**Total No. of Questions : 5]**

**SEAT No. :** ____

**P-8792**

**[Total No. of Pages : 2**

# [6156]-31A
# S.Y. B.Sc.
# BIOTECHNOLOGY
## BBt - 301 : Cell Biology - I
## (2019 Pattern) (Semester - III)

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

***Instructions to the candidates :***

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

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

a) Define diffusion.

b) Microfilaments are composed of which protein?

c) What is MTOS?

d) What is turgor pressure in plant cell?

e) Define semipermeable membrane.

f) Give any two important structural component of cell membrane.

***Q2)*** a) Describe the most recent version of fluid mosaic model of membrane structure. **[6]**

OR

What is cell junction? Enlist different junctions & describe any one in detail.

b) Write a basic framework of ECM. **[4]**

***P.T.O.***

***Q3)*** a) How material is transported across cell membrane? Give comparative account of active & passive transport. **[6]**

OR

What is cytoskeleton? Give detail structure & function of microtubule.

b) Write a note on cellular diversity. **[4]**

***Q4)*** a) Enlist different cell organelle & describe in detail structure & function of mitochondria. **[6]**

OR

How bulk transport is carried out by cell? Explain detail process of exocytosis with help of neat labelled diagram.

b) Define general structure of phospholipid molecule & what makes it suitable as a major component of cell membrane. **[4]**

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

a) Endocytosis

b) Vacuole

c) Tight junction

d) Functions of cell membrane

e) Cell theory

f) Chloroplast

▽▽▽▽

**Total No. of Questions : 5]**

**SEAT No. :** ____

**P6406**

**[Total No. of Pages : 2**

**[6156]-32**

**S.Y.B.Sc.**

**BIOTECHNOLOGY**

**BBT 302 - Molecular Biology - I**

**(2019 Pattern) (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) What are exons?

b) Define Chargaff's rule.

c) What is universality of genetic code.

d) Define nucleotide.

e) Define Euchromatin.

f) mRNA.

***Q2)*** a) Give a Comparative account of A,B and Z form of DNA. **[6]**

OR

Give a Comparative account of proteins involved in Prokaryotic & eukaryotic DNA replication.

b) Explain organization of mitochondrial genome. **[4]**

***Q3)*** a) What is genetic code? Give its properties. **[6]**

OR

Explain in detail Condensation of chromosome in eukaryotes.

b) A sample of purified DNA obtained form Hibiscus leaf contains 30 mole percent of Guanine. Assuming that only four principal bases are present. Calculate the approximate mole percentage of purine residues in its DNA. **[4]**

***P.T.O.***

***Q4)*** a) Explain in detail : The process of replication in eukaryotes. **[6]**

OR

Explain in detail : The process of replication in Prokaryotes.

b) Genetic code is degenerate. Justify. **[4]**

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

a) Histone Proteins.

b) Blender's experiment.

c) Rules of DNA replication.

d) Clover leaf structure of t-RNA.

e) $\beta$ clamp model.

f) Helicase enzyme.

❄ ❄ ❄

Total No. of Questions : 5]

SEAT No. :

P-6407

[Total No. of Pages : 2

# [6156]-33
# S.Y. B.Sc.
# BIOTECHNOLOGY
## BBt-303 : Genetics
## (2019 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) ***Questions 2 to 5 carry equal marks.***
4) ***Figures to the right indicate full marks.***

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

a) Define allele.

b) State law of independent assortment.

c) What is penetrance?

d) What is polyploidy?

e) What is meant by tautomerism?

f) Write symptoms of 'Down Syndrome'.

***Q2)*** a) Describe reasons of mendel's success in his experiments. **[6]**

OR

Explain recessive epistasis with example.

b) Describe frameshift mutation with example. **[4]**

***Q3)*** a) What are structural chromosomal aberration? Explain inversion mutation and it's type. **[6]**

OR

What is dosage compensation? Explain mechanism of dosage compensation.

b) Justify : Colour blindness is mostly observed in males. **[4]**

***P.T.O.***

***Q4)*** a) What is linkage? Describe incomplete linkage with example. **[6]**

OR

Justify : Human blood group is example of co-dominance, multiple allele and complete dominance.

b) Justify : Hbs/Hbs combination genes is leathal in sickle cell anaemia. **[4]**

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

a) Pleotropism

b) Dihybrid cross

c) Symbols used in pedigree analysis

d) Kleinfelter's syndrome

e) Crossing over

f) Hotspot mutations

□□□

**Total No. of Questions : 5]**

**SEAT No. :** ____

**P6408**

**[Total No. of Pages : 2**

**[6156]-34**

**S.Y.B.Sc.**

**BIOTECHNOLOGY**

**BBt - 304 : Metabolism**

**(Revised 2019) (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 no.2 to 5 carry equal marks.***

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

a) Define catabolism.

b) What are ketogenic amino acids? Give two examples.

c) Define glycogenolysis.

d) What are saturated and unsaturated fatty acids?

e) Define Bioenergetics.

f) What are purines & pyrimidines.

