Total No. of Questions : 5]

SEAT No. : ____

PB1898

[Total No. of Pages : 2

[6238]-301
S.Y. B.Sc.
BIOTECHNOLOGY
BBt-301 : Cell Biology - I
(Revised 2019 Pattern) (CBCS) (Semester - III)

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

Instructions to the candidates:

1) ***Question 1 is compulsory.***
2) ***Solve any three questions from Q.2 to Q.5.***
3) ***Question 2 to Question 5 carry equal marks.***
4) ***Figures to the right indicate full marks.***

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

a) Give contributions of M.Schleiden & T. Schwann.

b) Define passive transport.

c) Mention any 2 functions of smooth endoplasmic reticulum.

d) Give an example of anchoring junctions.

e) Mention role of microtubule.

f) State the composition of cell membrane.

Q2) a) Explain role & working of Na^+–K^+ pump. **[6]**

OR

Explain the structure of chloroplast and add a note on its function.

b) Compare and contrast between plant cell & animal cell. **[4]**

Q3) a) Give comparative account of types of cytoskeletal elements. **[6]**

OR

"Cell membrane is a dynamic entity". Justify the statement.

b) Comment on proteoglycans. **[4]**

P.T.O.

Q4) a) Explain structure & function of Nucleus. **[6]**

OR

How transport occurs across the cell using facilitated diffusion?

b) Compare & contrast between smooth & rough endoplasmic reticulum. **[4]**

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

a) Ion channels

b) Hemidesmosomes

c) Synport

d) Laminin

e) Endosymbiont theory

f) Basal bodies.



Total No. of Questions : 5]

SEAT No. : ____

PB-1899

[Total No. of Pages : 2

[6238]-302

S.Y.B.Sc.

BIOTECHNOLOGY

BBt - 302 : Molecular Biology - I

(Revised 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) ***Qustions 2 to 5 carry equal marks.***

Q1) **Solve any five of the following :** **[5 × 1 = 5]**

a) What is chargaff's rule?

b) Define hetero- chromatin.

c) Define enhancers.

d) Draw structure of Adenine.

e) Define mRNA.

f) What is reading frame?

Q2) a) With the help of neat labelled diagram explain Griffith's experiment in detail. **[6]**

OR

Explain Blender experiment in detail. Diagram necessary.

b) Give salient features of DNAB. **[4]**

Q3) a) Give the names and roles of enzymes & protein involved in prokaryotic DNA replication. **[6]**

OR

What is genetic code? Write a short note on its discovery.

b) Give an account of chromosomal organization in eukaryotes. **[4]**

P.T.O.

Q4) a) Explain organization of DNA in viruses. **[6]**

OR

Explain with diagram, Frameshift mutation.

b) Differentiate between euchromatin & heterochromatin. **[4]**

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

a) DNA replication is semiconservative.

b) Regulatory sequences - promotor, enhancer & suppressors.

c) DNA polymerase

d) t-RNA

e) Non-histone proteins

f) Z form of DNA

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Total No. of Questions: 5]

SEAT No. : ____

PB1900

[Total No. of Pages :2

[6238]-303
S.Y.B.Sc.
BIOTECHNOLOGY
BBt-303 : Genetics
(Revised 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.***

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

a) Define Allele

b) State law of dominance

c) What is penetrance?

d) What is chromosome interference?

e) What is polyploidy

f) Write the cause and symptoms of klinfilter syndrome

Q2) a) Gene linkage influences mendelian ratio: Justify with example. **[6]**

OR

Explain inversion mutation in chromosome and it's type.

b) Mendel was lucky in choosing pea plant for his experiments. **[4]**

Q3) a) Explain homo and heterogametic theory of sex determination. **[6]**

OR

Describe frameshift mutation with example and their effects.

b) Explain the mechanism of mutation by uv radiation Add a note on it's effects. **[4]**

P.T.O.

Q4) a) What is dosage compensation? Explain the mechanism of dosage compensation. **[6]**

OR

What are base analogue? Explain the mechanism of mutation with example.

b) Colour blindness is considered as recessive sex linked disease. Justify **[4]**

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

a) Epistatis
b) Sickle cell anemia
c) X-linked inheritance
d) Hot spot mutation
e) Co-dominance
f) Crossing over



Total No. of Questions : 5]

SEAT No. :

PB-1901

[Total No. of Pages : 2

[6238]-304

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 2 to 5 carry equal marks.***

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

a) Redox reaction.

b) Define Free energy.

c) Draw the structure of ATP.

d) Enlist essential amino acids.

e) Name five vitamins require by pyruvate dehydrogenase.

f) Define Salvage Pathway.

