Total No. of Questions : 7]

SEAT No. :

PC-4317

[Total No. of Pages : 2

[6345]-1001
M.Sc.-I
BIOTECHNOLOGY
BT-501MJ: Bacteriology, Parasitology and Virology
(2023 Pattern) (CBCS) (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) ***Q.2 to Q.7 carry equal marks.***

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

a) What is the significance of taxonomy in the classification of bacteria?

b) List some viral diseases that affect poultry.

c) Define archebacteria with an example.

d) What are prions? Give example of disease caused by prions.

e) Define siderophore with an example.

f) What is parasitism? Give one example of animal parasite.

Q2) a) Discuss the conversion of lytic and lysogenic life cycles of viruses. **[7]**

b) Explain the difference between Gram positive and Gram negative bacteria. **[5]**

Q3) a) Explain the process of bacterial DNA replication. **[7]**

b) Give brief account of strategies to culture the unculturable bacteria. **[5]**

Q4) a) What are some common viral diseases that affect plants? **[7]**

b) Describe quoram sensing in detail and state its significance in biofilm formation. **[5]**

P.T.O.

Q5) a) Discuss in detail about replication in DNA viruses. **[7]**

b) Explain virus cultivation in embryonated eggs. **[5]**

Q6) a) Describe the life cycle of plasmodium spp. **[7]**

b) Give an account of numerical taxonomy approach in bacteriology. **[5]**

Q7) **Write short notes on Any Two of the following:** **[12]**

a) Biosensors.

b) Biofertilizers and biopesticides.

c) Enterobacteria as a human pathogen.

Total No. of Questions : 5]

SEAT No. : ____

PC-4318

[Total No. of Pages : 2

[6345] - 1002
M.Sc.-I
Biotechnology
BT- 502-MJ: Advanced Cell Biology
(2023 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) ***Questions 2 to 5 carry equal marks.***

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

a) Define vesicular transport.

b) What is the main function of mitochondria?

c) What is apoptosis?

d) What is a G - Protein coupled receptor?

e) What is the function of Fibronectin?

f) Name one protein involved in tight junction.

Q2) a) What is passive transport? Explain simple diffusion and facilitated diffusion. **[6]**

b) Describe cell signalling Explain types of cell signalling. **[4]**

P.T.O.

Q3) a) Elaborate the pathways of cell death including the granzyme - mediated pathway. **[6]**

b) Explain the structure and function of organelles involved in membrane trafficking **[4]**

Q4) a) Discuss the etiology of cancer including the roles of oncogenes and tumor suppressor genes in cancer development & transformation. **[6]**

b) Explain the structure and role of collagen in cell matrix interaction. **[4]**

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

a) Gap Junctions

b) Meiosis

c) Phases of cell cycle

Total No. of Questions : 5]

SEAT No. : ____

PC-4319

[Total No. of Pages : 2

[6345] - 1003
M.Sc.
BIOTECHNOLOGY
BT- 503-MJ: Advanced molecularbiology
(2023 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) ***Questions 2 to 5 carry equal marks.***

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

a) What are Histone proteins?

b) Give the significance of sigma factor in transcription.

c) Describe photoreactivation.

d) Explain degeneracy of codon.

e) Give the account of cot curve.

f) What is Polytene chromosome?

Q2) a) What is repair mechanism in DNA? Describe any one repair system in detail. **[6]**

b) What is recombination? Distinguish between Homologous and Non Homologous recombination **[4]**

P.T.O.

Q3) a) Describe in detail Eukaryotic DNA replication. **[6]**

b) What are codons? Comment on initiation and termination of codons. **[4]**

Q4) a) Give the detailed account of mutagens and its types. **[6]**

b) Justify - Base analogues cause transition mutations. **[4]**

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

a) Wobble Hypothesis

b) SOS Repair mechanism

c) Site specific recombination

Total No. of Questions : 5]

SEAT No. : ____

PC-4320

[Total No. of Pages : 2

[6345] - 1004
M.Sc. (Biotechnology)
BT- 504-MJ: Advance Immunology
(2023 Pattern) (CBCS) (Semester - I)

Time : 2 Hours] ***[Max. Marks : 35***

Instructions to the candidates:

1) ***Q. No.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) Define self and nonself antigen.

b) Define allotype and idiotype

c) What are adjuvants? with example.

d) What is secondary infection?

e) Define Immunogenicity.

f) What is agglutination & Precipitation.

Q2) a) Explain in detail activation, maturation, and differentiation of T-cells with diagram. **[6]**

b) Explain indirect and sandwitch ELISA. **[4]**

P.T.O.

