Total No. of Questions : 7]

SEAT No. :

PD3584

[Total No. of Pages : 2

[6485]-11

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) ***Question No.1 is compulsory.***
2) ***Solve any 5 questions from Q.2 to Q.7.***
3) ***Questions 2 to 7 carry equal marks.***
4) ***Neat diagrams must be drawn wherever necessary.***
5) ***Figures to the right indicate full marks.***

Q1) Solve any Five of the following. **[5×2=10]**

a) Define specific activity of the enzyme and give its significance.

b) Comment on pharmacological activity of alkaloids.

c) Explain the term metabolic flux.

d) What are chaperons?

e) Comment on Lock and key hypothesis for enzyme catalysis.

f) Give an comparative account between primary and secondary metabolites.

Q2) a) Explain the term Xenobiotics and write an account on Xenobiotics w.r.t. metabolic engineering. **[7]**

b) Describe diseases associated with protein misfolding. **[5]**

Q3) a) Give detailed account on synthesis of Isopentenyl pyrophosphate through meralonate pathway. **[7]**

b) Explain catalysis of Bisubstrate reaction by enzyme with a suitable example. **[5]**

P.T.O.

Q4) a) Explain the role of Chaperons in protein folding. **[7]**

b) What are different methods used for extraction of secondary metabolites? Explain any one in detail. **[5]**

Q5) a) Derive Michaelis-Menten (MM) equation for enzyme kinetics and give significance of V_{max} & km. **[7]**

b) Write a note on therapeutic proteins. **[5]**

Q6) a) What different techniques are used in qualitative analysis of secondary metabolites? Explain any one of them. **[7]**

b) Write a note on allosteric inhibition. **[5]**

Q7) Write short notes on any two. **[2×6=12]**

a) Phenolics

b) Role of enzymes in diagnostics

c) Polyketide synthesis

Total No. of Questions : 7]

SEAT No. :

PD3585

[Total No. of Pages : 2

[6485]-12
M.Sc. - I
BIOTECHNOLOGY
MBT 102 : Cell and Molecular Biology
(2019 Pattern) (Semester - I)

Time : 3 Hours] ***[Max. Marks : 70***

Instructions to the candidates:

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

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

a) What is c-value paradox?

b) Explain the significance of buoyant density in studying genome complexity.

c) Explain apoptosis.

d) What are signalling molecules. Give suitable example.

e) What is cell transformation with a suitable example.

f) Define cis - acting elements.

Q2) a) Describe post transcriptional modifications of eukaryotic RNA. **[7]**

b) Give an account of clathrin coated vesicular transport. **[5]**

Q3) a) Explain in detail the regulation of cell cycle. **[7]**

b) Justify the role of homeobox genes in controlling development in insects. **[5]**

P.T.O.

Q4) a) Discuss mechanism of transcription initiation in eukaryotes mediated by RNA polymerase II. **[7]**

b) Explain the molecular basis of muscle contraction. **[5]**

Q5) a) Describe the composition and structure of extra cellular matrix in plants. **[7]**

b) How is shortening of eukaryotic DNA prevented after every replication cycle. **[5]**

Q6) a) Discuss in detail the mechanism of prokaryotic DNA replication. **[7]**

b) Explain the role of cyclin dependent kinases (CDKs) in cell cycle progression. **[5]**

Q7) Write short notes on any two. **[12]**

a) Excision repair

b) Cell transformation and cancer

c) Role of proteins involved in recombination

Total No. of Questions : 7]

SEAT No. : ____

PD3586

[Total No. of Pages : 2

[6485]-13
M.Sc. - I
BIOTECHNOLOGY
MBT-103: Genetics and Immunology
(2019 Pattern) (Credit System) (Semester - I)

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) ***Q.2 to Q.7 carry equal marks.***

Q1) Solve any Five of the following. **[5×2=10]**

a) Define Test cross.

b) What are molecular markers?

c) Define neutral evolution.

d) Enlist any two PRR and their role.

e) Explain affinity and avidity of antigen - antibody reaction.

f) Give any two points of differences between ELISA and ELISPOT.