Q2) a) Describe the Hexose monophosphate shunt. Add a note on its significance. **[6]**

OR

Give an account on Beta-oxidation of fatty acid.

b) Discuss anaerobic glycolysis with suitable example. **[4]**

Q3) a) Discuss glycogenolysis. Add a note on its regulation. **[6]**

OR

Describe reactions in synthesis of urea.

b) Comment on Ketogenesis. **[4]**

P.T.O.

Q4) a) Write an account on biosynthesis of Ionosine Monophosphate(IMP) **[6]**

OR

Give an account of cholesterol biosynthesis.

b) Discuss Acyl carrier protein (ACP) **[4]**

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

a) Glucogenic and ketogenic aminoacids.

b) α-Ketoglutarate dehydrogenase.

c) Regulation of citric acid cycle.

d) Transamination.

e) Regulation of glycolysis.

f) Degradation of Pyrimidines.

Total No. of Questions : 5]

SEAT No. :

PB-1902

[Total No. of Pages : 2

[6238]-305

S.Y. B.Sc.

BIOTECHNOLOGY

BBT - 305 : Environmental Biotechnology

(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) What is food web?

b) Define Environment

c) Enlist consequences of radiation pollution.

d) Define bioindicators.

e) Enlist the microorganisms used for bioremidiation.

f) What is meant by eutrofication?

Q2) a) What is biosphere? Illustrate briefly . **[6]**

OR

Explain components of ecosystem.Add note on aquatic ecosystem **[6]**

b) Describe in detail Integrated waste management. **[4]**

Q3) a) Explain in brief microbial degradation of insecticides. **[6]**

OR

Write in brief about green house effect. **[6]**

b) Give an account of causes, effects and control measures of water pollution. **[4]**

P.T.O.

Q4) a) Elaborate on importance of biotechnology in conservation of biodiversity. **[6]**

OR

Give an account of causes, effects and consequences of ozone layer depletion. **[6]**

b) Explain in brief TRAFIC. **[4]**

Q5) Write a short note on Any Four of the following: **[10]**

a) Types of ecological succession.

b) Acid rain

c) Microbial biodegradation of hydrocarbons

d) Environmental impact assessment

e) Concept of climax

f) Phytoremediation

Total No. of Questions : 5]

SEAT No. : ____

PB-1903

[Total No. of Pages : 2

[6238]-306
S.Y.B.Sc.
BIOTECHNOLOGY
BBT - 306 : Bioanalytical Techniques
(CBCS) (Rev. 2019) (Semester - III)

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

Instructions to the candidates:

1) ***Question No.1 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 the term pH.

b) What is meant by strong anion exchanger?

c) Define the term Absorbance.

d) State the role of Bromophenol blue (BPB) dye in loading dye of PAGE.

e) Explain relative centrifugal force (RCF).

f) State Henderson - Hasselbalch equation.

Q2) a) State different types of centrifuges and explain differential centrifugation in detail. **[6]**

OR

a) Explain principle and applications of adsorption chromatography.

b) State composition and role of components in Native PAGE. **[4]**

Q3) a) Discuss various principles on basis of which bioanalytes can be separated by Chromatographic techniques. **[6]**

OR

P.T.O

a) State various factors affecting electrophoretic mobility of biomolecules during electrophoresis explain the impact of Buffer and voltage in detail.

b) Define the terms molarity and molality. What amount of NaOH will be required to prepare 2M 500ml NaOH solution. **[4]**

Q4) a) Diagrammatically explain construction and working of double beam eletrophotometer. **[6]**

OR

Explain in detail conduction working and application of analytical centrifuge.

b) Define terms normality and equivalent weight what values of conc HCl (Hydrochloric acid) will be required to prepare 2.5N HCl 100ml. Give normality of cone .HCl = 11.2N. **[4]**

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

a) Errors in experimentation.

b) Electromagnetic spectrum.

c) Agorose Gel electrophoreses.

d) Molar extriction coefficient.

e) Calibration of pepetic.

f) Density gradient centrifugation.



