

Total No. of Questions : 7]

SEAT No. :

PE-5573

[Total No. of Pages : 2

[6519]-101
M.Sc. (Part -I)
BIOTECHNOLOGY
MBT-101: Advanced Biological Chemistry
(2019 Pattern) (Semester - I) (Credit System)

Time : 3 Hours]

[Max. Marks : 70

Instructions to the candidates :

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

Q1) Solve Any Five of the following :

[5 × 2 = 10]

- a) Define enzyme activity. Give its unit.
- b) Give the pharmacological significance of flavanoid.
- c) Explain the term metabolome.
- d) What do you mean by super secondary structure of a protein?
- e) Explain allosteric enzyme with suitable example.
- f) Briefly comment on integration of primary and secondary metabolites.

Q2) a) Explain metabolic flux and its analysis.

[7]

b) Discuss protein - DNA interaction with suitable examples.

[5]

P.T.O.

Q3) a) Discuss shikimic acid pathway for synthesis of secondary metabolites. [7]

b) Write a note on Line weaver-burkcr's plot. [5]

Q4) a) Describe various factors affecting on protein stability. [7]

b) Enlist various extraction methods used for isolation of secondary metabolites. Explain any one in detail. [5]

Q5) a) Explain various factors influencing on enzyme activity. [7]

b) Discuss the quaternary structure of protein with suitable example. [5]

Q6) a) Give various techniques used in analysis of secondary metabolites. Explain any one in detail. [7]

b) Explain competitive enzyme inhibition with suitable example. [5]

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

a) Alkaloids

b) Biosensors

c) Polyketide synthesis.



Total No. of Questions : 7]

SEAT No. :

PE5574

[Total No. of Pages : 2

[6519]-102

M.Sc. - I (Biotechnology)

MBT-102 : CELL & MOLECULAR BIOLOGY

(2019 Pattern) (CBCS) (Semester-I) (4 Credits)

Time : 3 Hours]

[Max. Marks : 70

Instructions to the candidates:

- 1) *Question No.1 is compulsory.*
- 2) *Attempt any 5 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) Name the inhibitory neurotransmitter and its action.
- b) Draw a schematic diagram of cell junction.
- c) Enlist the names of molecules that guard each check point of cell cycle.
- d) If $G + C = 70$ and $A + T = 30$, the DNA is 140kp. Calculate its T_M .
- e) Antitermination controls lytic and lysogenic development of phage. Justify.
- f) Nucleosome is 11nm, 146kp DNA is wound around it. What is the packaging ratio achieved.

Q2) a) Describe sliding filament theory with illustration.

[7]

b) Explain transcription initiation of RNA pol II.

[5]

Q3) a) Explain any three post-translation modifications in detail.

[7]

b) Describe the signalling cascade of G protein coupled receptors.

[5]

Q4) a) Illustrate intrinsic and extrinsic pathway of apoptosis.

[7]

b) Explain mismatch and sos repair.

[5]

P.T.O.

- Q5)** a) Explain capping and polyadenylation of hnRNA. [7]
b) Describe cell differentiation with a suitable example. [5]
- Q6)** a) With a neat labelled diagrams, explain the components of extracellular matrix. [7]
b) Describe pseudo genes and truncated genes are products of evolution.[5]
- Q7)** Write short notes on any two. [12]
a) Transcription regulation
b) Action potential
c) RTKase signalling



Total No. of Questions : 7]

SEAT No. :

PE-5575

[Total No. of Pages : 2

[6519]-103
M.Sc. - I
BIOTECHNOLOGY
MBT-103 : Genetics and Immunology
(2019 Pattern) (Semester - I) (Credit System)

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 :

[5 × 2 = 10]

- a) Define back cross.
- b) What is genetic drift.
- c) Explain the concept of genetic fitness
- d) Enlist any two classes of Immunoglobulins and state their functions.
- e) Explain sensitivity and specificity of antigen - antibody reaction.
- f) What are cytokines? Give any two examples.

Q2) a) Explain Hardy Weinberg equilibrium with an illustration.

[7]

- b) Briefly outline development of B-lymphocytes in secondary lymphoid organs.

[5]

P.T.O.