***Q2)*** a) Discuss in detail the reactions of glycogenesis. **[6]**

OR

What are phospholipids? Write a note on phospholipid synthesis. **[6]**

b) Give the regulatory step in cholesterol synthesis. **[4]**

***Q3)*** a) Explain in details oxidative & non-oxidative reactions of HMP shunt. **[6]**

OR

Discuss in detail urea cycle & its connection with TCA cycle. **[6]**

b) What are ketone bodies? Discuss the synthesis of ketone bodies by liver. **[4]**

***P.T.O.***

***Q4)*** a) Discuss in detail biosynthesis of Purine **[6]**

OR

Discuss in detail beta-oxidation of fatty acids. **[6]**

b) Discuss in detail Transamination. **[4]**

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

a) Pyruvate dehydrogenase complex.

b) Anaplerotic reactions.

c) Fates of Pyruvate.

d) Essential and non-essential amino acids.

e) Regulatory steps in glycolysis.

f) Regulatory step in TCA cycle.

**Total No. of Questions: 5]**

**SEAT No. :** ____

**P6409**

**[Total No. of Pages :2**

# [6156]-35
# S.Y. B.Sc.
# BIOTECHNOLOGY
## BBt 305 : Environmental Biotechnology
## (Revised 2019) (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 Q.2 to Q.5.***
3) ***Q.2 to Q.5 carry equal marks.***

***Q1)*** Solve any Five of the Following. **[5×1=5]**

a) Define Biosphere

b) Define ecosystem and give its types

c) What is mean by Eutrophication

d) What is mean by bioaugmentation

e) Write Full form TRAFFIC

f) Give the two examples of green house gases

***Q2)*** a) What is mean by biome give its different types **[6]**

OR

Describe the concept and structure of ecosystem **[6]**

b) Describe concept of environment and its components **[4]**

***Q3)*** a) Explain the air pollution and principal air pollutants **[6]**

OR

Describe in detail process of EIA with case study **[6]**

b) Explain the types of succession **[4]**

***P.T.O.***

***Q4)*** a) Describe in detail proper disposal of biomedical waste **[6]**

OR

Discuss the process of phytoremediation and its importance **[6]**

b) Discuss about microbial biodegradation of plastic **[4]**

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

a) Climax community

b) Biotechnological approach to control air pollution

c) Red data book

d) Bioindicators

e) Global warming

f) Acid rain



**Total No. of Questions : 5]**

**SEAT No. :** ____

**P-6410**

**[Total No. of Pages : 2**

# [6156]-36
# S.Y. B.Sc.
# BIOTECHNOLOGY
## BBt - 306 : Bio-Analytical Techniques
## (2019 Revised 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 Buffer.

b) What is the role of Beta-mercaptoethomol in SDS-PAGE?

c) What do you mean by angular velocity?

d) Define wavelength. Give relation between wavelength and frequency.

e) What is partition Chromatography?

f) Give one application of gel-filtration chromatography.

***Q2)*** a) Describe in detail instrumentation of UV-Visible Spectroscopy with the help of diagram. **[6]**

OR

Give the Principle of Ion-Exchange Chromatography. Differentiate between Anion and cation Exchange Chromatography.

b) Explain Beers-Lambert Lows and discuss its limitations. **[4]**

***P.T.O.***

***Q3)*** a) Compare and contrast Native-PAGE and SDS-PAGE. Explain applications of Native-PAGE. **[6]**

OR

Explain density gradient centrifugation in detail.

b) Differentiate between Preparative and Analytical Centrifugation. **[4]**

***Q4)*** a) Describe in detail the principle and steps involved in Column Chromatography. **[6]**

OR

Discuss role of different factors affecting rate of migration of molecules in electrophoresis.

b) Write Chemical and Biological Challenges while undertaking experiments in laboratory. **[4]**

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

a) Need of Biological Buffers.

b) Adsorption Chromatography.

c) Hyper chromic Shift.

d) Relative Centrifugal Field.

e) Principle of Gel-Filtration Chromatography.

f) Systematic Errors.