Q2) a) Write a note on epistasis with a suitable example. **[7]**

b) Explain immune response kinetics in adaptive immunity. **[5]**

Q3) a) Explain killing of target cells by TC cells. **[7]**

b) Write a note on klinefelter syndrome. **[5]**

Q4) a) Explain the factors affecting Hardy Weinberg equilibrium. **[7]**

b) Compare and contrast structure and function of MHC-I and MHC-II molecules. **[5]**

Q5) a) Give an account of Live-attenuated vaccine and recombinant DNA vaccine using suitable example. **[7]**

b) Explain the use of Arabidopsis as a model in genetics studies. **[5]**

P.T.O.

Q6) a) Explain the concept of population bottlenecks. **[7]**

b) Explain microscopic techniques used for detection of antigen-antibody reaction. **[5]**

Q7) Write short notes on any 2. **[12]**

a) Sex linkage

b) Karyotyping

c) Complement system

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Total No. of Questions : 5]

SEAT No. :

PD3587

[Total No. of Pages : 1

[6485]-14
M.Sc. - I
BIOTECHNOLOGY
MBT-105 : Environmental Biotechnology
(2019 Pattern) (Semester - I) (2 Credits)

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) ***Q.2 to Q.5 carry equal marks.***

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

a) Define bio-augmentation

b) What is carbon foot print?

c) Write significance of ISO 14000.

d) Mention outcomes of stockholm conference.

e) What is GIS?

f) What is conventional energy?

Q2) a) Discuss causes and consequences of climate change. **[6]**

b) Recycle, reuse and recovery is an important strategy in solid waste management. Justify. **[4]**

Q3) a) Explain the various types of phytoremediation with suitable examples. **[6]**

b) Give applications of remote sensing. **[4]**

Q4) a) What is EIA? Write the guidelines of EIA. **[6]**

b) Give an account of the objectives of anti-pollution acts. **[4]**

Q5) Write short notes on any 2 of the followning : **[10]**

a) Conventional energy resources.

b) Activated studge process

c) Rio conference

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Total No. of Questions : 7]

SEAT No. :

PD3588

[Total No. of Pages : 2

[6485]-15
M.Sc. - I
BIOTECHNOLOGY
MBT-106 : Food Biotechnology
(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) ***Q.2 to Q.7 carry equal marks.***

Q1) Solve any five of the following questions : **[5×2=10]**

a) What are chemical factors responsible for destruction of microorganisms.

b) Write applications of penctinase enzyme in food processing.

c) Define nanosensors.

d) What is prebiotics? Give two examples of prebiotics.

e) What are nutraceuticals?

f) Define QA

Q2) a) Describe the process of citric acid production and its applications in food technology. **[7]**

b) Describe the formulation of foods for drought & diaster. **[5]**

Q3) a) Define FSSAI. What are objectives of food laws and regulations. **[7]**

b) Traditional fermented foods are source of probiotic. Justify. **[5]**

Q4) a) Discuss how nanotechnology is used in food packaging. **[7]**

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

P.T.O.

Q5) a) Describe ethical issues associated with biotechnological products. **[7]**

b) Write applications of biotechnology in food waste management. **[5]**

Q6) a) Explain microbial toxins in detail. **[7]**

b) Describe antioxidant rich food products. **[5]**

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

a) Objectives of food laws and regulations.

b) Role of microbe in production of Wine.

c) Health risks of Nanotechnology.

Total No. of Questions : 7]

SEAT No. : [ ]

PD3589

[Total No. of Pages : 2

[6485]-21

First Year M.Sc.