Q3) a) Explain in detail the structure, types and functions of immunoglobuline with suitable diagram. **[6]**

b) Write about structure and functions of MHC I and MHC II. **[4]**

Q4) a) Write in detail about conjugate and recombinant DNA vaccine. **[6]**

b) Explain mechanism and therapy of autoimmunity. **[4]**

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

a) Classical complement pathway

b) Phagocytosis

c) Immunofluorescence microscopy

Total No. of Questions : 5]

SEAT No. :

PC-4321

[Total No. of Pages : 2

[6345]-1005

M.Sc. (Part - I)

BIOTECHNOLOGY

BT-507- MJ :Environmental Biotechnology

(2023 Credit Pattern) (CBCS) (Semester - I)

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) Define phyto volatalization.

b) What is Green House effect? Give names of two gases responsible.

c) State two objectives of EIA.

d) Define Hazardous waste with examples.

e) What is the process of Bioleaching?

f) List two out comes of Rio conference.

Q2) a) Explain in detail about Biodiversity & its types. Give the significance. **[6]**

b) Give an detailed account of Indian Eco - standards. **[4]**

Q3) a) Discuss the concept of phytoremediation in detail. **[6]**

b) State the objectives and importance of kyoto protocol. **[4]**

Q4) a) Explain in detail about Bioremediation also describe the types with examples. **[6]**

b) Give an account of micro - organisms used in Biofuel production. **[4]**

P.T.O.

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

a) Biological waste water treatment method.

b) Carbon footprint and carbon credit.

c) Objectives and process of EIA.

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Total No. of Questions : 5]

SEAT No. :

PC- 4322

[Total No. of Pages : 2

[6345]-1006
M.Sc. (Part - I)
BIOTECHNOLOGY
BT - 508 - MJ : Food Biotechnology
(2023 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) ***Q.2 to Q.5 carry equal marks.***

Q1) Solve any Five of the following. **[5]**

a) Define pre biotics.

b) Give two applications of proteases in Food Processing.

c) Write the role of antiolidants as a food additives.

d) Define GM Foods.

e) What is TQM?

f) Name one high temperature food processing method and its significance in food safety.

Q2) a) What is fermentation technology? Explain the role of microorganisms in fermentation of beer. **[6]**

b) Discuss the National and international food laws. **[4]**

Q3) a) Define nutrigenomics? Discuss its relationship to nutrition and genetics. **[6]**

b) What is freez-drying? Why is it used in food preservation. **[4]**

P.T.O.

Q4) a) Define functional foods and explain. How they differ from regular foods. **[6]**

b) Explain the role of probiotics in the treatment of cancer. **[4]**

Q5) Write short note on any Two of the following. **[10]**

a) FSSAI Rules

b) Health applications of curcumin

c) Biopreservation

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Total No. of Questions : 5]

SEAT No. : ____

PC-4323

[Total No. of Pages : 2

[6345]-1007

M.Sc. (Part - I)

BIOTECHNOLOGY

BT - 509 MJ : Biostatistics

(2023 Pattern) (CBCS) (Semester - I)

Time : 2 Hours] ***[Max. Marks : 35***

Instructions to the candidates:

1) ***Question 1 is compulsory.***
2) ***Solve any three question from Q.2 to Q.5.***
3) ***Questions 2 to 5 carry equal marks.***
4) ***Use of scientific calculator is allowed.***

Q1) **Solve any <u>five</u> of the following :** **[5]**

a) Define 'Null hypothesis'.

b) Write any two assumptions made in simple linear regression.

c) The data is related to blood pressure measurements (in mm Hg)
120, 125, 130, 118, 122
Calculate the arithmetic mean for the above data.

d) Write down the formula for 'coefficient of variation'.

e) Draw a scatter diagram for the following data.

x	10	15	20	40
y	20	35	45	65

Comment on your diagram.

f) What do you mean by 'critical region'?

Q2) a) Describe 'stratified random sampling' indetail. **[6]**

b) Two referees in a flower beauty competition rank the 5 types of flowers as follows : **[4]**

Referee A	1	5	3	2	4
Referee B	5	3	4	1	2

Compute Spearman's rank correlation coefficient between referee A and referee B.

P.T.O.

Q3) a) Explain the term 'Skewness' with its types. **[6]**

b) The following table shows the results of an experiment performed to analyse the effect of vaccination on laboratory animals against a particular disease. **[4]**

	Infected	Uninfected
Vaccinated	5	431
Not Vaccinated	9	239

Examine the effect of vaccination in controlling the suspectibility of animals to disease. Use 5% l.o.s. {Table value : 3.841}.