Total No. of Questions : 5]

SEAT No. :

PB1904

[Total No. of Pages : 2

[6238]-401
S.Y. B.Sc.
BIOTECHNOLOGY
BBt-401 : Cell Biology-II
(Revised 2019 Pattern) (CBCS) (Semester - IV)

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

Instructions to the candidates:

1) ***Question one 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) State importance of S-Phase.

b) Define chiasmata.

c) What is paracrine signaling?

d) Define ferroptosis.

e) What is MAPK?

f) Mention significance of spindle fibres.

Q2) a) Diagrammatically explain various stages and substages of meiosis-I. **[6]**

OR

Enlist various modes of cell cycle regulation and elaborate on any one mechanism. **[6]**

b) Explain in detail, mechanism of autophagy. **[4]**

P.T.O.

Q3) a) Explain G-protein signaling with suitable example. **[6]**

OR

Elaborate on checkpoints of cell cycle. **[6]**

b) Justify , "Meiosis is the basis of genetic variation." **[4]**

Q4) a) Explain the theories of ageing in detail. **[6]**

OR

Elaborate on different signaling molecules with suitable examples. **[6]**

b) Compare and contrast apoptosis and necrosis. **[4]**

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

a) Karyokinesis

b) Caspases

c) Pyroptosis

d) Cdk-Cyclin complexes

e) Autocrine signaling

f) Neoplasia

Total No. of Questions : 5]

SEAT No. :

PB-1905

[Total No. of Pages : 2

[6238]-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) Define Gene.

b) What is Promoter?

c) Enlist Inhibitors of translation.

d) Explain what are housekeeping genes?

e) State the role of Sigma factor in transcription.

f) What is Positive regulation?

Q2) a) Describe the process of prokaryotic transcription. **[6]**

OR

Discuss post transcriptional modifications, their types & importance in brief.

b) Describe the structure & function of prokaryotic RNA polymerase with neat labelled diagram. **[4]**

Q3) a) Explain the process of initiation of eukaryotic translation. **[6]**

OR

Discuss the process of termination of translation in prokaryotes.

b) Explain mechanism of mRNA capping process. **[4]**

P.T.O.

Q4) a) Discuss regulation of lac operon in detail. **[6]**

OR

Describe the mechanism of Nucleotide-Excision Repair (NER).

b) Write a note on charging of t-RNA during the process of translation. **[4]**

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

a) Enhancers and Silencers

b) Photoreactivation

c) Mechanism of attenuation

d) Abortive initiation

e) Polyribosome

f) Shine Dalgarno Sequences

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Total No. of Questions: 5]

SEAT No. :

PB1906

[Total No. of Pages :2

[6238]-403
S.Y.B.Sc.
BIOTECHNOLOGY
BBt-403 : Immunology
(Revised 2019 Pattern) (Semester-IV)

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

Instructions to the candidates:

1) ***Questions 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 intection and pathogen

b) What is opsonin?

c) Give role of NK cells

d) Enlist types of interferon

e) Explain the term allergy

f) What are killed and live attenuated vaccines?

Q2) a) Describe structure and function of secondary lymphoid organs. **[6]**

OR

Explain the terms antigen and immunoene city Discuss factors affecting immunogenecity.

b) What is delayed type of hypersensitivity? Give its clinical manifestation **[4]**

Q3) a) What is immunity? Differentiate between innate and adaptive immunity**[6]**

OR

Give an account on primary and secondary immune response

b) Give Principle of Precipitation and agglutination Explain clinical significance of these reactions with suitable example. **[4]**

P.T.O.

Q4) a) What is complement system? Discuss how it works for humoral immunity **[6]**

OR

Give an account on types Properties and fuction of cytokines

b) Describe structure and function of IgM antibody **[4]**

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

a) Phagocytosis

b) Immunofluorescence

c) Immunotherapy

d) Monoclonal antibodies

e) Autoimmunity

f) MHC I



Total No. of Questions : 5]

SEAT No. :

PB-1907

[Total No. of Pages : 2

[6238]-404

S.Y. B.Sc.

