Total No. of Questions : 6]

SEAT No : ____

P 2225

[Total No. of Pages :2

[5332]-11
M.Sc.
BIOTECHNOLOGY
BT - 11 : Advanced Biological Chemistry
(2008 Pattern) (Semester-I)

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

Instructions to the candidates:

1) ***Question No. 1 is compulsory.***
2) ***Answer any four from the remaining questions.***
3) ***Marks are given in parenthesis.***

Q1) Briefly describe any four of the following: **[4×5=20]**

a) Derive the Henderson Haselbach equation.

b) Explain the α helix structure in protein.

c) Give the importance of secondary metabolities in plants.

d) Enlist the applications of metabolic engineering.

e) State the principle of Nuclear Magnetic Resonance.

Q2) Write short note on the following: **[3×5=15]**

a) Quaternary structure of proteins.

b) Practices and regulations in use of herbal medicine.

c) Metabolic control analysis.

Q3) a) Discuss the biosynthetic pathway for terpenoids in plants. **[7]**

b) With the help of a schematic diagram explain the components and working of High performance liquid chromatography (HPLC). **[8]**

P.T.O.

Q4) Discuss in details 2D gel electrophoresis w.r.t. principle, instrumentation and applications. **[15]**

Q5) a) Explain the cooperative model for allosteric enzymes. **[7]**

b) How is spectroscopy useful in separation of secondary metabolites? **[8]**

Q6) Answer the following: **[3×5=15]**

a) Explain how site directed mutagenesis is useful in metabolic engineering.

b) Give the importance of non covalent interactions in the stability of protein structure.

c) Give the pathway for glycogenolysis.

Total No. of Questions : 6]

SEAT No :

P 2226

[Total No. of Pages :2

[5332]-12
M.Sc.
BIOTECHNOLOGY
BT - 12 : Molecular & Cell Biology
(2008 Pattern) (Semester-I)

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

Instructions to the candidates:

1) ***Q. 1 is compulsory. Solve any four of the remaining.***
2) ***Figures to the right indicate full marks.***
3) ***Use of colour pencils restricted to diagrams.***

Q1) Short Notes on (Any 4): **[4×5=20]**

a) G. protein mediated signaling.

b) Role of hormones in homeostasis.

c) Steps in mitosis.

d) X-linked immunodeficiency.

e) Polymorphism.

Q2) a) Explain transport of proteins to the mitochondria. **[7]**

b) Describe 'ABC model' in plant development. **[8]**

Q3) Write short notes on:- **[3×5=15]**

a) Oxidative phosphorylation.

b) Boyer's binding change mechanism.

c) Fo-Fi ATPase.

P.T.O.

Q4) a) Describe pattern formation in Drosophila melanogaster. **[7]**

b) Explain role of secondary messengers with example. **[8]**

Q5) Explain in detail the process of transcription in eukaryotes. **[15]**

Q6) Short notes on:- **[3×5=15]**

a) Base analogs & mutations.

b) Photoreactivation repair.

c) Glycosylation.

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Total No. of Questions : 6]

SEAT No : ____

P 2227

[Total No. of Pages :2

[5332]-13

M.Sc. - I

BIOTECHNOLOGY

BT - 13 : Environmental Bio-technology
(2008 Pattern) (Semester - I)

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

Instructions to the candidates:

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

Q1) Write short notes on : (Any 4) **[4 × 5 = 20]**

a) Thermal Inversion

b) MINAS

c) Effect of Noise pollution on human health.

d) In-situ conservation of organisms.

e) EIA guidelines for industrial projects.

Q2) Explain non-conventional energy sources. Give detailed, working, advantages and disadvantages of Bioenergy. **[15]**

Q3) a) What is remote sensing? Explain its principle and applications. **[8]**

b) Define biosensors. Giving appropriate examples, explain their role in environmental monitoring. **[7]**

Q4) a) Explain principle, working & use of phosphones removal in effluent treatment. **[8]**

b) Elaborate on Environmental priorities in India. **[7]**

P.T.O.

