

Total No. of Questions : 5]

SEAT No. :

PE1526

[Total No. of Pages : 2

[6503]-301

S.Y.B.Sc. (Biotechnology)

BBt - 301 : CELL BIOLOGY - I

(Revised 2019 Pattern) (Semester - III)

Time : 2Hours]

[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 from 2 to 5 carry equal marks.

Q1) Solve any five of the following [5]

- a) What is Facilitated diffusion?
- b) Which is the marker enzyme of mitochondria?
- c) State the role of nucleolus.
- d) Define tonocity.
- e) Mention the function of cholesterol in cell membrane.
- f) What is Plasmodesmata?

Q2) a) What is cytoskeleton? Enlist different types of cytoskeletal elements and describe any one in detail. [6]

OR

Describe in detail structure, components and functions of ER

b) Discuss Extracellular Matrix in detail. [4]

Q3) a) Explain the structure of Eukaryotic cell with the help of neat, labelled diagram. [6]

OR

With the help of labelled diagram, describe ultrastructure of mitochondria.

b) Illustrate 'Lipids' as an important chemical component of cell membrane. [4]

P.T.O.

Q4) a) Describe the different types of energy driven transport mechanisms in the cell. **[6]**

OR

Discuss any two types of cell junctions in detail.

b) Give an account on 'functions of cell membrane'. **[4]**

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

- a) Cell theory.
- b) Bulk transport.
- c) Vacuoles.
- d) Functions of lysosomes.
- e) Basal Bodies.
- f) Smooth Endoplasmic Reticulum.



Total No. of Questions : 5]

SEAT No. :

PE-1527

[Total No. of Pages : 2

[6503]-302

S.Y. B.Sc.

BIOTECHNOLOGY

BBt-302 : Molecular Biology - I

(Rev. 2019) (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 Gene.
- b) What is Nucleotide?
- c) Define Replicon.
- d) State the Role of DNA polymerase - II.
- e) Which strain selected by Griffith for his experiment?
- f) Define suppressors.

Q2) a) Describe the structure of Watson and Crick model of DNA.

[6]

OR

Explain organization of DNA in prokaryotes.

- b) Give the properties of Genetic code.

[4]

Q3) a) Enlist and explain the role of enzymes involved in prokaryotic DNA replication.

[6]

OR

Describe in brief, types and structure of RNA.

- b) Write a note on nucleosomes.

[4]

P.T.O.

Q4) a) Write in brief about organelle DNA. **[6]**

OR

Explain the experiments conducted for the identification of DNA as a genetic material.

b) Write a note on Rolling circle replication. **[4]**

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

- a) Promoters.
- b) Decipher genetic code.
- c) General principles of DNA synthesis.
- d) Nucleoside.
- e) Bidirectional replication.
- f) Non-histone proteins.



Total No. of Questions : 5]

SEAT No. :

PE-1528

[Total No. of Pages : 2

[6503]-303
S.Y. B.Sc.
BIOTECHNOLOGY
BBt-303 : Genetics
(Rev. 2019) (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 Genotype and phenotype.
- b) Draw any 4 symbols used in pedigree analysis.
- c) State any 2 deviations from Mendel's laws.
- d) Define allele.
- e) Write any two symptoms of Down's syndrome.
- f) Define frameshift mutation.

Q2) a) Describe Deletion & Duplication with suitable examples. **[6]**

OR

Explain epistasis w.r.t. Duplicate & complementary gene interactions.

- b) What is meant by Dosage compensation? How is it brought about in organisms with heterogametic females (birds) **[4]**

Q3) a) Comment on Mendel's contribution in the field of Genetics. **[6]**

OR

Describe polyploidy in details with suitable examples.

- b) Write a note on karyo type analysis. **[4]**

P.T.O.

Q4) a) What is linkage mapping? How is it done using three point test cross.[6]

OR

What are mutagens? Describe any two types of mutations brought about using chemical mutagens.

b) Explain stern's experiment as a cytological proof of crossing over. [4]

Q5) Write short notes on any four of the following :

[10]

- a) Penetrance and expressivity.
- b) Environmental sex determination.
- c) X-linked inheritance.
- d) Genetic counselling.
- e) Somatic and germline mutations.
- f) X-inactivation.



Total No. of Questions : 5]

SEAT No. :

PE-1529

[Total No. of Pages : 2

[6503]-304
S.Y. B.Sc.
BIOTECHNOLOGY
BBt-304 : Metabolism
(Revised 2019) (Semester - III)

Time : 2 Hours]

[Max. Marks : 35

Instructions to the candidates:

- 1) Q.1 is compulsory.
- 2) Solve any three of Q.2 to Q.5.
- 3) Questions 2 to 5 carry equal marks.

