Total No. of Questions : 5]

SEAT No. : ____

P5164

[Total No. of Pages : 2

[5824]-101

First Year B.Sc. (Biotechnology)

BBT : 101 - FUNDAMENTALS OF CHEMISTRY - I

(2019 CBCS Pattern) (Semester - I)

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

Instructions to the candidates:

1) ***Q.1 is compulsory.***
2) ***Solve any three Questions From Q2 to Q.5.***
3) ***Questions 2 to 5 carries equal marks.***

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

a) What is covalent bond?

b) Why alkanes are insoluble in water?

c) Define valency. Give one example.

d) State first law of thermodynamics.

e) What is the oxidation number of Cr in $K_2Cr_2O_7$.

f) Define isomerism.

Q2) a) What are different types of intermolecular forces? Explain intermolecular hydrogen bonding in detail. **[6]**

OR

What are alcohols? How are they classified? How will you prepare alcohol from alkyl halides.

b) Balance the following equation by oxidation number method. **[4]**

$S + HNO_3 \rightarrow SO_2 + NO_2 + H_2O$

Q3) a) Define entropy. What is the unit of entropy? Derive an expression for entropy charge in reversible process. **[6]**

OR

What is conformational isomerism? Draw conformation of n-butane with energy profile diagram.

b) Define and explain formation of ionic bond and coordinate bond with suitable example. **[4]**

P.T.O.

Q4) a) Explain types of processes in classical thermodynamics. **[6]**

OR

Define hybridization. State its types. Explain any one type is detail.

b) Predict the product for $CH_3 - CH_2 - CH_2 - Cl \xrightarrow{alc.KOH} ? \xrightarrow[H_2O_2/OH^-]{B_2H_6} ?$ **[4]**

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

a) Importance of Carnot's cycle.

b) Types of overlap is bond formation.

c) State and explain Aufbau's principle.

d) Dalton's Atomic theory.

e) Optical isomers.

f) Homologous series.

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Total No. of Questions : 5]

SEAT No. :

P5165

[Total No. of Pages : 2

[5824]-102
First Year B.Sc.
BIOTECHNOLOGY
BBT-102 : Fundamentals of Physics
(2019 CBCS 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) ***Q. 2 to Q. 5 carry equal marks.***
4) ***Figure to the right indicate full marks.***
5) ***Use of calculator and log-table is allowed.***

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

a) Define atomic mass unit (amu).

b) One atmosphere is how many pascal?

c) Define surface tension.

d) State principal of superposition of waves.

e) Write statement of Doppler's effect.

f) What are monochromatic aberrations?

Q2) Answer the folloiwng questions. **[10]**

a) Define pressure. With the help of a neat diagram explain how atmospheric pressure can be measured using a mercury barometer. **[6]**

b) The coefficient of viscosity of water at $10^{o}C$ is 1.3×10^{-3} kg/m^{-s}. calculate the viscous force between layers 1 cm. apart and moving with a relative velocity of 2cm/sec and area of contact between them is 10 cm^2. **[4]**

Q3) Answer the following questions. **[10]**

a) With the help of a neat diagram, describe capillary rise method to determine the surface tension of a liquid. Derive necessary formula. **[6]**

b) Two organ pipes closed at one end are of equal diameters but different lengths. They produce 8 beats per second when sounded simaltaneously. The smaller organ pipe is 16 cm. long and the speed of sound in air is 320 m/s. Find the length of the other pipe. **[4]**

P.T.O.

Q4) Answer the following questions. **[10]**

a) What is a simple microscope? With the help of a neat diagram give construction and working of a simple microscope. **[6]**

b) Write a note on application of ultrasonics. **[4]**

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

a) Applications of Doppler's effect.

b) Relevance of surface tension to life sciences.

c) Cohesive and adhesive forces.

d) Streamline and turbulant flow.

e) International system of units.

e) Wettability.

❖ ❖ ❖

Total No. of Questions : 5]

SEAT No. : ____

P5166

[Total No. of Pages : 2

[5824]-103

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

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

a) Covalent bond.

b) Enlist the buffer used at acidic pH basic pH.

c) Draw the structure of lactose.

d) $18{:}3^{\Delta 9,12,15}$

e) Write 2 anomeric forms of glucose.

f) Distinguish between starch and glycogen.

Q2) a) Explain the structure of cellulose, giving its significance. **[6]**

OR

Describe amylose and amylopectin in detail.

b) Classify monosaccharides with examples. **[4]**

Q3) a) Explain lipoprotein molecules in detail, add a note on receptor mediated endocytosis. **[6]**

OR

With the help of structure, justify the role of phospholipids.

b) Describe sphingolipids in detail. **[4]**

Q4) a) Describe Urey Miller experiment. **[6]**

OR

Explain properties of water that makes it suitable for life.

b) Describe Handerson-Hasselbalch equation. **[4]**

P.T.O.

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

a) Anomers of galactose

b) Epimers of mannose.

c) Mutarotation

d) Cholesterol.

e) Condensation reaction

f) pH

Total No. of Questions : 5]

SEAT No. :

P5167

[Total No. of Pages : 2

[5824] - 104
F.Y. B.Sc.
BIOTECHNOLOGY
BBt - 104 : Biophysics
(2019 CBCS Pattern) (Semester - I)

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

Instructions to the candidates:

1) ***Question No.1 is compulsory.***
2) ***Solve any three Questions from Q.No. 2 to Q.No. 5.***
3) ***Q2 to Q5 carry equal marks.***

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

a) Define isobars.

b) Balmer series of hydrogen atom.

c) Enlist the properties of alpha rays.

d) Define osmosis

e) What is membrane potential.

f) Define radioactivity.

Q2) a) Describe the structures of plasma membrane with reference to fluid Mosaic model. **[6]**

OR

Explain the postulates of Bohr's Atomic model.

b) Explain quantum numbers for Atom. **[4]**

Q3) a) Explain the spectrum of hydrogen atom in various region. **[6]**

OR

Explain the active electrical properties of plasma membrane.

b) Explain the vector atom model. **[4]**

P.T.O.