Q5) a) Define Bioremediation and discuss phytoremediation approaches with appropriate examples. **[8]**

b) Explain strategies for monitoring and control of particulate pollutants in flue gases. **[7]**

Q6) a) Explain chemical operations applied in waste water treatment and elaborate on precipitation coagulation. **[8]**

b) Describe the principle and working of trickling filters and give its advantages. **[7]**

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Total No. of Questions : 8]

SEAT No. :

P2228

[Total No. of Pages : 2

[5332]-21

M.Sc.

BIOTECHNOLOGY

BT - 21 : Genetic Engineering

(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) ***Answer to the sections must be written on separate answer books.***
3) ***Neat labelled diagram must be drawn whenever necessary.***
4) ***Figures to the right indicate full marks.***

SECTION - I

Q1) a) What is star activity and what are factors responsible for it? **[8]**

b) Draw a neat labeled schematic map of BAC vector. **[8]**

Q2) Explain procedure, advantages, applications and limitation of AFLP and RAPD. **[16]**

Q3) a) With two suitable examples, explain bio therapeutics and their synthesis using recombinant DNA technology. **[8]**

b) Describe in detail the Gene transfer methods employed in eukaryotic gene cloning. **[8]**

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

a) DNA polymerases and Ligases

b) Shuttle vectors

c) Inclusion bodies.

P.T.O.

SECTION - II

Q5) Explain the principles of shotgun sequencing and fragment assembly. **[16]**

Q6) Compare and contrast the following. **[16]**

a) Hot start and Nested PCR

b) Touch down and Inverse PCR

Q7) Write self - explanatory notes on any two of the following. **[16]**

a) Gene annotation.

b) Physical mapping.

c) Gene therapy.

Q8) a) Explain giving reasons the steps involved in manufacturing of edible vaccines. **[8]**

b) Describe molecular farming. **[8]**

Total No. of Questions : 8]

SEAT No : ____

P 2229

[Total No. of Pages :2

[5332]-22
M.Sc.
BIOTECHNOLOGY
BT - 22 : Bioinformatics
(2008 Pattern) (Semester-II)

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

Instructions to the candidates:

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

SECTION-I

Q1) What are types of publicaly available databases? Explain any one of them in detail. **[16]**

Q2) Discuss any one tool of bioinformatics used for homology searching with respect to its algorithm & advantages. **[16]**

Q3) Give a brief account of:

a) Study of gene expression using bioinformatics. **[8]**

b) Gene search using bioinformatic tool. **[8]**

Q4) a) What are different techniques used for energy optimization? Discuss any one of them in detail. **[8]**

b) Explain the role of bioinformatics in structure based drug designing. **[8]**

P.T.O.

SECTION-II

Q5) How is protein structure predicted using bioinformatics tools? Explain with the help of a suitable example. **[16]**

Q6) Discuss the role of immunoinformatics in biotechnology. **[16]**

Q7) a) Which technique is used to determine structure function relationship in proteins? **[8]**

b) Discuss the role of bioinformatics in protein structure classification. **[8]**

Q8) Write short notes on <u>any two</u>: **[16]**

a) Current research trend in bioinformatics.

b) Academic research funding in bioinformatics.

c) Bioinformatics business model.

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Total No. of Questions : 8]

SEAT No. : ____

P2230

[Total No. of Pages : 2

[5332] - 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 atleast two questions from each section.***
2) ***Answer to the sections should be written on separate answer books.***
3) ***Draw neat labeled diagrams wherever necessary.***
4) ***Figures to the right indicates full marks.***

SECTION - I

Q1) Discuss in detail various stages of micropropagation. Add note on advantages and disadvantages of micropropagation. **[16]**

Q2) a) Explain significance of horizontal gene transfer in crop improvement. **[8]**

b) What is organogenesis? Give the various factors affecting organogenesis. **[8]**

Q3) a) What are secondary metabolites? Elaborate role of elicitors in secondary metabolite production. **[8]**

b) Compare and contrast between cybrids and hybrids. **[8]**

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

a) Land marks in plant biotechnology.

b) Somaclonal variations.

c) Biopesticides.

