation of competent cells and DNA transfer by transformation. **[5]**

c) Explain importance of hybridisation in plant improvement. **[5]**

♦♦♦♦

Total No. of Questions : 4]

SEAT No. : ____

P558

[Total No. of Pages : 1

[4338] - 23
M.Sc. (Semester - II)
BIOTECHNOLOGY
BT - 23a : Microbiology
(2005 Pattern)

Time : 1½ 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 growth kinetics involved in the phases of bacterial growth curve. **[10]**

Q2) a) Describe the crown gall formation mechanism in Agrobacterium. Add a note on nitrogen fixation. **[8]**

b) Discuss the Pathogenicity of Mycobacterium tuberculosis. What precautions should be taken while handling Pathogens. **[7]**

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

a) Multiple drug resistance

b) Preservation of bacteria

c) Anaerobes

Q4) a) Explain the physical & chemical methods of sterilization. **[5]**

b) Describe the method of ethanol production using micro organisms. **[5]**

c) Comment on the classification and life cycle of cyanobacteria. **[5]**

♦♦♦♦

Total No. of Questions : 4]

SEAT No. :

P559

[Total No. of Pages : 1

[4338] - 24
M.Sc. (Semester - II)
BIOTECHNOLOGY
BT - 23b : Virology
(2005 Pattern)

Time : 1½ 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 morphology. Ultrastructure and steps involved in replication of a typical RNA virus. **[10]**

Q2) a) Explain the laboratory tests used in viral diagnosis. **[7]**

b) Comment on the candidature of protein and DNA as the vaccine candidate. **[8]**

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

a) Vaccine trials

b) Si RNAs

c) Bacteriophages

Q4) a) Describe the method for propagation of animal viruses. **[5]**

b) Enlist and explain any one method to study the viruses. **[5]**

c) Give the molecular basis for virus - induced immunodeficiency (AIDS) **[5]**

♦♦♦♦

Total No. of Questions : 4]

P560

SEAT No. : ____

[Total No. of Pages : 1

[4338] - 25
M.Sc. (Semester - II)
BIOTECHNOLOGY
BT-24 : Immunology
(2005 Pattern)

Time : 1½ Hours] ***[Max. Marks :40***

Instructions to the candidates :

1) ***Question Nos. 1 are 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 a comparative account on BCR and TCR. Add a note on rδTCR. **[10]**

Q2) a) Discuss the mechanism of immune response to viral and bacterial lymphatic infection. **[8]**

b) Describe the structure and function of antibody. **[7]**

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

a) Secondary signalling.

b) Hypersensitivity.

c) Autoimmune diseases.

Q4) a) Describe the mechanism of MHC peptide interaction. **[5]**

b) Explain the B - cell ontology. **[5]**

c) Explain the major events in the inflammatory responses. **[5]**

♦♦♦♦

Total No. of Questions : 4]

P561

SEAT No. : ____

[Total No. of Pages : 1

[4338] - 26
M.Sc. (Semester - II)
BIOTECHNOLOGY
BT - 25 : Bioinformatics
(2005 Pattern)

Time : 1½ Hours] ***[Max. Marks :40***

Instructions to the candidates :

1) ***Question Nos. 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) What is sequence Alignment? Give full account of pairwise sequence alignment. **[10]**

Q2) a) Write in detail "Homology Based Gene Prediction". **[5]**

b) Write difference between Local & Global Alignment. **[5]**

c) What is classification of protein? Explain with the help of CATH Topology. **[5]**

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

a) BLAST

b) Gen Bank

c) Pattern searching.

Q4) a) Explain in detail Ab initio structure prediction of proteins. Give name of the tools used in Ab initio prediction. **[8]**

b) What is Entrez? Explain the information retrieval system by Entrez. **[7]**

♦♦♦♦

Total No. of Questions : 8]

SEAT No. :

P562

[Total No. of Pages : 1

[4338]-31
M.Sc. (Semester - III)
BIOTECHNOLOGY
BT - 31 : Tissue Culture (Plant and Animal)
(2005 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) What is micropropagation? Mention its stages, advantages and limitations. **[16]**

Q2) Enlist the incubation systems used for plant tissue and cell culture. Explain any one system. Add a note on its advantages. **[16]**

