

Total No. of Questions :7]

SEAT No. :

[Total No. of Pages : 2

P2629

[6072]-214

M.Sc.-I

BIOTECHNOLOGY

**MBT 205 : Clinical Research, Data base Management and IPR
(2019 Pattern) (CBCS) (Semester-II)**

Time : 3 Hours]

[Max. Marks : 70

Instructions to the candidates:

- 1) *Question 1 is compulsory.*
- 2) *Solve any five questions from Q.2 to Q.7.*
- 3) *Q.2 to Q.7 carry equal marks.*

Q1) Solve any five of the following:

[10]

- a) What is NDA? When it is field?
- b) State the role of FDA.
- c) What is phase IV of Clinical trial.
- d) What are the Criterias of patentability?
- e) What is geographical Indications? Give examples.
- f) What are breeder's rights?

Q2) a) Justify significance of pre-clinical studies and clinical trails in the process of drug development. **[7]**

b) What are microbial patents? Elobarate on budapest treaty and its significance. **[5]**

Q3) a) What is copyright? Elobarate on copyright ownership and its transfer.**[7]**

b) What is informed consent. State its importance. **[5]**

P.T.O.

- Q4)** a) What is schedule 'Y'? State its role in regulation of clinical trial. [7]
b) What is infringement? Describe different remedies for copyright infringement. [5]
- Q5)** a) What is patent? discuss provisional and complete specifications in patent filing. [7]
b) Comment on query raising and its resolution in clinical trial data management. [5]
- Q6)** a) What is pharmacovigilance? Discuss international procedures of it. [7]
b) Comment on transfer of patents. [5]
- Q7)** Write short notes on any two of the following: [12]
a) Blinding and randomization in clinical trials.
b) Investigator's responsibilities.
c) Patent cooperation treaty.



Total No. of Questions : 7]

SEAT No. :

P-2621

[Total No. of Pages : 2

[6072]-111

M.Sc.

BIOTECHNOLOGY

MBT-101 : Advanced Biological Chemistry

(2019 Pattern) (CBCS) (Semester - I)

Time : 3 Hours]

[Max. Marks : 70

Instructions to the candidates:

- 1) *Question 1 is compulsory.*
- 2) *Solve any five questions from Q.2 to Q.7.*
- 3) *Question 2 to 7 carry equal marks.*

Q1) Solve any Five of the following :

[10]

- a) Maximum velocity.
- b) Isopentenyl pyrophosphate.
- c) Protein Families.
- d) ES complex.
- e) Metabolic Flux.
- f) Effect of pH on enzyme activity.

Q2) a) Explain with an appropriate example protein-protein interactions. [7]

- b) Discuss the shikimate pathway for synthesis of secondary metabolites. **[5]**

Q3) a) Comment on the assumptions used for the derivation of Michaelis-Menten equation. [7]

- b) Explain the importance of integration of metabolism for the functioning of an organism. **[5]**

P.T.O.

- Q4)** a) With the representative example explain the process of metabolic engineering. [7]
b) Explain Diagnostics and therapeutic use of enzymes. [5]
- Q5)** a) Give the classification of terpenoids and the major pathway responsible for its synthesis. [7]
b) Comment on the protein folding and the genetic diseases associated with it. [5]
- Q6)** a) Discuss competitive inhibition of enzyme. [7]
b) Give the significance of double reciprocal plot to measure the K_m & V_{max} of an enzyme. [5]
- Q7)** Write short note on any Two of the following. [12]
a) Pharmacological properties of flavonoids.
b) Therapeutic proteins.
c) Molten globule



Total No. of Questions : 7]

SEAT No. :

P2622

[Total No. of Pages : 2

[6072]-112

F.Y.M.Sc. (Biotechnology)

MBT -102 : CELL & MOLECULAR BIOLOGY

(2019 Pattern) (Semester - I) (CBCS)

Time : 3 Hours]

[Max. Marks : 70

Instructions to the candidates:

- 1) *Question 1 is compulsory.*
- 2) *Attempt any five of questions 2 to 7.*
- 3) *Q.2 to Q.7 carry equal marks.*

Q1) Solve any five of the following:

[10]

- a) State the importance of cholesterol present in membrane.
- b) What are secondary messengers.
- c) State the role of primase in replication process.
- d) Describe G₀ stage.
- e) What are ribozymes.
- f) Enlist different inhibitors of prokaryotic transcription.

Q2) a) Describe Na⁺-K⁺ ATPase in detail.

[7]

b) Comment on Tight junctions.

[5]

Q3) a) Write a detailed note on signal transduction mediated by GPCR.

[7]

b) What is vesicular transport?