▽▽▽▽

Total No. of Questions : 5]

SEAT No. :

**P6411**

[Total No. of Pages : 2

# [6156]-41
# S.Y. B.Sc. (Biotechnology)
# BBT-401 : CELL BIOLOGY - II
# (Revised 2019) (CBCS) (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 carries equal marks.***

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

a) What is Receptor?

b) Comment on Go Phase.

c) What is crossing over?

d) Enlist modes of signaling.

e) What is significance of Mitosis.

f) Define autophagy

***Q2)*** a) With the help of neat labelled diagram explain different phases of cell cycle. **[6]**

OR

Explain in detail cell surface receptors with example. **[6]**

b) Describe calcium signaling in detail. **[4]**

***Q3)*** a) What is Apoptosis? Explain pathways involved in apoptosis. **[6]**

OR

Define cell signaling. Explain autocrine and endocrine signaling modes. **[6]**

b) Describe different phases of Meiosis - I. **[4]**

***P.T.O.***

***Q4)*** a) Give a brief account on regulatory mechanism of cell cycle. **[6]**

OR

Describe signaling pathway of GPCR. **[6]**

b) Compare and contrast in between Mitosis and meiosis. **[4]**

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

a) Necrosis

b) Theory of Aging

c) Adaptor protein

d) Cyclic AMP as secondary messenger

e) Cytokinesis

f) Chiasmata formation

**Total No. of Questions : 5]**

**SEAT No. :**

**P-6412**

**[Total No. of Pages : 2**

# [6156]-42
# S.Y. B.Sc.
# BIOTECHNOLOGY
## BBt-402 : Molecular Biology - II
## (2019 Pattern) (Semester - IV) (CBCS)

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

***Instructions to the candidates:***

1) ***Q1 is compulsory.***
2) ***Attempt any three of Q2 to Q5.***
3) ***Q2 to Q5 carry equal marks.***

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

a) Name any four inhibitors of translation.

b) Illustrate arabinose operon.

c) Distinguish between RNA pol I, pol II and pol III.

d) Write the building blocks of eukaryotic ribosomes.

e) Define promotor clearance.

f) What is difference between f.Met and Met t- RNA.

***Q2)*** a) Explain Base excission repair in detail. **[6]**

OR

Discuss the role shine - Delgarno sequence in detail.

b) Describe the post translational modifications. **[4]**

***Q3)*** a) Explain catabolite repression in Lac operon. **[6]**

OR

Describe attenuation w.r.t. tryptophan operon.

b) Discuss the role of enhancers & silencers. **[4]**

***P.T.O.***

***Q4)*** a) Elaborate the role of transcription factor involved in RNA pol II transcription. **[6]**

OR

Explain the transcription of 5s RNA and t-RNA.

b) Explain mismatch repair in detail. **[4]**

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

a) Polyadenylation

b) Aminoacyl t-RNA synthase

c) Splicing

d) Anti termination

e) Regulation of arabinose operon

f) –10 and –35 sequences

Total No. of Questions : 5]

SEAT No. :

**P6413**

[Total No. of Pages : 2

# [6156]-43
# S.Y. B.Sc.
# BIOTECHNOLOGY
# BBT-403 : Immunology
# (Revised 2019) (Semester - IV)

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

***Instructions to the candidates:***

1) ***Q.1. is compulsory.***
2) ***Attempt any three of Q.2. to Q.5***
3) ***Q.2 to Q.5 carry equal marks.***

***Q1)*** Attempt any five of the following. **[5]**

Pertaining to antibody molecules answer -

a) Antibody crossing placenta.

b) Antibody in allergies.

c) Antibody with least concentration in serum

d) Antibody in primary infections

e) Antibody in secretions

f) Pentameric antibody

***Q2)*** a) Explain 'thymus' anatomy, add a note on maturation of T cells **[6]**

OR

Describe phagocylosis, add a note on $O_2$ dependent and $O_2$ independent killing of pathogen.

b) Draw the structure of lymphnode with 8 labells **[4]**

***P.T.O.***

***Q3)*** a) Explain 'Covishield' vaccine in detail. **[6]**

OR

With an example explain sub unit vaccine.

b) Name the components of innate immune system, add a note on protection they impart. **[4]**

***Q4)*** a) Explain antigen antibody interaction w.r.t. - **[6]**

i) ELISA

ii) coomb's test

OR

Discuss SRID as Mancini method and Quchterlony's as double diffusion method in detail.

