Total No. of Questions : 8]

SEAT No. :

P1371

[Total No. of Pages : 2

[5439]-11
M.Sc.
BIOTECHNOLOGY
BT - 11 : Advanced Biological Chemistry
(2008 Pattern) (Semester - I)

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

Instructions to the candidates:

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

SECTION - I

Q1) a) Define secondary metabolites. Give its importance in agriculture. **[8]**

b) Explain the basis of gel permeation chromatography give its applications. **[8]**

Q2) a) Define the term resolution, partition coefficient and selectivity factor in chromatography give the ways to determine it. **[8]**

b) Explain the three prominent ways of metabolic regulation. **[8]**

Q3) a) Describe the steps involved in the shikimic acid pathway for secondary metabolites synthesis. **[8]**

b) How can we use ultracentrifugation for separation of proteins. How does the shape of protein affects the sedimentation coefficient. **[8]**

Q4) Write short notes on : **[8]**

a) Zone electrophoresis.

b) Metabolic flux.

c) Chemical shift.

d) Concept of thermodynamics in biological system.

P.T.O.

SECTION - II

Q5) Name any four major categories of secondary metabolites with their biosynthetic origin. Describe some key physical or identifying characteristics of each. **[16]**

Q6) a) Give a comparative account between two basic secondary structure of proteins. **[8]**

b) Discuss the methods for manipulations in metabolic pathways for increased production of secondary metabolites. **[8]**

Q7) a) Explain the possible reasons for the increase in demand of natural products in recent times. **[8]**

b) Protein is amino acid least commonly found in α-helices and regularly found in β-helices. Justify. **[8]**

Q8) Write short notes on: **[8]**

a) Homotropic & Heterotropic modification.

b) turnover of secondary metabolites.

c) Importance of hydrogen-bonding in protein structures.

d) Pharmacognosy.

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Total No. of Questions : 8]

SEAT No. :

P1372

[Total No. of Pages : 2

[5439]-12

M.Sc.

BIOTECHNOLOGY

BT - 12 : Molecular and Cell Biology

(2008 Pattern) (Semester - I)

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

Instructions to the candidates:

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

SECTION - I

Q1) a) Describe the effects of glucagon on blood glucose. **[8]**

b) Write a note on the structure of ATP synthase enzyme. **[8]**

Q2) a) What is photo respiration? Explain its significance. **[8]**

b) Explain the role of different genes involved in Drosophila development. **[8]**

Q3) a) Explain the role of caspases in programed cell death. **[8]**

b) Enlist the phospholipids present in the plasma membrane and justify the statement, "Plasma membrane is asymmetric in nature". **[8]**

Q4) Write short notes on the following:

a) Temperature regulation in reptiles. **[4]**

b) Non- cyclic photophosphorylation. **[4]**

c) Menstrual cycle. **[4]**

d) Hormones secreted by Pituitary gland. **[4]**

P.T.O.

SECTION - II

Q5) Justify the following statements.

a) "What you eat can change your gene expression". **[8]**

b) "White blood cells play many defensive role". **[8]**

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

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

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

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

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

Q8) Write short notes on:

a) Natural selection **[4]**

b) Mutation **[4]**

c) Genetic drift **[4]**

d) X-linked immuno deficiencies **[4]**

Total No. of Questions : 8]

SEAT No. :

P1373

[Total No. of Pages : 1

[5439]-13

M.Sc.
BIOTECHNOLOGY
BT-13 : Environmental Biotechnology
(2008 Pattern) (Semester-I)

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

Instructions to the candidates:

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

SECTION-I

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

Q2) Write explanatory notes on:

a) Water quality standards **[8]**

b) Noise pollution and it's control **[8]**

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

Q4) a) Explain physicochemical analysis of soil. **[8]**

b) Comment on municipal solid waste management strategies. **[8]**

SECTION-II

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

Q6) Write explanatory notes on:

a) Conservation Biotechnology **[8]**

b) ISO 14000 standard series **[8]**

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

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

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

Total No. of Questions : 8]