P.T.O.

SECTION - II

Q5) Explain the biotechnological intervention for qualitative and quantitative improvement of fungi. **[16]**

Q6) a) Discuss the Genetic engineering approach used for development of Bt cotton. **[8]**

b) Discuss methods used for seed improvement testing and certification. **[8]**

Q7) a) Manipulation of photosynthesis is used to increase yield. Justify. **[8]**

b) Enlist and explain different methods of vectorless DNA transformation. **[8]**

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

a) Plantibodies.

b) Somatic embryogenesis.

c) Biofuels.

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Total No. of Questions : 8]

SEAT No : ____

P 2231

[Total No. of Pages :2

[5332]-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 atleast 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) What contributes to the productivity of livestocks? Mention the methods of artificial breeding of livestock animals. State advantages and hazards of artificial breeding. **[16]**

Q2) a) Explain the types of animal cell culture. Give its application. **[8]**

b) Describe different methods of characterization of cell lines. **[8]**

Q3) Explain: **[16]**

a) Cryopreservation of embryo.

b) Enzymatic tissue disaggregation method.

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

a) Biotechnological methods of animal conservation.

b) Applications of IVF.

c) Cell sorting methods.

P.T.O.

SECTION-II

Q5) Explain in detail one transgenic mouse model to study human diseases. **[16]**

Q6) Enlist properties of stem cells. Explain any two methods of stem cell purification. **[16]**

Q7) a) What is embryo transfer technique? Add a note on its advantages. Mention the precautions. **[8]**

b) Explain different methods to insert a transgene in zygote. **[8]**

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

a) Detection of mycoplasma contamination.

b) Bioethics in Animal biotechnology.

c) Germ cell storage.

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Total No. of Questions : 8]

SEAT No : ____

P 2232

[Total No. of Pages :2

[5332]-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 answer book.***
3) ***Neat diagrams must be drawn wherever necessary.***
4) ***Figures to the right indicate full marks.***

SECTION-I

Q1) a) Discuss the kinetics of growth of a bacteria in continuous culture. **[8]**

b) Explain in detail the working of Immobilised cell bioreactor. **[8]**

Q2) Describe the measurement and control of inlet and exit gases and pH in a fermentation process. **[16]**

Q3) a) Enlist the different methods of strain improvement and explain any one in detail. **[8]**

b) Write a short note on Airlift bioreactors. **[8]**

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

a) Types of agitators.

b) Scale down.

c) Yield coefficient.

P.T.O.

SECTION-II

Q5) With the help of neat labelled diagram, explain the down stream processing of an organic acid. **[16]**

Q6) What is Biotransformation? Give its advantages and disadvantages. Explain steroid transformation with suitable examples. **[16]**

Q7) a) Discuss the applications of microbes as biocontrol agents. **[8]**

b) What is $k_L a$? Describe the factors affecting $k_L a$. **[8]**

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

a) Cultivation of aerobes.

b) Biogas production.

c) Ultrafiltration.

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Total No. of Questions : 6]

SEAT No :

P 2233

[Total No. of Pages :2

[5332]-33

M.Sc.

BIOTECHNOLOGY

BT - 33a: Principles of Virology
(2008 Pattern) (Semester-III) (Credit System)

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) a) Describe nucleocapsid of viruses. **[5]**

b) Explain various methods of cultivation of viruses. **[5]**

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

a) Explain Baltimore system of classification for viruses.

b) What are nucleoside analogues? Explain with suitable example.

Q3) a) Explain with neat and labelled diagram lysogeny and it's importance.**[5]**

b) Compare and contrast conventional and modern approach of vaccine development. **[5]**

P.T.O.

SECTION-II

Q4) a) Explain triad model of epidemiology. **[5]**

b) Explain the term acute and persistent infections with suitable example. **[5]**

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

a) Discuss importance of phase III and phase IV of clinical trials.

b) Give an account of cauliflower mosaic Virus.