Q4) a) Discuss in detail types of membrane transport. **[6]**

OR

Discuss the physical & biological handling of alpha & beta emitting isotopes.

b) Explain the energy level diagram of hydrogen atom. **[4]**

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

a) Explain Pauli's exclusion principle.

b) Explain the equation of origin of spectral lines. (Rydberg's constant).

c) Describe the liquid drop model of nucleus.

d) Explain construction of GM counter.

e) Explain Action potential in brief.

f) Explain Electrocardiogram (ECG) in brief.

Total No. of Questions : 5]

SEAT No. :

P5168

[Total No. of Pages : 2

[5824]-105
F.Y.B.Sc.
BIOTECHNOLOGY
BBt - 105 : Animal Science-I
(CBCS 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 Q2 to Q5.***
3) ***Questions 2 to 5 carry equal marks.***

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

a) Functions of madreporite.

b) Give any two examples of protozoan parasites.

c) Write any two characters of phylum-urochordata.

d) Define camouflage in frog.

e) Write any two characters of muscular tissue.

f) Give any two examples of Phylum-Annelida.

Q2) a) Write the characters of class-mammalia with 2 examples. **[6]**

OR

Describe the different types of simple epithelial tissues.

b) Hydra as a good model system- Justify. **[4]**

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

OR

Explain in detail process of communication in honeybee.

b) Describe sting apparatus of Honeybee with diagram. **[4]**

P.T.O.

Q4) a) Explain in detail reproduction in hydra. **[6]**

OR

Describe general characters of Pisces.

b) Explain different types of locomotion in frog. **[4]**

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

a) Hyoid apparatus.

b) Haversian canal system.

c) Structure of neuron.

d) Queen of honeybee.

e) Characters of Phylum-Arthropoda.

f) Locomotary organelles in protozoa.

Total No. of Questions : 5]

SEAT No. :

P5169

[Total No. of Pages : 2

[5824]-106
F.Y. B.Sc.
BIOTECHNOLOGY
BBt - 106 : Plant Sciences - I
(CBCS 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 carries equal marks.***

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

a) Define Inflorescence.

b) State true on false:

Sweet potato is example of stem modification.

c) What is secondary growth in plants?

d) Find odd man out:

Euglena, Yeast, Dinoflagellates, Diatom.

e) Enlist the composition of cell wall of plant cell.

f) Classify plant tissue using T - diagram.

Q2) a) Describe modifications in root with examples. **[6]**

OR

Give general account of pteridophytes with suitable example. **[6]**

b) Illustrate monocot seed with proper labelling. Write note on it. **[4]**

P.T.O.

Q3) a) Explain permanent tissue with its types. **[6]**

OR

Explain plant modification in accordance with their habitat. **[6]**

b) Draw neat labelled diagram of plant cell. Write note on it. **[4]**

Q4) a) Give detail account on reproduction of fungi. **[6]**

OR

Explain cymose inflorescence with suitable diagram. **[6]**

b) Differentiate between cryptogam and phanerogam. **[4]**

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

a) Explain principle behind plant classification.

b) Illustrate meristematic tissue with proper labelling.

c) Write a note on vascular cambium and cork cambium.

d) Differentiate between gymnosperm and Angiosperm.

e) Illustrate secondary growth in dicot stem. Write a note on it.

f) Give general features of Bryophytes.

Total No. of Questions : 5]

SEAT No. :

P5170

[Total No. of Pages : 2

[5824] - 107
F.Y.B.Sc
BIOTECHNOLOGY
BBt - 107 : Microbiology-I
(2019Pattern) (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) ***Question 2 to 5 carry equal marks.***

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

a) Write two features of prokaryotic cell.

b) Write two postulates of Koch.

c) Enlist any four characters of fungi.

d) What is resolving power of Microsope?

e) Write two examples of gram positive bacteria

f) Enlist parts of bright field microscope.

Q2) a) Explain in brief general characters of virus and write note on lytic cycle. **[6]**

OR

Discuss difference between prokaryotic and eukaryotic cells.

b) With neat labelled diagram explain structure of bacterial endospore. **[4]**

Q3) a) Draw neat labelled diagram of typical bacterial cell and discuss structure and function of cell wall of gram positive bacteria. **[6]**

OR

Describe in detail contribution of Louis Pasteru. Write note on Pasteurization process.

b) Write principle and method of acid Fast staining. **[4]**

P.T.O.

Q4) a) Describe in detail applications of Microbiology in verious field. **[6]**

OR

With neat labelled diagram explain structure and function flagellum in prokaryotic cell.

b) Draw a ray diagram and explain principle, working of compound microscope. **[4]**

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

a) Abiogenesis Vs Biogenesis

b) General characters of Algae

c) Structure of bacterial cell membrane

d) Dark field microscope

e) Monochrome staining

f) Wet mount.

Total No. of Questions : 5]

SEAT No. :

P5171

[Total No. of Pages : 2

[5824] - 108
F.Y.B.Sc.
BIOTECHNOLOGY
BBt - 108 : Biomathematics and Biostatistics-I
(CBCS 2019 Pattern) (Semester -I)

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

Instructions to the candidates:

1) ***All questions are compulsory.***
2) ***Figures to the right indicate full marks.***
3) ***Use of non-programmable scientific calculator is allowed.***
4) ***Solve each section on separate answer paper.***

SECTION-I
(Biomathematics)

Q1) Attempt any Four of the following. **[4×1=4]**

a) Give the standard formula for ellipse and hyperbola centered at origin.

b) Define Zero matrix.

c) Find the number of ways to arrange 4 identical red pens, 6 identical green pens and 3 identical blue pens?

d) Evaluate $\bar{a} \times \bar{b}$ where

$\bar{a} = \bar{i} - 3\bar{j} + \bar{k}$

$\bar{b} = 3\bar{i} + 2\bar{j} - 3\bar{k}$

e) Write the following in the logarithmic form

$4^4 = 256$

Q2) Attempt any ONE of the following. **[1×7=7]**

a) i) Evaluate $2\log_3 5 + \log_3 40 - 3\log_3 10$ **[1×3=3]**

ii) Let $A = \begin{bmatrix} 2 & 6 & 1 \\ 3 & -4 & -2 \\ 5 & 4 & 3 \end{bmatrix}$ find determinant of A. **[1×4=4]**

OR

b) i) How many four letter words with repetition are there? Also find four letter words without repetition. **[1×3=3]**

ii) Let $V = \mathbb{R}^3$. If $W = \{(x, y, z) \in \mathbb{R}^3 / 2x + 3y + 4z = 0\}$. Determine whether W is a subspace of V. **[1×4=4]**

P.T.O.