BIOTECHNOLOGY

MBT-201: Genetic Engineering

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

Time : 3 Hours] ***[Max. Marks : 70***

Instructions to the candidates:

1) ***Question 1 is compulsory.***
2) ***Attempt any 5 questions from Q.2 to Q.7.***
3) ***Q.2 to Q.7 carries equal mark.***

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

a) DNase footprinting?

b) Intein-based vectors.

c) DNA ligase.

d) Artificial chromosome vectors.

e) Micro RNA

f) Colony hybridization.

Q2) a) With an appropriate example explain principle and application of gene silencing. **[7]**

b) Comment on the significance of restriction endonucleases and polymerases in genetic engineering. **[5]**

Q3) a) Discuss the automation in sanger's method for DNA sequencing. **[7]**

b) Explain the viral gene delivery systems used in genetic transformation. **[5]**

Q4) a) Give a comparative between cDNA and genomic libraries **[7]**

b) Comment on any one method used to study protein-DNA interactions. **[5]**

P.T.O.

Q5) a) Discuss the properties to be taken in consideration for designing gene specific primers. **[7]**

b) Define gene therapy and explain the in-vivo method for replacing the defective gene. **[5]**

Q6) a) Define probe. Add a note on its use in southern hybridization. **[7]**

b) Explain the DNA marker technology in selection of elite varietes of plants. **[5]**

Q7) Write short notes on any two of the following. **[12]**

a) BACs.

b) Genetically engineered vaccines.

c) CRISPR-CAS.

Total No. of Questions : 7]

SEAT No. :

PD3590

[Total No. of Pages : 2

[6485]-22
M.Sc. - I
BIOTECHNOLOGY
MBT 202 : Bacteriology and Virology
(CBCS 2019 Pattern) (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) ***Question 2 to 7 carry equal marks.***

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

a) What are unculturable bacteria?

b) State the applications of psychrophiles.

c) What are cell inclusions? State one example.

d) Enlist any two examples of group IV of Baltimore classification.

e) Explain capsid symmetry.

f) State any two examples of therapeutic antiviral agents along with their action.

Q2) a) Describe in detail different forms of cell wall in bacteria and archea **[7]**

b) Elaborate on in-vitro cultivation methods used for virus cultivation. **[5]**

Q3) a) Describe metabolic diversity in bacteria **[7]**

b) Explain lysogenic conversion of λ-phage (lambda phage) **[5]**

Q4) a) Discuss serological tests used in viral diagnosis. State their significance **[7]**

b) What is biosurfactant? Give it's applications **[5]**

Q5) a) Explain numerical taxonomy in detail. **[7]**

b) Describe group VII of Baltimore classification with suitable example. **[5]**

P.T.O.

Q6) a) Explain in detail viral replication in Baltimore group VI with appropriate example. **[7]**

b) Discuss molecular adaptations in psychrophiles **[5]**

Q7) Write short notes on any two of the following. **[12]**

a) Bioremediation

b) Interferons

c) Re-emerging viral diseases

Total No. of Questions : 7]

SEAT No. :

PD3591

[Total No. of Pages : 2

[6485]-23
First Year M.Sc.
BIOTECHNOLOGY
MBT - 203 : Plant Biotechnology
(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) Define stage 3 in micropropagation.

b) Define cryoprotectant.

c) What is MAS?

d) Give two examples of promoters.

e) What is T-DNA?

f) Explain gene pyramiding.

Q2) a) Discuss concept of cryopreservation. Explain various methods and techniques used for it. **[7]**

b) Explain chemical and electrofusion method of protoplast fusion. **[5]**

Q3) a) Discuss suspension culture. Write methods, growth and applications of it. **[7]**

b) What is plant viral vector? Explain any one vector in detail. **[5]**

Q4) a) Justify - crop productivity is incneased by manipulating photosynthesis and nitrogen fixation. **[7]**

b) Discuss how MAS is used for improvement of qualitative and quantitative traits. **[5]**

P.T.O.