SEAT No. :

P1374

[Total No. of Pages : 2

[5439]-21
M.Sc.
BIOTECHNOLOGY
BT-21 : GENETIC ENGINEERING
(2008 Pattern) (Semester - II)

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

Instructions to the candidates:

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

SECTION - I

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

a) Alkaline phosphatases and ligases

b) Genomic DNA library

c) Cosmid

d) Transformation

Q2) a) Describe a typical yeast expression vector with one example. **[8]**

b) Describe the expression of any two industrially important products using recombinant DNA technology. **[8]**

Q3) a) Describe Southern blot technique and give its importance. **[8]**

b) Describe the methods used for screening c DNA libraries. **[8]**

Q4) a) Give the importance of DNases and RNases in genetic engineering. **[8]**

b) Write notes on shuttle vectors with examples. **[8]**

P.T.O.

SECTION - II

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

a) Taqman probes

b) RFLP

c) Primer designing for PCR

d) Genetic diseases

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

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

Q7) Write self-explanatory notes on

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

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

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

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

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Total No. of Questions : 8]

SEAT No. :

P1375

[Total No. of Pages : 2

[5439]-22
M.Sc.
BIOTECHNOLOGY
BT - 22 : Bioinformatics
(2008 Pattern) (Semester - II)

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

Instructions to the candidates:

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

SECTION - I

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

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

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

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

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

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

a) Energy optimization methods.

b) Structure base drug designing.

P.T.O.

SECTION - II

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

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

Q6) Write a note on

a) Gene expression informatics. **[8]**

b) Chemoinformatics. **[8]**

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

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

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

b) Explain bioinformatics business model. **[8]**

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Total No. of Questions : 8]

SEAT No. :

P1376

[Total No. of Pages : 2

[5439]-23
M.Sc. - I
BIOTECHNOLOGY
BT - 23 : Plant Biotechnology
(2008 Pattern) (Semester - II)

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

Instructions to the candidates:

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

SECTION - I

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

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

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

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

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

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

a) Significance of hardening/acclimatisation in micropropagation.

b) Single cell protein

c) Synthetic seeds

P.T.O.

SECTION - II

Q5) a) What is abiotic stress? Explain the use of transgenics in generation of drought tolerance in plants with available example. **[8]**

b) Transgenics can be used to increase photosynthetic efficiency-Justify. **[8]**

Q6) a) Explain the various approaches used to increase production of secondary metabolites in vitron cultures with suitable examples. **[8]**

b) What is protoplast fusion? Distinguish between somatic hybrids and cybrids. **[8]**

Q7) a) Elaborate on the use of transgenic in quality improvement of lipids. **[8]**

b) Write a note on mass multiplication of economically important horticulture plants. **[8]**

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

a) Edible vaccines.

b) Antisense RNA technology in transgenic.

c) Plant Biotechnology for improvement of pharmaceuticais.

Total No. of Questions : 8]

SEAT No. :

P1377

[Total No. of Pages : 2

[5439]-31

M.Sc. - II

BIOTECHNOLOGY

BT - 31 : Animal Biotechnology

(2008 Pattern) (Semester - III)

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

Instructions to the candidates:

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

SECTION - I

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

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

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

Q3) Explain **[16]**

a) Cell sorting

b) Gene banking

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

a) Methods of Tissue disaggregation.

b) Applications of Transgenic Animals.

c) Assessment of Proliferative Heterogeneity of stem cells.

P.T.O.

SECTION - II

Q5) Describe the method of Artifical insemination. Give the advantages and disadvantages of artificial insemination. **[16]**

Q6) Explain different methods of generate chimeric organisms. **[16]**

Q7) a) Mention the advantages and limitations of IVF. **[8]**

b) Describe the bioethical problems associated with transgenic animals. **[8]**

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

a) Embryonic stem cells

b) Embryo transfer technique

c) Cross contamination in ATC.