Q3) Explain the procedure for obtaining plant protoplasts. Enlist the applications of isolated plant protoplasts and explain any one. **[16]**

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

a) Redifferentiation in vitro.
b) Hormonal regulation of in vitro morphogenesis.
c) GM crops

SECTION - II

Q5) Explain advantages and limitations of serum free media in animal cell & tissue culture. **[16]**

Q6) How are three dimensional cultures established and maintained? What are the advantages and applications of three dimensional cultures? **[16]**

Q7) Explain the basis and procedure of cryopreservation. What are its applications in animal cell and tissue culture? **[16]**

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

a) Stem cell culture.
b) Maintenance of cell lines.
c) Cell disaggregation.

♦♦♦♦

Total No. of Questions : 6]

P563

SEAT No. : ____

[Total No. of Pages : 1

[4338] - 32
M.Sc. (Semester - III)
BIOTECHNOLOGY
BT-32 : Fundamentals of Genetic Engineering
(2005 Pattern)

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 is a cDNA library? Explain the method for construction of cDNA library. **[10]**

Q2) What are expression vectors? Mention such vectors in bacteria and describe salient features of any one such vector. **[10]**

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

a) Site directed mutagenesis.

b) Southern blotting.

SECTION - II

Q4) Explain the method of screeing and selection of transformant. Cite an appropriate example. **[10]**

Q5) Enlist the methods of transformation in vitro. Explain any one method to obtain genetically transformed plant cells. **[10]**

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

a) YAC

b) Chimeric constructs.

♦♦♦♦

Total No. of Questions : 6]

SEAT No. : ____

P564

[Total No. of Pages : 1

[4338] - 33

M.Sc. (Semester - III)

BIOTECHNOLOGY

BT-33 : Biological Chemistry - II

(2005 Pattern)

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 is electrophoresis? Mention its types and explain any one. **[10]**

Q2) Explain the use of ion exchange chromatography for purification of proteins. **[10]**

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

a) Ramchandran plot.

b) Protein sequencing

SECTION - II

Q4) Explain the salient features of tertiary structure of proteins. **[10]**

Q5) How is differential centrifugation employed for cell fractionation? Add a note on isolation of any one cell fraction. **[10]**

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

a) MALDI. TOF

b) Micro arrays.

♦♦♦♦

Total No. of Questions : 6]

SEAT No. :

P565

[Total No. of Pages : 1

[4338] - 34
M.Sc. (Semester - III)
BIOTECHNOLOGY
BT-34 : Biochemical Engineering
(2005 Pattern)

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) Compare advantages and limitations of mechanically agitated and nonmechanically agitated fermenters. **[10]**

Q2) Explain the process of gas liquid mass transfer of oxygen. **[10]**

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

a) Bioprocess scale up.

b) Heat transfer mechanism in bioreactors.

SECTION - II

Q4) Enlist the types of aerators used for bioprocesses. Explain the function of any one. **[10]**

Q5) How do shear stress and shear rate affect the broth rheology? **[10]**

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

a) Types of valves in a bioreactor.

b) Reynolds number.

♦♦♦♦

Total No. of Questions : 6]

SEAT No. :

P566

[Total No. of Pages : 1

[4338] - 35

M.Sc. (Semester - III)

BIOTECHNOLOGY

BT - 35 : Pleuripotent Cell Technologies and Reproduction

(2005 Pattern)

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 is oogenesis? Explain the nucleo cytoplasmic changes associated with it. **[10]**

Q2) Explain the role of primary embryonic induction in the process of cell differentiation. **[10]**

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

a) Embryonal stem cells.

b) Transgenic animals.

SECTION - II

Q4) Enlist the techniques used in development of transgenic animals and explain any one. **[10]**

Q5) Explain the cellular and subcellular processes involved in pattern formation in Drosophila embryo. **[10]**

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

a) Salient features of adult stem cells.

b) Gene therapy.

