Total No. of Questions : 5]

SEAT No. :

PA-1038

[Total No. of Pages : 2

[5903]-11
F.Y. B.Sc. (Biotechnology)
BBT - 101 : FUNDAMENTALS OF CHEMISTRY - I
(2019 Pattern) (CBCS) (Semester - I)

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

Instructions to the candidates:

1) ***Q1 is compulsory.***
2) ***Solve any three questions from Q2 to Q5.***
3) ***Questions 2 to 5 carries equal marks.***

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

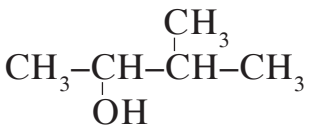
a) Calculate bord order of O_2.

b) State Pauli's exclusion principle.

c) Give electronic configuration of chlorine. (atomic number of Cl : 17)

d) Define functional group isomerism with example.

e) Give IUPAC name of



f) Define enthalpy.

Q2) a) What are alkyl halides? How are they classified? What is the reaction of **[6]**

i) Aqueous KOH and

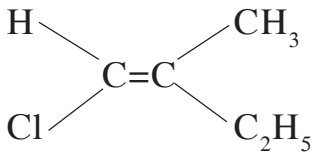
ii) C_2H_5 ONa on ethyl bromide.

OR

Define hybridization. State its types. Explain Sp^3 hybridization in detail with suitable example.

b) Assign E / Z **[4]**

i)



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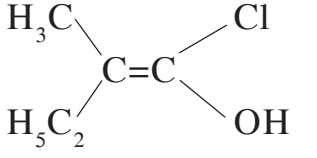


Q3) a) Define conformational isomerism. Draw conformation of ethane with energy profile diagram. **[6]**

OR

State and explain VSEPR Theory.

b) Differentiate between Isothermal and Adiabatic process. **[4]**

Q4) a) What are nucleophilic substitution reactions? Explain SN^1 in detail with example. **[6]**

OR

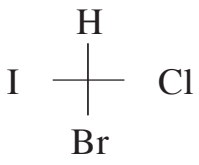
Define oxidation and reduction. Calculate oxidation number for the following.

i) $Cr \text{ in } Cr_2O_7^{2-}$ ii) $Cl \text{ in } ClO_4^-$

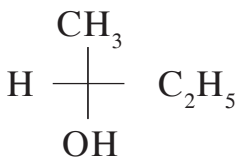
iii) $M_n \text{ in } M_nO_4^{2-}$ iv) $Pt \text{ in } K_2PtCl_6^-$

b) Assign R / S for **[4]**

i)



ii)



Q5) **Write short notes on (Any Four) :** **[10]**

a) Enthalpy as state function

b) Dipole Dipole forces

c) Biological oxidation reduction reaction

d) Fridel Crafts Acylation reaction

e) Bohr's atomic model

f) Paramagnetism

Total No. of Questions : 5]

SEAT No. : ____

PA-1039

[Total No. of Pages : 2

[5903]-12
F.Y. B.Sc. (Biotechnology)
BBT-102 : FUNDAMENTALS OF PHYSICS
(2019 Pattern) (Semester - I)

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

Instructions to the candidates:

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

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

a) What is standard defination of 1 second.

b) Define streamline flow.

c) Define surface Tension & it's unit.

d) State that coefficient of viscosity (η).

e) Define shell's law.

f) What is value of 1 amu (Atomic mass unit)?

Q2) a) Define Fundamental & derived quantities. List the seven important of fundamental quantities along with appropriate unit & symbols. **[6]**

OR

Obtain the poiseuille's equation for flow of liquid through a capillary tube.

b) Write any four application of surface tension in details. **[4]**

Q3) a) Obtain expression for surface Tension in capillary action. **[6]**

OR

State Doppler's effect. Derive an expression for apparent when source is moving towards & away from a stationary observer.

P.T.O.

b) Two flat horizontal plates, each of area 100 cm^2 are separated by 1mm thick layer of glycerine. If the lower plate be fixed, calculate the force required to move the upper plate with a speed of 7 cm/sec (coefficient of viscosity η = 1 kg/m sec). **[4]**

Q4) a) Explain the difference between audiable, ultrasound & ultrasonic waves & state the frequency range between it. **[6]**

OR

Write the types of lenses & derive the expression for lens maker equation.

b) A slit of variable width is illuminated by red light of wavelength 6500 A°. At what width of the slit the first minimum of the minimum will fall at $\theta = 30°$? **[4]**

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

a) Explain the principle of super position of waves

b) Write eq^n of continuity in short

c) Explain the quantity of standard of mass

d) What is wetting angle & wettability explain with example

e) Define wave with their types

f) Explain sound wave as pressure wave

□□□

Total No. of Questions : 5]

SEAT No. : ____

PA-1040

[Total No. of Pages : 2

[5903]-13
F.Y. B.Sc. (Biotechnology)
BBt - 103 : BIOCHEMISTRY - I
(2019 Pattern) (Semester - I)

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

Instructions to the candidates :

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

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

a) Ionic bond.
b) Enlist 'any two' Good's buffer.
c) Write any two properties of water, that make it suitable for life.
d) Draw structure of maltose.
e) 16 : 0.
f) Name two epimers of glucose.

Q2) a) Explain 'mutarotation' of glucose. **[6]**

OR

a) Describe structure of chitin, give its significance.
b) Explain the phenomenon of 'Osmosis'. **[4]**

Q3) a) Classify fatty acids giving examples. **[6]**

OR

a) Name the different type of phospholipids with their structure and significance.
b) Justify MDL concentration and its correlation with heart disorders. **[4]**

Q4) a) Describe with example heterogenous polysaccharides. **[6]**

OR

a) Explain cholesterol decreases membrane fluidity.
b) Triacyl glycerols are packed with abundant energy, Justify. **[4]**

P.T.O.

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

a) Sphingolipids.

b) Reducing sugar.

c) Urey-Miller Experiment.

d) Cellulose.

e) Lactose.

f) $18 : 2^{\Delta 9,12}$.

▽▽▽▽

Total No. of Questions : 5]

SEAT No. : ____

PA-1041

[Total No. of Pages : 2

[5903]-14
F.Y. B.Sc. (Biotechnology)
BBT - 104 : BIOPHYSICS
(2019 Pattern) (Semester - I)

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

Instructions to the candidates :

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

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

a) Define Cohesion.
b) Explain J.J Thomsons atomic model.
c) Define half life of a radioactive isotope.
d) What is cellular biophysics?
e) Define Passive transport.
f) Osmosis.

Q2) a) What are Nuclear Forces? Give their properties. **[6]**

OR

a) Explain branches of Biophysics. **[6]**
b) What is quantum number? Enlist & explain them. **[4]**

Q3) a) Explain vector atom model. **[6]**

OR

a) Give the properties of α, β and γ rays. **[6]**
b) What is surface tension? Explain factor affecting surface tension. **[4]**

Q4) a) What is dialysis? Explain its types. **[6]**

OR

a) Explain GM counter in detail. **[6]**
b) Derive the relation between radius of Bohr's orbit and principle quantum number. **[4]**

P.T.O.

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

a) Sandwich model.

b) Facilitated diffusion.

c) Shell model.

d) Applications of Radioactive isotopes.

e) Depolarization & repolarization.

f) Colloids.

▽▽▽▽

Total No. of Questions : 5]

SEAT No. : ____

PA-1042

[Total No. of Pages : 2

[5903]-15
F.Y. B.Sc (Biotechnology)
BBt - 105 : Animal Sciences - I
(2019 Pattern) (Semester - I) (CBCS)

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

Instructions to the candidates:

1) ***Q1 is compulsory.***
2) ***Solve any three questions from Q2 to Q5.***
3) ***Q2 to Q5 carries equal marks.***

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

a) Enlist the names of canal system of phylum porifera.

b) Define metamorphosis.

c) Write any two characters of protochardata.

d) Write two important characters of connective tissue.

e) Define aestivation in frog.

f) Enlist two examples of phylum Mollusca.