b) Write in detail - **[4]**

i) Hapten

ii) Epitope

iii) Carrier and

iv) Adjuvants

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

a) MHC - I and MHC - II

b) Clonal selection theory

c) TCR - CD3 complex

d) Differentiation of B cell

e) Granulocytes and agranulocytes

f) Cytokines

**Total No. of Questions : 5]**

**SEAT No. :**

**P-6414**

**[Total No. of Pages : 2**

# [6156]-44
# S.Y. B.Sc.
# BIOTECHNOLOGY
## BBt-404 : Animal Development
## (2019 Revised Pattern) (Semester - IV) (CBCS)

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

***Instructions to the candidates:***

1) ***Q1 is compulsory.***
2) ***Solve any 3 questions from Q.2 to Q.5.***
3) ***Question No. 2 to question No. 5 carries equal marks.***

***Q1)*** Solve any Five of the following. **[5 × 1 = 5]**

a) Mention the contribution of vogt in developmental biology.

b) What is organizer?

c) Mention the structural feature of stereoblastula.

d) What is a telolecithal egg? Give any one example.

e) Comment on conditional specification.

f) Define Vitellogenesis.

***Q2)*** a) Describe the molecular mechanism of pattern formation in Drosophila. **[6]**

OR

Explain with appropriate example about compensatory regeneration. Add a note on differences between other types of regeneration.

b) Illustrate cell lineage with example. **[4]**

***Q3)*** a) Describe the process of gastrulation in Frog. **[6]**

OR

Describe the process of gastrulation in Amphioxus.

b) Define Polyspermy. Explain cortical granule reaction. **[4]**

***P.T.O.***

***Q4)*** a) Describe the significance of translocation of sperm in female reproductive tract. Write the difference between zona reaction and acrosomal reaction. **[6]**

OR

Describe primary and secondary neurlation in frog.

b) Explain the process of spermeiogenesis. **[4]**

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

a) Mouse as a model of developmental biology

b) Oxidative stress theory of ageing

c) Retinoic acid as a teratogen

d) Apoptosis

e) Transdifferentiation

f) Meroblastic cleavage

Total No. of Questions : 5]

SEAT No. :

**P6415**

[Total No. of Pages : 2

# [6156]-45

## S.Y.B.Sc. (Biotechnology)

## BBT - 405 : PLANT DEVELOPMENT

## (2019 Credit 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)*** Solve any five of the following. **[5]**

a) What is embryo sac?

b) Define dedifferentiation.

c) Define megasporogenesis.

d) Define totipotency.

e) Define endothelium.

f) Define anatropus ovule.

***Q2)*** a) Explain microsporogenesis and development of male gametophyte. **[6]**

OR

Which genes have been identified specific to embryo development using arabidopsis as a model system.

b) With a suitable diagram explain root development with all the zones of development in root apex. **[4]**

***Q3)*** a) Enlist and explain various external stimuli that bring out transition from vegetative to reproductive phase. **[6]**

OR

Define parthenocarpy. Explain types and applications of it.

b) Explain development of endosperm. **[4]**

***P.T.O.***

***Q4)*** a) Describe any three types of ovule with suitable diagram and examples. **[6]**

OR

Enlist and explain genes involved in embryo development.

b) Write unique features of plants. **[4]**

***Q5)*** Solve any <u>four</u> of the following. **[10]**

a) Vernalization.

b) Senescence.

c) Shoot apical meristem.

d) Tapetum.

e) Double fetilization.

f) Seed germination.



**Total No. of Questions : 5]**

**SEAT No. :** ____

**P-6416**

**[Total No. of Pages : 2**

# [6156]-46

## S.Y. B.Sc.

## BIOTECHNOLOGY

## BBt - 406 : Microbial Biotechnology

## (2019 Pattern) (CBCS) (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 : putrefaction.

b) Enlist applications of microbial toxins.

c) What is transient flora?

d) Name any two dyes used in EMB agar.

e) Define : food intoxication.

f) State reaction involved in stormy fermentation.