Q4) a) Discuss the 'principles of design of experiments' in detail. **[6]**

b) Dissolving times (in sec) of a drug in gastric juice are 42.7, 43.4, 44.6, 45.1, 46.8. Can we conclude that the population mean is 45 seconds? Use 5% level of significance {Table value: 2.776}. **[4]**

Q5) **Write short notes on any <u>Two</u> of the following:** **[10]**

a) Type I and Type II error.

b) Completely Randomized Design (CRD).

c) One - way ANOVA.

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Total No. of Questions : 5]

SEAT No. :

PC-4324

[Total No. of Pages : 2

[6345]-1008
M.Sc
BIOTECHNOLOGY
BT-510-MJ : Rasayana : An Ancient Gerontology
(2023 Pattern) (CBCS) (Semester - I)

Time : 2 Hours] ***[Max. Marks : 35***

Instructions to the candidates:

1) ***Question No. 1 is compulsory.***
2) ***Solve any three questions from Que . No.2 to Que. No 5.***
3) ***Question No.2 to 5 carry equal marks.***

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

a) What is Naimittika?

b) Explain Ajastrika.

c) What is Pranakamya?

d) What is kamya?

e) How to determine Tridosha type?

f) What is Rasayana?

Q2) a) Describe wear & tear theory. **[6]**

b) Describe Pranakamya rasayana and its significance in ayurveda. **[4]**

Q3) a) Explain genetic control theory and its significance in biological systems. **[6]**

b) Describe shrikamya rasayana. **[4]**

P.T.O.

Q4) a) Elaborate the method for medhakamya rasayana preparation. **[6]**

b) Explain mutagenic rasayana. **[4]**

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

a) Tridosha

b) Calorie restriction theory

c) Prevention of Ageing and Longevity.

Total No. of Questions : 5]

SEAT No. :

PC-4325

[Total No. of Pages : 2

[6345]-1009

M.Sc.

BIOTECHNOLOGY

BT- 511 - RM : Research Methodology

(2023 Pattern) (CBCS) (Semester - I)

Time : 2 Hours] ***[Max. Marks : 35***

Instructions to the candidates:

1) ***Question 1 is compulsory.***
2) ***Solve any three questions from Que . No.2 to Que. No 5.***
3) ***Question No.2 to 5 carry equal marks.***

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

a) What do you mean by holistic approach of research?

b) Define - Null hypothesis

c) Enlist various methods for secondary data collection.

d) What is g - index?

e) Give different softwares used for plagiarism detection.

f) What is patent?

Q2) a) What do you mean by data analysis? Explain non - parametric tests of data analysis. **[6]**

b) What is scientific misconduct? Discuss preventive measure for it. **[4]**

Q3) a) Explain basic principle and different types of experimental design. **[6]**

b) What is citation index? Elaborate on different citation index used in research. **[4]**

P.T.O.

Q4) a) Explain in detail various modes of scientific communications with suitable example. **[6]**

b) Give an account on research ethics. **[4]**

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

a) Primary data collection.

b) Research philosophies.

c) Preventive measures to avoid plagiarism.

Total No. of Questions : 7]

SEAT No. :

PC-4326

[Total No. of Pages : 2

[6345]-2001

M.Sc.- I

BIOTECHNOLOGY

BT-551MJ : Advanced Biological Chemistry

(2023 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 Q2 to Q7.***
3) ***Questions 2 to 7 carry equal marks.***

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

a) What are amino sugars.

b) PUFA with examples.

c) Importance of Deamination

d) What are Isozymes

e) Enlist the non-essential amino acids.

f) Give the significance of V_{max}.

Q2) a) Discuss the composition of bacterial cell wall. **[7]**

b) Explain the structure and functions of fats and oils. **[5]**

Q3) a) With a representative example of Haemoglobin, explain the structural organization of proteins. **[7]**

b) Comment on the dehydrogenase reactions of TCA cycle & give its significance. **[5]**

P.T.O.

Q4) a) Discuss the effect of substrate concentration on enzyme activity to derive the MM equation. **[7]**

b) Explain the structure and biological role of Prostaglandins. **[5]**

Q5) a) Explain the central role of Glucose-1-phosphate in synthesis and degradation of glycogen. **[7]**

b) Give the functions of naturally occurring peptides. **[5]**

Q6) a) Discuss pyruvate dehydrogenase as an multienzyme complex. Add a note on roles of cofactors in its functioning. **[7]**

b) Explain the limitations of lineweaver Burk plot. **[5]**

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

a) Reversible and Irreversible inhibition of enzyme.

b) Peptide bond

c) β-oxidation of fatty acids

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Total No. of Questions : 7]

SEAT No. : ____

PC4327

[Total No. of Pages : 2

[6345]-2002

M.Sc. - I

BIOTECHNOLOGY

BT-552-MJ : Genetic Engineering

(2023 CBCS Pattern) (Semester - II) (Credit System)

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

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

a) Insertional vector.

b) RNase H enzyme.

c) Give properties of ideal vector.

d) Hot start PCR.

e) CIAP.

f) DEAE mediated gene transfer.