- Q3)** a) Define antigen-antibody reaction and state its characteristics. Explain Lattice hypothesis. [7]
- b) Write a note on Turner's syndrome. [5]
- Q4)** a) What is inbreeding? Explain inbreeding depression with suitable example. [7]
- b) Explain role of PRR in innate immunity. [5]
- Q5)** a) Elaborate on techniques used in monoclonal antibody production. [7]
- b) Explain the concept of genetic mosaics. [5]
- Q6)** a) Explain genetic recombination with an example. [7]
- b) Justify "western blotting" is a confirmatory diagnostic test. [5]
- Q7)** Write short notes on any two : [12]
- a) Amniocentesis
- b) Hybrid vigor
- c) Role and properties of adjuvants.



Total No. of Questions : 5]

SEAT No. :

PE-5576

[Total No. of Pages : 2

[6519]-104

M.Sc. (Part - I)

BIOTECHNOLOGY

MBT-105 : Environmental Biotechnology

(2019 Pattern) (CBCS) (Semester - I) (2 Credits)

Time : 2 Hours]

[Max. Marks : 35

Instructions to the candidates:

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

Q1) Solve any Five of the following :

[5]

- a) What are Xenobiotic compounds?
- b) Distinguish between Remote sensing and GIS.
- c) Define Bio-mining.
- d) What is environmental audit?
- e) What is Ozone Hole?
- f) Mention significance of Bio-plastics in environmental protection.

Q2) a) Elaborate the impact of Global warming on future scenario of the global environment. [6]

b) Give an account of different strategies used for Municipal Solid Waste management. [4]

Q3) a) Explain the role of in - situ and ex-situ bioremediation techniques in environmental clean - up. [6]

b) What are Eco standards? Give their significance. [4]

P.T.O.

Q4) a) What is ISO 14,000 series? Explain its role in sustainable development.[6]

b) Mention important out comes of Earth summits. [4]

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

a) Biological fertilizers and pesticides.

b) Environmental Impact Assessment.

c) Environmental Protection Act 1986.



Total No. of Questions : 7]

SEAT No. :

PE-5577

[Total No. of Pages : 2

[6519]-105

M.Sc. (Part - I)

BIOTECHNOLOGY

MBT-106 : Food Biotechnology

(2019 Pattern) (Credity System) (Semester - I)

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) Question 2 to 7 carry equal marks.

Q1) Solve any Five of the following questions :

[5 × 2 = 10]

- a) What are physical factors responsible for destruction of microorganisms.
- b) Explain Genetically Modified Microorganisms. Write its 2 applications.
- c) Define nutrigenomics.
- d) What is probiotics? Give two examples of probiotics.
- e) What are functional foods.
- f) Define QC.

Q2) a) Describe in detail the process of Amylase production along with microorganisms involved, write its applications. **[7]**

b) Define nutraceuticals. Write a note on health benefits of curcumin. **[5]**

Q3) a) Explain mandatory and voluntary food laws. **[7]**

b) Oligosaccharides are source of prebiotic Justify. **[5]**

Q4) a) Discuss how nanotechnology help in preservation of food. **[7]**

b) Define TQM. Explain significance of TQM in food technology. **[5]**

P.T.O.

Q5) a) Describe safety and regulatory issues associated with biotechnological products. **[7]**

b) Explain how to develop value added products using biotech. **[5]**

Q6) a) Describe Bacterial toxins and mycotoxins in detail. **[7]**

b) What is food formulation? Explain food formulation designed for sportsmen. **[5]**

Q7) Short notes (Any Two) : **[2 × 6 = 12]**

a) Common food adulteration and misbranding.

b) Role of microbe in production of beer.

c) Duties and responsibilities of food safety authorities.



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SEAT No. :

PE-5475

[Total No. of Pages : 2

[6519]-201

First Year M.Sc.

BIOTECHNOLOGY

MBT-201 : Genetic Engineering

(2019 Pattern) (Semester - II)

Time : 3 Hours]

[Max. Marks : 70

Instructions to the candidates:

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

Q1) Answer any five of the following:

[10]

- a) What is Cosmid?
- b) How will you generate expression library?
- c) Give the significance of adaptors in G.E.
- d) Use of reverse transcriptase.
- e) Define gene knockouts.
- f) What is PCR cycle threshold?

Q2) Answer the following.