♦♦♦♦

Total No. of Questions : 8]

SEAT No. :

P567

[Total No. of Pages : 2

[4338] - 101
M.Sc. (Semester - I)
BIOTECHNOLOGY
BT-11 : Advanced Biological Chemistry
(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.***
5) ***All questions carry equal marks.***

SECTION - I

Q1) a) What are biological buffers? Explain bicarbonate system for maintaining acid - base balance. **[8]**

b) Give principle and application of ISO - electric focussing. **[8]**

Q2) a) Differentiate between analytical and preparative centrifugation with suitable example. **[8]**

b) Explain the term metabolic engineering with representative example. **[8]**

Q3) a) Discuss the physical basis of peak broadening in chromatography with example. **[8]**

b) Give the types of secondary metabolites of plant origin. State the use of any one type in agriculture. **[8]**

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

a) Electroendoosmosis.

b) Metabolic flux analysis.

c) Chemical shift.

d) Redox potential.

P.T.O.

SECTION - II

Q5) Describe the non covalent forces that control the protein structure with illustrative example. **[16]**

Q6) a) Discuss the importance of multienzyme complexes in natural product biosynthesis. **[8]**

b) Describe Jacques Monads (MWC) model for allosteric transitions of protein. **[8]**

Q7) a) Enlist the types of terpenoids and give the steps involved in biosynthesis of terpenoids. **[8]**

b) Explain the role of proteins in membrane organisation. **[8]**

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

a) Use of herbals in medicine.

b) Protein engineering.

c) Chow - Fasman method.

d) Pharmacological activities of phenolics.

♦♦♦♦

Total No. of Questions : 8]

SEAT No. :

P568

[Total No. of Pages : 2

[4338] - 102
M.Sc. (Semester - I)
BIOTECHNOLOGY
BT - 12 : Molecular and Cell Biology
(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.***
5) ***All questions carry equal marks.***

SECTION - I

Q1) a) Enlist the major differences between oxidative phosphorylation and photo phosphorylation. **[8]**

b) What are the major features of F_1 F_0 ATPase complex? **[8]**

Q2) a) Describe in detail the modulation of cytosolic Ca^{++}. **[8]**

b) Highlight the role of inositol - 1, 4, 5 triphosphate in Ca^{++} signaling pathway. **[8]**

Q3) a) Describe the external respiration. **[8]**

b) What are the factors on which efficient external respiration depends upon? **[8]**

Q4) a) Describe the physiological and metabolic effects of epinephrine. **[8]**

b) How does skin contributes to the regulation of body temperature? **[8]**

SECTION - II

Q5) a) What do you understand by differential gene expression? **[8]**

b) How does the environmental factors influence expression of gene? **[8]**

Q6) a) What are interferons? Describe the cellular process involved in Innate defense mechanism. **[8]**

b) Describe natural defense against diseases in animals. **[8]**

P.T.O.

Q7) a) What is the role of gene promoter like TATA boxes? **[8]**

b) How does the "machinery" of the cell know where to begin reading the gene. **[8]**

Q8) a) "Ribosomes are the work benches for translation". Justify the statement. **[8]**

b) Describe the role of genetic variation and natural selection in evolution. **[8]**

♦♦♦♦

Total No. of Questions : 8]

SEAT No. : ____

P569

[Total No. of Pages : 1

[4338] - 103
M.Sc. (Semester - I)
BIO - TECHNOLOGY
BT-13 : Environmental 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 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 do you understand by non - conventional energy sources? Discuss the advantages, limitations and applications of geothermal energy. **[16]**

Q2) Write explanatory notes on : **[16]**

a) Use of genetically modified plants against pathogens.

b) Transport and diffusign of air pollutants.

Q3) Describe any one technique used in the measurement of noise pollution. Discuss various ways for control and abatement of noise pollution. **[16]**

Q4) Describe in detail the process of biodegradation of fungicides and pesticides in soil. **[16]**

SECTION - II

Q5) Explain in detail various strategies for phytoremediation. Give appropriate examples. Add a note on its applications. **[16]**

Q6) a) Explain the importance of flow and loading rate in biological waste water treatment. **[8]**

b) Explain advanced waste water treatment. **[8]**

Q7) What is the scope of conservation biotechnology? Explain the use of biotechnology - based methods for microbial conservation. **[16]**

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

a) Minas for industries and Ecomarks.

b) ISO 14000 standard series.

♦♦♦♦

Total No. of Questions : 8]

SEAT No. :

P570

[Total No. of Pages : 2

[4338]-201
M.Sc. (Semester - 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) Regulation of copy number in plasmids.

b) Chimeric construct.

c) Synthetic promoters used in expression vectors.

d) Construction of cDNA library.