Q2) a) Explain Northen blotting and Hybridization technique. Add a note on its applications. **[7]**

b) Discuss phagemid vector in detail. **[5]**

Q3) a) Explain the mechanism of T-DNA transfer by Agrobacterium mediated gene transfer. Add a note on its applications. **[7]**

b) Describe Bacteriophage P_1 Artificial chromosome vector in brief. **[5]**

P.T.O.

Q4) a) Explain Nested PCR in detail. Add a note on its advantages and disadvantages. **[7]**

b) Explain liposome mediated gene transfer method. **[5]**

Q5) a) Explain the strategies for production of transgenic plants. Give its applications with suitable examples. **[7]**

b) Discuss the nomenclature of Restriction endonuclease with suitable example. **[5]**

Q6) a) Explain different types of plasmid vectors used in gene manipulation. **[7]**

b) Explain various developmental aspects of genetic Engineering. **[5]**

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

a) Differential display PCR.

b) Enzyme based selection of recombinants.

c) Panicle bombardment gene transfer method.

Total No. of Questions : 5]

SEAT No. :

PC-4328

[Total No. of Pages : 2

[6345]-2003
M.Sc. - I
BIOTECHNOLOGY
BT-553MJ : Advanced Genetics
(2023 Pattern) (CBCS) (Semester - II)

Time : 2 Hours] ***[Max. Marks : 35***

Instructions to the candidates:

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

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

a) Define an allele and locus.

b) What are Cytogenetic maps?

c) What is Intrachromosomal recombination?

d) Draw a Pedigree symbol showing consanguineous marriage.

e) What are two-point crosses in genetic mapping?

f) What are Lethal Mutants?

Q2) a) Differentiate between Physical maps and genetic maps. **[6]**

b) Write a note on y-linked inheritance. **[4]**

Q3) a) What are mutations? Describe the classification of different types of mutants. **[6]**

b) Write a note on experimental methods for determining recombination frequency. **[4]**

P.T.O.

Q4) a) Using Drosophila Melanogaster as an example. Illustrate how x-linked genes are expressed. **[6]**

b) Explain the inheritance pattern of Autosomal recessive genes. **[4]**

Q5) Write short notes (any two) : **[10]**

a) Double Hit strain.

b) Transformation Rescue

c) Pleiotropy with example.

Total No. of Questions : 5]

SEAT No. :

PC-4329

[Total No. of Pages : 2

[6345]-2004
M.Sc. (Part - I)
BIOTECHNOLOGY
BT-560MJ: Nanotechnology
(2023 Pattern) (Semester - II) (CBCS)

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

Q1) **Solve Any Five of the following:** **[5]**

a) Define metal oxide nanoparticles.

b) What are carbon nanotubes?

c) Write the applications of UV-visible spectrophotometer.

d) What is bottom-up approach?

e) What is oil/water microemulsion?

f) What are protein nanoparticle interactions?

Q2) a) Describe use of SEM in characterization of nanoparticles. **[6]**

b) Discuss environmental and health impact of nanoparticles with respect to ecotoxicity. **[4]**

Q3) a) Describe in detail sol gel method. **[6]**

b) Describe lipid nanoparticles and it's properties. **[4]**

P.T.O.

Q4) a) Describe microwave assisted synthesis of nanoparticles. **[6]**

b) Explain antifungal activity of nanoparticles. **[4]**

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

a) Solvothermal precipitation method.

b) Isotropic nanoparticles.

c) Fluorescence spectrophotometry.

Total No. of Questions : 5]

SEAT No. :

PC-4330

[Total No. of Pages : 2

[6345] - 2005
M.Sc.-I
BIOTECHNOLOGY
BT- 562MJ: Stemcells and Regenerative Technology
(2023 Pattern) (CBCS) (Semester - II)

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) Define unipotent stem cells. Give any one example.

b) Mention any two important discoveries in stem cell technology.

c) Write any two applications of stem cells.

d) State clinical applications of adult stem cells.

e) What is gene therapy?

f) Give two types of stem cell partitioning.

Q2) a) What are stem cells? Mention characteristics and types based on sources. **[6]**

b) Describe the role of stem cells in organ regeneration. **[4]**

Q3) a) What do you understand by stem cell niche? Elaborate on its components and functions. **[6]**

b) What are neural stem cells? Write their applications. **[4]**

P.T.O.