BIOTECHNOLOGY

BBT - 404 : Animal Development

(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) ***Question No. 2 to No. 5 carry equal marks.***

Q1) Solve any five of the following : **[5 × 1 = 5]**

a) Mention the contribution of spemann in developmental biology.

b) What is primary induction?

c) Mention the structural features of blastocyst.

d) What is an oligolecithal egg? Give any one example.

e) Give the significance of lamp - brush chromosomes during oocyfe differentiation.

f) Comment on autonomous specification.

Q2) a) Define pattern formation. Explain in detail anterio posterior pattern formation in Drosophila. **[6]**

OR

Give details of epimorphic regeneration with an appropriate example. Comment on its unique features compared to other mechanisms of regeneration.

b) Describe in detail the concept of cell lineage, lineage tracking methods and any one examples. **[4]**

P.T.O.

Q3) a) Elaborate on the process of oogenesis. Comment on its discontinuous nature with respect to cell division. **[6]**

OR

Describe in detail the process of fertilization in sea-urchin.

b) Describe the process of neurulations in frog. **[4]**

Q4) a) Explain in detail about formation of germ - layers in a chick embryo. Comment on fates of these layers. **[6]**

OR

Explain the process of germ - layer formation in a frog embryo comment on differences between frog and chick gastrulating mechanisms.

b) Diploid zygote is formed by the fusion of single sperm with an ovum. How does ovum prevent, polyspermy during fertilisation? **[4]**

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

a) Zebrafish as a model of developmental biology.

b) Theories of aging.

c) Teratogens & Teratogenesis.

d) Apoptosis in development.

e) Role of stem cells in development.

f) Difference between superficial and discoidal clearage patterns.

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Total No. of Questions : 5]

SEAT No. :

PB-1908

[Total No. of Pages : 2

[6238]-405

S.Y. B.Sc.

BIOTECHNOLOGY

BBT - 405 : Plant Development

(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 carry equal marks.***

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

a) Define Determination.

b) What is meant by phytomere?

c) Define viviparous germination.

d) What is Vernalization?

e) Graminad type of embryogeny.

f) Describe the structure of female gametophyte.

Q2) a) Describe various phases in male gametophyte development from microspore to male gamete. **[6]**

OR

Comment on dicot embryogeny with suitable diagrams.

b) Define pollination. Describe any two modifications of flower to suit insect pollination. **[4]**

Q3) a) Explain the molecular regulation of floral development with reference to Arabidopsis as a model system. **[6]**

OR

Describe the types of embryo sac development with suitable examples.

b) Describe the types of ovules based on number of integuments and amount of nucell us with examples. **[4]**

P.T.O.

Q4) a) Comment on shoot patterning with respect to physiological and gene expression patterns. **[6]**

OR

What is the importance of seed in Angiosperms? Compare dicot and monocot seed. Add a note on seed dispersal.

b) Write short note on significance and involvement of phytochrome pigments in floral induction. **[4]**

Q5) **Write a short note on Any Four of the following :** **[10]**

a) Describe possible ways in which pollen tube penetrates ovule.

b) Parthenocarpy

c) Flower as modified shoot.

d) Invivo differentiation, dedifferentiation & redifferentiation with one example each.

e) Types of endosperm.

f) Ways opted to achieve self pollination.

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Total No. of Questions : 5]

SEAT No. :

PB-1909

[Total No. of Pages : 2

[6238]-406
S.Y.B.Sc.
BIOTECHNOLOGY
BBT - 406 : Microbial Biotechnology
(CBCS) (Revised 2019) (Semester - IV)

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

Instructions to the candidates:

1) ***Question No.1 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 Fermentation.

b) What is synthetic biology.

c) What is resident flova.

d) Define food infection.

e) What is ropiness in milk.

f) Define BOD.

Q2) a) Enlist intrinsic factors of food & explain their role in food spoilage. **[6]**

OR

Enlist various test used for grading of milk explain any two in detail.

b) Describe the process of pasteurization. **[4]**

Q3) a) Describe etiology of Leprosy with respect to: **[6]**

i) Causative agent ii) Pathogenesis

iii) Symptoms iv) Diagnosis

v) Treatment/preventation

OR

With neat labelled diagram describe working principle and construction of anaerobic diagester.

b) Define Biofertilizer. Explain process of biofertilizer production. **[4]**

P.T.O

Q4) a) Explain the principle and process of primary test done to check water potability. **[6]**

OR

What are intentially added preservative? Explain mechanism of action and use of any two.

b) Justify: Coliform are indicators of faecal pollution. **[4]**

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

a) Kefir.

b) MEOR.

c) Microbial sweetners.

d) Completed test of water.

e) Treatment of tuberculosis.

f) Eijkman test.