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

a) Marek's disease in poultry.

b) H_1N_1

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Total No. of Questions : 6]

SEAT No. :

P2234

[Total No. of Pages : 2

[5332]-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 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 B cell activation by TD antigens. **[5]**

b) Comment on protective and destructive role of immune system. **[5]**

Q2) a) Explain different immune evasion mechanisms by parasites. **[5]**

b) Compare and contrast initial phases of different pathways of complement activation. **[5]**

Q3) Answer the following: **[10]**

a) Explain with suitable example organ specific autoimmune diseases.

b) Define cytokines. Discuss their role in cell mediated immunity with suitable examples.

SECTION - II

Q4) a) Explain the importance of transgenic animals in Immunology studies. **[5]**

b) Explain any one technique for large scale manufacturing of antibodies with suitable example. **[5]**

P.T.O.

Q5) a) Explain stepwise approach for development of immunodiagnostics. **[5]**

b) Comment on applications of stem cells in Immunology. **[5]**

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

a) Reassortment vaccines.

b) Antibody engineering.

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Total No. of Questions : 8]

SEAT No : ____

P 2235

[Total No. of Pages :2

[5332]-41
M.Sc.
BIOTECHNOLOGY
BT - 41 : Genomics & Proteomics
(2008 Pattern) (Semester-IV)

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

Instructions to the candidates:

1) ***Attempt total of five questions selecting at least 2 questions from each section.***
2) ***Answers to the section should be written on separate answer sheet.***
3) ***Figures to the right indicates full marks.***

SECTION-I

Q1) a) Explain the complexity of the Eukaryotic genome as compared to that of prokaryotic system. **[6]**

b) Discuss the significance of transcriptomics in genome analysis. **[6]**

Q2) a) Describe the strategy and the techniques involved in study of structural genomics. **[6]**

b) Explain the importance of hybridization techniques in gene expression studies. **[6]**

Q3) Discuss the sequencing techniques and the automation to complete the whole genome sequencing. **[12]**

Q4) Write short notes on (any two): **[12]**

a) Pharmacogenomics.

b) Genome annotation.

c) Microarray techniques.

P.T.O.

SECTION-II

Q5) a) Explain the methods used in physical characterization of proteins. **[6]**

b) Give the application of Proteomics in identifying disease conditions. **[6]**

Q6) a) Proteome represents some subset of all possible genes. Justify. **[6]**

b) Discuss the methods used for studying the protein-protein intaraction. **[6]**

Q7) Give an comperative between the structural and functional Proteomics with suitable examples. **[12]**

Q8) Write short notes on (any two): **[12]**

a) 2 Dimensional electrophoresis.

b) Digestion methods in mass spectroscopy.

c) Strategy for isolation of Proteins.

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Total No. of Questions : 8]

SEAT No : ____

P 2236

[Total No. of Pages :2

[5332]-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 total of five questions selecting at least 2 questions from each section.***
2) ***Answers to the sections must be written on separate answer books.***
3) ***Neat diagrams must be drawn whenever necessary.***
4) ***Figures to the right indicates full marks.***

SECTION-I

Q1) Explain in detail biotechnology patent and how effective enforcement of intellectual property encourages economic development. **[12]**

Q2) Describe, with the help of a flowchart, the procedure for the registration of industrial design. Add a note on the infringement of industrial design. **[12]**

Q3) What is the difference between patentable and non-patentable inventions? Add a note on rights of patence. **[12]**

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

a) Software copyright.

b) Trade secret and Trade mark.

P.T.O.

SECTION-II

Q5) Discuss in detail the key issues of IPR in Indian agriculture. **[12]**

Q6) Explain the major changes in Indian Patent System after TRIPS agreement. **[12]**

Q7) Discuss the issues of patents related to turmeric and rice in Indian context. Write a note on provision of compulsory licensing. **[12]**

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

a) Geographical Indications.

b) Paris convention.

