

Total No. of Questions : 5]

SEAT No. :

P-8792

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[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. :

[Total No. of Pages : 2

**P6406**

**[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 from 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.



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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 lethal in sickle cell anaemia. [4]

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

- a) Pleiotropism
- b) Dihybrid cross
- c) Symbols used in pedigree analysis
- d) Klinefelter's syndrome
- e) Crossing over
- f) Hotspot mutations



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SEAT No. :

[Total No. of Pages : 2

**P6408**

**[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.





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SEAT No. :

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**P6409**

**[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-mercaptoethanol 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 Laws 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. :

[Total No. of Pages : 2

**P6413**

**[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 phagocytosis, add a note on O<sub>2</sub> dependent and O<sub>2</sub> 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 neurulation in frog.

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

- Q5)** Write short notes on any four 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. :

[Total No. of Pages : 2

**P6415**

**[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 four of the following. **[10]**

- a) Vernalization.
- b) Senescence.
- c) Shoot apical meristem.
- d) Tapetum.
- e) Double fertilization.
- 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