Q5) a) What is molecular farming. Discuss it's use in vaccine and antibody production. **[7]**

b) Discuss concept and types of molecular marker used in plant biotechnology. **[5]**

Q6) a) What is Ti and Ri plasmid? Discuss in detail the mechanism of T-DNA transfer to plants. **[7]**

b) Describe commerical application of micropropagation. **[5]**

Q7) Write a short note on any two of the following. **[12]**

a) Biotic and abiotic stress.

b) Organogenesis.

c) QTL mapping techniques.

Total No. of Questions : 7]

SEAT No. :

PD3592

[Total No. of Pages : 2

[6485]-24

M.Sc. - I

BIOTECHNOLOGY

MBT-205: Clinical Research, Data Base Management and IPR

(2019 Pattern) (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 Belmont report?

b) Explain randomization and blinding in clinical trial.

c) What is inclusion and exclusion criteria in clinical trial.

d) Explain concept of priority date.

e) What in infringement?

f) Explain patent cooperation treaty.

Q2) a) Explain role and importance of WIPO. **[7]**

b) What are essential documents? Comment on essential documents required before the conduct of clinical trial. **[5]**

Q3) a) What is ICH-GCP? Elaborate on core principles of ICH-GCP. **[7]**

b) Comment on rights conferred to a patentee. **[5]**

Q4) a) Give an account of transfer of patents. **[7]**

b) Describe an importance of source documents in clinical trial monitoring. **[5]**

Q5) a) Discuss guidelines for protocol designing in clinical trial. **[7]**

b) Comment on protection of plant varieties. **[5]**

P.T.O.

Q6) a) What are types of claims? Comment on provisional and complete specifications. **[7]**

b) Discuss the role of CDSCO in clinical trial. **[5]**

Q7) Write short notes on any Two of the following. **[12]**

a) Investigators Brochure

b) Pharmacovigillence in India

c) Biotechnological patents

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Total No. of Questions : 7]

SEAT No. : ____

PD3593

[Total No. of Pages : 2

[6485]-25
M.Sc. - I
BIOTECHNOLOGY
MBT-206: Medical 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) ***Q.2 to Q.7 carry equal marks.***

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

a) Define 'top down' method of nanotechnology.

b) Name the materials use as scaford for tissue engineering.

c) Give examples of subunit vaccines.

d) Write the name of sources of adult stem cells.

e) Enlist the defect in single gene in case of Tay-Sachs and CF.

f) Exemplify any two chromosomal disorders.

Q2) a) Explain nanotech's use in diagnostics. **[7]**

b) Describe sickle cell anemia. **[5]**

Q3) a) Discuss Gene therapy with a case study. **[7]**

b) Explain the concept of Bioartifical organs. **[5]**

Q4) a) Explain role of monoclonal antibodies in disease diagnosis. **[7]**

b) Discuss Biosensors and their mechanism. **[5]**

Q5) a) Explain ADA deficiency its diagnosis and treatment. **[7]**

b) Describe PCR based diagnostics. **[5]**

P.T.O.

Q6) a) Describe polygenic disorders, giving examples. **[7]**

b) Covaxin was an attenuated vaccine, explain its effectiveness. **[5]**

Q7) Write short notes on any two. **[12]**

a) Ribozyme

b) Microarry

c) Hormone replacement therapy

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Total No. of Questions : 7]

SEAT No. :

PD3594

[Total No. of Pages : 2

[6485]-31

S.Y. M.Sc.

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 Q.7.***
3) ***Q.2 to Q.7 carry equal marks.***

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

a) Mention any two applications of animal cell cultures.

b) Why are inverted microscopes preferred in animal tissue culture technique?

c) Write any two disadvantages of adding serum as supplement in animal tissue culture medium.

d) What kind of markers are used for characterisation of hematopoietic stem cells?

e) Define progenitor cells. Write any one suitable example.

f) Define split ratio & mention its significance.