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Total No. of Questions : 8]

SEAT No. :

P1378

[Total No. of Pages : 2

[5439]-32

M.Sc.

BIOTECHNOLOGY

BT - 32 : Fermentation Technology

(2008 Pattern) (Semester - III)

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

Instructions to the candidates:

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

SECTION - I

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

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

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

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

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

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

a) Spargers

b) Inoculum build up

c) Bubble column Bioreactor

P.T.O.

SECTION - II

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

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

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

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

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

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

a) Biomethanation

b) Recovery of enzyme from fermentation broth.

c) Feed back regulation for control of Branched pathways.

Total No. of Questions : 6]

SEAT No. :

P1379

[Total No. of Pages : 1

[5439]-33
M. Sc.
BIOTECHNOLOGY
BT - 33A : Principles of Virology
(2008 Pattern) (Semester - III)

Time : 1½ Hour] *[Max. Marks : 40*

Instructions to the candidates:

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

SECTION - I

Q1) a) With neat labelled diagram describe structure of HIV. **[5]**

b) Describe concept of ID_{50}. **[5]**

Q2) Answer the following :

a) With neat labelled diagram describe replication of T_4 Phage. **[5]**

b) Give mode of action of **[5]**

i) Acyclovir ii) Azidothymidine

Q3) a) What is reassortment Vaccine? Give suitable example. **[5]**

b) Comment on importance of immunodiagnostic techniques in Virology. **[5]**

SECTION - II

Q4) a) Define : Prevalance, mortality, Incidence, Epidemics. **[5]**

b) Give reasons for emergence and reemergence of Viruses. **[5]**

Q5) a) Comment on Pathogenesis of Varicella Zooster Virus. **[5]**

b) Give an account on economical effects of plant Viruses. **[5]**

Q6) Write short note on : **[10]**

a) Different phases of clinical trials.

b) FMD Virus.

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Total No. of Questions : 6]

SEAT No. :

P1380

[Total No. of Pages : 1

[5439]-34
M.Sc.
BIOTECHNOLOGY
BT - 33B : Advanced Immunology
(2008 Pattern) (Semester-III)

Time : 1½ Hours] *[Max. Marks : 40*

Instructions to the candidates:

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

SECTION-I

Q1) a) Explain activation of cytotoxic T cells and process of CTL mediated immune response. **[5]**

b) Explain pathophysiology of systemic lupus erythromatosus. **[5]**

Q2) Answer the following: **[10]**

a) Explain complement activation pathway in innate immunity.

b) Explain any one technique in molecular immunology.

Q3) a) What is graf Vs host reaction. **[5]**

b) Give an account of primary lymphoid organs. **[5]**

SECTION-II

Q4) a) Comment on various animal models used and their application in immunological studies. **[5]**

b) Define : Chimeric antibodies. Describe their types in brief **[5]**

Q5) Answer the following: **[10]**

a) Explain use of labels in immunodiagnostics.

b) What are stem cells? How stem cells can be used in treatment of diseases.

Q6) Write short note on: **[10]**

a) Polyvalent Vaccines.

b) Phage display.

✓ ✓ ✓

Total No. of Questions : 8]

SEAT No. :

P1381

[Total No. of Pages : 1

[5439]-41
M.Sc.-II
BIOTECHNOLOGY
BT41 : GENOMICS & PROTEOMICS
(2008 Pattern) (Semester - IV)

Time : 3 Hours] *[Max. Marks : 60*

Instructions to the candidates:

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

SECTION - I

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

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

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

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

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

SECTION - II

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

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

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

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

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

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

✓ ✓ ✓

Total No. of Questions : 8]

SEAT No. :

P1382

[Total No. of Pages : 1

[5439]-42
M.Sc.
BIOTECHNOLOGY
BT-42: Legal and Ethical Aspects in Biotechnology and IPR
(2008 Pattern) (Semester - IV)

Time : 3 Hours] *[Max. Marks : 60*

Instructions to the candidates:

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

SECTION - I

Q1) What is intellectual property? Describe in detail various tools of intellectual property. **[12]**

Q2) Explain in detail, with the help of the flowchart, the procedure for applying and granting the patent. **[12]**

Q3) Describe the procedure for registration of copyright. Add a note on competent authority to grant copyright. **[12]**

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

a) Law on industrial design.

b) Biotechnology Patents.