Q4) a) What are iPSC? How are they different than embryonic stem cells? Also mention advantages of iPSC over embryonic stem cells. **[6]**

b) Describe in detail derivation and culturing of embryonic stem cells. **[4]**

Q5) **Solve any two from the following :** **[10]**

a) Controversies in stem cell research

b) Stem cells in immunomodulation.

c) Regenerative medicine

Total No. of Questions : 5]

SEAT No. :

PC-4331

[Total No. of Pages : 2

[6345]-2006
M.Sc. (BIOTECHNOLOGY)
BT-564MJ: TISSUE ENGINEERING
(2023 Pattern) (CBCS) (Semester - II)

Time : 2 Hours] ***[Max. Marks : 35***

Instructions to the candidates:

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

Q1) **Solve Any Five of the following:** **[5]**

a) What is mechanobiology?

b) Give components of biological dressing.

c) Write any two sources of cells for liver tissue engineering.

d) Mention any two unforseen consequences of tissue engineering.

e) Who is a father of tissue engineering?

f) Write any two properties of hyaluronic acid that make it a good scaffold material.

Q2) a) Define rheology. Add a note on its significance in development of tissue constructs. **[6]**

b) Describe in brief several sources of cells used in tissue engineering. **[4]**

Q3) a) What is scaffold? Explain tissue specific scaffolds used in tissue engineering. **[6]**

b) Elaborate on clinical applications of tissue engineering in cardiovascular regeneration. **[4]**

P.T.O.

Q4) a) Write in detail about cartilage tissue engineering. **[6]**

b) What are hydrogels? How are they advantageous to construct a scaffold? **[4]**

Q5) **Solve Any Two of the following.** **[10]**

a) Computational modelling to study tissue mechanics.

b) Puramatrix.

c) Ethical and regulatory considerations in tissue engineering.

Total No. of Questions : 5]

SEAT No. :

PC-4332

[Total No. of Pages : 2

[6345] - 2007
M.Sc.
BIOTECHNOLOGY
BT- 566-MJ: Herbal Medicine
(2023 Pattern) (Semester - II) (CBCS)

Time : 2 Hours] *[Max. Marks : 35*

Instructions to the candidates:

1) ***Q.No 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) What is the contribution of Friedrich Wilhelm serturner?

b) Name the pathway for the synthesis of Flavonoids

c) Name the pathway for the synthesis of sesquiterpene

d) Name the method use to quantitate Alkoloids

e) State the qualitative analysis method of Alkoloids.

f) Define Saponins

Q2) a) Explain the technique HPTLC used in the analysis of secondary metabolites. **[6]**

b) Write the flow chart of shikimic Acid pathway. **[4]**

Q3) a) Explain any four in-vitro experiments to evaluate the efficacy of secondary metabolites. **[6]**

b) Explain the difficulties encountered in marketing the herbal drug. **[4]**

P.T.O.

Q4) a) Describe the role of anthocynanin in colouration of flowers **[6]**

b) State guidelines under drug & cosmatic Act (CND of 1945) **[4]**

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

a) Ashwagandha

b) Vincristine

c) Cardiac Glycoside

Total No. of Questions : 7]

SEAT No. :

PC-4333

[Total No. of Pages : 2

[6345] - 3001
M.Sc- II (Biotechnology)
BT- 601-MJ: PHYSIOLOGY
(2023 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 Q. 2 to Q. 7.***
3) ***Questions 2 to 7 carry equal marks.***

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

a) Chemoreceptor

b) Unstrited muscle

c) Trail following

d) Explain photoreversibility.

e) Circandian rhythms

f) Vernalization

Q2) a) Discuss the process of synaptic transmission. Enlist the factors influencing on it. **[7]**

b) Explain the role of shoot apex in floral evocation. **[5]**

Q3) a) Explain in detail different types of drought resistance mechanism in plants. **[7]**

b) Describe three chemical classes of hormones of animals with suitable examples. **[5]**

P.T.O.

Q4) a) Discuss how endocrine system regulates nutrient metabolism in mammals. **[7]**

b) Elaborate the mechanism of regulation of blue light stimulated response in plants. **[5]**

Q5) a) Describe phytochemical and biochemical properties of Phytochromes.**[7]**

b) Explain any two nevigational strategies used by animals. **[5]**

Q6) a) Explain the process of excitation - contraction coupling in skeletal muscles add a note on role of calcium with respect to contractile muscle proteins. **[7]**

b) Explain how the discovery of florigen advanced our understanding of flowering mechanism? **[5]**

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

a) Mechanoreceptor for touch & hearing.

b) Membrane potential

c) Heat shock mediated protein tolerance in plants.