- a) What is factorial transformation? Explain any two methods for selection of transformants. [7]
- b) Write a note on shuttle vector with examples. [5]

Q3) Answer the following.

- a) With a representative example, explain the production of recombinant proteins using genetic engineering. [7]
- b) Discuss the importance of PCR in molecular diagnostics for viral detection. [5]

Q4) Answer the following.

- a) Explain the Sangers method for DNA sequencing and give its application in Human Genome project. [7]
- b) Describe the steps involved in construction of genomic DNA library. [5]

P.T.O.

Q5) Answer the following.

- a) Explain the principle and applications of gene silencing. [7]
- b) Discuss how ex vivo gene therapy is used in the treatment of genetic disorders with an example. [5]

Q6) Answer the following.

- a) Give the importance of Taq. Polymerase in PCR. Describe any two variants of PCR. [7]
- b) Explain the role of restriction endonucleases in genetic engineering. [5]

Q7) Write short notes on the following. [12]

- a) RFLP
- b) CRISPR-CAS
- c) Methods to study protein-DNA interactions



Total No. of Questions : 7]

SEAT No. :

PE-5476

[Total No. of Pages : 2

[6519]-202
First Year M.Sc.
BIOTECHNOLOGY
MBT-202 : Bacteriology and Virology
(2019 Pattern) (Semester - II)

Time : 3 Hours]

[Max. Marks : 70

Instructions to the candidates:

- 1) *Question No.1 is compulsory.*
- 2) *Attempt any 5 questions from question 2 to 7.*
- 3) *Question 2 to 7 carry equal marks.*

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

- a) What is binomial nomenclature? Explain with suitable example.
- b) Give any two examples of gram positive bacilli and gram negative cocci.
- c) Explain with suitable example significance of bioluminescence in bacteria.
- d) Give significance of molecular methods for the diagnosis of viral infections.
- e) State any two examples of viruses belong to class IV of Baltimore classification system.
- f) Differentiate between any two types of capsid symmetry.

Q2) a) Elaborate on Strategies for identification of pure culture with suitable diagram. **[7]**

b) Comment on cellular sites of virus replication and assembly of influenza virus. **[5]**

Q3) a) Give an account of 'Infectivity Assays' in the diagnosis of viral diseases. **[7]**

b) Comment on methods of measurement of microbial diversity. **[5]**

Q4) a) Illustrate diagrammatically structure and formation of bacterial endospore. **[7]**

b) Explain role of animals in the study of viruses. **[5]**

P.T.O.

- Q5)** a) Explain with suitable example various reasons for re-emergence of viral infections. [7]
b) Justify, Archea is a link between prokaryote and eukaryote. [5]
- Q6)** a) Give an account of laboratory diagnosis of enteric fever. [7]
b) Comment on economic impact of viral diseases of plants. [5]
- Q7)** Write short notes on any two of the following. [12]
a) Probiotics
b) Life cycle of Lambda phage
c) Nucleoside analogues



Total No. of Questions : 7]

SEAT No. :

PE-5477

[Total No. of Pages : 2

[6519]-203

First Year M.Sc.

BIOTECHNOLOGY

MBT-203 : Plant Biotechnology

(2019 Pattern) (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.No.2 to Q.No.7.
- 3) Questions 2 to 7 carry equal marks.

Q1) Solve any five of the following:

[10]

- a) What is acclimatisation of in vitro raised plants?
- b) Explain the term-androgenic haploids.
- c) Give the role of marker genes in vectors with example.
- d) Enlist the various components of a tissue culture medium.
- e) What are the enzymes used for protoplast isolation?
- f) What are the stages of micropropagation?

Q2) a) Explain the direct gene transfer methods used to achieve plant transformation. [7]

b) Explain the role of transgenics in improvement of plant proteins. [5]

Q3) a) Describe in detail the method of protoplast fusion and explain the advantages of use of cytoplasts in generating hybrids. [7]

b) Explain the use of plant viral vectors in genetic transformation. [5]

Q4) a) What is marker Assisted Selection (MAS)? Explain the important properties of ideal marker. [7]

b) What is somatic embryogenesis? How can it be used to prepare artificial seeds? [5]

P.T.O.