Q2) a) Give two examples of Class Aves and write the salient features of it. **[6]**

OR

With neat labelled diagram describe the ultrastructure and functions of striated muscle.

b) C. elegans as a good animal model system. Justify. **[4]**

Q3) a) Describe male reproductive system of frog. **[6]**

OR

Describe the life cycle of drosophila.

b) Explain anyone of the sense organ in frog. **[4]**

P.T.O.

Q4) a) Describe water vascular system in Echinodermata. (Asteroida) **[6]**

OR

Write the characters of class cephalochordata with examples.

b) Write differences between non-chordates and chordates with examples. **[4]**

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

a) Polymorphosim in Hydra.

b) Byproducts of honeybee.

c) Different types of pseudopodia (any two)

d) Sexual diamorphism in Drosophila.

e) Worker bee.

f) Hyaline cartilage

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Total No. of Questions : 5]

SEAT No. : ____

PA-1043

[Total No. of Pages : 2

[5903]-16
F.Y. B.Sc (Biotechnology)
BBt : 106 Plant Sciences - I
(2019 Pattern) (Semester - I) (CBCS)

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

Instructions to the candidates:

1) ***Q1 is compulsory.***
2) ***Solve any three questions from Q2 to Q5.***
3) ***Q2 to Q5 carry equal marks.***

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

a) State any four unique characteristics of plants.

b) Define phyllotaxy.

c) Explain the term epipetalous stamens with suitable example.

d) What is the role of lateral meristem.

e) Explain storage root modification with examples.

f) What are pneumatophores.

Q2) a) Give general account of Bryophytes with suitable examples. **[6]**

OR

a) What are the objectives and principles of plant classification. Describe classification of plants on the basis of habit and habitat with suitable examples. **[6]**

b) Compare dicots & monocots. **[4]**

Q3) a) Explain three basic types of primary tissue systems in plants. **[6]**

OR

a) With a neat labelled diagram describe the internal structure of young dicot stem. **[6]**

b) Describe aerial modifications of stem with suitable examples. **[4]**

P.T.O.

Q4) a) What is inflorescence? Explain the subtypes of racemose inflorescence with diagrams and examples. **[6]**

OR

a) Describe the types of cohesion of stamens. **[6]**

b) Compare xylem and phloem. **[4]**

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

a) T.S. of dicot leaf.

b) Types of vascular bundles based on arrangement in plant body.

c) Compare algae and fungi.

d) Structure of plant cell wall.

e) Types of flower based on position of ovary.

f) Write short note on leaf modifications.

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Total No. of Questions : 5]

SEAT No. : ____

PA-1044

[Total No. of Pages : 2

[5903]-17
F.Y. B.Sc.
BIOTECHNOLOGY
BBt - 107 : Microbiology - I
(2019 Pattern) (Semester - I)

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

Instructions to the candidates:

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

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

a) Write two examples of Gram negative bacteria.
b) Write two features of eukaryotic cell.
c) Enlist any four distinguishing characters of algae.
d) What is numerical aperture?
e) What is mordant?
f) Give principle of monochrome staining.

Q2) a) Explain in brief general characteristics and importance of prokaryotes. **[6]**

OR

Discuss differences between prokaryotes and eukaryotes.

b) With neat labelled diagram explain structure of prokaryotic cell membrane. **[4]**

Q3) a) Explain in brief structure and importance of nucleoid in prokaryotic cell. **[6]**

OR

What is germ theory of disease? Write Koch's postulates.

b) Write principle and method of Gram's staining. **[4]**

P.T.O.

Q4) a) Describe in detail structure and life cycle of bacteriophages. **[6]**

OR

With neat labelled diagram explain structure of bacterial endospore and add a note on process of sporulation.

b) Explain working and functions of compound microscope. **[4]**

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

a) Archaebacteria.

b) General characters fungi.

c) Structure of flagella.

d) Different types of objective lenses.

e) Negative staining

f) Viriods and prions.

Total No. of Questions : 8]

SEAT No. :

PA-1045

[Total No. of Pages : 2

[5903]-18
F.Y. BSc. (Biotechnology)
BBt 108 : BIOMATHEMATICS AND BIOSTATISTICS - I
(2019 CBCS Pattern) (Semester - I)

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

Instructions to the candidates:

1) ***Solve each section on separate answer paper.***
2) ***Use of non-programmable scientific calculator is allowed.***
3) ***Q.1 and Q.5 are compulsory.***
4) ***Solve any two questions out of Q.2, Q.3 and Q.4 in Biomathematics section.***
5) ***Solve any two questions out of Q.6, Q.7 and Q.8 in Biostatistics section.***

SECTION - I
(Biomathematics)

Q1) a) Define : Symmetric Matrix. **[1]**

b) Write the expression $5^2 = 25$ in logarithmic form. **[1]**

c) Compute the dot product of vectors $\overline{u} = \overline{i} + \overline{j} + \overline{k}$ and $\overline{v} = 2\overline{i} - \overline{j} + \overline{k}$. **[1]**

Q2) a) If $3^{x-y} = 27$ and $3^{x+y} = 243$, then find the values of x and y. **[3]**

b) Determine whether the vectors $v_1 = (1, 0, 1)$ $v_2 = (-1, 0, 1)$ and $v_3 = (0, 1, 4)$ are linearly dependent. **[4]**

Q3) a) If $\log 2 + \log (x+3) - \log (3x-5) = \log 3$, then find the value of x. **[3]**

b) How many integers from 1 to 1000 are divisible either by 2 or 3 or 5? **[4]**

Q4) a) The lengths of the diagonals of a rhombus are 56cm and 33cm find the area of the Rhombus. **[2]**

b) How many ways are there to arrange the 11 letters in the word 'MATHEMATICS'? **[2]**

c) If $A = \begin{bmatrix} 3 & -1 \\ 2 & 4 \end{bmatrix}$ and $B = \begin{bmatrix} 1 & 2 \\ 0 & 0 \end{bmatrix}$, then find the matrix x such that $2x + 3A - B = 0$ where '0' is zero matrix of order 2. **[3]**

P.T.O.

SECTION - II

(Biostatics)

Q5) State whether each of the following statements is true or false : **[1each]**

a) Mean of the data 2, 4, 6, 8, 10, is 2

b) Cov(x,4) = 0

Q6) Define the following terms : (any four) **[2each]**

a) Median

b) Central tendency

c) Standard deviation.

d) Mean deviation

e) Positive correlation.

Q7) Attempt the following.

a) Compute quartile deviation for the following data: 20, 25, 19, 22, 26, 17,30. **[5]**

b) For certain data $\sum(x_i - \bar{x})(y_i - \bar{y}) = 28$ and $\sum(x_i - \bar{x})^2 = 20$, compute regression coefficient of y on x. Also comment on the result. **[3]**

Q8) Attempt the following.

a) Explain the representation of data using ogive curves. **[5]**

b) Explain need of statistics in biology. **[3]**

Total No. of Questions : 5]

SEAT No. : [ ]

PA-1046

[Total No. of Pages : 2

[5903] - 21

F.Y. B.Sc.

BIOTECHNOLOGY

BBt - 201 : Fundamentals of Chemistry - II

(2019 Pattern) (CBCS) (Semester - II)

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

Instructions to the candidates :

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

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

a) Define Buffer.

b) What is EMF?

c) State Ostwalds law of dilution.

d) What is reversible cell?

e) Define Normality.

f) State Rate law.