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

- a) Define entropy.
- b) Write significance of unsaturated fatty acids.
- c) Write role of glucose-6-phosphatase.
- d) Comment on non-essential amino acids.
- e) Give two names of Ketogenic amino acids.
- f) What are pyrimidines?

Q2) a) Describe complete process of glycolysis with its regulation. **[6]**

OR

Explain cholesterol metabolism with its enzymes and significance.

b) Elaborate on ATP energy cycle and bands involved. **[4]**

Q3) a) Explain B-oxidation of fatty acid. **[6]**

OR

Describe citric acid cycle with intermediates and their regulation.

b) Comment on Urea cycle. **[4]**

P.T.O.

Q4) a) Write short note on de novo pathway of purine synthesis. **[6]**

OR

Compare and contrast between glycogenesis and glycogenolysis.

b) What is transamination? Add a note on catabolism of amino acids. **[4]**

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

- a) Fatty acid synthase as a multi enzyme complex.
- b) Ketone bodies.
- c) Pyrimidine degradation.
- d) Pentose phosphate pathways.
- e) Oxidation reduction reactions.
- f) Amino acids as biosynthetic precursors.



Total No. of Questions : 5]

SEAT No. :

PE1530

[Total No. of Pages : 2

[6503]-305

S.Y. B.Sc.

BIOTECHNOLOGY

**BBt - 305 : Environmental Biotechnology
(2019 Revised Pattern) (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) Stratosphere is called ozonosphere. Why?
- b) Explain climax concept of community.
- c) Name any two micro-organism used in bioremediation.
- d) What is Environmental Impact Assessment?
- e) What is green house effect?
- f) Define Acid Rain.

Q2) a) Explain the sources and consequences of Soil Pollution. **[6]**

OR

Describe aquatic ecosystem in detail.

b) Write current global environmental issues. What is El Nino? **[4]**

Q3) a) Explain in detail process of EIA. **[6]**

OR

Describe the hydrarch succession in detail.

b) Explain Global climate change. **[4]**

P.T.O.

Q4) a) Explain microbial degradation of hydro carbons. **[6]**

OR

Enlist the types of terrestrial ecosystem. Explain one of it in detail.

b) Describe in short environmental priorities in India. **[4]**

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

- a) Trophic levels
- b) Ozone depletion
- c) Abiotic components of ecosystem
- d) Bioindicators
- e) Biomedical waste
- f) TRAFIC

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Total No. of Questions : 5]

SEAT No. :

[Total No. of Pages : 2

PE1531

[6503]-306

S.Y. B.Sc.

BIOTECHNOLOGY

BBt-306 : Bioanalytical Techniques

(Revised 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) Define transmittance.
- b) What is role of APS in SDS-PAGE?
- c) Give any two safety rules in laboratory.
- d) Write the significance of pipettes calibration.
- e) Comment on planer chromatography.
- f) What do you mean by sedimentation coefficient?

Q2) a) Describe in detail, double beam spectrophotometer with help of diagram and mention its significance. **[6]**

OR

Define centrifugation, Explain principal and process of density gradient centrifugation.

b) Give an account on buffer solutions and pH measurements. **[4]**

Q3) a) Write explanatory note on SDS-PAGE. **[6]**

OR

Explain, adsorption chromatography in detail.

b) Discuss the electromagnetic spectrum. **[4]**

P.T.O.

- Q4)** a) Describe in detail, process and significance of column chromatography with respect to packing of column, stationary phases and sample application. [6]

OR

What are different factors influence the rate of migration of molecules in Agarose gel electrophoresis?

- b) Elaborate on ultracentrifugation, add note on applications of centrifuge. [4]

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

- a) Beers Lamberts Law
- b) Thin layer chromatography
- c) Accuracy and errors in experiment.
- d) Applications of electrophoresis
- e) Rotors used in centrifugation
- f) Write names and principle of staining used in electrophoresis.



Total No. of Questions : 5]

SEAT No. :

PE1532

[Total No. of Pages : 2

[6503]-401

S.Y.B.Sc. (Biotechnology)

BBt - 401 : CELL BIOLOGY - II

(Revised 2019 Pattern) (Semester - IV)

Time : 2Hours]

[Max. Marks : 35

Instructions to the candidates:

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

Q1) Solve any five of the following. [5]

- a) What is Chiasmata?
- b) Define 'Ferroptosis'.
- c) What is meant by MPF?
- d) Define Go Phase.
- e) What is Paracrine signalling?
- f) Enlist the stages of cell cycle.