***Q2)*** a) Explain the process of canning in detail. **[6]**

OR

Describe food intoxication caused by clostridium botulinm.

b) Write in detail process of cheese production. **[4]**

***P.T.O.***

***Q3)*** a) Describe etiology of tuberculosis w.r.t. **[6]**

i) Causitive agent

ii) Pathogenesis

iii) Symptoms

iv) Prevention and treatment

OR

With neat labeled diagram describe construction and working principle of Activated sludge process.

b) Take an account of various colour defects found in milk spoilage. **[4]**

***Q4)*** a) How will you use presumptive test to check potability of water? Explain in detail. **[6]**

OR

What are developed preservatives? Explain its mechanism of action with examples.

b) Justify : extrinsic factors are responsible for food spoilage. **[4]**

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

a) Yogurt

b) Confirmed test of MPN

c) Microbial polysaccharide

d) Bioleaching

e) Membrane filter technique

f) Symptoms of syphilis

▽▽▽▽

**Total No. of Questions : 5]**

**SEAT No. :** ____

**P-6417**

**[Total No. of Pages : 2**

# [6156]-51
# T.Y. B.Sc. (Biotechnology)
# BBt 501 : INDUSTRIAL MICROBIOLOGY
# (2019 Pattern) (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 5 carry equal marks.***

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

a) Enlist various inhibitors used in media.

b) Write any two characteristics of ideal fermenter.

c) What is solid? State fermentation.

d) Write any two roles of culture collection centers of industrially important microorganisms.

e) Define : Del factor

f) What is Primary screening?

***Q2)*** a) With neat labelled diagram describe construction and working Principle of pocked bed reactor. **[6]**

OR

Explain continuous sterilization process and add its advantages and disadvantages.

b) Justify: Fixed pore filters are used to prepare virus free media. **[4]**

***Q3)*** a) What is strain improvement? Describe in detail. Primary screening methods used for selection of industrially important microorganisms. **[6]**

OR

What is centrifugation? Describe Disc bowl centrifuge in detail with diagram.

b) Describe method of measurement and control of foam in fermentation process. **[4]**

***P.T.O.***

***Q4)*** a) Describe Large Scale Manufacturing process of citric acid w.r.t. production strain, Fermentation media, growth condition and recovery process. **[6]**

OR

Describe machanism of rotary Vacuum filter.

b) Explain use of high pressure homogeniser in cell disruption. **[4]**

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

a) Scale up

b) Drum drying.

c) Auxotrophic mutant.

d) Fed - Batch culture.

e) Surface treatments of bioreactor.

f) Nitrogen sources used in Fermentation media.



Total No. of Questions : 5]

SEAT No. :

**P6418**

[Total No. of Pages :2

# [6156] - 52
# T.Y.B.Sc. (Biotechnology)
# BBT 502 : R-DNA TECHNOLOGY
# (2019 Pattern) (CBCS) (Semester-V)

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

***Instructions to the candidates:***

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

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

a) What is recombinant DNA?

b) Explain characteristics of a good vector.

c) State the role of ligases enzyme.

d) What is Host organism

e) State applications of genomic library.

f) Define transformation

***Q2)*** a) What are restriction enzymes? How are they useful in R-DNA technology. **[6]**

OR

Write a detailed note on signifecance & role of alkaline phosphatases in R-DNA technology. **[6]**

b) Describe Lambda phage vectors in brief. **[4]**

***P.T.O.***

***Q3)*** a) How is cDNA synthesized? How cDNA libraries are constructed? Mention applications of it. **[6]**

OR

Comment on: **[6]**

i) Cosmid vectors

ii) Phagemid vectors

b) Explain how is R-DNA constructed & transformed? Describe basic mechanism of it with applications. **[4]**

***Q4)*** a) Describe Sanger's enzymatic method of DNA sequencing. **[6]**

OR

Write a detailed note on PCR. Mention types of PCR & its applications. **[6]**

b) Comment on CRISPR-Cas 9 as genome editing tool. **[4]**

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

a) PBR 322

b) Gene therapy

c) Recombinant insulin production

d) M 13 vectors

e) Application of DNA polymerase in RDT

f) Real time PCR.



**Total No. of Questions : 5]**

**SEAT No. :**

**P-6419**

**[Total No. of Pages : 2**

# [6156]-53

## T.Y. B.Sc.

## BIOTECHNOLOGY

## BBt-503 : Plant Tissue Culture

## (2019 Pattern) (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 chemostat & turbidostat.

b) Define hyper hydration.

c) Enlist different methods of artificial plant propagation.

d) Define totipotency and developmental plasticity.

e) Importance of physical environment on *invitro* growth of plants.

f) Comment on filter sterilization techniques.