Total No. of Questions : 5]

SEAT No. : ____

PC-4334

[Total No. of Pages : 2

[6345]-3002

M.Sc. - II

BIOTECHNOLOGY

BT602MJ: PLANT BIOTECHNOLOGY

(2023 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 <u>Any Five</u> of the following:** **[5]**

a) Define Androgenesis.

b) Define single cell protein.

c) Give two examples of Genetically Modified plants.

d) What are cryoprotectants?

e) What are selectable markers?

f) What are cybrids?

Q2) a) What is transformation? Describe in detail physical methods of transformation. **[6]**

b) Explain the process of biotic stress tolerance mechanism in plants. **[4]**

P.T.O.

Q3) a) Describe in detail the concept & methods of micropropogation. **[6]**

b) Explain plant vectors in detail with suitable examples. **[4]**

Q4) a) Explain the role of biotechnology in quantitative improvement of algae with suitable example. **[6]**

b) Explain the mechanism of T-DNA transfer. **[4]**

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

a) Artifical Seeds.

b) Methods of protoplast isolation.

c) Organogenesis in plants.

Total No. of Questions : 5]

SEAT No. : ____

PC-4335

[Total No. of Pages : 2

[6345] - 3003
M.Sc.- II
BIOTECHNOLOGY
BT- 603-MJ: Animal Biotechnology
(2023 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) Give two examples of living medicine.

b) What is REMI?

c) How will you differentiate hemopoietic stem cells to neurons?

d) What is cryoprotectant?

e) What are Yamanaka factors?

f) What are replacement vectors used in transgenesis?

Q2) a) Describe the production of therapeutic proteins using adherent cell culture on large scale. Mention its advantages and disadvantages in comparison to suspension cell culture system. **[6]**

b) Explain the use of nanomaterials in tissue engineering with appropriate examples. **[4]**

P.T.O.

Q3) a) Discuss the generation of knockout mouse model using induced Cre-loxP strategy. **[6]**

b) Explain the technique of in vitro fertilization used to improve and breed the livestock animals artificially. **[4]**

Q4) a) Describe the role of stem cell therapies in medicine. Explain the process of maintenance and differentiation of embryonic and mesenchymal stem cells in context to stem cell therapy to treat diseases. **[6]**

b) Elaborate on gene silencing using RNA. **[4]**

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

a) 3D bioprinting for tissue engineering.

b) Role of biotechnology in allergenics research.

c) Biosafety and Bioethics associated with transgenic animals.

Total No. of Questions : 5]

SEAT No. : ____

PC-4336

[Total No. of Pages : 2

[6345]-3004

M.Sc. - II

BIOTECHNOLOGY

BT-604 MJ : Emerging Trends in Biotechnology

(2023 Pattern) (CBCS) (Semester - III)

Time : 2 Hours] ***[Max. Marks : 35***

Instructions to the candidates:

1) ***Question 1 is compulsory.***
2) ***Solve any three question froms Q.2 to Q.5.***
3) ***Questions 2 to 5 carry equal marks.***

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

a) Round up ready technology.

b) Phases of clinical trials.

c) Metagenomics.

d) Drones in agriculture.

e) Gene therapy.

f) Benefits of LMO's

Q2) a) Explain the mechanism of cell replacement and adoptive cell therapy. Add a note on its benefits. **[6]**

b) Singapore has progressed in maximum use of emerging technologies - Justify. **[4]**

Q3) a) Explain the factors that alter the microbiome. Add a note on its identification method. **[6]**

b) Describe the process of developments of virus resistant GMO's. **[4]**

P.T.O.

Q4) a) Discuss the phases of 3D bioprinting of tissues and organs. **[6]**

b) Explain the method of single cell sequencing with benefits and challenges. **[4]**

Q5) **Write short notes on any <u>Two</u> of the following:** **[10]**

a) Vertical farming.

b) Ethical and biosafety regulations of transgenics.

c) CAR - T cell theraphy.

Total No. of Questions : 5]

SEAT No. :

PC-4337

[Total No. of Pages : 2

[6345]-3005
M.Sc. (Part - II)
BIOTECHNOLOGY
BT-610 - MJ :Molecular Diagnostics
(2023Pattern) (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 Nos. 2 to 5 carry equal marks.***

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

a) Justify need of early disease diagnosis.

b) What is pre analytical quality control?

c) Enlist any two metabolic disorders.

d) What are Haemoglobinopathies?

e) Enlist molecular markers to diagnose pathogens.

f) State importance of pre-natal disease diagnosis.

Q2) a) Compare and contrast traditional v/s molecular diagnosis methods. **[6]**

b) What is sex linked inheritance? Describe methods of diagnosis of sex linked inherited disorders with suitable example. **[4]**

Q3) a) Give an account on single gene disorder. Add a note on it's diagnosis markers. **[6]**

b) Explain analysis of maternal inheritance. **[4]**

P.T.O.