Q2) a) Comment on the difference in strategies used for cloning prokaryote and eukaryote genes. **[8]**

b) Explain the mechanism and applications of lac operon in expression of industrially important products. **[8]**

Q3) a) Describe the methods used for screening and selection of transformed cells in gene library construction. **[8]**

b) i) Give the importance of topoisomerase & ligase enzyme.

ii) With suitable example describe a typical yeast expression vector. **[8]**

Q4) a) Give a comparative account between plasmid and phage as DNA carrier with respect to host, insert size, entry in host, efficiency and application. **[8]**

P.T.O.

b) i) Write a brief note on restriction enzymes, its types and role in genetic modification.

ii) Construct a restriction map for a 8.9 kb circular plasmid which is singly and doubly digested with 3 restriction enzymes, EcoRI, Bam HI and Hind III.

Following bands were obtained :
Eco RI – 8.9 kb
Bam HI – 6 kb & 2.9 kb
Hind III – 8.9 kb
EcoRI + Bam HI – 6.0 kb, 2.4 kb & 0.5 kb
EcoRI + Hind III – 7.4 kb & 1.5 kb
Bam HI + Hind III – 5 kb, 2.9 kb & 1 kb
EcoRI + Bam HI + Hind III – 5 kb, 2.4 kb, 1 kb, & 0.5 kb **[8]**

SECTION - II

Q5) a) What are Co - dominant markers? Explain the development of miciosatellite markers. **[8]**

b) Explain the technology used for creating the cloned sheep 'Dolly'. Give, reason for early death of Dolly at the age of 6 (normal sheeps live upto to 12 years). **[8]**

Q6) Write an assay on any two methods employed for transgenic plant development. Add a note on biosafety precautions taken while releasing transgenic plants. **[16]**

Q7) a) Explain the recipe for a typical polymerase chain reaction, commenting on the importance of each ingredient. **[8]**

b) Give the principle of Sanger's di - deoxy method for sequencing a gene. How automation in this technology been revolutionerised. **[8]**

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

a) Multiplex PCR.

b) Fusion proteins.

c) Cre - lox technology.

d) Amplified Fragment Length Polymorphism.

♦♦♦♦

Total No. of Questions : 8]

SEAT No. :

P571

[Total No. of Pages : 2

[4338]-202
M.Sc. (Semester - 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) Genetic algorithm.

b) PAM.

c) SMILE notation.

d) Secondary data resources.

Q2) a) What are motifs. Write in detail about sequential and structural motif with one example each. **[8]**

b) Using the BLAST tool we can find the homology between related organisms. Justify. **[8]**

Q3) a) Define gene expression informatics. Give the method and application of microarray in gene expression analysis. **[8]**

b) Give an account on progressive and non - progressive methods of multiple sequence alignment. **[8]**

Q4) Explain structure based drug designing using chemoinformatics. **[16]**

P.T.O.

SECTION - II

Q5) a) Give a comparative account between SCOP and CATH. **[8]**

b) How do you derive a Ramchandran plot. Give its applications in protein structure validation. **[8]**

Q6) a) What is epitope. Explain the methods used to predict the epitope using in - silico approach. **[8]**

b) Comment on the different routes to funding for research in India and world wide. **[8]**

Q7) a) Define structural bioinformatics. Discuss the importance of 3D structure prediction of protein. **[8]**

b) Explain the method and applications of microarray in gene expression analysis. **[8]**

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

a) Bioinformatics business model.

b) Structure - Function relationship in protein.

c) Substitution matrices.

d) Chou - Fasman algorithm.

♦♦♦♦

Total No. of Questions : 8]

SEAT No. :

P572

[Total No. of Pages : 2

[4338]-203
M.Sc. (Semester - 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) With a suitable example explain the methods used for increased production of secondary metabolites in vitro using plant cell cultures. Give the significance of in vitro method over the in viva. **[16]**

Q2) a) Comment on the methods used for seed improvement, testing and certification. **[8]**

b) Explain how clonal variations has helped the crop improvement programme using plant tissue culture technique. **[8]**

Q3) a) Explain qualitative and qvantitative improvement of economically important fungi using modern techniques. **[8]**

b) Give the traditional uses of algae. Discuss use of biotechnology for mass propagation of commercially important algal species. **[8]**

Q4) Write short notes on :

a) Plant growth regulators.

b) Somatic embryogenesis.

c) Biodiesel

d) Haploid production.