[5]

Q4) a) 'Justify the role of Telomerase in replicating ends of chromosomes. [7]

b) Describe Extra cellular matrix.

[5]

P.T.O.

- Q5)** a) Give an account on positive & negative regulation of lac operon. [7]
b) Explain the role of CDK & cyclins in cell cycle regulation. [5]

- Q6)** a) Write a note on different types of lipids present in plasma membrane.[7]
b) Describe Base excision repair system. [5]

- Q7)** Write short notes on any two: [12]
a) Mitochondrial DNA.
b) Nucleosome.
c) Neurotransmitters.



Total No. of Questions : 7]

SEAT No. :

P-2623

[Total No. of Pages : 2

[6072]-113
M.Sc. (Part - I)
BIOTECHNOLOGY
MBT-103 : Genetics and Immunology
(2019 Pattern) (CBCS) (Semester - I)

Time : 3 Hours]

[Max. Marks : 70

Instructions to the candidates:

- 1) *Question 1 is compulsory.*
- 2) *Solve any five questions from Q.2 to Q.7.*
- 3) *Question 2 to 7 carry equal marks.*

Q1) Solve any five of the following : **[10]**

- a) Define back cross and test cross.
- b) What is adaptive landscape?
- c) What is linkage disequilibrium?
- d) Define :
 - i) Epitope
 - ii) PAMP
- e) What is precipitation reaction? State any two techniques based on it.
- f) What are CDRS?

Q2) a) What is clinical genetics? Explain genetics of Hypertension in detail. **[7]**

b) What is phagocytosis? Explain its process with labelled diagram. **[5]**

Q3) a) Give an account on haematopoiesis. Explain structure and function of each cell. **[7]**

b) Explain the concept of genetic linkage and describe the process of linkage mapping. **[5]**

Q4) a) Explain Hardy-Weinberg Principle and describe the factors that can affect Hardy-Weinberg equilibrium. **[7]**

b) Give a brief account on immunofluorescence microscopy. **[5]**

P.T.O.

- Q5)** a) What are immunoglobulins? State its classes, and their functions. Describe with labelled diagram structure of IgG. [7]
- b) Describe the concept of inbreeding and inbreeding depression with example. [5]
- Q6)** a) What is epistasis? Explain dominant and recessive epistasis in detail.[7]
- b) Compare and contrast active and passive immunization. [5]
- Q7)** Write short notes on any two of the following : [12]
- a) Molecular marker and its significance.
- b) Complement activation.
- c) Monoclonal antibodies.



Total No. of Questions : 5]

SEAT No. :

P-2624

[Total No. of Pages : 2

[6072]-114

F.Y. M.Sc.

BIOTECHNOLOGY

MBT - 105 : Environmental Biotechnology

(2019 Pattern) (CBCS) (Semester - I)

Time : 2 Hours]

[Max. Marks : 35

Instructions to the candidates:

- 1) *Q. 1 is compulsory.*
- 2) *Solve any three questions from Q.2 to Q.5.*
- 3) *Question 2 to 5 carry equal marks.*

Q1) Answer any Five of the following :

[5]

- a) Define bioleaching.
- b) Mention constraints of Air act 1981.
- c) What is Ozone hole.
- d) Enlist names of biological agents in pollution control.
- e) Mention significance of antipollution act.
- f) Write any 2 limitations of Bioremediation.

Q2) a) Comment on International Environmental Laws & Policies.

[6]

b) Write a note on Environmental Impact Assessment.

[4]

Q3) a) Explain types of Remote sensing with their applications.

[6]

b) Explain xenobiotic degradation in detail.

[4]

P.T.O.

- Q4)** a) Write detail account on Activated sludge process. [6]
b) Write a note on impact of various pollutants on Environment. [4]

Q5) Write short notes on Any Two of the following : [10]

- a) Bioaugmentation
b) Sea level rise
c) Important objectives of Environment Protection Act 1986



Total No. of Questions : 7]

SEAT No. :

P-2625

[Total No. of Pages : 2

[6072]-115

F.Y. M.Sc. (Biotechnology)

MBT - 106 : FOOD BIOTECHNOLOGY

(2019 Pattern) (Semester - I) (CBCS)

Time : 3 Hours]

[Max. Marks : 70

Instructions to the candidates :

- 1) *Q.1 is compulsory.*
- 2) *Solve any five questions from Q.2 to Q.7.*
- 3) *Questions 2 to 5 carry equal marks.*

Q1) Solve any five of the following questions. **[10]**

- a) Define food borne intoxication Enlist the agents responsible for food borne intoxication.
- b) What are genetically modified microorganisms.
- c) Give applications of nutrigenomics.
- d) Explain probiotics with 2 examples.
- e) What are functional foods.
- f) Write Role of quality control in food industry.