Q2) a) Describe the technique of tissue engineering. Add a note on its applications. **[7]**

b) Enlist different characteristics of transformed cell lines. **[5]**

P.T.O.

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

b) Justify : LIF is a master molecule for maintaining pleuripotency of mouse embryonic stem cells. **[5]**

Q4) a) Discuss the technique of long term maintenance & characterization of embryonic stem cells. **[7]**

b) What is criterion for semen sample selection? Also describe any one method for semen collection from bulls. **[5]**

Q5) a) Explain the concept of scale up of animal cells and describe different methods for scaling up of adherent cells. **[7]**

b) What is REMI? How can it be used for generating transgenic animals. **[5]**

Q6) a) Describe evolution of a cell line from a primary cell culture. **[7]**

b) Write applications of mesenchymal stem cells in therapeutics. **[5]**

Q7) Write short notes on any two of the following. **[12]**

a) Cross contamination in animal cell cultures.

b) RNAi technology for gene silencing.

c) Histotypic cultures.

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Total No. of Questions : 7]

SEAT No. : [ ]

PD3595

[Total No. of Pages : 2

[6485]-32
S.Y. M.Sc.
BIOTECHNOLOGY
MBT 302 : Bioprocess Engineering
(2019 Pattern) (Semester - III)

Time : 3 Hours] ***[Max. Marks : 70***

Instructions to the candidates:

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

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

a) Write two considerations for nutrient supplementation in fermentation media.

b) What is dual culture? Give its example.

c) What is feed back inhibition?

d) Write the role of baffles in fermentor.

e) Write strategies used for feeding in fed batch culture.

f) Write any two responsibilities of quality assurance department.

Q2) a) Discuss the role of fermentation in bioprocess engineering with an example. **[7]**

b) What strategies can be employed to improve the yield and productivity of bioprocess. **[5]**

Q3) a) How do you monitor and control parameters like pH and temperature in bioreactor. **[7]**

b) Explain the significance of downstream processing in bioprocess engineering. **[5]**

P.T.O.

Q4) a) What are the main challenges in scaling-up process from lab to industrial scale? **[7]**

b) How does viscosity of fermentation broth impacts mass transfer process? **[5]**

Q5) a) Discuss the significance of oxygen uptake rate (OUR) and oxygen transfer rate (OTR) in fermentation. **[7]**

b) What is strain improvement? Why it is important in fermentation process? **[5]**

Q6) a) What are the factors influencing choice of carbon and nitrogen source in the media of fermentation? **[7]**

b) Describe large scale production of cheese. **[5]**

Q7) Write short note on any two of the following. **[12]**

a) Good manufacturing practices.

b) Liquid - liquid extraction

c) Reynold number

Total No. of Questions : 7]

SEAT No. : ____

PD3596

[Total No. of Pages : 2

[6485]-33
S.Y. M.Sc.
BIOTECHNOLOGY
MBT-303: Bioinformatics and Biostatistics
(2019 Pattern) (CBCS) (Semester - III)

Time : 3 Hours] ***[Max. Marks : 70***

Instructions to the candidates:

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

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

a) Give any two softwares available for molecular docking.

b) Define 'Null hypothesis'.

c) State any two assumptions for t-test.

d) Give any two examples of nucleic acid and protein data bases.

e) State any two differences between linear and non-linear regression.

f) Give different classes of pharmacophore.

Q2) a) What do you mean by MSA? Explain Iterative and Block-based alignment method. **[7]**

b) Following table gives number of births according to their sex and conditions at the birth time: **[5]**

Sex	Condition	
	Normal	Abnormal
Male	19	05
Female	30	06

Test at $\alpha = 0.05$, whether conditions at birth depends on the sex of the child. (Table value = 3.84)

Q3) a) What do you mean by molecular docking? Explain any one method of docking in detail. **[7]**

b) Calculate Pearson's correlation coefficient for following data: **[5]**

Age (x)	56	42	36	47	49
Blood Pressure (y)	147	125	118	128	145

Comment on your result.