Q3) Attempt any ONE of the following. **[1×7=7]**

a) i) Find the equation of the parabola with vertex at the origin and having its axis along the *x*-axis and passing through (1, –4) **[1×3=3]**

ii) Express $\bar{q} = 2 + 6x^2$ as linear combination of $P_1 = 2 + x + 4x^2$, $P_2 = 1 - x + 3x^2$, $P_3 = 3 + 2x + 5x^2$. **[1×4=4]**

OR

b) i) Determine ||U||, ||V|| and d(u,v) where $\bar{u} = (1, 1, -1)$, $\bar{v} = (-1,1,0)$ **[1×3=3]**

ii) Let $\bar{u} = (-1,1,2)$ & $\bar{v} = (2,-1,2)$ then find $(2\bar{u} - 3\bar{v},\ 3\bar{u} + \bar{v})$. **[1×4=4]**

SECTION - II

(Biostatistics)

Q4) Attempt any Two of the following. **[2×1=2]**

a) Explain the term 'Inclusive type of classification'.

b) State any one measure of dispersion.

c) Explain the term parameter.

Q5) Attempt any three of the following. **[3×5=15]**

a) Write a short note on

i) Correlation

ii) regression

b) Compute mean and median for the following data.

Weight (in kg)	50-60	60-70	70-80	80-90	90-100
No. of Patients	8	13	46	26	3

c) i) Explain different types of data.

ii) Represent the following data by using Ogive curve.

Age	20-24	24-28	28-32	32-36	36-40
No.of Candidates	4	13	19	11	2

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

P5172 **[Total No. of Pages : 2**

[5824]-201

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

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

a) Define order of reaction.

b) What is solubility product?

c) State Raoults law.

d) Define oxidation potential.

e) What is Molarity?

f) Give example of strong acid and weak acid.

Q2) a) Derive relation between Kc and Kp. **[6]**

OR

a) Discuss the collision theory for bimolecular reaction. **[6]**

b) Calculate pH of N/100 HCl and N/100 NaOH solutions. Assuming them to be completely ionised. **[4]**

Q3) a) Obtain the rate equation for a second order reaction with equal initial concentration of reactants. **[6]**

OR

a) Explain neutralization curve of weak acid and strong base. **[6]**

b) A first order reaction is found to 7.39×10^{-5} s^{-1}, find the halflife of the reaction. **[4]**

P.T.O.

Q4) a) What is Reference electrode? Explain calomel electrode in detail. **[6]**

OR

a) What are colligative properties? Explain depression in freezing point. **[6]**

b) State Le Chateliers principle and give it's applications. **[4]**

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

a) Hydrogen bonding.

b) Standard hydrogen electrode.

c) Characteristics of first order reaction.

d) Lewis concept of Acids and Bases.

e) Energy of Activation.

f) Permagnometry.

Total No. of Questions : 5]

SEAT No. : ____

P5173

[Total No. of Pages : 2

[5824]-202

F.Y.B.Sc.

BIOTECHNOLOGY

BBt - 202 BIOCHEMISTRY - II

(2019 CBCS Pattern) (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) Define enzyme activity.

b) What is coenzyme?

c) Give the names of disorder caused due to deficiency of vitamin C.

d) What is denaturation of Nucleic acid?

e) Give the names of water soluble vitamins.

f) Enlist the names of nitrogen bases present in purine.

Q2) a) Classify polar amino acids with structures. **[6]**

OR

Explain in detail, inhibition of enzymes. **[6]**

b) Describe secondary structure of protein. **[4]**

Q3) a) Write in detail, different parameters affecting enzyme activity. **[6]**

OR

Describe in detail, different forms of DNA. **[6]**

b) Explain in detail, titration curve of amino acid. **[4]**

P.T.O.

Q4) a) Classify enzymes with example. **[6]**

OR

Explain in detail. types of RNA with structure. **[6]**

b) Give an account on biochemical functions of fat soluble vitamins. **[4]**

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

a) Structure of Uracil and Thymine

b) Lock & Key hypothesis.

c) Forces stabilizing nucleic acid structure.

d) Properties of enzymes

e) Nucleoproteins

f) Quaternary structure of protein.

Total No. of Questions : 5]

SEAT No. :

P5174

[Total No. of Pages : 2

[5824]-203

F.Y. B.Sc.

BIOTECHNOLOGY

BBt - 203 : Bioinstrumentation (Revised)

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

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

a) What is Resolving power?

b) Define Homiothermic organisms

c) What is RPM?

d) Define pH

e) How to calculate RF value?

f) What is the use of x-rays?

Q2) a) What are characteristics of Electromagnetic waves? **[6]**

OR

Explain in detail principle construction & working of pH meter. **[6]**

b) What is TLC? Give its Applications. **[4]**

Q3) a) Explain in detail Mass spectroscopy. **[6]**

OR

Describe in detail SEM and TEM. **[6]**

b) What are different techniques used to visualized the results of TLC. **[4]**

P.T.O.