Q2) a) Describe the process of protease production & its applications in food processing. **[7]**

b) Explain how nanosensors are used in detection of pathogens. **[5]**

Q3) a) Explain National and International food laws. **[7]**

b) Describe health benefits of creatine. **[5]**

P.T.O.

- Q4)** a) Define nutraceuticals. Write health benefits and side effects of conjugated Linoleic acid. [7]
b) Write principles of TQM. [5]
- Q5)** a) Describe mechanism of action of probiotics. Write disadvantages of probiotics. [7]
b) Write applications of Biotechnology in development of value added products. [5]
- Q6)** a) What is food borne infection? Explain in detail organisms involved in food borne infection. [7]
b) Explain food formulation for drought and disaster affected area. [5]
- Q7)** Short notes (any 2) [2×6=12]
a) Mycotoxin.
b) Food safety Authorities.
c) Radical sequencing activity of antioxidant.



Total No. of Questions : 7]

SEAT No. :

[Total No. of Pages : 2

P2626

[6072]-211

M.Sc.-I

BIOTECHNOLOGY

MBT- 201 : Genetic Engineering

(2019 Pattern) (CBCS) (Semester-II)

Time : 3 Hours]

[Max. Marks : 70

Instructions to the candidates:

- 1) *Question 1 is compulsory.*
- 2) *Solve any five questions from Q.2 to Q.7.*
- 3) *Questions 2 to Q.7 carry equal marks.*

Q1) Solve any five of the following. **[10]**

- a) Biopharming.
- b) Multiple cloning site.
- c) Dideoxynucleotide and its significance.
- d) Radioactive probes.
- e) Alkaline phosphatase.
- f) Transfection.

Q2) a) Summarize the enzymes used in successful generation of a recombinant DNA. **[7]**

b) Comment on the use of phagemids as cloning vectors. **[5]**

Q3) a) Explain any one chemistry used in the study of gene expression profile by quantitative PCR. **[7]**

b) Give a comparative between replacement vectors and insertional vectors. **[5]**

Q4) a) Discuss the CRISPR-CAS technology for gene editing. **[7]**

b) Explain the PCR based method for detection of mutation in a sample. **[5]**

P.T.O.

Q5) a) With a representative example discuss the expression of industrially important biotherapeutics. [7]

b) Define genetic diseases. Explain methods for detection and diagnosis.[5]

Q6) a) Discuss the direct methods of gene transfer in plant cells. [7]

b) Explain the method for chemical synthesis of oligonucleotides. [5]

Q7) Write short notes on (any two) [12]

a) Electrophoretic mobility shift assay.

b) Application of gene silencing.

c) shuttle vectors.



Total No. of Questions : 7]

SEAT No. :

P-2627

[Total No. of Pages : 2

[6072]-212

F.Y. M.Sc.

BIOTECHNOLOGY

**MBT-202 : Bacteriology and Virology
(2019 Pattern) (Semester - II) (CBCS)**

Time : 3 Hours]

[Max. Marks : 70

Instructions to the candidates :

- 1) *Question 1 is compulsory.*
- 2) *Solve any five questions from Q.2 to Q.7.*
- 3) *Questions 2 to 7 carry equal marks.*

Q1) Solve any five of the following. **[10]**

- a) Define phylogeny.
- b) Define Horizontal gene transfer.
- c) What is L form of bacteria?
- d) What is PFU/ml
- e) State the mechanism of action of acyclovir.
- f) Enlist the different types of poultry virusus.

Q2) a) Give ultra detail structure of bacterial Flagella with respect to **[7]**

- i) Arrangement
- ii) Types of bacteria

b) Describe the use of in vivo models in virology studies. **[5]**

Q3) a) Describe fatty acid profile analysis used in taxanomy. **[7]**

b) Discuss importance and limitations of ICTV systems for classification of virusus. **[5]**

Q4) a) Explain genome organization and life cycle of M13 bacteriophage. **[7]**

b) What is bioluminescence? Explain with suitable example. **[5]**

P.T.O.

- Q5)** a) Write structure, functions and significance of sidero phase. [7]
b) Describe any two viral diseases of plants and state its economic importance. [5]
- Q6)** a) Discuss molecular methods for the diagnosis of viral diseases, state its importance. [7]
b) Explain molecular adaptations in halophiles. [5]
- Q7)** Write a short note on any two of the following. [12]
a) Biofertilizers.
b) Antiviral agents.
c) Structure and pathogenesis of influenza virus.