Q2) a) Diagrammatically represent the stages of meiosis in detail. [6]

OR

Describe different modes of cell signalling.

b) Discuss cell death with respect to necrosis. [4]

Q3) a) Explain apoptosis with intrinsic and extrinsic pathways. [6]

OR

Explain in brief checkpoints of cell cycle.

b) Discuss different phases of mitosis with neat labelled diagram. [4]

P.T.O.

Q4) a) Explain different theories of ageing **[6]**

OR

Elaborate on G-protein signalling with an example.

b) Describe the terms neoplasia and pyroptosis. **[4]**

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

- a) IP 3 mediated calcium release.
- b) Autophagy.
- c) Neurotransmitters.
- d) Significance of meiosis.
- e) Anaphase promoting complex.
- f) Differentiate between mitosis and meiosis.



Total No. of Questions : 5]

SEAT No. :

PE-1533

[Total No. of Pages : 2

[6503]-402

S.Y. B.Sc.

BIOTECHNOLOGY

BBt-402 : Molecular Biology - II

(Rev. 2019) (Semester - IV)

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 enhancers?
- b) Explain the term - TATA box.
- c) What do you mean by initiator t-RNA?
- d) Enlist inhibitors of transcription in eukaryotes.
- e) Define polycistronic mRNA.
- f) Mention the difference between prokaryotic & eukaryotic ribosomes.

Q2) a) Describe the process of prokaryotic translation.

[6]

OR

Explain DNA damages, types of damages & causes of DNA damages.

b) Write a note on poly adenylation of eukaryotic mRNA.

[4]

Q3) a) Explain the Nucleotide excision repair.

[6]

OR

Describe mechanism of splicing.

b) Write a note on 'Charging of tRNA' during translation process.

[4]

P.T.O.

Q4) a) Give detailed account on positive & negative regulation of lac operon. [6]

OR

How are proteins glycosylated? Add a note on importance of glycosylated proteins.

b) Describe the process of initiation of eukaryotic transcription. [4]

Q5) Write short notes on any four from the following : [10]

- a) Photoreactivation.
- b) Mismatch repair mechanism.
- c) Promoter clearance.
- d) Rho independent termination of transcription.
- e) Structure of tRNA.
- f) Co-translation.



Total No. of Questions : 5]

SEAT No. :

PE-1534

[Total No. of Pages : 2

[6503]-403
S.Y. B.Sc.
BIOTECHNOLOGY
BBt-403 : Immunology
(Rev. 2019) (Semester - IV)

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 epitope.
- b) Explain the term immunogen.
- c) What are Adjuvants?
- d) Give concept of invasion.
- e) Define Pathogen.
- f) Enlist types of cytokines.

Q2) a) Explain the structure of antibody and give its types. **[6]**

OR

What is vaccine? Give its type and explain 2 examples of vaccines.

b) Give an account on Immunofluorescence. **[4]**

Q3) a) What is Autoimmunity? Give mechanism and types. **[6]**

OR

Give structure and function of primary lymphoid organs.

b) Give an account on chimeric antibody. **[4]**

P.T.O.

Q4) a) Explain the concept of Lattice hypothesis and Zone phenomenon. **[6]**

OR

Discuss general characteristics of antigen - antibody reaction.

b) Discuss factors affecting immunogenicity. **[4]**

Q5) Write short notes on the following : (Any four) **[10]**

- a) Opsonization.
- b) Hapten
- c) Antigen presenting cells.
- d) Major Histocompatibility complex I.
- e) Hematopoiesis.
- f) Membrane attack complex.



Total No. of Questions : 5]

SEAT No. :

PE-1535

[Total No. of Pages : 2

[6503]-404

S.Y. B.Sc.

BIOTECHNOLOGY

BBt-404 : Animal Development

(Rev. 2019) (Semester - IV)

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 determination in embryonic development.
- b) What are morphogenetic movements?
- c) Write contribution of Nusslein - Volhard in developmental biology.
- d) Mention any two features of Zebra fish as a model organism to study animal development.
- e) Justify the significance of Koller's sickle region.
- f) Give any two features of blastocyst.

Q2) a) Explain in detail the process of oogenesis with an emphasis on role of vitellogenesis. [6]

OR

Discuss the process of capacitation and zona reaction. Add a note on differences in key events involved in fertilization of mammals and sea urchin.