Q4) a) Define spectroscopy. Explain Flurosence spectroscopy with diagram. **[6]**

OR

Differentiate between preparative centrifuge and ultra centrifuge. **[6]**

b) Explain principle and working of clinical thermometer. **[4]**

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

a) Glass electrode

b) Difference between upright and inverted Microscope.

c) Enlist different types of roters

d) Charge and current

e) Magnifying parts of Microscopes

f) Emission spectra

Total No. of Questions : 5]

SEAT No. :

P5175

[Total No. of Pages : 2

[5824]-204

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) Role of salivary amylase in digestion.

b) What is Nodes of Ranvier.

c) Name two hormones secreted by thyroid gland.

d) Define gametogenesis.

e) Write the differences between smooth & cardiac muscle.

f) Define Vermiculture.

Q2) a) Describe Physiology of digestion. **[6]**

OR

Describe the structure and functions of haemoglobin.

b) Write the role of various hormones secreted by ovary and testis. **[4]**

Q3) a) What is neuromuscular junction? Explain its structure with suitable diagram. **[6]**

OR

Describe schizogony phase is the life cycle of plasmodium. Mention control measures for malaria.

b) Write the economic importance of Apiculture. **[4]**

P.T.O.

Q4) a) Describe moriculture. **[6]**

OR

What is vermicomposting? Explain the requirements for preparation of vermicompost.

b) Mention larval forms of Tapeworm and comment on its pathogenicity. **[4]**

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

a) Bhor's effect.

b) Role of intestinal glands in digestion.

c) Parasitism.

d) Sporogony.

e) Prawn Culture.

f) Parathyroid gland.

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Total No. of Questions : 5]

SEAT No. :

P5176

[Total No. of Pages : 2

[5824]-205
F.Y. B.Sc.
BIOTECHNOLOGY
BBt - 205 : Plant Sciences - 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 carry equal marks.***

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

a) Define Imbibition with suitable example.

b) What is photorespiration?

c) Comment on symbiotic N_2 fixation.

d) Write importance of Abscisic acid in growth of plants.

e) Draw neat labelled diagram of Dicot and Monocot Stomata.

f) What is cohesion & adhesion of water?

Q2) a) What are plant growth regulators? Explain the co-ordinated nature of hormone action to control the growth of plants. **[6]**

OR

Explain three theories of ascent of sap in plants. **[6]**

b) Write short note on dark reactions of photosynthesis. **[4]**

Q3) a) What is osmosis? Explain Exo and endo osmosis with suitable examples. **[6]**

OR

Comment on photosystems in plants. **[6]**

b) Write short note on ETC of respiration. **[4]**

P.T.O.

Q4) a) Define diffusion. Explain DPD with suitable examples. **[6]**

OR

Enlist photosynthetic pigments in plants. Explain action and absorption spectra of chlorophyll. **[6]**

b) With a neat labelled diagram explain the structure of mitochondria. **[4]**

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

a) Photolysis of H_2O.

d) Compare Guttation and Transpiration.

c) Economic importance of Fiber and Timber plants.

d) Ammonification.

e) CAM Pathway.

f) Effect of light intensity and temperature on rate of photosynthesis.

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Total No. of Questions : 5]

SEAT No. :

P5177

[Total No. of Pages : 2

[5824]-206

F.Y. B.Sc.

BIOTECHNOLOGY

BBt - 206 : Microbiology - 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 carry equal marks.***

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

a) Define Micronutrient. Give an example of micronutrient required for growth of microorganisms.

b) What is pure culture?

c) Give application of MIC technique.

d) What is generation time?

e) Define Biosafety.

f) Enlist methods of sterilization by using Physical agent.

Q2) a) Explain the term selective and differential media and give application with suitable example. **[6]**

OR

Give concept of disinfectant and discuss characteristics of ideal disinfectant.

b) What is serial dilution? Give its application. **[4]**

Q3) a) Explain the term sterilization and give an account on any one method of sterilization. **[6]**

OR

Give account on microbe-microbe interaction with suitable example.

b) What are phenolic compounds? Give suitable example and explain its mode of action. **[4]**

P.T.O.

Q4) a) Explain the principle of Autoclave and give its application. **[6]**

OR

Give nutritional classification of bacteria.

b) What is bacterial growth curve? Give its significance. **[4]**

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

a) Lichen

b) Heavy metals

c) Enrichment culture

d) Binary fission

e) Halophile

♣ ♣ ♣

Total No. of Questions : 8]

SEAT No. :

P5178

[Total No. of Pages : 2

[5824]-207
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 **[1]**

$$\frac{d^2y}{dx^2} + 4y = \tan x$$

b) Solve the integration $\int xe^x dx$. **[1]**

c) Compute the partial derivative of the function $x^2 y^3 + xy$ with respect to 'x'. **[1]**

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

$x + y + z = 2$
$x + 2y + 3z = 5$
$2x + 3y + 4z = 11$

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

Q3) a) Find the stationary point of the following function **[2]**

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

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

P.T.O.

Q4) Find eigenvalues and eigenvectors of matrix $A = \begin{bmatrix} 2 & 0 & -2 \\ 0 & 3 & 0 \\ 0 & 0 & 3 \end{bmatrix}$ **[7]**

SECTION - II
(Biostatistics - II)

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

a) Probability of impossible event is zero.

b) For normal distribution mean = median = mode.

Q6) Attempt the following : **[2 each]**

a) Define the following terms.

i) Type II error.

ii) Sample space.

b) State any one application of binomial distribution in bioscience. **[4]**

If $X \rightarrow B(10, 0.8)$ find E(X), Var(X), P(X is divisible by 4).

Q7) Attempt the following :

Write a note on *t* test and chisquare test. **[8]**

Q8) Complete the following ANOVA table. Carry out the analysis and interpret the result. **[8]**

Source of variation	Degrees of freedom	Sum of squares	Mean sum of squares
Variety	4		
Error	15	43.5	
Total		101	

(Use 5% level of significance)

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Total No. of Questions : 5]

SEAT No. :

P5179

[Total No. of Pages : 2

[5824]-208
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) Define Minicomputer.

b) What is Bioinformatics?

c) List any two features of Windows Operating System.

d) Write application areas of supercomputer.

e) State any four characteristics of computer.

f) State true / false for following :

i) RAM is a volatile memory

ii) Webcamera is an output device

Q2) Answer the following :

a) Write following in brief : **[6]**

i) Distinguish between wordpad and notepad.

ii) Explain Entity relationship model.

b) What is database? State it's characteristics. **[4]**

P.T.O.