Total No. of Questions : 7]

SEAT No. :

P2628

[Total No. of Pages : 2

[6072]-213

F.Y.M.Sc.

BIOTECHNOLOGY

MBT-203 : Plant Biotechnology

(2019 Pattern) (CBCS) (Semester - II)

Time : 3 Hours]

[Max. Marks : 70

Instructions to the candidates:

- 1) *Q.1 is compulsory.*
- 2) *Solve any Five questions from Q.2 to Q.7.*
- 3) *Questions 2 to 7 carry equal marks.*

Q1) Solve any five of the following :

[10]

- a) What is stage 2 in micropropagation?
- b) What is QTL?
- c) Give two examples of Cryoprotectant.
- d) Define selectable marker.
- e) What is invitro androgenesis?
- f) Define somatic hybridization.

Q2) a) What is protoplast? Explain different methods of protoplast isolation & comment on cybridization. **[7]**

b) Explain application & disadvantages of cryopreservation. **[5]**

Q3) a) What are transgenic plants? Discuss selection & regeneration of transgenic plants. **[7]**

b) Enlist various biotic stress & explain any one in detail. **[5]**

Q4) a) What is MABC? Explain procedure to perform MABC. **[7]**

b) How synthetic biology is used for production of bioactive secondary metabolities? **[5]**

P.T.O.

- Q5)** a) What is organogenesis? Discuss in detail factors affecting it. [7]
b) Discuss marker assisted gene pyramiding. [5]
- Q6)** a) How stress tolerant plant variety is produced? Explain with one example for biotic & abiotic stress. [7]
b) What are advantages of micropropagation over conventional methods. [5]
- Q7)** Write a short notes on any two of the following : [12]
a) Molecular farming for antibody & therapeutic protein.
b) Suspension culture.
c) Methods of cryopreservation.



Total No. of Questions :7]

SEAT No. :

[Total No. of Pages : 2

P2630

[6072]-215

F.Y. M.Sc.

BIOTECHNOLOGY

MBT-206 : MEDICAL BIOTECHNOLOGY

(2019 Pattern) (CBCS) (Semester-II)

Time : 3 Hours]

[Max. Marks : 70

Instructions to the candidates:

- 1) *Question No.1 is compulsory.*
- 2) *Solve any five questions from Q.2 to Q.7.*
- 3) *Q.2 to Q.7 carry equal marks.*

Q1) Attempt any five of the following:

[10]

- a) What is bottom up method in nanotechnology?
- b) Name two chromosomal disorders.
- c) What are DNA vaccines?
- d) Give two uses of stem cell's in medical biotechnology.
- e) Enlist the defects in single gene in case of sickle cell anaemia.
- f) Name any two hormonal disorders.

Q2) a) With a suitable example describe microarray technology in disease diagnosis. **[7]**

b) Describe infection disorders **[5]**

Q3) a) Discuss enzyme therapy with the help of examples. **[7]**

b) Give a brief Account of genetic diseases with example. **[5]**

P.T.O.

- Q4)** a) Explain HIV its diagnosis and gene therapy for its treatment. [7]
b) Discuss polygene diseases. [5]
- Q5)** a) Give an account of PCR and nucleic acid probes in disease diagnosis.[7]
b) Give uses of embryonic stem cells in tharapeutics. [5]
- Q6)** a) How would you diagnose infections diseases using monoclonal antibodies. [7]
b) Discuss bioartificial Organs. [5]
- Q7)** Write short note on any two [12]
a) Biosensors.
b) Nanotechnology in diagnostics.
c) Thala ssemia.



Total No. of Questions : 7]

SEAT No. :

P-2631

[Total No. of Pages : 2

[6072]-311

M.Sc.

BIOTECHNOLOGY

MBT-301 : Animal and Stem Cell Technology

(2019 Pattern) (CBCS) (Semester - III)

Time : 3 Hours]

[Max. Marks : 70

Instructions to the candidates:

- 1) *Question 1 is compulsory.*
- 2) *Solve any five questions from Q.2 to Q.7.*
- 3) *Question 2 to 7 carry equal marks.*

Q1) Solve any five of the following :

[10]

- a) What is split ratio comment on its importance?
- b) Write about use of CO₂ incubator in animal tissue culture lab.
- c) What are knock in animals?
- d) Enlist two important properties of pluripotent stem cells.
- e) Define histotypic cultures. Mention applications in ATC.
- f) Explain the concept of cnyptic contamination.