Q2) a) Derive Handerson Balch Equation for Acidic Buffer. **[6]**

OR

Explain Pseudomolecular Reaction with suitable example.

b) What is the use of salt bridge? How it is prepared? **[4]**

P.T.O.

Q3) a) What is rate of reaction? Obtain the rate equation for a first order reaction. **[6]**

OR

What are Colligative properties? Explain Elevation of boiling point is a Colligative property.

b) A second order reaction where a = b is completed in 500 sec, how long it will take for the reaction to go to 60% completion. **[4]**

Q4) a) What is Standard Cell? Explain Weston Standard Cell. **[6]**

OR

Define equivalence point. Explain neutralization curve of Strong Acid and Weak Base.

b) Calculate the pH of the following : **[4]**

i) 10^{-8} (M).

ii) $\frac{M}{200} Ca(OH)_2$.

iii) 1.0×10^{-2} (M) $Ca(OH)_2$

iv) 0.1 M CH_3 COOH.

Q5) Write short notes on **(Any Four)** : **[10]**

a) Lewis Acid and Base concept.

b) Calomel Electrode.

c) Lowering of vapour pressure.

d) Characteristics of 1st order reaction.

e) Medicinal and Biological concept of water.

f) Galvanic cell.

Total No. of Questions : 5]

SEAT No. : ____

PA-1047

[Total No. of Pages : 2

[5903] - 22

F.Y. B.Sc.

BIOTECHNOLOGY

BBT - 202 : Biochemistry - II

(2019 Pattern) (Semester - II)

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) Zwitter Ion.

b) Peptide bond.

c) Specific Activity.

d) Nucleoprotein.

e) Active site.

f) Nucleoside.

Q2) a) Explain six classes of enzyme according to the type of reaction catalyzed by them. **[6]**

OR

Explain the structure of DNA with the help of well labelled diagram. Add a note on functions of Nucleic Acids.

b) Briefly explain role of Thiamine pyro phosphate as coenzyme. **[4]**

P.T.O.

Q3) a) Explain different forces stabilizing structure of DNA. **[6]**

OR

Explain α-Helix and β pleated sheet structure of proteins.

b) Briefly explain biochemical role of Riboflavin and Niacin. **[4]**

Q4) a) Give structure of following amino acids. **[6]**

i) Aspartic Acid.

ii) Glycine.

iii) Proline.

iv) Cysteine.

v) Lysine.

vi) Valine.

OR

Explain the effect of temperature, pH and substrate concentration on enzyme activity.

b) Discuss in brief denaturation of Nucleic acids. **[4]**

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

a) Structure of Adenine and Thymine.

b) Ionisation of Amino Acid Side Chain.

c) Induced Fit Model.

d) Z DNA.

e) Phosphodiester Bond.

f) Competetive inhibition.

Total No. of Questions : 5]

SEAT No. :

PA-1048

[Total No. of Pages : 2

[5903]-23
F.Y. B.Sc.
BIOTECHNOLOGY
BBT-203: Bioinstrumentation
(2019 Pattern) (CBCS) (Semester - II)

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

Instructions to the candidates :

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

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

a) Enlist the applications of spectrophotometer.

b) Define Absorption.

c) Enlist the applications of Atomic Absorption Spectrometer.

d) What is stationary phase?

e) Define sedimentation rate.

f) Enlist the thermometric properties of thermometer.

Q2) a) Explain the principle of centrifuge Add a note on different types of centrifuges. **[6]**

OR

Explain the construction & working of colorimeter mention it's applications.

b) Explain the principle of Mass spectroscopy. **[4]**

P.T.O.

Q3) a) Explain the principle & working of phase contrast microscope. **[6]**

OR

Explain the principle of double beam spectrophotometer. Add a note on applications of spectrophotometer to biomolecules.

b) Explain the principle of TLC & mention it's applications. **[4]**

Q4) a) Explain the principle & working of dark field microscope in detail. **[6]**

OR

Explain the principle & construction of thermocouple thermometer.

b) Explain the principle of fluorescence microscope & mention its applications. **[4]**

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

a) Write a note on principle of pH meter.

b) Write a note on Analytical techniques.

c) Explain principle of colorimeter.

d) Explain energy levels of rigid diatomic molecules.

e) Give an account on applications of centrifuge.

f) Explain the construction of stereozoom microscope.

Total No. of Questions : 5]

SEAT No. : ____

PA-1049

[Total No. of Pages : 2

[5903]-24
F.Y. B.Sc.
BIOTECHNOLOGY
BBT-204: Animal Science - II
(2019 Pattern) (CBCS) (Semester - II)

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

Instructions to the candidates :

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

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

a) Name any two digestive glands.

b) Define synapse.

c) Enlist two hormones secreted by pituitary.

d) Write two differences between striated and non-striated muscle.

e) Define sarcomere.

f) Mention the scientific name of honey bee.

Q2) a) Describe physiology of digestion in mouth and stomach. **[6]**

OR

With the help of diagram explain the transport of O_2 and CO_2 between alveoli and tissue.

b) Describe mechanism of muscle contraction. **[4]**

P.T.O.

Q3) a) Describe spermatogenesis with diagram. **[6]**

OR

Explain the structure and functions of thyroid gland.

b) Write a note on various types of hives used in apiculture. **[4]**

Q4) a) Explain asexual phase in the life cycle of plasmodium. **[6]**

OR

Define sericulture and explain the life cycle of silkworm.

b) Name the hosts of helminthes parasite Taenia.sp. Write about the pathogenecity. **[4]**

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

a) Digestion of carbohydrates.

b) Stucture of Neuron.

c) Symbiotic relationship with example.

d) Fish by products.

e) Respiratory pigments.

f) Silkworm diseases.

Total No. of Questions : 5]

SEAT No. :

PA-1050

[Total No. of Pages :2

[5903] - 25
F.Y. B.Sc. (Biotechnology)
BBt - 205 : PLANT SCIENCES - II
(CBCS) (2019 Pattern) (Semester - II)

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

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

a) Define Osmosis.

b) What is ascent of sap.

c) Define photophosphorylation.

d) Comment on photoperiodism.

e) Draw neat labelled diagram of chloroplast.

f) Write two examples of fiber yielding plants.

Q2) a) Describe light reactions of photosynthesis. Add a note on photosynthetic pigments. **[6]**

OR

What is diffusion? Explain the cohesion - tension theory for ascent of sap in plants. **[6]**

b) Write short note on kreb's cycle. **[4]**

Q3) a) Describe mechanisms of Nitrogen fixation. **[6]**

OR

State five classes of plant hormones. Explain their role in growth of plants **[6]**

b) Write a note on phloem loading and unloading. **[4]**

P.T.O.

Q4) a) Describe the factors influencing photosynthesis. Add a note on CAM pathway. **[6]**

OR

With a neat labelled diagram explain ETC involved in respiration. **[6]**

b) Write differences between photosynthesis and respiration. **[4]**

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

a) Active and passive transport.

b) Imbibition.

c) C_4 pathway of photosynthesis.

d) Economic importance of cereals & pulses with suitable examples.

e) Vernalisation.

f) Glycolysis.

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Total No. of Questions : 5]

SEAT No. :

PA-1051

[Total No. of Pages :2

[5903] - 26
F.Y. B.Sc. (Biotechnology)
BBT - 206 : MICROBIOLOGY - II
(2019 Pattern) (Semester - II)

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

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

a) State importance of sterilization process in microbiology.

b) Write mode of action of heavy metal on bacteria.

c) Write any two applications of pure culture.

d) Which method of sterilization you will use to sterile following material:

i) Syringes & needles.

ii) Inoculation cabinet.

iii) Serum.

iv) Petriplates & Pipettes.

e) What is MIC?

f) What is biosafety level 2 laboratory?