Q3) Answer the following :

a) Solve the following : **[6]**

i) Explain CD-ROM in detail.

ii) What is primary memory? Explain its various type.

b) What is biological databases? Give its examples. **[4]**

Q4) Answer the following :

a) Solve the following : **[6]**

i) List the various scanning devices and explain any one of them in brief.

ii) Explain multimedia database. State its applications.

b) What is database? State its characteristics. **[4]**

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

a) RAM

b) Icons

c) Entity

d) Internet Searching

e) Parallel Processing System

Total No. of Questions : 5]

SEAT No. : ____

P5180

[Total No. of Pages : 2

[5824]-301

S.Y. B.Sc.

BIOTECHNOLOGY

BBt - 301 : Cell Biology - I

(2019 Pattern) (Semester - III)

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

Instructions to the candidates:

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

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

a) Enlist components of plant cell wall.

b) Define osmosis.

c) Draw a neat labelled diagram of plant cell.

d) What happens to cell if it is kept in hypertonic solution?

e) What is plasmodes mata?

f) What is retrograde transport?

Q2) a) What are different modes of cellular transport? Explain in detail passive transport. **[6]**

OR

Explain structure and functions of nucleus with a neat labelled diagram comment on nuclear pore complex. **[6]**

b) Give a brief account on membrane asymmetry. **[4]**

Q3) a) Digramatically explain fluid mosaic model of plasma membrane. **[6]**

OR

Give a detail account on various cell junctions. **[6]**

b) Explain role of COP I and COP II in vesicular transport. **[4]**

P.T.O.

Q4) a) Explain in detail structure, function and types of Endoplasmic reticulum. **[6]**

OR

What are different types of cytoskeleton? Explain any two types of it. **[6]**

b) Give a brief account on component and functions of ECM. **[4]**

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

a) Functions of lysosome

b) Receptor mediated endocytosis

c) Cell theory and its postulates.

d) Membrane phospholipids.

e) Voltage gated ion channels.

f) Comparative account on mitochondria and chloroplast.

Total No. of Questions : 5]

SEAT No. :

P5181

[Total No. of Pages : 2

[5824]-302

S.Y. B.Sc.

BIOTECHNOLOGY

BBt - 302 : Molecular Biology - I

(2019 Pattern) (Semester - III)

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

Instructions to the candidates:

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

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

a) What are introns?

b) Explain Nucleosides.

c) Define Frame shift mutation.

d) What are enhancers?

e) What are purines?

f) Describe central-dogma of molecular biology.

Q2) a) Describe Hershey & Chase experiment. **[6]**

OR

Describe the structure & properties of DNA double helix.

b) Explain role of telomerase enzyme in replicating ends of linear DNA molecule. **[4]**

Q3) a) Describe the structure of chromatin solenoid model. **[6]**

OR

Explain the process of eukaryotic replication initiation in detail.

b) Write a note on chloroplast DNA. **[4]**

P.T.O.

Q4) a) Differentiate between euchromatin & heterochromatin. **[6]**

OR

Describe different properties of genetic code.

b) Describe the structure & function of DNA polymerase. **[4]**

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

a) Degeneracy of genetic code.

b) Primase enzyme.

c) Differentiate between DNA & RNA.

d) Termination of prokaryotic replication.

e) Semi-conservative mode of replication.

f) Role of regulatory sequences.

Total No. of Questions : 5]

SEAT No. : ____

P5182

[Total No. of Pages : 2

[5824]-303

S.Y. B.Sc.

BIOTECHNOLOGY

BBt - 303 : Genetics

(2019 Pattern) (Semester - III)

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

Instructions to the candidates:

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

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

a) What are lethal genes?

b) Enlist any two chemical mutagens.

c) What is double trisomy? Give example.

d) What is tautomeric shift?

e) Give any four symbols used in Pedigree analysis.

Q2) a) Define Linkage. Explain types of linkage. What is Cis and Trans arrangement of genes? **[6]**

OR

Describe Aneuploidy in detail with examples. **[6]**

b) Explain the role of 'Alkylating agents' in chemically induced mutagenesis. **[4]**

Q3) a) What is Epistasis? Explain with examples. **[6]**

OR

What are chromosomal aberrations? Explain any two variations in chromosome structure. **[6]**

b) What are genetic disorders? Explain with any one example. **[4]**

P.T.O.

Q4) a) Give the Mendel's law of segregation. Add a note on Mono hybrid cross. **[6]**

OR

Explain following types of mutations in detail. **[6]**

i) Transversion and ii) Frame shift matation

b) What is Crossing over? Give emphasis on Recombination frequency and Map distance. **[4]**

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

a) Co-dominance

b) Pedigree analysis

c) Effect of UV. Radiation on DNA

d) Pleiotrophism

e) X-linked inheritance

f) Polyploidy

Total No. of Questions : 5]

SEAT No. :

P7246

[Total No. of Pages : 2

[5824]-304

S.Y. B.Sc.

BIOTECHNOLOGY

BBt-304 : Metabolism

(2019 Pattern) (Semester - III)

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

Instructions to the candidates:

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

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

a) Metabolism

b) Unsaturated fatty acids

c) ATP structure

d) Gluconeogenesis

e) Cholesterol

f) Phosphoanhydride bond

Q2) a) Discuss in detail reaction in TCA cycle. **[6]**

OR

Describe de-novo pathway of nucleotide biosynthesis. **[6]**

b) Explain in detail glycogen synthesis. **[4]**

Q3) a) Describe the synthesis of ketone bodies in diabetic patient. **[6]**

OR

Explain fatty acid synthesis. **[6]**

b) Explain fates of pyruvate. **[4]**

P.T.O.