SECTION - II

Q5) Explain the patenting of biological material. Add a note on Budapest Treaty. **[12]**

Q6) Mention the salient features of TRIPS agreement. Give the role of WTO in intellectual property. **[12]**

Q7) Elaborate on plant breeder's and farmer's right act. Describe the criteria for the protection of plant variety. **[12]**

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

a) Berne convention

b) Legal protection to diversity.

Total No. of Questions : 6]

SEAT No. :

P1383

[Total No. of Pages : 1

[5439]-43
M.Sc. - II
BIOTECHNOLOGY
BT - 43 : Clinical Research and Database Management
(2008 Pattern) (Semester - IV)

Time : 1½ Hours] *[Max. Marks : 40*

Instructions to the candidates:

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

SECTION - I

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

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

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

SECTION - II

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

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

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

a) Good Clinical Practices.

b) Protocol Design and Development.

c) Serious Adverse Event.

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Total No. of Questions : 3]

SEAT No. :

P1384

[Total No. of Pages : 1

[5439]-44
M.Sc. - II
BIOTECHNOLOGY
BT - 44A : Nanobiotechnology
(2008 Pattern) (Semester - IV)

Time : 1½ Hours] *[Max. Marks : 40*

Instructions to the candidates:

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

Q1) Write short notes on (any 4): **[20]**

a) Synthesis of nanoparticles using chemical vapour Deposition.

b) Spectroscopic analysis of nanoparticles.

c) Applications of nanoparticles in physical sciences.

d) Recent trends in Nanobiotechnology.

e) Different parameters affecting size of nanoparticles.

f) Functionalisation of nanoparticles.

Q2) Answer the following (any one): **[10]**

a) Discuss characterisation of nanomaterials using Electron microsopy.

b) Explain the merits and demerits of physical methods of synthesis of nanomaterials.

Q3) Answer the following (any one): **[10]**

a) Nanotechnology has immense applications in Biosensors. Justify.

b) Explain Biological methods of synthesis of nanomaterials.

Total No. of Questions : 8]

SEAT No. :

P1385

[Total No. of Pages : 2

[5439]-45
M.Sc. - II
BIOTECHNOLOGY
BT - 44b : Stem Cell Technology and Regenerative Medicines
(2008 Pattern) (New) (Semester - IV)

Time : 3 Hours] *[Max. Marks : 60*

Instructions to the candidates:

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

SECTION - I

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

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

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

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

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

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

a) Embryonic stem cell

b) Pattern formation

c) Competence and Induction

P.T.O.

SECTION - II

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

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

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

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

a) Stem cell therapy

b) Transgenic animals

c) Mesenchymal stem cells

Total No. of Questions : 8]

SEAT No. :

P1386

[Total No. of Pages : 2

[5439]-46
M.Sc.
BIOTECHNOLOGY
BT - 44C : Agricultural Biotechnology
(2008 Pattern) (Semester - IV)

Time : 3 Hours] *[Max. Marks : 60*

Instructions to the candidates:

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

SECTION - I

Q1) Write short notes on any two : **[12]**

a) Endosperm culture

b) Gametoclonal variation

c) Homogygous plants

Q2) What do you understand by embryo rescue technique? Explain various methods for embryo rescue & add notes on its application. **[12]**

Q3) Describe multiplication of variety of oil seed crop by micropropagation with suitable example. **[12]**

Q4) Explain phenomena of apomixis with suitable example and write its significance with respect to agriculture . **[12]**

P.T.O.

SECTION - II

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

a) Biopesticides

b) Virus indexing

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

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

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