P.T.O.

Q4) a) Describe the term 'Kurtosis' along with it's types. Also explain coefficient of Kurtosis based on moments. **[7]**

b) What do you mean by scoring matrices? Give comparative account of PAM and BLOSUM. **[5]**

Q5) a) What is kendall rank correlation coefficient? Describe the detail procedure to obtain it. **[7]**

b) Discuss database similarity search tools. **[5]**

Q6) a) What is the need of protein structure prediction? Describe tertiary structure prediction method in detail. **[7]**

b) Four laboratories carried out experiment on precision and each used a sample of 5. The ammonic content was analysed. **[5]**

The results are:

The sum of squares : 0.84,

Sum of square between laboratories = 0.55 Prepare ANOVA table.

Q7) Write a short notes on any TWO of the following: **[12]**

a) Molecular file format

b) SCOP and CATH

c) Stratified random sampling

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Total No. of Questions : 5]

SEAT No. :

PD3597

[Total No. of Pages : 1

[6485]-34
S.Y. 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) ***Q.2 to Q.5 carry equal marks.***

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

a) What is agglomeration of nanoparticles?

b) Define dendrimers.

c) Give the Bragg's equation

d) What is meant by Sol and Gel.

e) Use of lipids as nanoparticles.

f) Define zeta potential.

Q2) a) Comment on use of microbial system for the synthesis of nanoparticles. **[6]**

b) Explain the use of X-ray diffraction. **[4]**

Q3) a) Discuss the types of nanoparticles and their uses. **[6]**

b) Comment on microemulsion synthesis. **[4]**

Q4) a) Explain any one method for the imaging of nanoparticles. **[6]**

b) Comment on the use of biomolecules for synthesis of nanoparticles. **[4]**

Q5) Write a short note on any two of the following : **[10]**

a) Nanomedicine

b) Biocompatible coating of Nanoparticles.

c) Use of nanoparticles in water remediation and purification.

Total No. of Questions : 5]

SEAT No. :

PD3598

[Total No. of Pages : 1

[6485]-35
M.Sc. - II
BIOTECHNOLOGY
MBT-306 : Agricultural 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) ***Q.2 to Q.5 carry equal marks.***

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

a) Full form of CRISPR.

b) What is virus indexing?

c) What is plant finger printing?

d) Mention special characteristics of golden rice.

e) What is metal chelation in plants?

f) What are microsatellites?

Q2) a) Discuss 4 various factors for optimal production in bioreactors. **[6]**

b) What is agribusiness? Explain it's 4 significance. **[4]**

Q3) a) What is plant DNA barcoding? Mention it's 4 applications. **[6]**

b) Comment on flavr savr tomato. **[4]**

Q4) a) Explain different methods of PCR for plant genotyping. **[6]**

b) With suitable example explain role of bacterial, cyanobacterial & fungal biofertilizers in agriculture. **[4]**

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

a) Pathogen diagnosis

b) Seedless plants

c) Microbial bioinsecticides

Total No. of Questions : 7]

SEAT No. : [ ]

PD3599

[Total No. of Pages : 2

[6485]-41

M.Sc. -II

BIOTECHNOLOGY

MBT-401: Genomics and Proteomics

(2019 Pattern) (Semester-IV)

Time : 3 Hours] ***[Max. Marks : 70***

Instructions to the candidates:

1) ***Question 1 is compulsory.***
2) ***Attempt any 5 questions from Q.2 to Q.7.***
3) ***Q.2 to Q.7 carries equal mark.***

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

a) What is genome annotation?

b) Write the significance of Biomarkers.

c) Define SAGE in genomics.

d) Enlist methods used for structural analysis of proteins.

e) What is NGS (Next Generation Sequencing)

f) Define functional proteomics.