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Total No. of Questions : 5]

SEAT No. :

PB1910

[Total No. of Pages : 2

[6238]-501
T.Y.B.Sc.
BIOTECHNOLOGY
BBt - 501 : Industrial Microbiology
(Revised 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) ***Questions 2 to 5 carry equal marks.***

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

a) Define fermentation.

b) Define strain improvement.

c) Give the role of baffles in fermentor.

d) What is secondary screening.

e) What is inducer? Give one example of inducer used in media.

f) Mention role of filter aids in filtration.

Q2) a) Explain air lift bioreactor design in detail with advantages. **[6]**

OR

a) Describe placket & Burman design & write the significance of Placket & Burman design in media optimization.

b) Justify. Air sterilization is carried out by depth filters. **[4]**

Q3) a) What are anatrophic mutants? Write the significance of anatrophic mutants. **[6]**

OR

a) What is centrifugation? Describe tubular bowl centrifuge in detail with diagram.

b) Describe the methods of measurement & control of dissolve oxygen. **[4]**

P.T.O.

Q4) a) Describe large scale manufacturing process of amylase with respect to production strain, fermentation media, growth conditions and recovery process. **[6]**

OR

a) Describe the liquid - liquid extraction process of product recovery.

b) Describe chemical methods of cell disruption. **[4]**

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

a) Seals in bioreactors

b) Types of agitators

c) Precursors in media

d) Continuous fermentation

e) Scale Up

f) Analogue resistant mutant

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Total No. of Questions : 5]

SEAT No. :

PB1911

[Total No. of Pages : 2

[6238]-502

T.Y.B.Sc.

BIOTECHNOLOGY

BBt - 502 : Recombinant DNA Technology

(Revised 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) Ligases

b) Significance of RDT

c) Alkaline phosphatase

d) PUC19

e) Define gene therapy

f) 5' end radioactive labeling

Q2) a) Discuss cDNA library. **[6]**

OR

Describe cosmid vector.

b) Give the applications of gene therapy. **[4]**

P.T.O.

Q3) a) Explain sanger dideoxy method of DNA sequencing. **[6]**

OR

What is expression vector? Explain any one of it.

b) Explain various types of restriction enzymes. **[4]**

Q4) a) Give the basic layout of RDNA laboratory. **[6]**

OR

Explain agrobacterial vector. Add a note on its applications.

b) Explain briefly the steps involved in polymerase chain reaction (PCR). **[4]**

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

a) Recombinant biotherapeutics

b) YAC

c) Q-PCR

d) CRISPR/Cas9

e) DNA polymerases

f) Contribution of boyer and cohen in RDT.

Total No. of Questions : 5]

SEAT No. : ____

PB1912

[Total No. of Pages : 2

[6238]-503
T.Y.B.Sc.
BIOTECHNOLOGY
BBt-503 : Plant Tissue Culture
(Revised 2019 Pattern) (CBCS) (Semester-V)

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

Instructions to candidates:

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

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

a) What is habituation of callus?

b) What is surface sterilization? Give at least two example of surface sterilants.

c) Enlist vitamins used in ms medium.

d) Write importance of colchicines in development of homozygous plants from haploids.

e) Define lubrid & somatic hybrid.

f) Give important contributions of skoog & miller to plant tissue culture.

Q2) a) What do you mean by suspension culture? Discuss chemostat & Turbidostat culture. Comment on measurement of cell growth and cell viability in suspension culture. **[6]**

OR

Define organogenesis. Explain the methods for direct and indirect organogenesis. Give applications of direct organogenesis. **[6]**

b) Elaborate how somaclonal variants are selected. **[4]**

P.T.O.