- b) Write a note on cellular commitment during animal embryonic development. [4]

Q3) a) Give an account of gastrulation in chick embryo. Give the fates of three germ layers. [6]

OR

Explain in detail morphogenetic movements involved in gastrulation of *Drosophila*. Give the fates of three germ layers.

- b) Describe the process of compensatory regeneration with a suitable example. [4]

P.T.O.

- Q4) a)** Elaborate the molecular mechanism of anterior and posterior axis formation in Drosophila. **[6]**

OR

Cleavage plane is dependent on type of egg. Elaborate the statement and write in detail different planes of cleavage.

- b) Write the role of apoptosis in development of an animal. Add a extrinsic pathway for the same. **[4]**

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

- a) Cortical granule reaction.
- b) Ageing.
- c) Teratogens.
- d) Organizer in Frog.
- e) C. elegans as a model to study animal development.
- f) Spermiogenesis.



Total No. of Questions : 5]

SEAT No. :

PE1536

[Total No. of Pages : 2

[6503]-405

S.Y. B.Sc. (Biotechnology)

BBt - 405 : PLANT DEVELOPMENT

(Revised 2019 Pattern) (Semester - IV)

Time : 2 Hours]

[Max. Marks : 35

Instructions to the candidates:

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

Q1) Answer any five of the following.

[5]

- a) Define competence.
- b) What is the meaning of differentiation.
- c) Define senescence.
- d) Define Double fertilization & triple fusion.
- e) What is Funicle & Hilum.
- f) Describe Anatropous ovule with neat labelled diagram.

Q2) a) Describe the process of megasporogenesis in angiosperms. Add a note of embryosac. **[6]**

OR

Comment on Root apical development in angiosperms. Draw neat labelled diagram of RAM.

b) Describe types of female gametophyte development in angiosperms. **[4]**

P.T.O.

Q3) a) With the help of suitable diagrams explain monocot embryogeny. **[6]**

OR

What is seed dispersal? Why is it important? Explain types of seed dispersal.

b) Write differences and similarities in plant and animal development. **[4]**

Q4) a) Comment on applications of plant development studies in biotechnology. **[6]**

OR

Describe ABC model of flower development.

b) Explain tissue systems seen in angiosperms. **[4]**

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

- a) Totipotency & developmental plasticity.
- b) Compare self & cross pollination.
- c) Structure of mature pollen grain.
- d) Photoperiodism & vernalization.
- e) Types of fertilization Depending upon the entry of pollen tube in embryo sac.
- f) Describe types of placentation with neat labelled diagrams.

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Total No. of Questions : 5]

SEAT No. :

[Total No. of Pages : 2

PE1537

[6503]-406

S.Y. B.Sc.

BIOTECHNOLOGY

**BBt-406 : Microbial Biotechnology
(Revised 2019 Pattern) (Semester - IV)**

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 the following (Any 5) : (1 mark each) **[5]**

- a) Give the use of salt in food preservation.
- b) What are the indicators of fecal pollution?
- c) Enlist microbial sweeteners.
- d) Give the symptoms of tuberculosis.
- e) Give the role of trickling filter in short.
- f) What is stormy fermentation of milk?

Q2) a) Describe the presumptive test of water for potability and give emphasis on coliforms. **[6]**

OR

Describe the various types of milk spoilages.

- b) Explain the role of biopesticides and biofertilizers for promoting plant growth. **[4]**

Q3) a) i) Give the various principles of food preservation. **[3]**

ii) Describe the normal flora of skin. **[3]**

- b) Explain the waste water treatment. Give emphasis on secondary treatment. **[4]**

P.T.O.

- Q4)** a) Describe the intrinsic factors of food. Explain how water activity is responsible for spoilage. [6]

OR

Describe 'Tetanus' disease with respect to causative agent, symptoms, pathogenesis and treatment.

- b) Write different methods of pasteurization. Add a note on phosphatase test. [4]

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

- a) IMViC test
- b) Lepromin test
- c) Ropiness
- d) Eijkman test
- e) Bioweapons
- f) Dye reduction test



Total No. of Questions : 5]

SEAT No. :

PE-1538

[Total No. of Pages : 2

[6503]-501

T.Y. B.Sc.

BIOTECHNOLOGY

BBt-501 : Industrial Microbiology

(Rev. 2019) (CBCS) (Semester - V)

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 carries equal marks.

Q1) Solve any five of the following :

[5]

- a) What is scale up?
- b) Define : Auxotrophic mutant.
- c) Write role of antifoam agents in industrial media.
- d) How baffles improve mixing in bioreactor?
- e) Enlist different substrates used in SSF.
- f) What is Del factor?