Q2) a) What is artificial insemination? Describe any one method of semen collection. **[7]**

b) Differentiate between finite & infinite cell lines? **[5]**

Q3) a) Describe embryo transfer technology in details. **[7]**

b) Explain the concept of stem cell niche with one suitable example. **[5]**

Q4) a) What are transgenic animals? Explain how are transgenic animals suitable in studies of neurodegenerative disorders. **[7]**

b) Write a note on tissue engineering. **[5]**

P.T.O.

- Q5)** a) Define primary cell culture. Explain establishment of any one primary culture in flow chart form. [7]
b) What are bioartificial organs? Mention their applications. [5]
- Q6)** a) Elaborate different methods for establishment of organ culture. Also add a note on applications of them. [7]
b) Write rationale of animal tissue culture media formulation. [5]
- Q7)** Write short notes on any two of the following : [12]
a) Applications of animal cell cultures.
b) Gene silencing.
c) Biochemical characterization of cells.



Total No. of Questions : 7]

SEAT No. :

P-2632

[Total No. of Pages : 2

[6072]-312

S.Y. M.Sc. (Biotechnology)

MBT-302 : BIOPROCESS ENGINEERING

(2019 Pattern) (Semester - III) (Credit System)

Time : 3 Hours]

[Max. Marks : 70

Instructions to the candidates:

- 1) *Q.1 is compulsory.*
- 2) *Attempt any FIVE questions for Q2 to Q7.*
- 3) *Questions 2 to 7 carry equal marks.*

Q1) Solve any five of the following : **[10]**

- a) What do you mean by specific growth rate?
- b) Define Thermal Death Temperature.
- c) What is Phase?
- d) Define brewing?
- e) Explain volumetric mass transfer coefficient.

Q2) a) Discuss the kinetics of product formation in chemostat. **[7]**

b) Explain sterilization of exhaust air. **[5]**

Q3) a) What is Newton law of viscous flow? Explain various types of non-newtonian fluid. **[7]**

b) Comment on aqueous two phase extraction for down stream processing. **[5]**

Q4) a) Explain industrial production and recovery of any one exopolysaccharide. **[7]**

b) What are the regulation on use and distribution of biotechnological product. **[4]**

P.T.O.

- Q5)** a) Discuss the inoculum development for yeast and mycelial processes.[7]
b) Explain in brief various carbon sources for media requirement in fermentation. [5]
- Q6)** a) How del factor is calculated during heating and cooling by using graphical integration method? [7]
b) Discuss measurement and control of dissolved oxygen in fermentation processes. [5]
- Q7)** Write short note on any TWO of following. [12]
a) Energy balance for fermentation.
b) Two film theory
c) Theory of depth filter



Total No. of Questions : 7]

SEAT No. :

P-2633

[Total No. of Pages : 3

[6072]-313

M.Sc.

BIOTECHNOLOGY

MBT - 303 : Bioinformatics & Biostatistics

(2019 Pattern) (CBCS) (Semester - III)

Time : 3 Hours]

[Max. Marks : 70

Instructions to the candidates:

- 1) *Question 1 is compulsory.*
- 2) *Solve any five questions from Q.2 to Q.7.*
- 3) *Q.2 to Q.7 carry equal marks.*

Q1) Solve any five of the following :

[10]

- a) Define : Lineage.
- b) Define : Type I error.
- c) List structural databases.
- d) Define : Alternative hypothesis.
- e) List any two block-based alignment programs.
- f) What do you mean by 'completely randomized design'?

Q2) a) What is sequence alignment? Give full account of pairwise sequence alignment. **[7]**

- b) The scores obtained by 5 candidates in drawing (X) and in music (Y) are given below : **[5]**

Codidate	A	B	C	D	E
Scores in drawing (X)	24	29	19	14	30
Scores in music (Y)	37	35	16	26	23

Compute Spearman's rank correlation between X and Y.

P.T.O.

- Q3)** a) Explain the term 'Correlation'. Write down its types. [7]
 b) Explain 'Pharmacophore Classes'. [5]

- Q4)** a) What is biological database? Explain its classification with example. Write importance of database in biology. [7]
 b) The following table shows the results of an experiment performed to analyse the effect of vaccination on laboratory animals against a particular disease :

	Infected	Uninfected
Vaccinated	5	431
Not - Vaccinated	9	239

Examine the effect of vaccination in controlling the susceptibility of animals to disease. [Table value : 3.841]. [5]

- Q5)** a) Explain the term 'Skewness'. Write its types. Write formula for coefficient of skewness based on moments. [7]
 b) Define the term phylogenetic tree. How are these trees constructed using multiple sequence alignment data : [5]

- Q6)** a) Discuss the importance of cheminformatics in drug discovery. Describe various tools and techniques used in cheminformatics along with their applications. [7]
 b) Prepare the analysis of variance (ANOVA) table for following data : [5]

Weights of grains
(in kgs)

Variety I	Variety II	Variety III
2.0	1.8	3.0
2.2	2.2	2.8
1.7	2.0	3.2

Q7) Write a short note on any two of the following :

[12]

- a) HMM
- b) Pharmacophore modelling
- c) Principles of randomization & replication in design of experiment.