***Q2)*** a) Write principle of haploid culture. Describe isolated pollen pollen culture method in detail. Add a note on applications of haploids. **[6]**

OR

Enlist essential nutrients for healthy plant growth with their role. Write the role of PGR in invitro growth of plants.

b) What is callus? Write downstream applications of callus culture. **[4]**

***P.T.O.***

***Q3)*** a) What is somatic hybridization? Explain the methods of protoplast isolation, culture & fusion. **[6]**

OR

What is organ culture? Comment on leaf and ovule culture.

b) Write applications of plant tissue culture. **[4]**

***Q4)*** a) Describe methods of artificial seed production with any one method in detail. Add a note on applications of artificial seeds. **[6]**

OR

What is cell suspension culture? Write a note on immobilisation of hairy root culture & synchronisation of suspension cultures.

b) Write applications of embryo and endosperm culture. **[4]**

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

a) Micropropagation

b) Cytodifferentiation

c) Direct and indirect organogenesis

d) Aseptic transfer technique

e) Principle and working of horizontal laminar airflow cabinet

f) Contamination and decontamination.

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**Total No. of Questions : 5]**

**SEAT No. :**

**P6420**

**[Total No. of Pages : 2**

**[6156]-54**

**T.Y.B.Sc.**

**BIOTECHNOLOGY**

**BBT 504 : Animal Tissue Culture**

**(Revised 2019) (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 split ratio.

b) Mention contribution of Ross G. Harrison in the field of animal tissue culture.

c) Write any one function of cell repositories.

d) Enlist any two methods of Mechanical disaggregation.

e) Why is vertical laminar air flow cabinet used in ATC.

f) What is generation time of cells?

***Q2)*** a) Describe concept of primary culture. Write in details about establishment of fibroblast cell culture. **[6]**

OR

Mention different types of contaminants found in animal cell cultures. Also describe methods of their detection.

b) Differentiate between finite & infinite cell lines. **[4]**

***Q3)*** a) Elaborate on evolution of a cell line. **[6]**

OR

Describe methods of cytogenetic characterization of cell lines.

b) Write a note on histotypic cultures. **[4]**

***P.T.O.***

***Q4)*** a) Mention which type of microscope in needed in animal tissue culture lab. Describe its principle & application. **[6]**

OR

Comment on subculturing of adherent cells.

b) Describe rationale of animal tissue culture media formulation. **[4]**

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

a) Suspension culture.

b) Applications of ATC.

c) Culture vessels used in ATC.

d) Balanced salt solution.

e) Mammalian cell lines.

f) Layout of animal tissue culture laboratory.

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Total No. of Questions : 5]

SEAT No. :

**P6421**

[Total No. of Pages : 2

**[6156]-55**

# T.Y.B.Sc. (Biotechnology)

## BBT-505 : APPLIED BIOTECHNOLOGY - I

## (2019 Pattern) (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) ***Question 2 to 5 carry equal marks.***

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

a) Define 'Mineralization'

b) Write any two applications of chitosan

c) Bottom up method

d) Name any two molecular diagnostic techniques.

e) Define buck ministerfullence

f) Give the names of barophillic organisms

***Q2)*** a) Explain biochemistry of composting **[6]**

OR

Write the principles of nanoparticle synthesis.

b) Discuss the concept of briquetting. **[4]**

***P.T.O.***

***Q3)*** a) Explain immunodiagnostics with one example. **[6]**

OR

Discuss electro-chemiluminescent tags.

b) Describe economic analysis of briquetting. **[4]**

***Q4)*** a) Explain role of sea weeds in removal of metal pollutants. **[6]**

OR

Discuss biomarkers in disease diagnostics.

b) Illustrate cellular diagnosis w.r.t. blood cells or (CBC) **[4]**

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

a) Electro - chemiluminescent tags

b) Sea weeds in removing pollutants

c) Biochips

d) Chitosan applications

e) Actinobacterial metabolites

f) GFP

Total No. of Questions : 5]

SEAT No. :

P-6422

[Total No. of Pages : 2

# [6156]-56
# T.Y. B.Sc.
# BIOTECHNOLOGY
## BBt-506 : Biodiversity and Systematics
## (Revised 2019) (Semester - V)

*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 species richness.

b) Define Genetic diversity.

c) What is aesthetic and cultural use of Biodiversity?

d) Define Biodiversity.

e) What is Insular habitats?

f) Enlist two IUCN threat categories.