Q2) a) With neat labelled diagram describe different phases of bacterial growth curve. **[6]**

OR

Explain construction, working principle and uses of autoclave. **[6]**

b) Classify bacteria on the basis of temperature and pH requirement. **[4]**

P.T.O.

Q3) a) Enlist various methods of preservation of microorganism. Explain process of lyophilization in detail. **[6]**

OR

With neat labelled diagram describe animal - microbe interaction. **[6]**

b) Write mode of action and uses of halogens and detergents. **[4]**

Q4) a) Discuss factors affecting bacterial growth and classify bacteria on the basis of nutritional requirement. **[6]**

OR

Describe any one method to obtain pure culture of microorganism. Add importance of serial dilution in it. **[6]**

b) Justify Blood agar is a differential media. **[4]**

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

a) Enrichment media.

b) Growth factors.

c) Pasteurization.

d) Ideal disinfectant.

e) Biosafety.

f) U.V. light sterilization.

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Total No. of Questions : 8]

SEAT No. :

PA-1052

[Total No. of Pages : 2

[5903]-27

F.Y. B.Sc. (Biotechnology)

BBt-207 : Biomathematics and Biostatistics - II

(2019 Pattern) (CBCS) (Semester - II)

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

Instructions to the candidates:

1) ***Solve each section on separate answer paper.***
2) ***Use of non programmable scientific calculator is allowed.***
3) ***Q.1 and Q.5 are compulsory.***
4) ***Solve any two questions out of Q.2, Q.3 and Q.4 in Biomathematics section.***
5) ***Solve any two questions out of Q.6, Q.7 and Q.8 in Biostatistics section.***

SECTION - I

Biomathematics - II

Q1) a) Find the order and degree of the differential equation $\frac{d^2y}{dx^2} + \frac{dy}{dx} + y = x$. **[1]**

b) Solve the integration $\int \frac{\cos x}{\sin x}\, dx$. **[1]**

c) Compute the partial derivative of the function $x^2y + \sin(x+y)$ with respect to 'x'. **[1]**

Q2) a) Solve the following system of linear equations by Gaussian elimination method. **[5]**

$$x + y + z = 1$$
$$x + y - 2z = 4$$
$$2x + y + z = 2$$

b) Find the stationary point of the following function

$f(x, y) = x^2 - xy + y^2 - 2x + y$ **[2]**

P.T.O.

Q3) a) Solve the differential equation $\frac{dy}{dx} = \frac{x+y}{x-y}$. **[5]**

b) Find the area under the curve $y = x^2 + 2$ from $x = 1$ to $x = 2$. **[2]**

Q4) Find eigenvalues and eigenvectors of matrix $A = \begin{bmatrix} 2 & 2 \\ 1 & 3 \end{bmatrix}$. **[7]**

SECTION - II

Biostatistics - II

Q5) State whether each of the following is true or false : **[1 each]**

a) Rejecting Ho when Ho is true is called as type II error.

b) For binomial distribution mean < variance.

Q6) Attempt the following :

a) Define the following terms : **[2 each]**

i) Random experiment

ii) Level of significance

b) State any one application of normal distribution is bioscience. **[4]**

If $X \rightarrow N(10, 16)$. Find $P(10 < X < |4)_9$ $P(|X - 10| < 4)$.

Q7) Attempt the following : **[8]**

The weight (in kg.) of 10 bags of salt taken from machine are found as follows :

15.9, 15.8, 16.2, 16.0, 16.4, 15.6, 15.8, 15.4, 16.1

Does the sample support the clainn of the company that average weigh of salt bag is 16kg. Use 1% level of significance.

(State the assumptions if any).

Q8) Write a note on one way ANOVA and two way ANOVA. **[8]**

Total No. of Questions : 5]

SEAT No. : ____

PA-1053

[Total No. of Pages : 2

[5903]-28

F.Y. B.Sc. (Biotechnology)

BBt-208 : Computer In Biology

(2019 Pattern) (Semester - II)

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) Give any two examples of output device.

b) Define firewall.

c) Write full form of following terms.

i) DVD

ii) RAID

d) What is Hashing?

e) Enlist the types of operating system (Any 2)

f) State True/false :

i) ROM is a non-volatile memory.

ii) Inkjet printer is a input device

Q2) Answer the following : **[10]**

a) Explain the generations of computers in detail. **[6]**

b) Write a short note on the following : **[4]**

i) Hierarchical Data Model.

ii) Working on Search Engine.

P.T.O.

Q3) Answer the following : **[10]**

a) What is Bioinformatics? Explain its history in brief. **[6]**

b) Write in brief following terms : **[4]**

i) Medline

ii) Pubmed

Q4) Answer the following : **[10]**

a) What is virus? State various type of viruses and explain in brief. **[6]**

b) Differentiate between supercomputer and mainframe computer. **[4]**

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

a) MS-Excel

b) Workstations

c) Network database management system

d) Storage Devices

e) Biological databases

f) Trojans

Total No. of Questions : 5]

SEAT No. :

PA-1054

[Total No. of Pages : 2

[5903]-31

S.Y. B.Sc.

BIOTECHNOLOGY

BBt-301 : Cell Biology - I

(2019 Pattern) (CBCS) (Semester - III)

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

Instructions to the candidates:

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

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

a) Define symport.

b) Mention role of SER.

c) What is prion?

d) Define pinocytosis.

e) What organelles are specific to plant cell?

f) What is plasmodesmata?

Q2) a) With the help of neat labelled diagram explain eukaryotic cell organization. **[6]**

OR

Discuss nuclear transport with respect to import & export. **[6]**

b) Describe microfilament. **[4]**

P.T.O.

Q3) a) Explain transport across cell membrane with help of transporters, ATP pump & protein channel. **[6]**

OR

Describe ultrastructure of chloroplast & explain photophosphorylation in detail. **[6]**

b) Elaborate on lysosome & its role in autophagy. **[4]**

Q4) a) Why is plasma membrane referred to as "Fluid Mosaic"? Justify **[6]**

OR

What is cellular diversity? Discuss important parameters of cellular diversity. **[6]**

b) Explain desmosome & hemidesmosome. **[4]**

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

a) MTOC

b) Cell theory

c) Phagocytosis

d) COPI/COPII transport

e) PPLO & mycoplasma

f) Gap junction

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Total No. of Questions : 5]

SEAT No. :

PA-1055

[Total No. of Pages : 2

[5903]-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 3 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 introns?

b) Define heterochromatin.

c) Define synonyms.

d) What are pyrimidines?

e) Define t-RNA

f) Which bond is present between Sugar & Nitrogen base?

Q2) a) Give an account of enzymes involved in DNA replication. **[6]**

OR

Explain, with the help of neat labelled diagram 'Meselson & stahl experiment'.

b) Explain in detail organization of genome in virus. **[4]**

P.T.O.

Q3) a) Explain B-form of DNA in detail. (diagram Compulsory) **[6]**

OR

Draw and explain t-RNA structure & Give its role.

b) DNA replication is semi discontinuous. Explain **[4]**

Q4) a) What is genetic code? Explain the experiment performed by Nirenberg & Matthaei. **[6]**

OR

Explain the structure and function of DNA polymerase.

b) A sample of purified DNA obtained from tobacco leaf contains 20 mole percent of Adenine. Assuming that only four principal bases are present. Calculate the approximate mole percentage of pyrimidine residues in its DNA. **[4]**

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

a) Non-Histone proteins.

b) Organization of genome in eukaryotes.

c) Initiation of Replication in prokaryotes.

d) mRNA

e) Alpha (α) DNA polymerase - Role.

f) Wobble hypothesis.