Total No. of Questions : 5]

SEAT No. :

P-2634

[Total No. of Pages : 2

[6072]-314

M.Sc. - II

BIOTECHNOLOGY

MBT-305 : Nanobiotechnology

(2019 Pattern) (CBCS) (Semester - III)

Time : 2 Hours]

[Max. Marks : 35

Instructions to the candidates:

- 1) *Question 1 is compulsory.*
- 2) *Solve any three questions from Q.2 to Q.5.*
- 3) *Question 2 to 5 carry equal marks.*

Q1) Solve any five of the following : **[5]**

- a) Chemical vapor deposition.
- b) Metal oxide nanoparticles.
- c) Co-precipitation.
- d) Nanometer.
- e) Bottom up approach.
- f) Polyvalent nanoparticles.

Q2) a) Define nanoparticles. Add a note on sources and the methods used for biological synthesis. **[6]**

b) Comment on applications of Nanobiotechnology in the field of water remediation and purification. **[4]**

Q3) a) Describe the use of electron microscope for imaging of nanoparticles. **[6]**

b) Explain the use of nanoparticles in diagnostics. **[4]**

P.T.O.

Q4) a) Comment on the chemical precipitation and hydrothermal method for synthesis of nanoparticles. [6]

b) Explain the structural properties of nanoparticles. [4]

Q5) Write short note on any two : [10]

a) Microelectrical systems (MEMs)

b) Nanoparticle-Protein interactions

c) Characterization of NP by spectroscopy



Total No. of Questions : 5]

SEAT No. :

P-2635

[Total No. of Pages : 2

[6072]-315

M.Sc. - II

BIOTECHNOLOGY

MBT - 306 : Agriculture Biotechnology

(2019 Pattern) (CBCS) (Semester - III)

Time : 2 Hours]

[Max. Marks : 35

Instructions to the candidates:

- 1) *Q.1 is Compulsory.*
- 2) *Solve any three questions from Q.2 to Q.5.*
- 3) *Question 2 to 5 carry equal marks.*

Q1) Solve any five of the following :

[5]

- a) Endosperm.
- b) Bio insecticides.
- c) Flavr savr tomato.
- d) Growth hormones.
- e) Artificial seeds.
- f) Cyanofacterio in agriculture.

Q2) a) With an representative example explain the production of seedless plant varieties. **[6]**

b) Comment on development and formulation of phosphate solubilizing bioinoculants. **[4]**

P.T.O.

Q3) a) Discuss on major pest of horticultural crops and their control by biotechnological methods. [6]

b) Give the importance of Agriculture at National Economy. [4]

Q4) a) Discuss the strategy for chloroplast manipulations for production of therapeutic antibodies. [6]

b) Comment on use of CRISPR based technology and its application in plants. [4]

Q5) Write short notes on any two : [10]

a) Barcoding markers.

b) Opportunities in Agriculture biotechnology.

c) Nitrogen fixing bioinoculants.



Total No. of Questions : 7]

SEAT No. :

[Total No. of Pages : 2

P2636

[6072]-411

S.Y. M.Sc.

BIOTECHNOLOGY

MBT- 401 : Genomics and Proteomics

(2019 Pattern) (CBCS) (Semester-IV)

Time : 3 Hours]

[Max. Marks : 70

Instructions to the candidates:

- 1) *Question 1 is compulsory.*
- 2) *Solve any five questions from Q.2 to Q.7.*
- 3) *Questions 2 to Q.7 carry equal marks.*

Q1) Solve any five of the following.

[10]

- a) What is genomics? How does it differ from genetics.
- b) What techniques used in functional proteomics.
- c) Define transcriptomics
- d) What is IEF?
- e) Give any two applications of comparative genomics.
- f) What is the difference between MALDI & ESI?

Q2) a) Describe the process of whole genome sequencing. including the methods used, assembly & analysis. **[7]**

b) Explain how protein structure is analyse? Explain X-ray crystallography method for protein structure analysis. **[5]**

Q3) a) Explain yeast two Hybrid system along with its applications. **[7]**

b) What is pharmacogenomics? How does it help in personalized medicine. **[5]**

Q4) a) Discuss the concept of metagenomics and its significance in studying microbial communities. **[7]**

b) Describe peptide mass finger printing. **[5]**

P.T.O.