Q2) a) With neat labeled diagram describe construction and working of air life reactor. [6]

OR

Enlist various methods of precipitation and describe use of salts and solvent for precipitation.

b) Discuss measurement and control of temperature in bioprocess. [4]

Q3) a) Diagrammatically represent and describe methods of contineous sterilization of industrial media. [6]

OR

Discuss various mechanism of capture of particles in air filtration.

b) Explain role of biotin in modifying permeability of producing strain to increase yield of product. [4]

P.T.O.

Q4) a) Discuss production of Vitamin B₁₂ w.r.t. **[6]**

- i) Producing strain
- ii) Media & conditions
- iii) Recovery

OR

Describe liquid-liquid extraction in detail.

b) What is primary screening? Explain principle of crowded plate technique. **[4]**

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

- a) Fixed pore filters.
- b) Precursors
- c) Drying
- d) Secondary screening
- e) Fed-batch fermentation.
- f) Sources of Carbon in industrial media



Total No. of Questions : 5]

SEAT No. :

PE-1539

[Total No. of Pages : 2

[6503]-502

T.Y. B.Sc.

BIOTECHNOLOGY

BBT-502 : R-DNA Technology

(Rev. 2019) (CBCS) (Semester - V)

Time : 2 Hours]

[Max. Marks : 35

Instructions to the candidates:

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

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

- a) Define C-DNA Library.
- b) Name the cofactors used by E.Coli and T₄ DNA ligase,
- c) What is recombinant DNA.
- d) What are chimeric vectors.
- e) Give two examples of Restriction enzymes with restriction and recognition sites.
- f) Define plasmid.

Q2) a) Describe sanger's enzymatic method of DNA sequencing. [6]

OR

Explain Maxam-Gilbert's method of DNA sequencing.

b) Explain the concept of linkers and Adaptors. [4]

Q3) a) Write a detailed note on PCR. Give the types of PCR and its applications. [6]

OR

Explain how R.DNA is constructed and transformed? Describe the mechanism and give its applications.

b) Comment on CRISPR-Cas g as genome editing tool. [4]

P.T.O.

Q4) a) What are restriction enzymes? How they are useful in R-DNA Technology. [6]

OR

Describe 'Gene Therapy' with examples.

b) Explain recombinant Insulin Production. [4]

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

- a) Cosmid vectors
- b) pBR322
- c) Automated DNA sequencing
- d) Role of DNA polymerase
- e) Insertional inactivation.
- f) Expression vectors.



Total No. of Questions : 5]

SEAT No. :

PE-1540

[Total No. of Pages : 2

[6503]-503

T.Y. B.Sc.

BIOTECHNOLOGY

BBt - 503 : Plant Tissue Culture

(Rev. 2019) (CBCS) (Semester - V)

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 any two complex additives used for the preparation of culture medium.
- b) What is PCV?
- c) What do you mean by cybrid?
- d) Define - Rhizogenesis.
- e) What is meristemming?
- f) Give two application of leaf culture.

Q2) a) With a neat labelled diagram give an outline of plant tissue culture laboratory. Comment on different areas in laboratory. **[6]**

OR

- a) How plant tissue culture medium is formulated? Discuss role of different components added in preparation of tissue culture medium. **[6]**
- b) What is explant? Discuss preparation of aseptic plant in brief. **[4]**

P.T.O.

- Q3)** a) How the callus tissue is formed in Vitro? Discuss the morphology, internal structure and applications of callus culture. [6]

OR

- a) What is protoplast culture? Discuss protoplast culture with respect to
- i) Isolation methods
 - ii) Factors affecting yield [6]
- b) What is importance of organogenesis in genetics & plant breeding? [4]
- Q4)** a) What is somatic embryogenesis? Compare and contrast direct & indirect somatic embryogenesis including advantages & disadvantages of each approach. [6]

OR

- a) Give an outline of the method of cell suspension culture and describe different categories of suspension culture. [6]
- b) What is micropropagation? What are critical factors that affect success of micropropagation in different plant species. [4]
- Q5)** Write short notes on any FOUR of the following : [10]
- a) Artificial seed
 - b) Embryo culture
 - c) Cell theory
 - d) PGR
 - e) Contribution of scientists in PTC.
 - f) Somatic hybridization.



Total No. of Questions : 5]

SEAT No. :

PE-1541

[Total No. of Pages : 2

[6503]-504

T.Y. B.Sc.