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Total No. of Questions : 5]

SEAT No. : ____

PA-1056

[Total No. of Pages : 2

[5903]-33
S.Y. B.Sc. (Biotechnology)
BBt-303 : GENETICS
(2019 Pattern) (Semester - III) (CBCS)

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

Instructions to the candidates:

1) ***Question 1 is compulsory.***
2) ***Solve any three questions from Q2 to Q5.***
3) ***Question 2 to 5 carry equal marks.***

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

a) Write the use of chorionic villus sampling.

b) Give any one differentiating feature of complementary & supplementary genes.

c) What is repulsive arrangement of genes on chromosomes?

d) Define coincidence in Genetics.

e) Self pollinating feature of pea plant was advantages to Mendel to set up the experiments. Justify.

f) State the mutation responsible for haemophilia.

Q2) a) What is incomplete linkage? Elaborate on linkage analysis. Using three point cross. **[6]**

OR

How do base altering agents/mutagens insert mutations? Explain in detail with atleast two examples.

b) Flower color in <u>Mirabilis jalapa</u> exhibits incomplete dominance. Justify. **[4]**

P.T.O.

Q3) a) Explain dominant epistatic interaction using any suitable example. Add a note on deviation of this ratio in comparison to Mendelian inheritance. **[6]**

OR

Explain duplicate recessive epistatic interaction using a suitable example.

b) Explain in detail features and consequences of Robertsonian translocation. Give any two conditions exhibiting the same. **[4]**

Q4) a) Multiple alleles do not follow Meadelian inheritance pattern. Justify by giving any suitable example. **[6]**

OR

Sex of an organism influences the inheritance process. Classify and Elaborate on those types of inheritance patterns. Also add any one example for each.

b) Calico cat is best example of Lyonization. Elaborate on the process of Lyonization. **[4]**

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

a) Pedigree analysis

b) Hot spot mutations

c) Law of independent assortment with an example.

d) Albinism as a genetic disorder

e) Cytological proof of crossing over by Barbara McClintock.

f) Penetrance of traits

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Total No. of Questions : 5]

SEAT No. : ____

PA-1057

[Total No. of Pages : 2

[5903]-34
S.Y. B.Sc. (Biotechnology)
BBT-304 : METABOLISM
(2019 Pattern) (Semester - III)

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

Instructions to the candidates:

1) ***Question 1 is compulsory.***
2) ***Solve any 3 of Q2 to Q5.***
3) ***Q2 to 5 carry equal marks.***

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

a) Draw $20:4^{\Delta 5,8,11,14}$

b) Name any two glucogenic amino acids.

c) Why diabetic patients have alcohol smell in their breath.

d) Name the three enzymes of pyruvate dehydrogenase.

e) Sketch - Thymine

f) Define 'Purine'.

Q2) a) Explain glycolysis and its energetics. **[6]**

OR

Describe urea cycle in detail.

b) PFK as pacemaker enzyme. **[4]**

Q3) a) What are transamination reaction, explain one example. **[6]**

OR

Explain β-oxidation. With regulation.

b) Name two enzyme required for unsaturation of fatly acids. **[4]**

P.T.O.

Q4) a) Illustrate Denovopathway of purine synthesis. **[6]**

OR

Describe salvage pathway.

b) Explain essential and nonessential amino acids giving example. **[4]**

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

a) Reactions of TCA cycle involving NAD^+

b) Gout

c) Irreversible steps in gluconeogenesis

d) Significance of HMP pathway

e) Cholesterol

f) Deamination reaction

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

PA-1058 [Total No. of Pages : 2

[5903]- 35
S.Y.B.Sc. (Biotechnology)
BBt-305: Environment Biotechnology
(CBCS 2019Pattern) (Semester - III)

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

Instructions to the candidates:

1) ***Q.1 is compulsory.***
2) ***Solve any 3 questions from Q.2 to Q.5.***
3) ***Question no. 2 to5 carry equal marks.***

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

a) Define biosphere .
b) Define climax.
c) Define phytoremediation.
d) What is EIA?
e) What is biomedical waste ?
f) What is green house effect?

Q2) a) Describe the stages of succession in hydrosere. **[6]**

OR

Define the term bioremediation. Give an account of bioremediation techniques.

b) Explain microbial degradation of plastic. **[4]**

Q3) a) Discuss the EIA and the stages involved in the EIA procedure. **[6]**

OR

What is Global warming & Give its effect on oceans, coastlines and on India.

b) What is food chain ? Give its types. **[4]**

Q4) a) Give sources and consequences of water pollution. **[6]**

OR

What are Bioindicators ? Describe use of it in environment monitoring.

b) Enlist the types of Ecosystem. Explain Freshwater ecosystem in detail. **[4]**

P.T.O.

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

a) Stratopause is also called ozonosphere. Why?

b) Explain TRAFIC.

c) Acid Rain.

d) What is integrated waste management?

e) Write a short note on Trophic level.

f) Biotechnological approaches for pollution control.

Total No. of Questions : 5]

SEAT No. :

PA-1059

[Total No. of Pages : 2

[5903]-36
S.Y.B.Sc. (Biotechnology)
BBt - 306 : BIOANALYTICAL TECHNIQUES
(2019 CBCS Pattern) (Semester - III)

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

Instructions to the candidates:

1) ***Q1 is compulsory.***
2) ***Solve any Three questions from Q2 to Q5.***
3) ***Questions 2 to 5 carry equal marks.***

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

a) Define Biological Buffer.

b) What do you mean by transmittance?

c) Define Hypochromic shift.

d) What is Retardation Factor in chromatography?

e) What is the role of APS in SDS-PAGE?

f) Define centrifugal force.

Q2) a) Write the principle of centrifugation. Give application of centrifuge in Biology. Add a note on maintenance and care of centrifuge. **[6]**

OR

Explain principle of gel-Filtration Chromatography. Enlist different factors affecting resolution of sample.

b) Describe applications of UV-Visible Spectrophotometer. **[4]**

Q3) a) Give an explanatory note on SDS-PAGE with respect to reagents required and their role, resolving and stacking gel, staining methods and applications. **[6]**

OR

Write Beers - Lambert Law. Describe wavelength selectors used in UV-Visible Spectroscopy.

b) Explain technique of differential centrifugation. **[4]**

P.T.O.

Q4) a) What is planar chromatography? Explain different types of planar chromatography. **[6]**

OR

Explain principle and theory of casting of gel in Agarose gel electrophoresis. Add a note on applications of Agarose gel electrophoresis.

b) Describe Random and Systematic errors in experimentation. **[4]**

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

a) Chemical Safety in Laboratory.

b) Biological Chromophores.

c) Cation Exchangers.

d) Activity staining.

e) Electromagnetic Spectra.

f) Partition Chromatography.

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Total No. of Questions : 5]

SEAT No. : ____

PA-1060

[Total No. of Pages : 2

[5903]- 41
S.Y. B.Sc. (Biotechnology)
BBt-401 : CELL BIOLOGY- II
(2019 Pattern) (Semester - IV)

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

Instructions to the candidates:

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

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

a) What is ferroptosis?

b) Define signaling molecule.

c) What are the oncogenes?

d) What are the significance of Meiosis?

e) Define cytokinesis.

f) What is calmodulin?

Q2) a) What the help of neat labelled diagram explain cell cycle and its phases. **[6]**

OR

Explain in detail, cell surface receptors with any two examples.

b) Describe different phases of Mitosis with neat labelled diagram. **[4]**

Q3) a) Explain Apoptosis with intrinsic pathway. **[6]**

OR

Describe different check points of cell cycle.

b) Explain in detail, G protein singnaling with example. **[4]**

P.T.O.

Q4) a) What is meiosis? Explain Meiosis- I with its phases. **[6]**

OR

What is cell signaling? Explain autocrine and paracrine signaling.