Total No. of Questions : 6]

SEAT No. : ____

P2237

[Total No. of Pages : 2

[5332] - 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) ***Answer to the sections must be written on separate answer books.***
3) ***Neat diagrams must be drawn wherever necessary.***
4) ***Figures to the right indicates full marks.***

SECTION - I

Q1) Explain in detail the important events in history of FDA that led to establishment of different regulations. Mention functions of FDA. **[10]**

Q2) Define protocol in clinical research. Explain in detail process of protocol design and development. **[10]**

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

a) Informed coment.

b) Drug controller general of India.

c) Randomization and Blinding in clinical Trials.

SECTION - II

Q4) Compare and contrast different phases of clinical Trials. **[10]**

P.T.O.

Q5) Discuss in detail the reporting and recording of Non - serious and serious Adverse Events. **[10]**

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

a) Investigational New Drug Application.

b) Database Management in Clinical Research.

c) Query Resolution Process.

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Total No. of Questions :3]

SEAT No. : ____

P2238

[Total No. of Pages :1

[5332] - 44

M.Sc. - II

BIOTECHNOLOGY

BT - 44A : Nano biotechnology

(2008 Pattern) (Semester - IV)

Time : 1 ½ 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 four): **[20]**

a) Synthesis of nanoparticles using chemical precipitation.

b) Effect of temperature on size of nanoparticles.

c) Application of nanomaterials in Biosensors.

d) Spectro slopic analysis of nanoparticles.

e) SOL - gel method.

f) Electrical and optical properties of nanoparticles.

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

a) Discuss the functionalisation of nanoparticles for biological applications.

b) Describe the characterisation of nanoparticles using electron microscopy.

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

a) 'Nanotechnology has immense application's in drug delivery; Justify.

b) Explain the synthesis of nanostructures using Biological methods.

Total No. of Questions :8]

SEAT No. :

P2239

[Total No. of Pages : 2

[5332]-45
M.Sc.-II
BIOTECHNOLOGY
BT-44 b : Stem Cell Technology and Regenerative Medicines
(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) ***Answer to the sections must be written on separate answer books.***
3) ***Neat diagrams must be drawn wherever necessary.***
4) ***Figures to right indicate full marks.***

SECTION-I

Q1) Describe the process of early development in a fertilized egg. **[12]**

Q2) a) Write a note on slow block and fast block of polyspermy. **[6]**

b) Describe the process of conditional specification during development. **[6]**

Q3) a) What are cell lineage? How are they established? **[6]**

b) Explain the process of morphogenetic movement during gastrulation. **[6]**

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

a) Application of transgenic animals.

b) Knock out Mice.

c) Metabolic activation of the egg.

SECTION-II

Q5) What are stem cells? Write a note on application of stem cells in human welfare. **[12]**

Q6) Compare and contrast between human cloning and therapeutic cloning. **[12]**

P.T.O.

Q7) Explain the mechanism of pattern formation during development. **[12]**

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

a) Mesenchymal stem cells

b) Cell differentiation

c) Induction

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Total No. of Questions :8]

SEAT No. :

P2240

[Total No. of Pages :2

[5332] - 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 atleast two questions from each section***
2) ***Answer to the sections must be written on separate answer books.***
3) ***Neat diagram must be drawn wherever necessary.***
4) ***Figures to the right indicate full marks.***

SECTION - I

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

a) Polyembryony.

b) Embryo rescue technique.

c) Somalclonal variation.

Q2) What are triploids? write methods for the production of triploids in agriculture. Add notes on their importance. **[12]**

Q3) Explain multiplication of elite varieties of cereals by micropropagation with suitable examples. **[12]**

Q4) Write in detail the methods of homogygous plant production by another culture. Write its applications. **[12]**

P.T.O.

SECTION - II

Q5) Write notes on any two: **[12]**

a) Metabolic engineering.

b) Bio fertilizers.

c) Virus indexing.

Q6) Explain with the help of suitable example herbicide resistant transgenic crop development in agriculture. **[12]**

Q7) Write the role of molecular markers for crop improvement giving example for biotic stress. **[12]**

Q8) What are bioreactor? Explain how they can be used for large scale production of plants. **[12]**