Q2) a) Explain pharmacogenomics along with its applications **[7]**

b) Explain NMR spectroscopy in detail. **[5]**

Q3) a) What is homology? Explain how it is used in protein structure predication. **[7]**

b) What is transcriptomics? Explain MPRAs in detail. **[5]**

Q4) a) Explain yeast 3 hybrid system with its applications. **[7]**

b) Discuss comparative genomics in detail. **[5]**

P.T.O.

Q5) a) What is toxicogenomics? Write the applications of toxicogenomics in detail. **[7]**

b) Explain how protein-DNA interactions determined by proteomics tools.**[5]**

Q6) a) Discuss in detail how proteins are isolated and seperated from any sample. **[7]**

b) Explain the preparation of DNA microarray. **[5]**

Q7) Write short notes on any two of the following. **[12]**

a) Peptide mass Finger printing.

b) Novel Drug Discovery.

c) Single Nucleotide Polymorphism(SNP).

Total No. of Questions : 7]

SEAT No. :

PD3600

[Total No. of Pages : 2

[6485]-42
S.Y.M.Sc.
BIOTECHNOLOGY
MBT 402 : Advanced Bio-Analytical Techniques
(CBCS 2019 Pattern) (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) Isolectric point

b) Applications of CD-spectroscopy

c) Significance of FISH

d) Principle of confocal Microscopy

e) Denaturing Gradient gel electrophoresis

f) Principle of Immunoprecipitation

Q2) a) Explain the construction & working of scanning Electron Microscopy. **[7]**

b) Discuss flow cytometry with its applications. **[5]**

Q3) a) Describe the principle & applications of DNA microarray Technique. Mention its Advantages & Disadvantages. **[7]**

b) Describe principle & mechanism of Gas chromatography. Add a note on its significance. **[5]**

Q4) a) Explain principle, working and applications of surface plasmon Resonance. **[7]**

b) Comment on IR spectroscopy **[5]**

P.T.O.

Q5) a) Describe the principle and Instrumentation of HPLC technique. Mention its advantages & disadvantages. **[7]**

b) Describe in detail microarray system with its applications. **[5]**

Q6) a) Explain Principle & working of Affinity chromatography. Add a note on its applications **[7]**

b) Draw the ray diagram of Fluorescence spectrophotometer. Add a note on its applications. **[5]**

Q7) Write short notes on any two of the following. **[12]**

a) NGS data processing

b) X-ray crystallography

c) 2D gel electrophoresis

Total No. of Questions : 7]

SEAT No. :

PD3601

[Total No. of Pages : 2

[6485]-43
S.Y. M.Sc.
BIOTECHNOLOGY
MBT - 404 : Bioentrepreneurship & Startup Designing
(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) Solve any five of the following. **[10]**

a) Define pricing policy.

b) Write long form of SWOT & SWOC.

c) Define entrepreneur.

d) Write any two competitive stategies.

e) What is innovation?

f) Why market research is important.

Q2) a) What is business opportunity? Explain its sources. **[7]**

b) Discuss the government schemes to promote entrepreneur. **[5]**

Q3) a) Explain feasibility of market. Add a note on technical & financial feasibility. **[7]**

b) Explain in detail business plan. **[5]**

Q4) a) Discuss in detail ethical entrepreneurship & its journey. **[7]**

b) Explain different types of entrepreneurs. **[5]**

P.T.O.

Q5) a) Explain women entrepreneurship. **[7]**

b) Discuss the evolution & growth of Entrepreneurship in India. **[5]**

Q6) a) Explain in detail strategies to appraise project. **[7]**

b) What is business risk? Explain the different types of business risk. **[5]**

Q7) Write a short note on any two of the following. **[12]**

a) Porter's 5 forces model.

b) Working capital management.

c) Skills & characteristics of an entrepreneur.