BIOTECHNOLOGY

BBt-504 : Animal Tissue Culture

(Rev. 2019) (CBCS) (Semester - V)

Time : 2 Hours]

[Max. Marks : 35

Instructions to the candidates:

- 1) Q.1 is compulsory.
- 2) Solve any three questions from Q2 to Q5.
- 3) Questions 2 to 5 carry equal marks.

Q1) Solve any five of the following.

[5]

- a) Phase contrast microscope (inverted) is an essential equipment in ATC lab. Justify.
- b) Write the role of Cryoprotectant.
- c) What are microcarriers?
- d) Mention the contribution of Harrison in ATC.
- e) Define Cell Strain.
- f) Name any two buffers used in ATC.

Q2) a) Describe in detail enzymatic disaggregation of tissue in primary cell culture. Write down its advantages & disadvantages w.r.t. other methods used for the same.

[6]

OR

Serum is an integral part of ATC media. Elaborate on the statement. Add a note on disadvantages of serum containing media.

- b) Discuss the methods of subculture for adherant and suspension cell lines.

[4]

P.T.O.

- Q3)** a) What are organotypic cultures? Discuss methods and applications in detail. [6]

OR

Cell line authentication is crucial step in cell culture research. Comment on a statement and add a note on methods to authenticate cell line using DNA & enzyme based markers.

- b) Write in detail approach to isolate lymphocytes and maintain them in vitro. [4]
- Q4)** a) Design an animal tissue culture laboratory with BSL-3 biosafety level. Draw a diagram. Add a note on necessary equipments. [6]

OR

What are biological contaminants in ATC? Add a note on their detection strategies/methods.

- b) What are the differences between finite and infinite cell lines. [4]
- Q5)** Write short notes on any four of the following; [10]
- a) Cell repository
 - b) Insect Cell lines
 - c) Cryopreservation
 - d) Organ culture
 - e) Application of ATC
 - f) Difference between Animal & Microbial cell culture



Total No. of Questions : 5]

SEAT No. :

PE-1542

[Total No. of Pages : 2

[6503]-505

T. Y. B.Sc.

BIOTECHNOLOGY

BBt-505 : Applied Biotechnology - I

(Rev. 2019) (CBCS) (Semester - V)

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 Mineralization.
- b) What is Fluorogenic Reporters.
- c) How dendrimers is important in biotechnology.
- d) What are biochips
- e) Justify the role of chitosan as a biomaterial.
- f) What are the application of Marine Biotechnology.

Q2) a) Explain the methods of composting.

[6]

OR

Where the Barophilic organism found and discuss their application.

- b) Illustrate the role of Biomarkers in Disease Diagnosis.

[4]

P.T.O.

Q3) a) What are the advantages of using nanomaterials for drug delivery. **[6]**

OR

Discuss any two Immunodiagnostic techniques.

b) Explain the role of seaweeds in removal of metal pollutants. **[4]**

Q4) a) Describe the various types of PCR used in Diagnosis of genetic disorders **[6]**

OR

Justify microalgae production is important in Biotechnology.

b) Explain Morphological forms of Nanomaterials. **[4]**

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

- a) Red Fluorescence proteins
- b) Cellular & functional genomics in diagnostics.
- c) Application of chitosan
- d) Secondary metabolites
- e) Principle of synthesis of Nanoparticles.
- f) Electro-chemiluminescent assay.



Total No. of Questions : 5]

SEAT No. :

PE1543

[Total No. of Pages : 2

[6503]-506

T.Y. B.Sc.

BIOTECHNOLOGY

BBt - 506 : Biodiversity and Systematics

(Revised 2019 Pattern) (Semester - V)

Time : 2 Hours]

[Max. Marks : 35

Instructions to the candidates:

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

Q1) Solve any five of the following.

[5]

- a) Define Genetic diversity.
- b) What is carrying capacity?
- c) Examples of IUCN threat categories.
- d) Define Immigration.
- e) Define species richness.
- f) What is Biomimetics?

Q2) a) Comment on the difference between exponential and logistic growth in population give one example. **[6]**

OR

Describe the different types of habitat found on earth (eg. terrestrial aquatic).

- b) Explain importance of Aesthetic and cultural biodiversity. **[4]**

P.T.O.