Q4) a) Give only the regulatory points of urea cycle. Add a note on its connection with TCA cycle. **[6]**

OR

Explain Hexose monophosphate shunt pathway. **[6]**

b) Metabolic pathways are integrated. Justify **[4]**

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

a) Ketogenic amino acids.

b) Enzymes of glycolysis.

c) Regulation of glycogenolysis.

d) Transamination and deamination reactions.

e) Carnitine

f) Pyruvate dehydrogenase complex.

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Total No. of Questions : 5]

SEAT No. :

P5183

[Total No. of Pages : 2

[5824]-305
S.Y. B.Sc.
BIOTECHNOLOGY
BBt - 305 : Environmental Biotechnology
(2019 Pattern) (Semester - III)

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

Instructions to the candidates:

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

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

a) Ozonosphere.

b) Define Zoocide.

c) What is Red data book?

d) Define Leachate.

e) Define Pedogenesis.

f) Explain Eutrophication.

Q2) a) Define environmental pollution. Explain various pollutants causing water pollution. **[6]**

OR

What is environmental pollution? Describe soil pollution in detail. **[6]**

b) Explain the process of plastic degradation. **[4]**

Q3) a) Discuss how bioremediation is useful in removal of different contaminants. **[6]**

OR

Explain how greenhouse gases affect environment. **[6]**

b) 'Hydrosphere is an important abiotic factor' Discuss. **[4]**

P.T.O.

Q4) a) What is ecological energetics? Describe the energy flow in a typical ecosystem. **[6]**

OR

Discuss the procedure for EIA. **[6]**

b) What is biomedical waste? How it is categorised? **[4]**

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

a) 5 R's for reducing solid waste.

d) Effects of acid Rain.

c) IUCN categories.

d) Bioaugmentation.

e) BOD

f) Y - shaped energy flow model.

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Total No. of Questions : 5]

SEAT No. :

P5184

[Total No. of Pages : 2

[5824]-306

S.Y. B.Sc.

BIOTECHNOLOGY

BBt-306 : Bioanalytical Techniques

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

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

Instructions to the candidates:

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

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

a) State Beer Lamberts Law.

b) Define the term sedimentation coefficient.

c) Enlist any two cation exchangers.

d) State Role of SDS in SDS-PAGE.

e) Define Buffer.

f) State stationary phases which can be used in TLC.

Q2) a) What different types of errors can occur during experimentation. Explain any two. **[6]**

OR

Explain the term Transmittance and Absorbance and derive relationship between them. **[6]**

b) State principle and application of Ion Exchange chromatography. **[4]**

Q3) a) With help of ray diagram explain principle and working of spectrophotometer. **[6]**

OR

Explain how variation in voltage and composition of buffer affect separation of proteins in PAGE. **[6]**

P.T.O.

b) Define the term Normality. What volume of concentrated H_2SO_4 (Sulphuric acid) will be required to prepare 1.0N, 100mL H_2SO_4 solution. **[4]**

Given SP gravity 1.83 purity - 98% of H_2SO_4.

Q4) a) State principle of density gradient centrifugation. Explain how will separate components of cell by density gradient centrifugation. **[6]**

OR

Give principle and applications of size exclusion chromatography. **[6]**

b) What moles of acetic acid and sodium acetate will be required to prepare acetate buffer of pH 4.5 0.1 m, 100ml? Given pka of acetic acid = 4.76. **[4]**

Q5) Write short notes on any 4 of the following : **[10]**

a) Electromagnetic spectrum.

b) Types of rotors used in centrifugation.

c) Components of column chromatography.

d) Scientific Notation.

e) Agarose Gel electrophoresis.

f) Paper chromatography.

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Total No. of Questions : 5]

SEAT No. : ____

P5185

[Total No. of Pages : 2

[5824]-401

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

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

a) Which checkpoint confirms all kinetochores are attached to spindle fiber?

b) What is GO phase?

c) Define pyroptosis.

d) What is secondary messenger?

e) Give any two ligands that can bind to intracellular receptors.

f) What is MAPK?

Q2) a) With the help of neat labelled diagram describe various steps involved in meiosis - I. **[6]**

OR

Describe in detail cell cycle regulation mechanism in eukaryote.

b) Give brief account of receptor tyrosine kinase signalling. **[4]**

Q3) a) What is cell signalling? Enlist different types & explain autocrine signalling in detail. **[6]**

OR

Enlist various modes of cell death. Explain extrinsic pathway of apoptosis.

b) Give significance of meiosis. **[4]**

Q4) a) What is GPCR? Explain in detail signalling pathway mediated by GPCR. **[6]**

OR

What is cell cycle? Briefly explain the stages involved in it.

b) Explain mechanism of ferroptosis. **[4]**

P.T.O.

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

a) Synaptonemal complex.
b) Oncogene & tumor suppressor gene.
c) Telomerase theories of ageing.
d) Adapter protein.
e) Caspases.
f) Autophagy.

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Total No. of Questions : 5]

SEAT No. :

P5186

[Total No. of Pages : 2

[5824]-402

S.Y. B.Sc.

BIOTECHNOLOGY

BBT - 402 : Molecular Biology - II

(2019 Pattern) (Semester - IV)

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

Instructions to the candidates:

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

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

a) Give the heptapeptide sequence of CTD Tail of RNA polymerase.

b) What includes processing of RNA?

c) What is the ribosome binding site called in prokaryotes?

d) Give two examples of inhibitors of transcription.

e) Define Mutagen. Give 1 example.

f) Give names of structural genes in Tryptophan operon.

Q2) a) What is post-translational modification? Give an account on ubiquitination. **[6]**

OR

What are promoter sequences? State their role in transcription process.

b) What is t-RNA charging? Give the process in detail. **[4]**

P.T.O.