Total No. of Questions : 7]

SEAT No. :

PD3602

[Total No. of Pages : 2

[6485]-44
M.Sc. - II
BIOTECHNOLOGY
MBT-405: Pharmaceutical Biotechnology and Drug 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) ***Q.2 to Q.7 carry equal marks.***

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

a) Define Drug tolerance.

b) What is PDR?

c) Define Genotoxicity.

d) What are Biopharmaceuticals?

e) Define pharmacophore.

f) Define immunology.

Q2) a) Describe in detail about pharmacodynamics. **[7]**

b) Describe mechanism of action of antiinflammatory drugs. **[5]**

Q3) a) Describe in detail different phases of clinical traits. **[7]**

b) Explain cytokines as a biotherapeutics. **[5]**

Q4) a) Explain what is structure based drug designing? **[7]**

b) How to identify Drug target using molecular modeling. **[5]**

Q5) a) Explain in detail European regulations. **[7]**

b) Describe molecular modeling of protein. **[5]**

P.T.O.

Q6) a) Write in detail manufacturing of biopharmaceuticals. **[7]**

b) What is Drug resistance? Explain with an example. **[5]**

Q7) Write short note on any two of the following. **[12]**

a) Drug Metabolism

b) Qualitative drug designing

c) Indian pharmacopeia

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Total No. of Questions : 7]

SEAT No. :

PD3603

[Total No. of Pages : 2

[6485]-45
S.Y. M.Sc.
BIOTECHNOLOGY
MBT-406 : Research Methodology and Scientific Communications
(2019 Pattern) (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 from Q.2 to Q.7. carry equal marks.***

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

a) Define citation index.

b) Enlist plagiarism detection tools.

c) What is the use of Tumitin software?

d) State the types of research philosophies.

e) What is deductive reasoning?

f) Explain the importance of biological controls.

Q2) a) Explain Holistic and reductionist approach in scientific research. **[7]**

b) Discuss the methods of research data organisation. **[5]**

Q3) a) Explain the components of effective oral communication. **[7]**

b) Describe methods of secondary data collection. **[5]**

Q4) a) Explain the significance of Hypothesis formulation & Hypothesis testing. **[7]**

b) Discuss steps of scientific research. **[5]**

P.T.O.

Q5) a) Explain different modes of scientific communication. **[7]**

b) Explain wild life ethics in research. **[5]**

Q6) a) Explain the statistical tools in scientific data processing and analysis. **[7]**

b) Explain the importance of journal impact factor? How it is calculated? **[5]**

Q7) Write short note on any two of the following. **[12]**

a) Biosafety issues in Animal experimentation.

b) Citation styles.

c) Characteristic of good scientific writing.

Total No. of Questions : 7]

SEAT No. :

PD3604

[Total No. of Pages : 2

[6485]-46
S.Y.M.Sc.
BIOTECHNOLOGY
MBT-407: Quality Control, Biosafety and Bioethics
(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) ***Question 2 to 7 carry equal marks.***

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

a) Define GMPs.

b) What is the need for Quality Control?

c) What is Quality Management?

d) Write any two ethical issues of cloning.

e) Name a few chemical hazards in the laboratory.

f) What is physical containment?

Q2) a) Explain in detail the stages of drug review. **[7]**

b) Explain the functions of RCGM. **[5]**

Q3) a) What is CPCSEA? Explain ethical guidelines that should be followed in research involving animals. **[7]**

b) Describe principle of biosafety. **[5]**

Q4) a) What are rules and regulations for start up companies. **[7]**

b) Comment on Environmental release issues of GMO's. **[5]**

P.T.O.

Q5) a) Enlist the licenses need to set up a pharmaceutical company for market distribution and explain any one of them. **[7]**

b) Define - Risk, containment and Biosafety. **[5]**

Q6) a) Explain in brief about the critical quality point in different stages of production. **[7]**

b) What is clinical research? Explain with example. **[5]**

Q7) Write short note on any two of the following: **[12]**

a) Institutional biosafety committee.

b) Fire prevention methods.

c) Biodiversity

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