Q3) a) Explain different types of survivorship curve with example. **[6]**

OR

Discuss in detail in situ and ex situ conservation with advantage and limitation.

b) Describe various molecular method in taxonomy. **[4]**

Q4) a) Explain the role and contribution of NGOs in India. **[6]**

OR

Give criteria of Hot Spot of Biodiversity with example.

b) Comment on Red Data book and its importance. **[4]**

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

- a) Opportunistic species
- b) TRAFFIC
- c) Role of ZSI & BSI
- d) Diversity gradient
- e) Uses of Biodiversity
- f) Role of Chipko movement



Total No. of Questions : 5]

SEAT No. :

PE-1544

[Total No. of Pages : 2

[6503]-601

T.Y. B.Sc.

BIOTECHNOLOGY

BBt-601 : Enzyme & Enzyme Technology

(Rev. 2019) (Semester - VI)

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) Proteolytic enzyme in meat Industry (Role)
- b) What is Prosthetic group?
- c) Enzyme in membrane.
- d) What is Ribozyme?
- e) Define the term 'Active site'.
- f) What is K_{cat} ?

Q2) a) Give the importance of Lineweaver-Burk plot in enzyme kinetics. [6]

OR

Enlist factor affecting enzyme activity and explain how temperature influence the rate of reaction.

b) With representative example discuss feed back mechanism. [4]

Q3) a) Define Enzyme catalysis and explain in detail the mechanism of covalent catalysis. [6]

OR

Comment on properties of matrices used for Immobilization.

b) Discuss the mechanism for proteolytic action of enzymes. [4]

P.T.O.

- Q4)** a) Explain in detail the mechanism of compartmentalization in regulation of metabolic pathways. [6]

OR

Discuss the mechanism of lysosomal pathway for enzyme degradation.

- b) Give the construction and working principle of Glucose biosensor.[4]

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

- a) Whole Cell Immobilization.
- b) Multienzyme complex.
- c) Clinical Application of Enzyme.
- d) Lock and key model.
- e) Metalloenzymes.
- f) M-M equation and its importance.



Total No. of Questions : 5]

SEAT No. :

PE-1545

[Total No. of Pages : 2

[6503]-602

T.Y. B.Sc.

BIOTECHNOLOGY

BBt-602 : Agriculture Biotechnology

(Rev. 2019) (CBCS) (Semester - VI)

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 is e-agriculture?
- b) Define tolerance.
- c) Define transgenic.
- d) What is aquaponics?
- e) What do you understand by phytosanitation?
- f) What do you mean by urban agriculture?

Q2) a) Explain the use of biotechnology in diagnostics with reference to pathogen diagnosis. [6]

OR

Define Biofertilizer. Comment on its types and development of biofertilizer.

b) Give a comparative account on classical and modern agriculture. [4]

Q3) a) Comment on construction and features of green house for protected cultivation. [6]

OR

Discuss the use of molecular markers in the study of plant breeding technology.

b) Explain the use of ICT in agriculture. [4]

P.T.O.

- Q4)** a) Comment on the methods used for gene transfer in plants. Explain any one in detail. [6]

OR

Discuss the use of computational methods for operating heating and cooling systems in green house.

- b) Explain the mechanism of vertical farming. [4]

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

- a) Ti plasmid
- b) Biotechnology in variety identification.
- c) Community gardens.
- d) Scope of agriculture biotechnology in India.
- e) Non conventional Biofertilizers.
- f) Quality control of Biofertilizers.



Total No. of Questions : 5]

SEAT No. :

PE-1546

[Total No. of Pages : 2

[6503]-603

T.Y. B.Sc.

BIOTECHNOLOGY

BBT-603 : Applied Biotechnology - II

(Rev. 2019) (CBCS) (Semester - VI)

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 induced pluripotent stem cells?
- b) Write the composition of Syn Gas.
- c) Give any two differences in conventional molecular biology and system biology.
- d) Justify the role of microalgae in biofuel synthesis.
- e) Define precision medicine.
- f) What are molecular markers used in forensic science?

Q2) a) Describe in detail biotransformation using suitable examples.

[6]

OR

Comment on different types of stem cells and their features. Add a note on applications of HSC in regenerative medicine.

- b) What are key objectives, methodologies and applications of Rice 3k project?

[4]

P.T.O.

Q3) a) What is system biology? Give details of approaches used to model biological systems. **[6]**

OR

Describe the procedure of DNA fingerprinting & its application in forensic science.

b) Elaborate on impact of microbes on environment. **[4]**

Q4) a) What is synthetic biology? Write in detail applications and products developed by synthetic biology. **[6]**

OR

Justify the use of biofuels over conventional fuel. Add a note on synthesis and carbon neutral features of biohydrogen & bioethanol.

b) What are the strategies to maintain genetic stability of stem cells for long term? **[4]**

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

- a) Cord blood banking.
- b) Human Genome Project.
- c) Health concerns of GMO-(crops)
- d) Applications of Biotechnology in healthcare.
- e) Green technology for sustainable development.
- f) Ethics and policies related to stem cells use.