- Q5)** a) What are suspension cultures? How are they initiated? Give the application of this in vitro technique in plant biotechnology. [7]
b) Explain the procedure for marker assisted back crossing and its use in plant breeding. [5]
- Q6)** a) Describe the role of transgenics in increase in productivity by manipulators of nitrogen fixation in plants. [7]
b) What is cryopreservation? Explain the applications of this in vitro technique. [5]
- Q7)** Write short notes on any two of the following: [12]
a) Particle bombardment-direct gene transfer.
b) Applications of micropropagation.
c) T_i plasmid.



Total No. of Questions : 7]

SEAT No. :

PE-5478

[Total No. of Pages : 2

[6519]-204

First Year M.Sc.

BIOTECHNOLOGY

**MBT-205 : Clinical Research, Database Management & IPR
(2019 Pattern) (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.No.2 to Q.No.7.*
- 3) *Q.No.2 to Q.No.7 carries equal marks.*

Q1) Solve any five of the following:

[5×2=10]

- a) Give four criterias of patentability.
- b) What is NDA and when it is submitted?
- c) Mention different types of licensing with respect to patent.
- d) Define 'Blinding' in clinical trials.
- e) What do you mean by sui-generis system?
- f) Give significance of Informal Consent in Clinical Trials.

Q2) a) Write in detail the procedure for filing patent application.

[7]

b) Explain role of each member of protocol writing team.

[5]

Q3) a) Elaborate importance of GCP in conduct of clinical trials.

[7]

b) Give an account of provision of Biological Diversity Act 2002.

[5]

Q4) a) Explain in detail Farmer's and Plant Breeders Rights.

[7]

b) Elaborate on design of CRF.

[5]

P.T.O.

- Q5)** a) What are essential documents? Explain the essential documents required during conduct of Clinical Trials. [7]
b) Discuss transfer for patent. [5]
- Q6)** a) What is AE, SAE and ADR? Give the guidelines for reporting the same. [7]
b) Comment on scope of copyright with respect to types of infringement. [5]
- Q7)** Write short note on any two : [12]
a) Regulatory Authorities of Clinical Trials in India.
b) Significance of ICMR guidelines.
c) Case study - Basmati Rice Patent



Total No. of Questions : 7]

SEAT No. :

PE-5479

[Total No. of Pages : 2

[6519]-205
First Year M.Sc.
BIOTECHNOLOGY
MBT-206 : Medical Biotechnology
(2019 Pattern) (Semester - II)

Time : 3 Hours]

[Max. Marks : 70

Instructions to the candidates:

- 1) *Question No.1 is compulsory*
- 2) *Attempt any Five questions of remaining Q.No.2 to Q.No.7.*
- 3) *Q.No.2 to Q.No.7 carries equal marks.*

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

- a) Illustrate the chromosome structural abnormality associated with Cri du chat syndrome.
- b) Draw a flowchart of diagnosis used in Type-I diabetes using Glucose oxidase.
- c) Enlist any four synthetic vectors used in gene therapy.
- d) Name any two therapeutic techniques employing nanotechnology.
- e) Give reasons: Subunit vaccines are far more superior to traditional vaccines.
- f) Write the names of Biological components of Biosensor.

Q2) a) Explain in detail sickle cell anemia; add a note how it can be diagnosed?**[7]**

b) With a flow chart, explain diagnosis of Covid-19. **[5]**

Q3) You have been supplied a normal and cancer tissue of patient, using microarray how will you detect the genes gone wrong? **[12]**

Q4) a) Describe the potential uses of stem cells in alleviating chronic diseases.**[7]**

b) Explain any one commercial diagnostic test which employs monoclonal antibodies. **[5]**

P.T.O.