Q3) a) Define micropropagation. Describe different stages of micropropagation and give its application. **[6]**

OR

Discuss the callus culture w.r.t.

i) Types

ii) Factors affecting

iii) Morphology & internal structure

iv) Application. **[6]**

b) Describe different sterilization techniques. **[4]**

Q4) a) Define somatic embryogenesis. Discuss the stages of embryo development in vitro and add a note on its application. **[6]**

OR

What are plant growth regulators? Enlist various types of plant growth regulators and discuss their uses in plant tissue culture in detail. **[6]**

b) Discuss various factors affecting shoot and root tip culture. **[4]**

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

a) Methods of protoplast isolation

b) Artificial seed

c) Embryo culture

d) Application of plant tissue culture in commercial industry

e) Cell theory & cellular totipotency

f) Different work area in PTC lab

Total No. of Questions : 5]

SEAT No. :

PB1913

[Total No. of Pages : 2

[6238]-504
T.Y. B.Sc.
BIOTECHNOLOGY
BBt-504 : Animal Tissue Culture
(Revised 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 from 2 to 5 carry equal marks.***

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

a) Define passage number.

b) Mention contribution of Hoyflick in the field of animal tissue culture.

c) Write method of serum sterilization.

d) Give any two applications of animal tissue culture.

e) Write the role of balanced salt solution.

f) Define confluency.

Q2) a) Describe establishment of primary culture w.r.t lymphocyte cell culture. **[6]**

OR

Explain advantages and limitations of serum containing media. **[6]**

b) Comment on transformed cell line. **[4]**

Q3) a) What are cryoprotectauts. Describe steps in cryopreservation. **[6]**

OR

What is the need of cell line characterization? Describe any two methods. **[6]**

b) Comment on Organotypic culture. **[4]**

P.T.O.

Q4) a) Decribe in detail about biosafety cabinet in animal tissue culture. Enlist any three instruments used in ATC. **[6]**

OR

Elaborate on subcultureing of cell line. **[6]**

b) Explain different components in ATC media. **[4]**

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

a) Adherent culture

b) Insect cell line

c) Cross-contanination

d) Layout of ATC lab

e) Nomenclature of cell lines

f) Cell viability

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Total No. of Questions : 5]

SEAT No. :

PB1914

[Total No. of Pages : 2

[6238]-505
T.Y. B.Sc.
BIOTECHNOLOGY
BBt-505 : Applied Biotechnology - I
(Revised 2019 Pattern) (CBCS) (Semester - V)

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

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

a) Define Briquetting.

b) Write any two applications of GFP.

c) Top down method.

d) Name any two immiuno diagnostic techniques.

e) Define dendrimers.

f) Give examples of actinobacterial metabolites.

Q2) a) Explain vermicomposting in detail. **[6]**

OR

Describe the process of mineralization indetail.

b) What are nanoparticles? How are these characterized. **[4]**

Q3) a) Explain Molecular diagnostics with one illustration. **[6]**

OR

Discuss fluorogenic reporters, giving their significance.

b) Describe the factors that affect composting. **[4]**

P.T.O.

Q4) a) Explain genomic diagnostics. **[6]**

OR

Biotechnology in microalgae production, describe a road map.

b) Describe Nanomaterial in drug delivery. **[4]**

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

a) Fluorogenic reporters.

b) Microalgae.

c) Nanomedicine.

d) Chitosan.

e) PCR.

f) Biomarkers for disease.

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Total No. of Questions : 5]

SEAT No. :

PB1915

[Total No. of Pages : 2

[6238]-506
T.Y.B.Sc.
BIOTECHNOLOGY
BBt - 506 : Biodiversity and Systematics
(Revised 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) ***Question No. 2 to 5 carry equal marks.***

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

a) Define ecosystem diversity.

b) Enlist the role of forest research institute.

c) What is logistic growth of population?

d) Define niche?

e) Enlist the uses of biodiversity.

f) What is chipko movement?

Q2) a) Explain in situ & Ex-situ conservation methods. Give the significance of insitu conservation method over ex-situ. **[6]**

OR

a) Explain Molecular & Morphological tools used in taxonomy. **[6]**

b) Explain in brief Exponential growth of population. **[4]**

Q3) a) What is habitat? Explain the types of habitat with their Flora & Fauna. **[6]**

OR

a) What is species extinetion? Explain major causes of extinetion of species. **[6]**

b) Describe biodiversity in Cities & Town. **[4]**

P.T.O.