***Q2)*** a) Describe Shanon and Simpson's Biodiversity Index. **[6]**

OR

Explain in brief CITES and Traffic.

b) Explain Survivorship Curve of population. **[4]**

***Q3)*** a) Describe importance of forest research institute and zoological survey of India in conservation of Biodiversity. **[6]**

OR

Describe various molecular methods used in taxonomy.

b) What is biodiversity hot spots? Add a note on anyone hot spot. in India. **[4]**

***P.T.O.***

***Q4)*** a) Explain the strategies used for conservation of Biodiversity. **[6]**

OR

Give the importance of NGO's in India & their contribution in conservation of Biodiversity.

b) What is Red data book? Also give its importance. **[4]**

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

a) Population density

b) Types of Habitat

c) Logistic growth of Population

d) Role of Panipanchayat

e) Concept of opportunistic species

f) Uses of Biodiversity in food and medicine



**Total No. of Questions : 5]**

**SEAT No. :**

**P-6423**

**[Total No. of Pages : 2**

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# T.Y. B.Sc.

# BIOTECHNOLOGY

## BBt-601 : Enzyme & Enzyme Technology

## (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 Q.2 to Q.5.***
3) ***Questions 2 to 5 carry equal marks.***

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

a) Specific activity

b) Kcat

c) Ribozymes

d) Thermophillic enzymes

e) Initial velocity

f) Activation energy

***Q2)*** a) Explain the concept of acid fase catalysis with an appropriate example. **[6]**

OR

Give the application of enzymes in meat and leather industry.

b) Discuss the effect of temperature on enzyme action. **[4]**

***Q3)*** a) Derive the Michaelis Menten equation to study enzyme kinetics. **[6]**

OR

Explain any one method of immobilization of enzymes and its applications.

b) Give the importance of enzymes as thrombolytic agent. **[4]**

***P.T.O.***

***Q4)*** a) Discuss the mechanism of non-lysosomal degradation of enzymes. **[6]**

OR

With an representative example explain the mechanism of proteolytic activation of zymogens.

b) Explain the protein nature of enzymes. **[4]**

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

a) Components of enzyme biosensor

b) Isozymes (LDH)

c) Compartmentalization of metabolic pathways.

d) Double reciprocal plot.

e) Proximity and orientation effect.

f) Metalloenzymes.

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Total No. of Questions : 5]

SEAT No. :

**P6424**

[Total No. of Pages : 2

# [6156]-62
# T.Y. B.Sc.
# BIOTECHNOLOGY
# BBT-602 : Agribiotechnology
# (Revised 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 carries equal marks.***

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

a) Define biopesticide

b) Comment on environmental stress factors of plants.

c) Describe morphological markers in brief.

d) What are non conventional biofertilizers.

e) Define vertical farming.

f) Define urban agriculture.

***Q2)*** a) Explain the utility of biotechnological approaches in variety purity testing & pathogen diagnosis. **[6]**

OR

Comment on concepts & application of e-agriculture & use of ICT in agriculture.

b) What is molecular marker assisted selction? Add a note on its application in modern agribiotechnology. **[4]**

***Q3)*** a) What is Green house? Discribe types of green houses based on utility and type of construction material. **[6]**

OR

Explain the forms of soil less culture with suitable diagrams & examples.

b) Write short note on application of biotechnology in developing salinity tolerant planst. **[4]**

***P.T.O.***

***Q4)*** a) What are molecular markers? Describe mechanism of PCR based molecular markers. **[6]**

OR

Describe the role of new technologies & microbial Control of promissing plant species for pest control.

b) Write short note on quality control of biofertilizers. **[4]**

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

a) Koch's postulates.

b) Methods of fungal pathogen diagnosis.

c) Biochemical markers.

d) Agrobacterium tumefaciens mediated plant transformation.

e) Compare classical & modern agribiotechnology.

f) Global scenario of agribiotechnology.

**Total No. of Questions : 5]**

**SEAT No. :**

**P-6425**

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# T.Y. B.Sc.

# BIOTECHNOLOGY

## BBT-603 : Applied Biotechnology - II

## (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 Q.2 to Q.5.***
3) ***Question 2 to 5 carry equal marks.***

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

a) Define biofuels.

b) Define genetically modified crops.

c) Define synthetic biology.

d) What is mean by $2^{nd}$ generation biofuels.

e) Define pleuripotent stem cell.

f) Define green technology.

***Q2)*** a) Explain the role of DNA profiling for solving crimes. **[6]**

OR

What is functional genomics? Write it's role in developing precision medicine.

b) Write biotransformation of recalcitrant metabolites. **[4]**

***Q3)*** a) Explain in detail genetically modified crops and foods. **[6]**

OR

Explain implications of human genome project in health and diseases.

b) Write ecological impact of microbes. **[4]**

***P.T.O.***

*Q4)* a) Explain long-term storage of stem cells. **[6]**

OR

Explain in detail 1st generation of biofuels.

b) Explain modelling in system biology. **[4]**

*Q5)* **Solve any four of the following :** **[10]**

a) Algal Fuel

b) Applications of system biology in biotechnology.

c) 3rd generation biofuels.

d) Stem cell policy and ethics.

e) Cord blood banking.

f) Applications of DNA profiling.