- Q5)** a) Classify the genetic disease giving examples of each. [7]
b) Explain: Tissue engineering of skin substitutes signifies a potential foundation of improved treatment in fighting acute and chronic skin wounds. [5]
- Q6)** a) Compare and contrast ex-vivo and in-vivo gene therapy. [7]
b) Describe the construction, principle and working of AccucheckTM glucometer. [5]
- Q7)** Write note on any two of the following: [12]
a) Ribozyme
b) Cystic fibrosis
c) Enzyme therapy



Total No. of Questions : 7]

SEAT No. :

PE5578

[Total No. of Pages : 2

[6519]-301

M.Sc. - II

BIOTECHNOLOGY

MBT - 301 : Animal and Stem Cell Technology

(2019 Pattern) (Semester - III)

Time : 3 Hours]

[Max. Marks : 70

Instructions to the candidates:

- 1) *Q.1 is compulsory.*
- 2) *Solve any five questions from Q.2 to Q7.*
- 3) *Q.2 to Q.7 carry equal marks.*

Q1) Solve any five of the following :

[10]

- a) Define cross contamination.
- b) What is pluripotency.
- c) Define cell transformation.
- d) What is the importance of trypsinization of cells.
- e) What is artificial insemination.
- f) Applications of suspension culture.

Q2) a) Discuss in detail Cre-Loxp recombination.

[7]

b) Write a note on biosafety issues related to animal biotechnology.

[5]

Q3) a) Explain in detail how a transgenic mouse model can be used to study cancer.

[7]

b) Comment on applications of ATC.

[5]

P.T.O.

- Q4)** a) Enlist different methods of cell sorting, Elaborate any two methods of cell sorting with appropriate example. [7]
b) Describe various methods of semen collection in animal. [5]
- Q5)** a) Explain in detail cell hybridization technique. [7]
b) Discuss the differences between anchorage independent and anchorage dependent cell cultures. [5]
- Q6)** a) Explain in detail detection of mycoplasma and viral contaminants. [7]
b) Comment on applications of organ culture. [5]
- Q7)** Write short notes on any two of the following : [12]
a) Antigenic marker in characterization of cell.
b) Embryo transfer techniques.
c) Artificial media.

x x x

Total No. of Questions : 7]

SEAT No. :

PE5579

[Total No. of Pages : 2

[6519]-302

M.Sc. - II (Biotechnology)

MBT-302 : BIOPROCESS ENGINEERING

(2019 Credit Pattern) (Semester-III)

Time : 3 Hours]

[Max. Marks : 70

Instructions to the candidates:

- 1) *Question No.1 is compulsory.*
- 2) *Attempt any 5 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) How does an aeration system benefit microbial growth in fermenter?
- b) What role does pH control play in optimizing fermentation processes?
- c) Write the advantages & disadvantages of hydrocarbons as source of carbon.
- d) How does the metabolic activity of microorganism differ between growth-linked & non-growth linked product formation in fermentation.
- e) What is Del Factor?
- f) Define scale down.

Q2) a) What is primary screening? Discuss any one method of primary screening in detail. **[7]**

b) Describe continuous sterilization process in detail. **[5]**

Q3) a) Define fluid rheology? Explain Newtonian & Non-Newtonian fluid with rheogram. **[7]**

b) Explain how dissolved oxygen is monitored & controlled in fermentor. **[5]**

P.T.O.

- Q4)** a) Define strain improvement? Explain any one method of strain improvement in detail. [7]
b) In downstream processing what is extraction? Describe liquid-liquid extraction in detail. [5]
- Q5)** a) What is KLa. Explain any one method of KLa determination in detail. [7]
b) Describe Role and responsibilities of Q.C in fermentation industry. [5]
- Q6)** a) Define medium optimization. Explain statistical design for medium optimization. [7]
b) Explain any one purification method used in downstream processing. [5]
- Q7)** Write short notes on any two of the following. [12]
a) Recombinant vaccines
b) Biotransformation product
c) Cell disruption by physical methods



Total No. of Questions : 7]

SEAT No. :

PE5580

[Total No. of Pages : 2

[6519]-303
S.Y.M.Sc.
BIOTECHNOLOGY
MBT 303 : Bioinformatics & Biostatistics
(2019 CBCS Pattern) (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 Database. Enlist protein sequence data bases.
- b) What is critical region in hypothesis testing?
- c) Name the tools used for Database similarity search.
- d) Explain the term 'sampling unit' in the design of experiment.
- e) What is gap penalty?
- f) If $\mu_2 = 0.6$ and $\mu_4 = 1.32$, compute coefficient of kurtosis based on moments.

Q2) a) What is MSA? Write its application in phylogenetic analysis. [7]

- b) The researcher collects blood pressure readings of 10 patients are as follows:

125, 130, 118, 122, 127, 134, 121, 126, 129, 123. Check whether average blood pressure of patients in a clinic is significantly different from population mean 120 mmHg.