Total No. of Questions : 5]

SEAT No. :

PE-1547

[Total No. of Pages : 2

[6503]-604

T.Y. B.Sc.

BIOTECHNOLOGY

**BBt-604 : Food and Pharmaceutical Biotechnology
(2019 Pattern) (CBCS) (Semester - VI)**

Time : 2 Hours]

[Max. Marks : 35

Instructions to the candidates:

- 1) Q.1 is compulsory.
- 2) Solve any three questions from Q2 to Q5.
- 3) Questions 2 to 5 carries equal marks.

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

- a) What is phase zero of clinical trial?
- b) Enlist non alcoholic beverages.
- c) Define Macronutrients.
- d) Explain the term 'Full Dose'.
- e) What is Quality Control?
- f) Give the role of Probiotics in human nutrition.

Q2) a) What are nutraceuticals? Explain in detail about their role and applications. **[6]**

OR

Explain the steps involved in Drug discovery process.

b) Explain in brief - Indian Pharmacopoeia. **[4]**

Q3) a) Describe the formulation process of vitamins with suitable examples. **[6]**

OR

Describe food adulteration. Give various types of adulterants and their effects on human health.

b) What are food borne diseases? **[4]**

P.T.O.

Q4) a) Describe GMP in pharmaceutical industry. [6]

OR

Describe 'Microbial Drug Discovery'.

b) What is edible packaging? [4]

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

- a) Emulsifiers and stabilising agents
- b) Target identification
- c) Water for injection
- d) Product Potency
- e) Computer aided drug designing
- f) Mode of action of Penicillin.



Total No. of Questions : 5]

SEAT No. :

PE-1548

[Total No. of Pages : 2

[6503]-605
T.Y. B.Sc.
BIOTECHNOLOGY
BBt - 605 : BIOINFORMATICS
(Rev. 2019) (CBCS) (Semester - V)

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 local alignment.
- b) What do you mean by annotation?
- c) Define DDBI.
- d) Give any two name of the techniques which is used to determine the macromolecular structure.
- e) Define algorithm.
- f) Mention any two branches of bioinformatics.

Q2) a) Explain nucleotide database with its types. Discuss file format of Genbank. **[6]**

OR

- a) What is metadata? Explain its types and uses in detail. **[6]**
- b) Differentiate between BLAST and FASTA. **[4]**

P.T.O.

Q3) a) Explain any two platform of the NGS in detail. [6]

OR

b) Give in detail account of Smith Waterman algorithm and its application. [6]

c) Explain CATH database in detail. [4]

Q4) a) Write in detail the different methods of protein sequencing with its application. [6]

OR

a) What is Biological database? Describe it with classification. [6]

b) Explain the procedure of DNA Microarray. [4]

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

a) Swiss-prot

b) Multiple Sequence alignment

c) SPDBV

d) Principle of NMR

e) Difference between Public and Private data.

f) PDB



Total No. of Questions : 5]

SEAT No. :

PE1549

[Total No. of Pages : 2

[6503]-606

T.Y. B.Sc.

BIOTECHNOLOGY

BBt - 606 : Biosafety, Bioethics & Intellectual Property Rights

(Revised) (2019 Pattern) (CBCS) (Semester - VI)

Time : 2 Hours]

[Max. Marks : 35

Instructions to the candidates:

- 1) *Q.1 is compulsory.*
- 2) *Solve any three 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 Bioethics?
- b) What do Trips stand for?
- c) Define Biosafety.
- d) Enlist classes of copyrights.
- e) What is the purpose of a biological safety cabinets?
- f) Define Trademarks?

Q2) a) Describe different biosafety levels & their applications. [6]

OR

How is bioethics applied in plants, animals and microbial genetic engineering?

- b) Elaborate on patent transfer. [4]

P.T.O.

Q3) a) Write down the salient features of Indian patent act 1970. **[6]**

OR

Write down the basic principles of bioethics.

b) Explain geographical indications with the help of examples? **[4]**

Q4) a) Give the difference between copyright, trademark and patent protection. **[6]**

OR

Explain any 4 symbols & its significance used in biosafety.

b) Write down the international laws on Biosafety. **[4]**

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

- a) GLP
- b) GATT
- c) Regulatory Bodies for bioethics in India
- d) Patenting of microorganisms.
- e) Containment level of Biosafety
- f) Patentable & non - Patentable Inventions