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Total No. of Questions : 5]

SEAT No. :

**P6426**

[Total No. of Pages : 2

# [6156]-64
# T.Y. B.Sc.
# BIOTECHNOLOGY
## BBT-604 : Food and Pharmaceutical Biotechnology
## (Revised 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 carries equal marks.***

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

a) Define 'Nutraceuticals'.

b) Give role of probiotics in human nutrition.

c) What are biocomposites?

d) Define LD50

e) Give concept of preclinical trail.

f) What is USP?

***Q2)*** a) What are Food adulterants? Give their effects on human health. **[6]**

OR

Describe types of packaging materials and their Functions. **[6]**

b) Explain the role of microbes in pharmaceutical industries. **[4]**

***Q3)*** a) Explain about microbial drug discovery. **[6]**

OR

Describe Formulation process of antibiotic with suitable example. **[6]**

b) Explain role of quality assurance. **[4]**

***P.T.O.***

***Q4)*** a) Explain about GMP in pharmaceutical industry. **[6]**

OR

Explain concept of Rational Drug discovery. **[6]**

b) Write role of enzymes as food processing. **[6]**

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

a) ED50

b) TQM

c) Ediable packaging

d) FSSAI

e) WHO guidelines for QC

f) Phase I of clinical trial

**Total No. of Questions : 5]**

**SEAT No. :**

**P-6427**

**[Total No. of Pages : 2**

# [6156]-65

# T.Y. B.Sc.

# BIOTECHNOLOGY

## BBt-605 : Bioinformatics

## (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 Q.2 to Q.5.***
3) ***Questions 2 to 5 carry equal marks.***

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

a) What is homologs?

b) What is composite database?

c) Define E-value.

d) Give 2 examples of indices.

e) What is dot matrix.

f) What do you mean by INSDL.

***Q2)*** a) Enlist different types of file formats used in Bioinformatics. Explain any one in detail. **[6]**

OR

Enlist Dynamic programming approaches & discuss any one in detail.

b) Explain SCOP in detail. **[4]**

***Q3)*** a) What is data generation? Give examples of data generation method. Explain any one method in detail. **[6]**

OR

Discuss Clustal W as a tool for MSA.

b) What is protein structure visualization tool. Explain SPDBV in detail. **[4]**

***P.T.O.***

***Q4)*** a) What is database? Enlist types and explain protein database. **[6]**

OR

Explain the steps involved in alignment using FASTA for similarity search.

b) Give an account on sequence retrival system. **[4]**

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

a) Microarray

b) Exaustive algorithm

c) Local alignment

d) Gap penalty

e) Pitfall of biological database

f) Limitations of Bioinformatics

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**Total No. of Questions: 5]**

**SEAT No. :**

**P6428**

**[Total No. of Pages :2**

# [6156]-66
# T.Y. B.Sc.
# BIOTECHNOLOGY
## BBt-606 : Biosafety and Bioethics and Intellectual Properly Rights
## (2019 Pattern) (CBCS) (Semester-VI)

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

***Instructions to the candidates:***

1) ***Q 1 is compulsory.***
2) ***Attempt any three of Q2 to Q5.***
3) ***Q2 to Q5 carry equal marks.***

***Q1)*** Attempt any five of the following. **[5]**

a) What is the duration of Indian patent?

b) Define Bioethics

c) Enlist four carcinogens

d) Define Biological hazard

e) Define trade mark

f) Define autonomy in biomedical ethics

***Q2)*** a) Explain protection of GMOS. **[6]**

OR

Discuss Buda pest treaty and its significance.

b) Describe with example geographicla indications. **[4]**

***Q3)*** a) Discuss the use of fume-hood **[6]**

OR

Wipo-objectives and it role, explain.

b) Explain GLP in detail. **[4]**

***P.T.O.***

***Q4)*** a) Explain the significance of Rio Conference **[6]**

OR

Discuss Multilateral ethical agreement

b) TRIPs **[4]**

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

a) Teratogens
b) Organisms allowed in BSL-2 facility
c) Copyright
d) Tuskegee syphilis study
e) Nuremberg code
f) Autonomy in medical ethics