{Table Value = 2.262}

[5]

P.T.O.

- Q3)** a) Explain the principles of design of experiment. [7]
 b) Explain the concept and applications of pharmacophore modelling. [5]

- Q4)** a) Explain the methods of protein tertiary structure predication. [7]
 b) Describe Mann Whitney U test. [5]

- Q5)** a) Check whether the smoking status and presence of health condition in sample of individuals is independent. [7]

	Condition Present	Condition Absent
Smoker	30	20
Non-Smoker	10	40

{Table value : 3.841}

- b) Discuss the role of protein structure visualisation tools. [5]
- Q6)** a) Discuss the features and significance of any two nucleic acid databases.[7]
 b) What is correlation? Explain its types with illustration. [5]

- Q7)** Write a short notes on any two of the following. [12]
 a) Importance of Ramchandran plot in Structural Bioinformatics.
 b) Stratified random sampling.
 c) Pubmed



Total No. of Questions : 5]

SEAT No. :

PE-5581

[Total No. of Pages : 2

[6519]-304

M.Sc.

BIOTECHNOLOGY

MBT-305 : Nanobiotechnology

(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) *Questions 2 to 5 carry equal marks.*

Q1) Solve Any Five of the following :

[5]

- a) Enlist the types of nanoparticles.
- b) What are nanosensors?
- c) State scope of nanoparticles in medicine.
- d) What are Dendrimers?
- e) Define zeta potential.
- f) What is the bottom-up method in nanotechnology?

Q2) a) Describe the use of an electron microscope for imaging of nanoparticles.

[6]

b) Explain the role of nanotechnology in agriculture.

[4]

P.T.O.

Q3) a) Add a note on sources and methods used for biological synthesis. **[6]**

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

Q4) a) Describe nanoparticles and give any two methods of their synthesis and characteristics. **[6]**

b) Give reasons for the health impact of nanoparticle made nanomaterials. **[4]**

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

a) Hyperthermia

b) Polyvalency

c) Green technology



Total No. of Questions : 5]

SEAT No. :

PE5582

[Total No. of Pages : 2

[6519]-305

M.Sc. - II

BIOTECHNOLOGY

MBT 306 : Agricultural Biotechnology

(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 question 2 to question 5.*
- 3) *Question 2 to 5 carry equal marks.*

Q1) Answer any five of the following.

[5]

- a) What is PCR?
- b) Enlist the markers used in plant barcoding.
- c) Write mode of action of biopesticide with example.
- d) Define transgenic crops.
- e) What is golden rice?

Q2) a) Discuss how chloroplast engineering be used for production of antibodies?[6]

b) Discuss the benefits & limitations in plant barcoding. **[4]**

Q3) a) Explain advantages of biotechnological methods in crop improvement?[6]

b) Comment on Flavr Savr Tomato. **[4]**

P.T.O.

- Q4)** a) Explain importance of agriculture in Indian economy. [6]
b) Comment on qualitative real time PCR assays & its applications in agriculture biotech. [4]

Q5) Write short notes on : (any 2). [10]

- a) Beneficial microbes in agriculture.
- b) Virus Indexing
- c) Agribusiness



Total No. of Questions : 7]

SEAT No. :

PE-5480

[Total No. of Pages : 2

[6519]-401

S.Y. M.Sc.

BIOTECHNOLOGY

MBT-401 : Genomics and Proteomics

(2019 Pattern) (Semester - IV)

Time : 3 Hours]

[Max. Marks : 70

Instructions to the candidates:

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

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

- a) Enlist NGS (Next Generation Sequencing) platforms used in genomics.
- b) Define proteomics. Write any two applications of proteomics.
- c) What is structural proteomics?
- d) Write goals of functional genomics.
- e) What are applications of microarray databases?
- f) Enlist protein separation methods used in proteomics.

Q2) a) How can gene expression profiling be used to identify biomarkers of toxicity. [7]

- b) Explain how protein structure is analysed by X-ray crystallography method. [5]

Q3) a) Explain the fundamental principles, key steps and applications of 2D electrophoresis. [7]

- b) How does comparative genomics contribute to our understanding of evolutionary biology. [5]

Q4) a) What is phage display and how does it work to study protein interactions. [7]

- b) What are the key steps involved in designing and constructing a DNA microarray. [5]

P.T.O.