Q3) a) What is mutation? Explain Nucleotide Excision Repair mechanism. **[6]**

OR

Explain initiation of translation in prokaryotes with the help of diagram.

b) Explain DNA damage caused due to radiation and its repair mechanism.**[4]**

Q4) a) Give an account on Tryptophan operon. Comment on Regulation by attenuation. **[6]**

OR

Give an account on Lactose operon and elaborate Feedback regulation of lac operon.

b) Explain Co-translational translocation of protein in ER lumen. **[4]**

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

a) Stop transfer sequences.

b) Catabolite repression.

c) Intercalating agents.

d) Translesion DNA Synthesis-DNA repair mechanism.

e) Rho-independent termination of transcription.

f) Ribosome.

Total No. of Questions : 5]

SEAT No. :

P5187

[Total No. of Pages : 2

[5824] - 403
S.Y.B.Sc. (Biotechnology)
BBt-403 : IMMUNOLOGY
(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 Q2 to Q5.***
3) ***Questions 2 to 5 carry equal marks.***

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

a) Define Hapten.

b) What is adjuvant?

c) What are Manochonal Antibodies?

d) What are Natural killer cells?

e) Define Immunogenicity.

f) Define MHC.

Q2) a) Write an explanatory note on secondary lymphoid organs. **[6]**

OR

What is the mechanism of Auto immunity Mention types of Autoimmune diseases with one example of each.

b) What is the difference between three types of complement pathway? Enlist functions of complement system. **[4]**

Q3) a) What are vaccines? Explain killed and live attenuated vaccines with examples. **[6]**

OR

Enlist general characteristics of Antigen-Antibody Interaction. Add a note on Western Blotting.

b) Explain structure, function and characteristics of IgG & IgM. **[4]**

P.T.O.

Q4) a) Write the principle and applications of followign techniques. **[6]**

i) ELISA

ii) RIA (Radioimmuno assay)

OR

Elaborate on the differences between Innate and Adaptive Immunity.

b) What is the difference between primary and secondary immune response. **[4]**

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

a) Humoral Immunity.

b) Mechanism of Phagocytosis.

c) Recombinant Vaccine.

d) Significance of Cytokines.

e) Function of Type II MHC.

f) Precipitation and agglutination.

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Total No. of Questions : 5]

SEAT No. :

P5188

[Total No. of Pages : 2

[5824] - 404
S.Y. B.Sc. (Biotechnology)
BBt 404 : ANIMAL DEVELOPMENT
(2019 Pattern) (Semester - IV)

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

Instructions to the candidates:

1) ***Question No.1 is compulsory.***
2) ***Solve any three Questions from Q.No. 02 to Q.No. 05.***
3) ***Questions Q2 to Q5 carry equal marks.***

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

a) Write any two differences between apoptosis and necrosis.

b) What is stereoblastula? Give any one example.

c) Mention the significance of dorsal lip of blastopore.

d) State in brief stages of cellular commitment.

e) C. elegans is one of the popular models of developmental biology. Justify.

f) Write down the contribution of spemann in developmental biology research.

Q2) a) Explain in detail the process of gastrulation in Amphioxus. Comment on fates of germ layer. **[6]**

OR

Give the details of ultrastructure of sperm with neat labelled diagram. Also, differentiate between spermatogenesis and oogenesis. **[6]**

b) Plane of spindle fibre orientation decides pattern of cleavage. Explain with reference to spiral and rotational cleavage. Comment on types of blastula in those patterns. **[4]**

P.T.O.

Q3) a) Write in detail the process of fertilization in sea urchin. Comment on its species specific nature. **[6]**

OR

Give in detail morphogenetic movements involved in three germ layer formation in Drosophila. Comment on inifiation of gastrulation in Drosophila in comparison to vertebrates. **[6]**

b) Define ageing. Explain the basis of ageing using any two theories. **[4]**

Q4) a) Oogenesis involves asymmetric cell division. Elaborate using neat labelled diagram. Comment on events of differentiation of functional onum. **[6]**

OR

Explain in detail cortical granule reaction. Comment on its significance during embryonic development. **[6]**

b) Describe the process of neural tube formation in amphibians. **[4]**

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

a) Morphallactic regeneration.

b) Properties of stem cells.

c) Trans differentiation in development.

d) Alcohol as a teratogen.

e) Maternal effect genes in axial patterning.

f) Zona reaction and its significance.

Total No. of Questions : 5]

SEAT No. :

P5189

[Total No. of Pages : 2

[5824]-405
S.Y.B.Sc (Biotechnology)
BBt-405: PLANT DEVELOPMENT
(2019 Pattern) (Semester-IV)

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

Instructions to the candidates:

1) ***Q1 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 :

a) Define Totipotency.

b) What do you mean by developmental plasticity.

c) What is parthenocrapy.

d) Define De-differentiation.

e) Define placentation with any two examples.

f) What is Phytomere.

Q2) a) Describe the process of microsporogenesis. Add a note on types of microspore tetrads. **[6]**

OR

Describe shoot apical meristem development in Angiosperms. Add a note on theories of SAM development.

b) Explain types of ovules with neat labelled diagrams. **[4]**

Q3) a) What is Seed dispersal. Explain the need for seed dispersal. Give types of seed dispersal in angiosperms. **[6]**

OR

Explain the terms photoperiodsm & vernalization in relation with floral induction in angiosperms.

b) Describe differnts types of embryogenesis in dicots. **[4]**

P.T.O.

Q4) a) Comment on "Arabidopsis - As a model system to stud plant development".

OR **[6]**

Dscribe the types of endosperm with suitable examples.

b) Which agencies are used for transfer of pollen grains. Explain with suitable examples. **[4]**

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

a) Competance and determination.

b) Arithmatic and Geometric growth.

c) Types of female gametophyte development.

d) Double fertilization and triple fusion.

e) Types of seed germination.

f) Life cycle of Angiosperms.

Total No. of Questions : 5]

SEAT No. :

P5190

[Total No. of Pages : 2

[5824] - 406
S.Y.B.Sc. (Biotechnology)
BBt-406 : MICROBIAL BIOTECHNOLOGY
(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 Q2 to Q5.***
3) ***Questions 2 to 5 carry equal marks.***

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

a) What is false presumptive test?

b) Give role of normal floza in human health.

c) What is radurization?

d) Give mode of action of aflatoxin.

e) Principle of Eijkman test.

f) Write any two application of microbial toxins.