SECTION - II

Q5) a) Explain the biolistic - mediated DNA transfection of monocot plants for pest resistant transgenic plant. **[8]**

b) Give the importance of use of biofertilizers and vermiculture in modern agriculture practices. **[8]**

P.T.O.

Q6) What is plant transformation. With suitable example, explain the direct and indirect methods of DNA transfer to plants to produce the transgenic plants. **[16]**

Q7) a) Define the term molecular farming? Explain how plants can be used for production of pharmaceutical and cosmaceutical products. **[8]**

b) Describe the process of protoplast isolation, fusion and regeneration of plants. **[8]**

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

a) Single cell proteins.

b) Mass multiplication of forest trees.

c) Direct embryogenesis.

d) Applications of plant biotechnology in Agriculture.

♦♦♦♦

Total No. of Questions : 8]

P573

SEAT No. : ____

[Total No. of Pages : 2

[4338] - 301
M.Sc. (Semester - III)
BIOTECHNOLOGY
BT - 31 : Animal Biotechnology
(2008 Pattern)

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

Instructions to the candidates :

1) ***Attempt five questions selecting atleast two questions from each section.***

2) ***Answers to the sections must be written on separate answer sheets.***

3) ***Neat diagrams must be drawn wherever necessary.***

4) ***Figures to the right indicate full marks.***

SECTION - I

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

a) Factors governing female fertility.

b) Semen sexing technology.

Q2) Write briefly about : **[16]**

a) In vitro culture of embryos

b) Endocrinology of estrous cycle in animals.

Q3) a) Define two types of cell lines and how cell lines are characterized?

b) What test are carried out to find out breeding potential of males in large animals?

[16]

Q4) a) How embryonic stem cells are established and characterized?

b) Explain in vitro neoplastic transformation phenomenon.

[16]

P.T.O.

SECTION - II

Q5) Explain different methods for developing transgenic small laboratory animals? Give applications of such animals? **[16]**

Q6) Write notes on : **[16]**

a) Production of Insulin in milk.

b) Cre Lox system for gene transfer.

Q7) a) What is germ cell storage? Give one protocol how it is done.

b) Explain the concept of gene banking and its advantages.

[16]

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

a) Transgenic animals in meat production

b) Retrovirus mediated gene transfer.

♦♦♦♦

Total No. of Questions : 8]

SEAT No. :

P574

[Total No. of Pages : 2

[4338] - 302

M.Sc. (Semester - 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 atleast two 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 mass transfer by molecular diffusion in a fermenter. **[8]**

b) Discuss the kinetics of product formation by microbial culture in terms of growth linked products in batch and fed batch cultures. **[8]**

Q2) a) Explain why biotransformation is widely seen as Green alternative over conventional chemical routes. Outline the difference between cell and enzyme based biotransformation.

b) What is measure of volumetric oxygen transfer rate in a fermenter? How $K_L a$ is derived in a fermenter.

[16]

Q3) a) Describe significance of membrane filtration over centrifugation.

b) Discuss role of bio - control agents in integrated pest management. What are challenges in terms of acceptance of the same?

[16]

Q4) a) Explain isolation of products of biotransformation with suitable example.

b) What is Reynold's number? How it can be useful for to characterize fluid flow?

[16]

P.T.O.

SECTION - II

Q5) a) Which separation method is suitable for purification of monoclonal antibodies? What are the advantages of affinity chromatography over size exclusion chromatography?

b) Discuss different physical and chemical sensors in a fermenter? **[16]**

Q6) Outline downstream processing steps for the recovery of recombinant vaccine and Penicillin. **[16]**

Q7) Discuss genetic and metabolic pathway engineering as mean for microbial strain improvement. **[16]**

Q8) Describe design of a fermenter suitable for cultivation of mammalian cells and why? Explain immobilized cell reactors and hollow fiber bioreactors. **[16]**

♦♦♦♦

Total No. of Questions : 6]

SEAT No. : ____

P575

[Total No. of Pages : 1

[4338] - 303

M.Sc. (Semester - III)

BIOTECHNOLOGY

BT - 33a : Principles of Virology

(2008 Pattern)

Time : 1½ Hours] ***[Max. Marks :40***

Instructions to the candidates :

1) ***Attempt four questions selecting atleast Two Questions from each section.***
2) ***Answers to the sections must be written on separate answer sheets.***
3) ***Neat diagrams must be drawn wherever necessary.***
4) ***Figures to the right indicate full marks.***

SECTION - I

Q1) Write short notes **[10]**

a) Plaque assay

b) HIV genome structure

Q2) a) How disease progression is monitored using polymerase chain reaction?

b) What is mode of action of Acyclovir?