- Q5)** a) What is whole genome sequencing and which bioinformatics tools are used for analyzing whole genome sequencing data. [7]
b) Explain how protein microarray can be used to identify potential biomarkers for disease diagnosis. [5]
- Q6)** a) Explain CHIP method for protein-DNA interaction. [7]
b) What is Single Nucleotide Polymorphism (SNPs) and how do they occur in the genome. [5]
- Q7)** Write short note on any two of the following. [12]
a) Applications of proteomics in novel protein identification
b) Applications of metagenomics
c) Investigative techniques in transcriptomics



Total No. of Questions : 7]

SEAT No. :

PE-5481

[Total No. of Pages : 2

[6519]-402

S.Y. M.Sc.

BIOTECHNOLOGY

MBT-402 : Advanced Bioanalytical Techniques

(2019 Pattern) (Semester - IV)

Time : 3 Hours]

[Max. Marks : 70

Instructions to the candidates:

- 1) Question No.1 is compulsory.
- 2) Attempt any 5 questions from question 2 to 7.
- 3) Question 2 to 7 carry equal marks.

Q1) Solve any five of the following:

[10]

- a) Define Fluorescence
- b) What is the primary purpose of Freeze-etching technique in EM?
- c) Significance of NMR Spectroscopy.
- d) What is the principle of radio immune assay?
- e) Advantages of ELISA.
- f) State Lambert's-Beer's law of spectroscopy.

Q2) a) Explain the construction and working of transmission electron microscopy. [7]

b) Comment on Capillary electrophoresis. [5]

Q3) a) Describe the principle and mechanism of affinity chromatography. Explain how affinity chromatography is used in protein purification. [7]

b) Give the principle and applications of IR spectroscopy. [5]

Q4) a) What is circular dichroism? Give its importance in protein structure determination. [7]

b) Discuss the principle and applications of X-ray crystallography. [5]

Q5) a) Describe the principle and applications of DNA microarray technique, including its advantages and limitations. [7]

b) Comment on confocal microscopy. [5]

P.T.O.

- Q6)** a) Explain in detail Fluorescence activated cell sorter (FACS). Add a note on it's significance. [7]
b) Comment on Isoelectric Focusing (IEF) of 2D electrophoresis. [5]
- Q7)** Write short notes on any two of the following. [12]
a) Denaturing Gradient Gel Electrophoresis (DGGE)
b) Quantitative PCR
c) Types of ELISA



Total No. of Questions : 7]

SEAT No. :

PE-5482

[Total No. of Pages : 2

[6519]-403

S.Y. M.Sc.

BIOTECHNOLOGY

**MBT-404 : Bioentrepreneurship and Start-up Designing
(2019 Pattern) (Semester - IV)**

Time : 3 Hours]

[Max. Marks : 70

Instructions to the candidates:

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

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

- a) What is microenvironment?
- b) Define venture capital.
- c) Enlist the types of entrepreneur.
- d) Steps to execute a business plan.
- e) Give the significance of a business plan.
- f) What does Liberalization mean?

Q2) a) Discuss in detail how economic factors impacts on emergence of entrepreneurship. **[7]**

b) Explain SWOT analysis. **[5]**

Q3) a) Describe sources of generating new ideas. **[7]**

b) Justify entrepreneurship and rural development. **[5]**

Q4) a) Write role of society and family in the growth of entrepreneur. **[7]**

b) Discuss in detail value chain analysis. **[5]**

P.T.O.

- Q5)** a) Elaborate the concept of Entrepreneurial personality with example. [7]
b) Explain the execution of Business plan. [5]
- Q6)** a) Describe the skills and characteristics an entrepreneur has to imbibe to be successful. [7]
b) Discuss in detail working capital management. [5]
- Q7)** Write short notes on any two of the following: [12]
a) Explain optimal use of resources.
b) Pre-feasibility study.
c) Barriers to entrepreneurship.



Total No. of Questions : 7]

SEAT No. :

PE-5483

[Total No. of Pages : 2

[6519]-404

S.Y. M.Sc.