- Q5)** a) Give an account on phage display. [7]
b) Describe toxicogenomics and its applications. [5]
- Q6)** a) Explain the concept of DNA microarray including their preparation, working & analysis. [7]
b) Give an account on LC-MS. [5]
- Q7)** Write short notes on any two of the following. [12]
a) SAGE
b) Protein microarrays
c) Functional genomics



Total No. of Questions : 7]

SEAT No. :

P-2637

[Total No. of Pages : 2

[6072]-412

S.Y. M.Sc.

BIOTECHNOLOGY

**MBT402: Advanced Bioanalytical Techniques
(2019 Pattern) (Semester - IV) (CBCS)**

Time : 3 Hours]

[Max. Marks : 70

Instructions to the candidates :

- 1) *Q.1 is compulsory.*
- 2) *Solve any five questions from Q.2 to Q.7.*
- 3) *Q.2 to Q.7 carry equal marks.*

Q1) Solve any Five of the following :

[5 × 2 = 10]

- a) Principle of Sandwich ELISA.
- b) Isoelectric focussing (IEF).
- c) Applications of FISH.
- d) Monochromators.
- e) Cryotomy.
- f) Bragg's equation.

Q2) a) Give the principle of TEM and its working to determine the surface structure of object. **[7]**

b) Discuss Radio Immuno Assay (RIA) technique. Add a note on its applications. **[5]**

P.T.O.

- Q3)** a) Give the principle and working of NMR Technique. [7]
b) Explain RNA Micro array system. [5]
- Q4)** a) Discuss the principle and applications of High Performance Liquid Chromatography (HPLC). [7]
b) Describe NGS data procession tools. [5]
- Q5)** a) Explain in detail Denaturing Gradient Gel Electrophoresis (DGGE) Technique. [7]
b) Enlist the types of Affinity chromatography. Add a note on its applications. [5]
- Q6)** a) Discuss the principle and working of flow cytometry. [7]
b) Give the principle and applications of mass spectroscopy. [5]
- Q7)** Write short notes on any two of the following : [12]
a) Freeze-Fracture method for electron microscopy.
b) Surface plasmon resonance.
c) Immuno precipitation.



Total No. of Questions : 7]

SEAT No. :

P2638

[Total No. of Pages : 2

[6072]-413

S.Y.M.Sc.

BIOTECHNOLOGY

**MBT-404 : Bio-Entrepreneurship & Startup Designing
(2019 Pattern) (CBCS) (Semester - IV)**

Time : 3 Hours]

[Max. Marks : 70

Instructions to the candidates:

- 1) *Q.1 is compulsory.*
- 2) *Solve any Five questions from Q.2 to Q.7.*
- 3) *Questions 2 to 7 carry equal marks.*

Q1) Solve any five of the following :

[10]

- a) What does Liberalization mean?
- b) Define Social entrepreneurship.
- c) Define Scalable Startup.
- d) Define Globalization.
- e) State what is B2B and B2C.
- f) Write long form of SWOT & SWOC.

Q2) a) Describe the status of technology in India.

[7]

b) Azim Premji-Wipro a Case study entrepreneur.

[5]

Q3) a) Describe how economic factors namely : Capital, labour, raw materials, markets and infrastructure impact emergence of entrepreneurship. **[7]**

b) Explain the execution of Business plan. **[5]**

Q4) a) Explain the role of entrepreneur in elimination of poverty. **[7]**

b) Describe innovation entrepreneurship. **[5]**

P.T.O.

- Q5)** a) Discuss the types of entrepreneurs. [7]
b) Explain what are five basic questions that one should ask for evaluating the opportunity. [5]
- Q6)** a) Explain how the New Economic Policy of 1991 was a huge turning point for entrepreneurs. [7]
b) Explain in detail value chain analysis. [5]
- Q7)** Write short notes on any two of the following : [12]
a) Business incubation centre.
b) Optimal use of Resources.
c) Government schemes to promote entrepreneur.



Total No. of Questions :7]

SEAT No. :

[Total No. of Pages : 2

P2639

[6072]-414

M.Sc. -II

BIOTECHNOLOGY

**MBT-405 : Pharmaceutical Biotechnology & Drug Designing
(2019 Pattern) (CBCS) (Semester-IV)**

Time : 3 Hours]

[Max. Marks : 70

Instructions to the candidates:

- 1) *Question 1 is compulsory.*
- 2) *Atmpt any five questions from Q.2 to Q.7.*
- 3) *Q.2 to Q.7 carry equal marks.*

Q1) Attempt any five of the following:

[10]

- a) What is CADD?
- b) Define pharmacokinetics.
- c) What is IND? state its significance.
- d) What are bio pharmaceuticals? State any two examples.
- e) What are Pharmacological patents?
- f) What is MDR? state any one example.