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

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

a) Neoplasia

b) Synapsis

c) Caspases

d) Causes of aging

e) Signaling receptor

f) Secondary messenger

Total No. of Questions : 5]

SEAT No. : ____

PA-1061

[Total No. of Pages : 2

[5903]- 42
S.Y. B.Sc. (Biotechnology)
BBT- 402 : MOLECULAR BIOLOGY- II
(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) ***Qustion no.2 to Q.5 carry equal marks.***

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

a) What is promoter?

b) What is attenuation?

c) Define Amino alyl t-RNA synthetase.

d) What is photoreactivation.

e) Define DNA damage.

f) What is Initiator t-RNA

Q2) a) Describe eukanyotic transcription in detail with the help of suitable diagrams. **[6]**

OR

Write a note on translation in prokaryotes.

b) Write the various steps involved in m-RNA processing in Eukaryotes. **[4]**

Q3) a) What is DNA repair? Explain different mechanism used in DNA repair. **[6]**

OR

Describe Lac operon in detail add a note on catabolic repression.

b) Write the mechanism and significance of charging of aminoacid on the t-RNA. **[4]**

P.T.O.

Q4) a) Write a note on Arabinose operon in detail. **[6]**

OR

Describe the post translation modification add a note on N- glycosylation.

b) Write a note on 'SOS' repair mechanism. **[4]**

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

a) Polyadenylation

b) Base excision repair

c) Stop codons

d) Ribosomes and its assembly.

e) σ factor

f) Regulatory elements in transcription

Total No. of Questions : 5]

SEAT No. : ____

PA-1062

[Total No. of Pages : 2

[5903]- 43
S.Y. B.Sc.
BIOTECHNOLOGY
BBt- 403 : Immunology
(2019 Pattern) (CBCS) (Semester - IV)

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

Instructions to the candidates:

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

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

a) State function of Primary lymphoid organs.

b) What is complement system?

c) State appication of western blotting.

d) Explain role of Adjuvant.

e) Comment on subunit vaccine.

f) What are anaphylatoxin?

Q2) a) What is immunogenecity? Describe about types of antigens and factors affecting immunogenecity. **[6]**

OR

What is Major Histocompatibility Complex? Explain important functions and structure of MHC class I.

b) Describe properties of cytokines with suitable examples. **[4]**

Q3) a) Explain concept of live and killed vaccine with suitable examples. **[6]**

OR

Describe ‘Hybridoma technology’.

b) Explain about ‘Precipitation reactions’ with suitable examples. **[4]**

P.T.O.

Q4) a) Explain about 'Hypersensitivity reactions'. **[6]**

OR

Differentiate the types of immunity- innate and adaptive immunity.

b) Comment on 'structure of immunoglobulin'. **[4]**

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

a) Phagocytosis

b) T cell subset

c) Lattice hypothesis

d) DNA vaccine

e) ELISA

f) Auto immunity

Total No. of Questions : 5]

SEAT No. : ____

PA-1063

[Total No. of Pages : 2

[5903]-44

S.Y. B.Sc.
BIOTECHNOLOGY
BBt - 404 : Animal Development
(CBCS 2019 Pattern) (Semester-IV)

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

Instructions to the candidates:

1) ***Q.1 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) Define Determination.

b) State the role of organizer in frog.

c) Name the process of regeneration in amphibian limb.

d) What is vitellogenesis?

e) Give any two features of coeloblastula.

f) Comment on Fate map.

Q2) a) Describe spermiogenesis and compare male and female gametogenesis. **[6]**

OR

Explain capacitation and zona reactions during the process of fertilization. Mention its significance.

b) Define cell lineage. Explain any one of them. **[4]**

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

OR

Describe the process of gastrulation in Amphioxus.

b) According to quantity of yolk classify different types of cleavages with examples. **[4]**

P.T.O.

Q4) a) Describe pattern formation in Drosophila. **[6]**

OR

Define polyspermy and explain any one mechanism to prevent it.

b) Explain Neurulation in frog. **[4]**

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

a) Intrinsic pathway

b) Ageing.

c) Compensatory regeneration.

d) Mouse as a model system in developmental biology.

e) Trans - differentiation.

f) Teratogenesis.

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Total No. of Questions : 5]

SEAT No. : ____

PA-1064

[Total No. of Pages : 2

[5903]-45

S.Y. B.Sc. (Biotechnology)

BBt-405 : PLANT DEVELOPMENT

(2019 CBCS 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) ***Questions 2 to 5 carry equal marks.***

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

a) Define Totipotency.

b) What is scutellum?

c) Draw the neat labelled diagram of embryo sac.

d) Define phytomere.

e) Explain the term senescence

f) Draw the diagram of mature seed. Describe the parts of it.

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

OR

Describe the shoot patterning in plants. With roles of genes in it. Add a note on theories of SAM development.

b) Describe various types of ovules. **[4]**

Q3) a) Why Arabidopsis is used as model system to study plant development. Comment on contribution of Arabidopsis study in studying floral patterning. **[6]**

OR

Describe various tissue systems in plants. Add a note on secondary growth in plants.

b) Describe polar auxin transport and its influence on vegetative growth of plants. **[4]**

P.T.O.

Q4) a) Explain the mechanism of monocot embryogenesis in detail. Draw neat labelled diagrams wherever necessary. **[6]**

OR

Describe axial patterning in plants & also mention some of the genes playing important role during the process.

b) Explain various types of female gametophyte development. **[4]**

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

a) Compare self & cross pollination.

b) Structure of mature pollen grain.

c) Photoperiodism and vernalisation.

d) Types of placentation.

e) Zones of development in RAM.

f) Applications of plant development studies in field of Biotechnology.

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Total No. of Questions: 5]

SEAT No. : ____

PA-1065

[Total No. of Pages : 2

[5903]-46
S.Y.B.Sc. (Biotechnology)
BBt-406: MICROBIAL BIOTECHNOLOGY
(2019 CBCS Pattern) (Semester-IV)

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

Instructions to the candidates:

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

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

a) What is meant by rancidity?
b) Enlist causes of food spoilage.
c) What is meant by stormy fermentation?
d) State any two advantages of normal flora.
e) Name any two dye present in EMB agar.
f) Define 'Bioleaching'.

Q2) a) What are intrinsic factors of food? Explain in detail their role in food spoilage. **[6]**

OR

What are developed preservative? Explain the mechanism of action with example.

b) Explain food intoxication by staphylococcus aureus. **[4]**

Q3) a) Explain Leprosy in detail with following points. **[6]**

i) Causative agent
ii) Pathogenesis
iii) Types
iv) Symptoms
v) Diagnosis
vi) Treatment

OR

Explain the principle and process of Secondary sewage treatment by trickling filters.

b) Describe colour and flavour defects in milk. **[4]**

P.T.O.

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

OR

Describe process of biofertilizer production. Add a note on it's significance.

b) Explain the method to check pasteurization efficiency. **[4]**

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

a) Ropiness in milk

b) Eijkman test

c) MEOR

d) Thaumatin

e) BOD

f) Kefir

Total No. of Questions : 5]

SEAT No. : ____

PA-1066

[Total No. of Pages : 2

[5903]-51

T.Y.B.Sc. (Biotechnology)

BBt : 501 - INDUSTRIAL MICROBIOLOGY

(CBCS 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) What is primary screening?

b) Write a role of Baffles in Bioreactor.

c) What is variable volume Fed batch fermentation?

d) What is precursor? Give example.

e) Which indicator organism is used in sterilization process why?

f) Enlist any 4 carbon sources used in large scale media.