[10]

Q3) Give details of lytic cycle of Lambda bacteriophage. **[10]**

SECTION - II

Q4) Write notes on **[10]**

a) Persistent viral infections.

b) Foot and Mouth disease.

Q5) How HIV epidemiology is studied and how it can be effectively used for control of spread of HIV? **[10]**

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

a) Mosquito borne new emerging viral diseases.

b) Marek's disease.

♦♦♦♦

Total No. of Questions : 6]

SEAT No. :

P576

[Total No. of Pages : 1

[4338] - 304
M.Sc. (Semester - III)
BIOTECHNOLOGY
BT-33 b : Advanced Immunology
(2008 Pattern)

Time : 1½ Hours] *[Max. Marks :40*

Instructions to the candidates :

1) ***Attempt four questions selecting atleast Two from each section.***
2) ***Answers to the sections must be written in separate answer sheets.***
3) ***Neat diagrams must be drawn wherever necessary.***
4) ***Figures to the right indicate full marks.***

SECTION - I

Q1) a) Which are different hematopoetic growth factors that play role in immune system?

b) Give detailed information of structure and function of T cells including its surface markers.

[10]

Q2) a) How innate immunity prevents infections in animals?

b) Give structural details of spleen.

[10]

Q3) a) Describe immunity in Drosophila.

b) Give concise account of alternative pathway of compliment fixation.

[10]

SECTION - II

Q4) Write notes on **[10]**

a) Treatment of autoimmune disorder.

b) Large scale cultivation of hybridoma cells.

Q5) Give detailed accounts of humanized antibody preparation. **[10]**

Q6) a) How antibodies are used as therapeutic agents?

b) With suitable examples describe active immunization.

[10]

♦♦♦♦

Total No. of Questions : 8]

P577

SEAT No. :

[Total No. of Pages : 1

[4338] - 401
M.Sc. (Semester - IV)
BIO - TECHNOLOGY
BT-41 : Genomics and Proteomics
(2008 Pattern)

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) Discuss merits and demerits of shotgun sequencing and clone by clone approach used for whole genome analysis. **[12]**

Q2) What is comparative genomics? How is it useful in genome annotation? **[12]**

Q3) Give a brief account of any one of the following. **[12]**

a) ENCODE project.

b) Use of RNAi in functional genomics.

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

a) Mutagenesis in functional genomics.

b) Transcriptomics

c) SNP microarrays

SECTION - II

Q5) Explain the use of yeast 2 - hybrid system in functional proteomics. **[12]**

Q6) Explain any one technique used in structural proteomics. **[12]**

Q7) What are the methods used for identification and characterization of novel proteins? Explain any one method. **[12]**

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

a) Application of proteomics in drug development.

b) Proteomics in screening of diagnostic markers.

c) Protein - protein interactions a computational approach.

♦♦♦♦

Total No. of Questions : 8]

SEAT No. :

P578

[Total No. of Pages : 1

[4338] - 402

M.Sc. (Semester - IV)

BIO - TECHNOLOGY

BT - 42 : Legal and Ethical Aspects in Biotechnology and IPR

(2008 Pattern)

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? How is it different from other type of property? Mention various forms of IPR? **[12]**

Q2) Mention basic requirements for patenting an invention. Explain with the help of an appropriate example. **[12]**

Q3) a) State the rights of a patentee. **[6]**

b) How are software programs protected? **[6]**

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

a) Protection of plant varieties.

b) Protection of farmer's rights.

SECTION - II

Q5) State the major changes in Indian patent system in post TRIPS. Explain any one change. **[12]**

Q6) Explain the specifications to be provided for filing a patent in Biotechnology. Cite an appropriate example. **[12]**

Q7) Explain procedures for :

a) Patenting a biological product. **[6]**

b) Obtaing a process patent. **[6]**

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

a) Geographical Indications.

b) Commercial exploitation of Industrial designs.