Q2) a) Elaborate on the process of drug discovery.

[7]

b) Elaborate on drug potency assarys & its significance.

[5]

Q3) a) What are antibiotics? Explain antibiotic resistance mechanisms with suitable examples. **[7]**

b) What are preclinical studies? Explain any two in-vivo models used in preclinical studies. **[5]**

P.T.O.

- Q4)** a) What is high throughput screening? Describe in detail about virtual HTS. [7]
b) Explain with suitable examples the downstream processing of biopharmaceutical production. [5]
- Q5)** a) What is pharmacophore? Discuss in detail about pharmacophore modelling. [7]
b) What are clinical trials? Justify its significance in drug development. [5]
- Q6)** a) Discuss drug regulation in India. [7]
b) What is docking? Explain any two docking softwares. [5]
- Q7)** Write short note on any two [12]
a) Indian pharmacopeia.
b) ADMET
c) Drug tolerance & intolerance.



Total No. of Questions : 7]

SEAT No. :

P-2640

[Total No. of Pages : 2

[6072]-415

M.Sc.

BIOTECHNOLOGY

MBT-406 : Research Methodology and Scientific
Communications

(2019 Pattern) (CBCS) (Semester - IV)

Time : 3 Hours]

[Max. Marks : 70

Instructions to the candidates:

- 1) *Question 1 is compulsory.*
- 2) *Solve any five questions from Q.2 to Q.7.*
- 3) *Question 2 to 7 carry equal marks.*

Q1) Solve any five of the following : **[10]**

- a) What is H Index?
- b) What is deductive reasoning?
- c) Write names of two Literature Style.
- d) Enlist any two statistical tools used in research of Biotechnology.
- e) What is turnitin tool?
- f) What is Google Scholar? What is its use in research?

Q2) a) Discuss various research philosophies. **[7]**

b) What is data fudging? Write ways to prevent it. **[5]**

Q3) a) Explain how ethics in scientific research is important. **[7]**

b) Discuss various mathematical models used in scientific data analysis. **[5]**

Q4) a) Discuss the similarities and differences between deductive and inductive reasoning with examples. **[7]**

b) Discuss the social impact of Research. **[5]**

P.T.O.

- Q5)** a) Explain the methods used in primary data collection. [7]
b) Explain how 'Results and Discussions' is critical in report writing. [5]
- Q6)** a) Discuss in details different types of Research Reports. [7]
b) Discuss various statistical software used in research data analysis. [5]
- Q7)** Write short notes on any two of the following : [12]
- a) What do you mean by Impact factor? How it is calculated? Write a note on its importance.
- b) Explain how to make on effective oral presentation.
- c) What is Patent? Write a note on Patenting of Biotech inventions and Product.



Total No. of Questions : 7]

SEAT No. :

P2641

[Total No. of Pages : 2

[6072]-416

S.Y.M.S.c. (Biotechnology)

**MBT-407 : QUALITY CONTROL, BIOSAFETY AND BIOETHICS
(2019 Pattern) (CBCS) (Semester - IV)**

Time : 3 Hours]

[Max. Marks : 70

Instructions to the candidates:

- 1) *Question 1 is compulsory.*
- 2) *Solve any five questions from Q.2 to Q.7.*
- 3) *Q.2 to Q.7 carry equal marks.*

Q1) Answer any five from the following: [10]

- a) Define validation state give any two advantages of validation state.
- b) What are the two main elements of quality management?
- c) State any two ethical limits for animal use.
- d) Discuss levels of biosafety.
- e) What is bio piracy?
- f) What is PPE?

Q2) a) Explain in detail four types of process validation. [7]

b) Discuss radiation hazard and its control. [5]

Q3) a) Describe containment control in BSL4 Lab. [7]

b) What is the sequence of qualification of equipment. [5]

Q4) a) Describe roles of industrial bisafety committee. [7]

b) Describe class II biosafety cabinete. [5]

P.T.O.

- Q5)** a) Write down animal ethics committee and its role. [7]
b) Describe four classes of fire. [5]

- Q6)** a) Discuss classification of infective micro organisms by risk groups. [7]
b) Discuss details points to be considered while designing premises as per CGMP. [5]

- Q7)** Write short note on any two of the following: [12]
a) Ethical issues related to animal cloning.
b) Total quality management.
c) Environmental release issues of GMO.