Q2) a) Describe process of large scale production of citric acid with respect to strain, media, optimum conditions and recovery. **[6]**

OR

What is media optimisation? Why placket & burman design is important in media optimisation.

b) Explain different types of seal used in industrial fermentation. **[4]**

Q3) a) Write a role of filter aids in filtration process. Describe construction and working of rotary vacuum filter. **[6]**

OR

Replica plate technique is used for isolation of auxotrophic mutant. Justify.

b) Explain measurement and control of temperature in fermentation. **[4]**

P.T.O.

Q4) a) Explain physical methods of cell disruption. **[6]**

OR

Explain Airlift fermentor in detail.

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

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

a) Scale up.

b) Significance of crowed plate technique.

c) Inhibitors.

d) Salt Precipitation.

e) Drum drying.

f) Applications of Amylase.

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Total No. of Questions : 5]

SEAT No. :

PA-1067

[Total No. of Pages : 2

[5903]- 52
T.Y.B.Sc.
BIOTECHNOLOGY
BBt 502 : R-DNA Technology
(2019 Pattern) (CBCS) (Semester - V)

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

Instructions to candidates:

1) ***Question 1 is compulsory.***
2) ***Solve any three questions from Q2 to Q5.***
3) ***Question 2 to 5 carry equal marks.***

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

a) Name two selectable markers present in pBR 322.

b) Write about contribution of Kary Mullis in the field of genetic engineering.

c) Define genomic DNA library.

d) What is the application of polynucleotide kinase.

e) Write any two applications of R-DNA Technology.

f) What are cosmids?

Q2) a) Explain the concept and working of real time PCR. Also add a note on its applications. **[6]**

OR

Write in details about recombinant insulin production.

b) Explain concept of linkers & adaptors. **[4]**

Q3) a) Give comparative account of DNA polymerases used in RDT. **[6]**

OR

Elaborate on expression vectors with suitable example.

b) Explain basic layout of R-DNA Technology. **[4]**

P.T.O.

Q4) a) What is meant by next generation sequencing. Describe any one method for next generation sequencing. **[6]**

OR

Draw a neat labelled diagram of pUC18. Also add a note on blue -white selection.

b) Write a short note on Ti plasmids. **[4]**

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

a) BAC vectors.

b) Concept of phagemids.

c) Gene therapy.

d) Type I restriction endonucleases.

e) Chemicals used in Maxam -Gilbert sequencing.

f) Reverse transcriptase.

Total No. of Questions : 5]

SEAT No. :

PA-1068

[Total No. of Pages : 2

[5903]- 53
T.Y.B.Sc. (Biotechnology)
BBt-503: PLANT TISSUE CULTURE
(CBCS 2019Pattern) (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 No.2 to 5 carry equal marks.***

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

a) What is Redifferentiation?

b) Define totipotency.

c) What is callus?

d) Define direct organogenesis.

e) What is Aseptic transfer?

f) What is Artificial seed?

Q2) a) Define Organ culture. Discuss organ culture techniques.

w.r.t. i) Root tip culture.

ii) Leaf culture. **[6]**

OR

What is micropropagation? Discuss different stages of micropropagation in detail.

b) Enlist and explain different Factors which affects callus culture. **[4]**

Q3) a) What is suspension culture. Discuss types, protocol and synchronization in detail. **[6]**

OR

Define tissue culture media. Comment on MS Media composition with their role.

b) How virus free plants can be generated? Explain with protocol. **[4]**

P.T.O.

Q4) a) What is somatic embryogenesis ? Discuss types and stages along with factors affecting somatic embryogenesis. **[6]**

OR

Define protoplast. Elaborate any one method of protoplast isolation and its fusion.

b) Discuss the applications of plant tissue culture in commercial industry. **[4]**

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

a) Plant growth Regulators.

b) Laminar Air Flow : Principle and Application.

c) Meristem culture.

d) PTC Laboratory design.

e) Surface sterilization of Explant.

f) Comment on "pollen culture"**.**

Total No. of Questions : 5]

SEAT No. : [ ]

PA-1069

[Total No. of Pages : 2

[5903]-54

T.Y. B.Sc. (Biotechnology)

BBt - 504 : ANIMAL 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 carries equal marks.***

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

a) Define cell line.

b) Mention the role of collagenase.

c) Give examples of serum free media.

d) Give contribution of Carrel in ATC.

e) Name any one cell repository.

f) What is split ratio?

Q2) a) Write a note on methods of tissue disaggregation. **[6]**

OR

Describe sources and detection of mycoplasma detection.

b) Compare between infinite and finite cell lines. **[4]**

P.T.O.

Q3) a) Explain biochemical characterization of cell line. **[6]**

OR

Write a note on cryopreservation. Explain it's need in ATC.

b) Give advantages and disadvantages of serum free media. **[4]**

Q4) a) Describe histotypic culture. **[6]**

OR

Elaborate on the role of CO_2 incubator and haemocytometer in animal tissue culture.

b) Describe layout of animal tissue culture laboratory. **[4]**

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

a) Suspension culture.

b) Substrates used in ATC.

c) Subculture of adherent cells.

d) Applications of animal tissue culture.

e) Methods of sterilization of serum.

f) Nutritional requirement of cells invitro.

Total No. of Questions : 5]

SEAT No. : [ ]

PA-1070

[Total No. of Pages : 2

[5903]-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) ***Q1 is compulsory.***
2) ***Solve any 3 questions from Q2 to Q5.***
3) ***Q2 - Q5 carry equal marks.***

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

a) Define Top down method.

b) Write applications of GFP.

c) Name two applications of molecular diagnostics.

d) Polyketides.

e) Exemplify any living marine bioresources.

f) Give the scientific name of earthworms used in vermicomposting.

Q2) a) Explain synthesis of nanoparticles using living organisms. **[6]**

OR

Describe Microalgae and its applications.

b) Microfluidics in diagnostic. **[4]**

P.T.O.

Q3) a) Write an assay on infrastructure requirements in composting. **[6]**

OR

Explain Barophilic organism and its application.

b) Nanobots as medicine to cross blood brain barrier. **[4]**

Q4) a) Explain PCR as diagnostic with any one example. **[6]**

OR

Describe role of sea weeds in removal of metals.

b) Explain marine resources and how these can be used? **[4]**

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

a) Biobriquetting.

b) Chitosan.

c) Marine aclinobacteria.

d) Biochip.

e) DNA reporters.

f) Biomarkers for disease.

Total No. of Questions : 5]

SEAT No. : [ ]

PA-1071

[Total No. of Pages : 2

[5903]-56

T.Y. B.Sc. (Biotechnology)

BBt - 506 : BIODIVERSITY AND SYSTEMATICS

(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 species diversity.

b) What do you mean by population dynamics?

c) What is Insular habitats?

d) Define Biomimetics.

e) What is opportunistic species?

f) What is Taxonomy?

Q2) a) Describe Habitat and Niche. Also give detail account on types of habitats. **[6]**

OR

Describe major threats to Biodiversity with one case study.

b) Explain aesthetic and medicinal benefits of Biodiversity. **[4]**

P.T.O.

Q3) a) Describe Insitu and Exsitu conservation methods in Biodiversity with examples. **[6]**

OR

Describe major causes and threats to Biodiversity with examples.

b) Explain the importance of NGO movements and their role in conservation of Biodiversity. **[4]**

Q4) a) Discuss various molecular tools in Taxonomy or classification system. **[6]**

OR

Discuss role of different institutions in conservation of Biodiversity.

b) Explain survivorship curves. **[4]**

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

a) Chipko movement.

b) What is Biodiversity Hot spots?

c) Red Data Book.

d) Indices for analysis of Biodiversity.

e) Population age distribution.

f) Strategies for sustainable exploitation of Biodiversity.