Q4) a) Explain population density & relative abundance. Add a note on method for estimating abundance. **[6]**

OR

a) Discuss the role of zoological survey of India & Botanical survey of India in conservation of Biodiversity. **[6]**

b) Explain strategies for sustainable exploitation of biodiversity. **[4]**

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

a) Ecological equivalence of species.

b) Explain Simpson's biodiversity index.

c) Uses of biodiversity in food & medicine.

d) Artifitial classification system.

e) Role of panipanchayat.

f) Red data book.



Total No. of Questions : 5]

SEAT No. :

PB1916

[Total No. of Pages : 2

[6238]-601
T.Y.B.Sc.
BIOTECHNOLOGY
BBt - 601 : Enzyme and Enzyme Technology
(Revised 2019 Pattern) (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 of the following. **[5]**

a) Ribozyme

b) Turnover number

c) Zymogen

d) Metabolism

e) Apoenzyme

f) Specific activity of enzyme

Q2) a) Give an account on allosteric regulation. **[6]**

OR

a) Explain double reciprocal plot with equation and give its significance. **[6]**

b) Describe multienzyme complex with suitable example. **[4]**

Q3) a) Explain mechanism of Non - lysosomal enzyme degradation pathway. **[6]**

OR

a) Define immobilization of enzyme. Describe any one method of enzyme immobilization. **[6]**

b) Describe the mechanism of action of chymotrypsin with suitable example. **[4]**

P.T.O.

Q4) a) Explain covalent catalysis with suitable example. **[6]**

OR

a) Discuss the effect of pH on enzyme activity. **[6]**

b) Comment on clinical applications of enzymes. **[4]**

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

a) Components of biosensor.

b) Carrier matrices used in enzyme immobilization.

c) Activation energy of enzyme.

d) Compartmentation of metabolic pathway.

e) Michaelis - Menten equation & its significance.

f) Metal degrading enzyme.



Total No. of Questions : 5]

SEAT No. : ____

PB1917

[Total No. of Pages : 2

[6238]-602
T.Y.B.Sc.
BIOTECHNOLOGY
BBT-602: Agriculture Biotechnology
(CBCS) (Revised 2019 Pattern) (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) ***Q.2 to Q.5 carry equal marks.***

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

a) Define biofertilizer.

b) What is green house?

c) Define e-agriculture.

d) Define molecular markes.

e) What is abiotic stress?

f) Write two examples of genetically modified micro-organisms for improvement of biofertilizers.

Q2) a) Explain development of herbicide resistance in crops. Give one example. **[6]**

OR

What is biopesticides? Give importance of biopesticides and industries producing different biopesticide.

b) Describe system employed to control and regulate greenhouse environment. **[4]**

P.T.O.

Q3) a) Explain modern agricultural biotechnology. Compare it with classical agricultural biotechnology. **[6]**

OR

Define biofertilizer. Explain development and quality control of biofertilizers.

b) Explain types of greenhouse in brief. **[4]**

Q4) a) Explain role of biotechnology for recycling horticulture waste as manures and livestock feed. **[6]**

OR

Explain development of drought tolerant varieties.

b) Explain biotechnology for pathogen diagnosis. **[4]**

Q5) Solve any FOUR of the followings: **[10]**

a) Phytosanitation.

b) Physical methods of gene transfer.

c) Role of agriculture biotechnology in India.

d) Non-conventional biofertilizers.

e) Molecular markers in plant breeding.

f) Importance of transgenic plants.



Total No. of Questions : 5]

SEAT No. :

PB1918

[Total No. of Pages : 2

[6238]-603
T.Y.B.Sc.
BIOTECHNOLOGY
BBt - 603 : Applied Biotechnology - II
(Revised 2019 Pattern) (CBCS) (Semester - VI)

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) What is meant by xenobiotic compounds?

b) Write any two example and application genetically modify crops.

c) What is mean by 3rd generation biofuels?

d) Give two example of system biology.

e) What is meant by hematopoietic stem cells?

f) Write significance of cordblood banking.

Q2) a) Describe the role of green technologies in sustainable development, with example. **[6]**

OR

a) What is biotransformation? Explain with example.

b) Development of 'personalised medicine' is possible after human genome project. Justify. **[4]**

Q3) a) Explain the role of DNA fingerprinting in forensic medicine. **[6]**

OR

a) How is the synthetic biology used for production of bioactive metabolite

b) What is the policy of stem cell use in India? **[4]**

P.T.O.