♦♦♦♦

Total No. of Questions : 6]

SEAT No. :

P579

[Total No. of Pages : 1

[4338] - 403

M.Sc. (Semester - IV)

BIOTECHNOLOGY

BT-43 : Clinical Research and Data Base Management

(2008 Pattern)

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 organisation, responsibilities and authority of FDA. **[10]**

Q2) Mention at least three medical devices. Explain R and D activities with reference to any one device. **[10]**

Q3) Write notes on any two of the following : **[10]**

a) Importance of GMPs in large scale pharmaceutical production.

b) Marketing the herbal drugs.

c) Research and development of Biologics.

SECTION - II

Q4) What is a database? Mention important fields of information of a database for clinical research. Add a note on management of clinical database. **[10]**

Q5) Explain the steps involved in designing the clinical trials. Add a note on importance of clinical trials. **[10]**

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

a) Query resolution.

b) Protection of safety of human subjects.

c) GLPs for manufacture of pharmaceuticals.

♦♦♦♦

Total No. of Questions : 6]

SEAT No. :

P580

[Total No. of Pages : 1

[4338] - 404
M.Sc. (Semester - IV)
BIOTECHNOLOGY
BT - 44 a : Nanobiotechnology
(2008 Pattern)

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 with the help of appropriate examples, contribution of nanomaterials in Bioscience and Biotechnology. **[10]**

Q2) a) Mention the characteristic physico - chemical properties acquired by the materials due to nanosize. **[5]**

b) Justify any two biomolecules as nanostructures. **[5]**

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

a) Thin films and their application in biotechnology.

b) Gene therapy.

SECTION - II

Q4) Explain one in vivo and one in vitro method of synthesis of nanostructures. **[10]**

Q5) How are nanoparticles functionalized for biological application? Explain with an appropriate example. **[10]**

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

a) Nanobiotechnology in pharmacokinetics.

b) Nanowires and their application.

♦♦♦♦

Total No. of Questions : 8]

SEAT No. :

P581

[Total No. of Pages : 1

[4338] - 405

M.Sc. (Semester - IV)

BIOTECHNOLOGY

BT - 44 b : Stem Cell Technology and Regenerative Medicines

(2008 Pattern)

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 pattern formation? Mention developmental events with respect to any two patterns. **[12]**

Q2) Explain the subcellular events that lead to the differentiation of animal sperm cell. Add a note on the ultrastructure of the sperm. **[12]**

Q3) Explain the role of metabolic activation and cytoplasmic rearrangement in early development after zygote formation. **[12]**

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

a) Significance of cell lineages

b) Cell differentiation

SECTION - II

Q5) What is the scope and application of embryonic stem cell technology? Explain with an appropriate example. **[12]**

Q6) How are transgenic animals produced? Comment on the advantages and disadvantages of transgenic animals. **[12]**

Q7) Discuss possible advantages and ethical problems of human cloning. **[12]**

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

a) Advantages and limitations of gene therapy.

b) Knock outs.

♦♦♦♦

Total No. of Questions : 8]

SEAT No. :

P582

[Total No. of Pages : 1

[4338] - 406

M.Sc. (Semester - IV)

BIOTECHNOLOGY

BT - 44C : Agricultural Biotechnology

(2008 Pattern)

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) Explain the technique of embryo rescue and its application in agrobiotechnology. **[12]**

Q2) What is somaclonal variation? How are somaclonal variants obtained? What are their applications? **[12]**

Q3) Compare and contrast advantages and limitations of micropropagation and conventional vegetative propagation. **[12]**

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

a) Induced polyembryony

b) Use of haploids in agriculture

SECTION - II

Q5) What are transgenic plants? Mention their applications and explain any one. **[12]**

Q6) a) How is gametoclonal variation used for crop improvement? **[6]**

b) Describe any two methods to test fidelity of progeny raised through micro propagation. **[6]**

Q7) Explain the concept of metabolic engineering. Add a note on advantages and limitations of metabolic engineering. **[12]**

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

a) Importance of apomicts in agrobiotechnology.

b) Biopesticides

♦♦♦♦