Q4) a) Discuss molecular basis of cancer. **[6]**

b) Comment on applications of multiplex - PCR. **[4]**

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

a) Muscular dystrophy

b) Western blotting

c) Importance of polymorphism in pathogens.

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Total No. of Questions : 5]

SEAT No. :

PC- 4338

[Total No. of Pages : 2

[6345]-3006

M.Sc.

BIOTECHNOLOGY

BT - 612 - MJ : Infectious Diseases and Vaccine Technology

(2023 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) Define infection.

b) State two differences between community acquired infection and hospital acquired infection.

c) Enlist any two protozoal diseases of human.

d) What is Geosentinel network?

e) State the role of adjuvants.

f) What is the goal of integrated vector control?

Q2) a) Elaborate on various factors contributing to infectious diseases out breaks. **[6]**

b) Describe any two viral diseases with reference to mode of transmission. Pathogenesis and treatment. **[4]**

Q3) a) Elaborate on serological methods for diagnosis of bacterial diseases with suitable example. **[6]**

b) "Immuno compromized patients are susceptible to Infectious diseases" justify. **[4]**

P.T.O.

Q4) a) Explain any three methods used to control infectious diseases. **[6]**

b) Comment on importance preclinical studies in vaccine development. **[4]**

Q5) Write short notes on any Two of the following. **[10]**

a) Types of vaccines

b) WHO guidelines for Infectious diseases

c) Helminth diseases

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Total No. of Questions : 5]

SEAT No. : ____

PC-4339

[Total No. of Pages : 2

[6345]-3007

M.Sc. - II

BIOTECHNOLOGY

BT-614 MJ : Biofuel Technology

(2023 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) ***Questions 2 to 5 carry equal marks.***

Q1) **Solve any <u>five</u> of the following :** **[5]**

a) Write advantages of biofuel.

b) Mention feed stock pretreatment in biogas production.

c) Mention the by products of alcohol manufacture.

d) Explain third generation biofuels.

e) Distinguish between bio air & bio diesel.

f) Enlist disadvantages of biofuel production.

Q2) a) Describe down stream processing for bioethanol production. **[6]**

b) Discuss key criteria used for selection of catalyst in biodiesel production. **[4]**

Q3) a) Comment on significance of batch and continuous fermentation process in bioethanol production. Add a note on their limitations. **[6]**

b) Describe the applications of by products of alcohol production. **[4]**

Q4) a) State different types of biogas digesters. Diagrammatically illustrate design and operations of any one type in detail. **[6]**

b) Comment on life cycle assesment of biofuel. **[4]**

P.T.O.

Q7) **Write short notes on any <u>Two</u> of the following:** **[10]**

a) Economic aspects of biofuel.

b) Pyrolysis.

c) Co-production of glycerol

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Total No. of Questions : 5]

SEAT No. :

PC-4340

[Total No. of Pages : 2

[6345]-3008

M.Sc. (Part - II)

BIOTECHNOLOGY

BT- 616 - MJ : Biotechnology for sustainable Development

(2023 Pattern) (CBCS) (Semester - III)

Time : 2 Hours] ***[Max. Marks : 35***

Instructions to the candidates:

1) ***Question No. 1 is compulsory.***
2) ***Solve any three questions from QNo.2 to QNo. 5.***
3) ***Question No.2 to 5 carry equal marks.***

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

a) What is the primary goal of sustainable development?

b) Give two examples of GMO.

c) Define bioremediation.

d) Give two examples of metals responsible for environment pollution.

e) define clean technology.

f) Enlist nonrenewable resources.

Q2) a) What types of bacteria are commonly used in bioleaching and how do they involved in copper extraction. **[6]**

b) Discuss the advantages and disadvantages of using biogas as a renewable energy source. **[4]**

Q3) a) What is Nano science? How does it relate to environmental sustainability. **[6]**

b) How do waste material serve as substrates for enzyme production in microbial processes. **[4]**

P.T.O.

Q4) a) What are different generations of biofuels? Explain how they differ from one another **[6]**

b) What types of natural substances or organisms are commonly used in sustainable pesticides. **[4]**

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

a) Pollutant assay.

b) flaver saver tomato

c) Biopolymers.

Total No. of Questions : 5]

SEAT No. : ____

PC-4341

[Total No. of Pages : 2

[6345]-3009

M.Sc.