Q4) a) Describe in detail the ecological role of microorganism. **[6]**

OR

a) Describe the application of system biology in Biotechnology.

b) Explain the therapeutic applications of stem cells in human neuro degenerative diseases. **[4]**

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

a) Rice 3k project

b) GUaRDIAN

c) 2nd generation biofuels

d) Recalcitrant metabolite

e) GM - food

f) Biodiesel



Total No. of Questions : 5]

SEAT No. :

PB1919

[Total No. of Pages : 2

[6238]-604
T.Y. B.Sc.
BIOTECHNOLOGY
BBt-604 : Food and Pharmaceutical Biotechnology
(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 questions from Q.2 to Q.5.***
3) ***Q.2 to Q.5 carry equal marks.***

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

a) What are trace elements? Give its functions.

b) Define lead compound.

c) What are Food allergens?

d) What is Kombucha Tea?

e) What is drug target?

f) What is structure activity relationship?

Q2) a) Explain with example computed assisted drug design. **[6]**

OR

Elaborate phases of clinical trials. **[6]**

b) What are Flavour enhancer? Give the example of each type of flavour. **[4]**

Q3) a) What are various types of food packaging materials. **[6]**

OR

Explain in detail about AGMARK and BIS. **[6]**

b) Discuss in brief about Indian Pharmacopiea (IP). **[4]**

P.T.O.

Q4) a) Describe various techniques used in microbial analysis of food. **[6]**

OR

Explain formulation of antibiotics as per IP. **[6]**

b) Discuss mechanism of action of probiotics and prebiotics. **[4]**

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

a) Biodegradable plastics used as a food packaging material.

b) Nutraceuticals

c) FSMS

d) Rational drug discovery

e) The pharmacy act 1948

f) Therapeutic applications of pharmaceutical biotechnology

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Total No. of Questions : 5]

SEAT No. : ____

PB1920

[Total No. of Pages : 2

[6238]-605
T.Y. B.Sc.
BIOTECHNOLOGY
BBt-605 : Bioinformatics
(Revised 2019 Pattern) (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) Give two example of literature database.

b) What is public data resources?

c) Define composite database.

d) What do you mean by sequence alignment? Give its type.

e) What is meant by gap penalty?

f) Give any two tools for protein Structure & Visualization.

Q2) a) What is biological database? Explain its classification with example. **[6]**

OR

What do you mean by algorithm? Note down the differences between Needlemen-Wunsch & Smith Waterman algorithm. **[6]**

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

Q3) a) Define BLAST. Explain steps followed by BLAST algorithm to find a matching sequence. **[6]**

OR

What is the biological basic for multiple sequence alignment? Explain use of CLUSTAL-W as a tool for MSA. **[6]**

b) Differentiate between CATH & SCOP. **[4]**

P.T.O.

Q4) a) Enlist basic tools for data generation & explain NGS genome sequencing in detail. **[6]**

OR

Explain file format of Gen Bank. **[6]**

b) Discuss relationship of biotechnology with bioinformatics. **[4]**

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

a) Metadata

b) SPDBV

c) Dynamic programming

d) Data Retrieval Systems

e) Private & Public data resources

f) Global Vs Local alignment

Total No. of Questions : 5]

SEAT No. :

PB1921

[Total No. of Pages : 2

[6238]-606

T.Y.B.Sc.

BIOTECHNOLOGY

BBt - 606 : Biosafety And Bioethics And 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) *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 territorial jurisdiction of the Patent Act 1970?

b) Define Beneficence.

c) Enlist four irritants.

d) Define Biocontainment.

e) Give example of geographical indications.

f) Define copyright.

Q2) a) Explain IPR and concans regarding genamics. **[6]**

OR

a) Describe GATT and TRIPs agreement.

b) Discuss designs, logo & equipments can be covered under IPR. **[4]**

Q3) a) Explain Biosafety Cakinets. **[6]**

OR

a) Discuss Budapest treaty, add a note on its significance.

b) Turmeric patent and its challenge by Indian government, discuss. **[4]**

P.T.O.

Q4) a) Explain Indian patent law. **[6]**

OR

a) Symbols and significance of Biosafety.

b) Discuss world trade organization and its benefit. **[4]**

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

a) Carcinogens

b) Organism allowed in BSL - 1 facility.

c) Non maleficence.

d) BSL - 3 facility

e) Trade mark

f) Melsinki declaration

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