Total No. of Questions : 5]

SEAT No. : ____

PA-1072

[Total No. of Pages : 2

[5903]- 61
T.Y. B.Sc.
BIOTECHNOLOGY
BBt-601 : Enzyme and 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) ***Q.2 to Q.5 carry equal marks.***

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

a) Ribozyme.

b) Specific activity.

c) Immobilization of enzyme.

d) Unit of enzyme.

e) Allosteric enzyme.

f) Metallozymes.

Q2) a) Explain Metal-Ion catalysis. **[6]**

OR

Give benefits of enzyme immobilization.

b) Discuss multienzyme complex. **[4]**

Q3) a) Discuss the model explaining enzyme action. **[6]**

OR

Discuss Lineweaver - Burk plot.

b) Explain in detail glucose Biosensor. **[4]**

P.T.O.

Q4) a) Derive Michaelis- Menten equation. Give the significance of Km. **[6]**

OR

Describe compartmentation of metabolic pathways.

b) Give the applications of immobilization of enzymes. **[4]**

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

a) Choline esterase and transaminase.

b) Isoenzyme with suitable example.

c) Mechanism of action of chymotrypsin.

d) Feedback regulation.

e) Lysosomal proteolytic pathway.

f) Classification of matrices used in enzyme immobilization.

Total No. of Questions : 5]

SEAT No. : ____

PA-1073

[Total No. of Pages : 2

[5903]- 62
T.Y. B.Sc.
BIOTECHNOLOGY
BBt-602 : Agriculture Biotechnology
(2019 Pattern) (CBCS) (Semester - VI)

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

Instructions to the candidates:

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

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

a) What is urban agriculture?

b) Define green house.

c) What is symbiotic nitrogen fixation?

d) Define modern agricultural biotechnology.

e) Define abiotic stress.

f) Define molecular markers.

Q2) a) What is disease diagnosis? Explain the techniques and importance in details. **[6]**

OR

Give concept and applications of ICT in agriculture.

b) Define biopesticides. Give importance of biopesticides. **[4]**

Q3) a) Define biofertilizers. Explain it's types in details. **[6]**

OR

Explain vertical farming with advantages.

b) Explain role of agriculture biotechnology in India and world. **[4]**

P.T.O.

Q4) a) Write a note on transgenic plant for disease resistance. Give one example. **[6]**

OR

Compare between hydroponics, aeroponics and aquaporins.

b) What is herbicide? Explain development of transgenic plant for herbicide resistance in crops. **[4]**

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

a) Methods of gene transfer.

b) Explain green house types based on shape.

c) Give factors responsible for loss of genetic purity.

d) Describe biocompost.

e) Explain marker assisted selection.

f) Give morphological symptoms of plant disease.

Total No. of Questions : 5]

SEAT No. : ____

PA-1074

[Total No. of Pages : 2

[5903]- 63
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) ***Questions 2 to 5 carry equal marks.***

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

a) Define unipotent stem cell.

b) Define Biotransformation.

c) What is metabolic network?

d) Define VNTR's.

e) What are genetically modified crops?

f) Define biofuel.

Q2) a) Explain in detail first generation of biofuels. **[6]**

OR

Explain in detail second generation of biofuels.

b) Give in detail applications of DNA profiling in forensic medicine. **[4]**

Q3) a) What are stem cells? Give its classification on basis of its potency & its sources. **[6]**

OR

What is stem cell therapy? Explain with an example.

b) What is GUARDIAN? Mention its significance. **[4]**

P.T.O.

Q4) a) What is Graph theory? Explain three graphs commonly used in system biology. **[6]**

OR

What is DNA finger printing? Give its applications.

b) What is rice 3K project? **[4]**

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

a) Green Technology

b) Lysosomal storage disorders (LSD)

c) Renewable energy Technologies.

d) Protein- Protein interactions (PPI's)

e) Cord blood banking.

f) Ecological risk associated with GM foods.

Total No. of Questions : 5]

SEAT No. :

PA-1075

[Total No. of Pages : 2

[5903]-64

T.Y. B.Sc. (Biotechnology)

BBT - 604 : FOOD AND PHARMACEUTICAL BIOTECHNOLOGY

(CBCS 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 No. 2 to 5 carry equal marks.***

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

a) Enlist non-alcoholic beverages.

b) Define Pharmacopoeia.

c) State examples of flavor enhancers.

d) What is NDA?

e) What is phase zero of clinical trial?

f) Which are the food borne viruses?

Q2) a) Explain the steps involved in drug discovery process. **[6]**

OR

Describe the formulation process of vitamin with suitable example. **[6]**

b) Explain in detail about probiotics and their roles. **[4]**

Q3) a) What are nutraceuticals? Explain in detail about their roles and applications. **[6]**

OR

Explain concept of molecular screening in drug discovery. **[6]**

b) Give a brief account on Indian pharmacopoeia. **[4]**

Q4) a) What is pharmaceutial biotechnology? Discuss in brief about its applications. **[6]**

OR

Explain principles of HACCP system. **[6]**

b) State the various types of packaging material used in food packaging and explain any two of them. **[4]**

P.T.O.

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

a) Biosimilars.

b) Significance of pre-clinical study.

c) Emulsifiers and stabilizing agents.

d) Role of bacterias in pharmaceutical production.

e) GMP guidlines of FDA.

f) Computer aided drug designing.

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Total No. of Questions : 5]

SEAT No. : ____

PA-1076

[Total No. of Pages : 2

[5903]-65

T.Y. B.Sc. (Biotechnology)

BBt-605 : BIOINFORMATICS

(CBCS 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) What is paralogs?

b) Define secondary database.

c) Write any two examples of boolean operators.

d) Write significance of FASTA.

e) What do you mean by redundancy in database.

f) Define global alignment.

Q2) a) Discuss in detail gene bank file format. **[6]**

OR

What is PSA? Discuss FASTA method of sequence alignment.

b) Explain CATH database **[4]**

Q3) a) Discuss “Microarray” as data generation tool. **[6]**

OR

What is sequence alignment? Explain in detail methods of MSA with examples.

b) Explain various attribute of indexing. **[4]**

P.T.O.

Q4) a) What are databases? Enlist various types of databases. Explain Nucleic Acid database. **[6]**

OR

Explain various steps involved in alignment using BLAST.

b) Discuss sequence retrieval system with example. **[4]**

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

a) Uniprot

b) Pubmed

c) Applications of MSA

d) Object oriented database

e) Low complexity in BLAST

f) Heuristic algorithm.

Total No. of Questions: 5]

SEAT No. : ____

PA-1077

[Total No. of Pages : 2

[5903]-66
T.Y.B.Sc. (Biotechnology)
BBt-606: BIOSAFETY & BIOETHICS & IPR
(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.***
4) ***Figures to the right indicate full marks.***
5) ***Draw neat labelled diagram wherever necessary.***

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

a) What are GMOs? Give two examples in agriculture.
b) Enlist the objectives (any two) of medical ethics.
c) How Intellectual Property should be protected?
d) Name the formats in which ethical data be stored.
e) Define Trade secret and its characteristics.
f) What are BSL-I to BSC-3 types of?

Q2) a) Explain change in Indian Patent System due to TRIPS. **[6]**

OR

Define Geographical Indication. Discuss GI in detail citing different examples.

b) With example, describe Maleficence in biomedical research. **[4]**

Q3) a) Describe 7 codes of Bioethics. **[6]**

OR

Explain Bioethics protect the dignity, rights and welfare of research participants.

b) Analyse role of Patent in technology transfer. **[4]**

Q4) a) With illustration describe Biosafety cabinet. **[6]**

OR

Explain containment level and GLP.

b) Discuss salient features of Indian Patent Law. **[4]**

P.T.O.

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

a) Objective of World Intellectual Property Organization.

b) Non-patentable Inventions

c) ICH-GCP

d) Laws on Biosafety

e) Kinds of Biological material accepted by IDA

f) Ethics in genetic engineering.