BIOTECHNOLOGY

BT-618 MJ : Biosensor Technology

(2023 Credit Pattern) (CBCS) (Semester - III)

Time : 2 Hours] ***[Max. Marks : 35***

Instructions to the candidates :

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

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

a) Composites materials used in biosensor.

b) Cell based biosensors.

c) Emission based detection systems.

d) Applications of biosensors in environment monitoring.

e) Relative biosensors.

f) Membranes used in biosensor.

Q2) a) Discuss the classification of biosensors based on output signals. **[6]**

b) Comment on immobilization techniques used in biosensors. **[4]**

Q3) a) With a suitable diagram discuss the characteristics features of biosensors. **[6]**

b) Comment on the analytes used in biosensors. **[4]**

P.T.O.

Q4) a) Explain how the use of biosensors significantly revolutionarised the industrial processes for online monitoring. **[6]**

b) Discuss on the biosensors used for pathogen detection. **[4]**

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

a) Wearable biosensors.

b) Polymers used in preparation of biosensor

c) Limitations of biosensors

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Total No. of Questions : 5]

SEAT No. : ____

PC- 4342

[Total No. of Pages : 2

[6345]-3010
M.Sc. (Part - II)
BIOTECHNOLOGY
BT - 620 - MJ : Intellectual Property Right (IPR)
(2023 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) What is specification?

b) Enlist classes of copyright.

c) What is infringement?

d) What is the purpose of IDA?

e) Enlist rights confered to patentee.

f) What GATT stands for?

Q2) a) Describe the procedure of patent application. **[6]**

b) Discuss copyright ownership and transfer of it. **[4]**

Q3) a) Give an account on Plant Breeders 'Rights and Farmers' Rights. **[6]**

b) Describe the components of TRIPS agreement. **[4]**

P.T.O.

Q4) a) Describe patenting of microorganisms w.r.t. Budapest Treaty. Comment on criteria for patenting microorganisms. **[6]**

b) Elaborate infringement of copyrights and its remedies. **[4]**

Q5) Write short notes on any Two of the following. **[10]**

a) Commercialization of patented innovations

b) Biological Diversity Act, 2002

c) Non-patentable inventions

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Total No. of Questions : 5]

SEAT No. :

PC-4343

[Total No. of Pages : 2

[6345]-3011

M.Sc. - II

BIOTECHNOLOGY

BT-622 MJ : Biofertilizer and Biopesticide Technology

(2023 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) Define PGPR.

b) Give example of any two non symbiotic nitrogen fixers.

c) Enlist liquid based biofertilizers.

d) Define heterocysts & its role.

e) Enlist two fungal biopesticides.

f) What is PSB?

Q2) a) Give an account on cryptolaemus production and it's mode of action. **[6]**

b) Comment on scope of biofertilizer. **[4]**

Q3) a) Explain various application methods & precautions for biopesticides. **[6]**

b) What is EM? Comment on it's significance. **[4]**

Q4) a) What are quality control techniques? Add a note on standard parameters according to CIB specifications. **[6]**

b) Write Azotobactor biofertilizer and it's significance. **[4]**

P.T.O.

Q5) **Write short notes on Any <u>Two</u> of the following:** **[10]**

a) Factors affecting efficacy of biofertilizers.

b) Plant extract as a biopesticides.

c) VAM.

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Total No. of Questions : 5]

SEAT No. :

PC-4344

[Total No. of Pages : 2

[6345]-3012
M.Sc (Part - II)
BIOTECHNOLOGY
BT- 624 - MJ : Machine Learning and Data Science
(2023 Pattern) (CBCS) (Semester - III)

Time : 2 Hours] ***[Max. Marks : 35***

Instructions to the candidates:

1) ***Question No.1 is compulsory.***
2) ***Solve any three questions from Que . No.2 to Que. No 5.***
3) ***Question No.2 to 5 carry equal marks.***

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

a) Give an example of feature engineering in a Biological dataset.

b) Why to normalize numerical data before applying machine learning algorithm?

c) Mention techniques to handle outliers in the data.

d) Compare machine Learning with traditional programming.

e) How would you handle missing values in a dataset?

f) Differentiate between training data and testing data.

Q2) a) What are the potential risks and benefits of using machine learning in Biotechnology? Explain by giving specific example. **[6]**

b) Describe any two examples of ordinal data. **[4]**

Q3) a) Discuss machine learning versus Artificial Intelligence versus Data Science. **[6]**

b) When would you choose Principal Component Analysis (PCA) Over Linear Discriminant Analysis (LDA) ? **[4]**

P.T.O.

Q4) a) Explain the difference between supervised and unsupervised learning.**[6]**

b) Elaborate on Descriptive task and predictive task in machine learning. **[4]**

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

a) Ethical considerations in Biotechnological applications of machine learning.

b) Issues in machine Learning.

c) Different Data Preprocessing Techniques.