BIOTECHNOLOGY

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

Time : 3 Hours]

[Max. Marks : 70

Instructions to the candidates:

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

Q1) Solve any five of the following:

[10]

- a) Define drug target.
- b) What is XDR?
- c) What is Mutagenicity?
- d) Define Bio therapeutics
- e) Define CADP.
- f) What is Pharmacodynamics?

Q2) a) Define pharmacokinetics and describe it in detail.

[7]

b) Describe mechanism of action of anticancer drug with example.

[5]

Q3) a) How do you validate and identify the target during drug development.**[7]**

b) Describe vitamins as a bio therapeutics.

[5]

Q4) a) Describe in detail ligand based drug designing.

[7]

b) How will you identify drug target using combinational libraries.

[5]

P.T.O.

- Q5)** a) Describe in detail Indian drug regulations. [7]
b) What is flexible and semiflexible docking? Give details. [5]
- Q6)** a) Describe mechanism of action of resistance of any two antibiotics. [7]
b) Describe about screening and isolation of bioactive compounds. [5]
- Q7)** Write short note on any two of the following: [12]
a) Preclinical studies
b) New European drug approval system
c) Use of natural compound libraries for high throughput screening.



Total No. of Questions : 7]

SEAT No. :

PE-5484

[Total No. of Pages : 2

[6519]-405

S.Y.M.Sc.

BIOTECHNOLOGY

**MBT-406 : Research Methodology & Scientific
Communication**

(2019 Pattern) (Semester - IV)

Time : 3 Hours]

[Max. Marks : 70

Instructions to the candidates:

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

Q1) Solve any five of the following:

[10]

- a) Define h index.
- b) Enlist the tools in research data organisation.
- c) What is patent.
- d) State the methods of primary data collection.
- e) What is SPSS and its use.
- f) What is citation style? Enlist any two citation styles.

Q2) a) Discuss the methods of data collection.

[7]

b) Explain the types of scientific communication and its importance.

[5]

Q3) a) Explain different types of research philosophies.

[7]

b) Define Journal impact factor. What is its significance.

[5]

Q4) a) Explain the systematic process of scientific methodology.

[7]

b) Explain various types of data.

[5]

P.T.O.

- Q5)** a) Discuss the difference between ‘Hypothesis’ ‘Reasoning’, ‘Theory’ and ‘Scientific law’ with suitable examples. [7]
b) Explain the importance of critical thinking. [5]
- Q6)** a) Explain specification of different types of research reports. [7]
b) What are legal forms of communication in science. [5]
- Q7)** Write short note on any two of the following: [12]
a) Ethics in Human experimentation.
b) Tools for detection of plagiarism.
c) Non parametric tests.



Total No. of Questions : 7]

SEAT No. :

PE-5485

[Total No. of Pages : 2

[6519]-406

S.Y. M.Sc.

BIOTECHNOLOGY

MBT-407 : Quality control, Biosafety and Bioethics

(2019 Pattern) (Semester - IV)

Time : 3 Hours]

[Max. Marks : 70

Instructions to the candidates:

- 1) Question No.1 is compulsory.
- 2) Solve any 5 questions from question 2 to 7.
- 3) Question 2 to 7 carry equal marks.

Q1) Solve any five of the following:

[10]

- a) Define Bioethics.
- b) Enlist the principles of Bioethics.
- c) What is proof reading?
- d) Write any two ethical issues of gene therapy?
- e) What is Safety?
- f) State the difference between GMO's and LMO's.

Q2) a) Explain the process of Validation in a pharmaceutical company.

[7]

b) Comment on the National ethical guidelines for research.

[5]

Q3) a) 'Human Genome Project'. Justify this ethically entitled issue in your own words.

[7]

b) Explain the ethical issues related to food and agriculture.

[5]

Q4) a) What are Biological safety cabinets? Explain with suitable diagram.

[7]

b) Describe GEAC in detail.

[5]

Q5) a) Explain Toxicology and its types in detail.

[7]

b) Explain how to do analysis and assessment of risk in laboratory?

[5]

P.T.O.

- Q6)** a) Describe in detail the impact of bioethics in Biotechnology. [7]
b) What are the steps used for framework for ethical decision making? [5]
- Q7)** Write short note on any two of the following. [12]
a) Biopiracy
b) BlueCross in India
c) Function of clinical data management