Q2) a) Compare and contrast food infection and intoxication with atleast one example. **[6]**

OR

What is food spoilage? Explain importance of intrinsic and extrinsic properties of food in designing food preservation process.

b) Explain norms and applications of GMO. **[4]**

Q3) a) Explain any two process of waste water treatment using microorganisms. **[6]**

OR

Describe stages of disease leprosy, and add a note on importance of prophylaxis in prevention of diseases with example. **[6]**

b) Enlist various principles of food preservation. Describe process of canning in detail. **[4]**

P.T.O.

Q4) a) Enlist various tests used for grading of milk. Explain one dye reduction test in detail. **[6]**

OR

Describe MPN test in detail. **[6]**

b) Define BOD& COD mention importance of its measurement in waste water treatment. **[4]**

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

a) Ropiness

b) Cheese

c) MEOR

d) Mode of action of tetanus toxin.

e) Membrane filter technique.

f) Application of synthetic biology.

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Total No. of Questions : 5]

SEAT No. : ____

P5191

[Total No. of Pages : 2

[5824]-501

T.Y.B.Sc. (Biotechnology)

BBt 501 : INDUSTRIAL MICROBIOLOGY

(2019 Pattern) (Semester - V)

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

Instructions to the candidates:

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

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

a) Define solid state fermeutation.

b) Give role of baffles.

c) What are inducers? Give any 2 examples.

d) Enlist various sources of nitrogen used in fermeutation media.

e) Define : scale up.

f) Write role of floculating agents in donenstream processing.

Q2) a) What is importance of air sterilization in fermeutation process? explain various mechanism of capture of air particles in filteration process. **[6]**

OR

Describe continuous sterilization process with neat labelled diagram. **[6]**

b) Explain use of chemicals for cell disruption in downstream processing.**[4]**

Q3) a) What are objectives of strain improvement? Add a note on analogue resistant mutant. **[6]**

OR

What is media optimization? describe Placket- Burman design of media optimization. **[6]**

b) Describe measurement and control of temperature in fermeutation. **[4]**

P.T.O.

Q4) a) Describe large scale manufacturing process of ethanol w.r.t. production strain, fermeutation media and conditions, recovery. **[6]**

OR

What are unit operations? discuss following methods of downstream processing. **[6]**

i) Centrifugation

ii) Solvent extraction

b) Explain construction and working and use of Air lift fermeuter. **[4]**

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

a) Objectives of secondary screening.

b) Dual fermeutation.

c) Types of aerator.

d) Surface treatment of construction material of fermeuter.

e) Drum dryer.

f) Indicator organism for design of sterilization cycle.

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Total No. of Questions : 5]

SEAT No. :

P5192

[Total No. of Pages : 2

[5824]-502

T.Y. B.Sc. (Biotechnology)

BBT-502 : R-DNA TECHNOLOGY

(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) Give two examples of Restriction enzymes with restriction & recognization site.

b) Define cDNA library.

c) Give the name and role of enzyme used in PCR.

d) What is replacement vector? Give example.

e) Enlist components required for Sanger's method of DNA sequencing.

f) Define Chimeric Vectors.

Q2) a) Describe Expression vectors with help of an example. **[6]**

OR

a) Write a short note on Restriction enzymes. **[6]**

b) Distinguish between Genomic library & cDNA Library. **[4]**

Q3) a) What are Endonucleases? Give its role in R-DNA. **[6]**

OR

a) Give application of Recombinant DNA Technology with respect to Insulin production. **[6]**

b) Comment on M-13 phage vectors. **[4]**

P.T.O.

Q4) a) Discuss the salient features of Ti plasmid with neat labelled diagram. **[6]**

OR

a) Explain the method for construction of cDNA library. **[6]**

b) Write a note on PCR elaborating steps involved in PCR and its applications. **[4]**

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

a) Insertional Inactivation.

b) YAC vector.

c) Automated DNA sequencing.

d) Layout of R-DNA Laboratory.

e) Applications of cDNA Library.

f) Real Time PCR.

Total No. of Questions : 5]

SEAT No. : ____

P5193

[Total No. of Pages : 2

[5824]-503

T.Y. B.Sc. (Biotechnology)

BBt -503 : PLANT TISSUE CULTURE

(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 totipotency

b) What is micropropagation?

c) Hybrids.

d) Dedifferentiation.

e) Photoperiod.

f) Senescence.

Q2) a) Explain in detail Somatic Embryogenesis and its types. **[6]**

OR

a) What is Anther culture? Explain pathway of its development. **[6]**

b) Explain Endosperm Culture with its types and application. **[4]**

Q3) a) Explain in detail "Protoplast Culture'. Also elaborate factors affecting in culture. **[6]**

OR

a) Describe PTC laboratory and explain how it is different from any other wet Lab. **[6]**

b) What is MS Media? Explain with its composition. **[4]**

Q4) a) Describe callus culture techniques. **[6]**

OR

a) Explain in detail 'Organ culture technique' w.r.t shoot tip culture. **[6]**

b) What are artificial seed? **[4]**

P.T.O.

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

a) Plant growth regulator.

b) Laminar Air flow

c) Leaf culture

d) Suspension culture

e) Maturation of Somatic Embryogenesis.

f) Hyper hydration.

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Total No. of Questions : 5]

SEAT No. :

P5194

[Total No. of Pages : 2

[5824]-504
T.Y. B.Sc.
BIOTECHNOLOGY
Bbt- 504 : Animal Tissue Culture
(2019 Pattern) (Semester - V)

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

Instructions to the candidates:

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

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

a) Mention contribution of any one scientist in the field of animal tissue culture.

b) Name any two tissue culture vessels used in ATC.

c) Define cell line.

d) Name any two enzymes used for tissue disaggregation

e) Define passage number.

f) Write any 2 properties of finite cell lines.

Q2) a) Explain establishment of fibroblast culture. **[6]**

OR

Why are mycoplasma considered as cryptic contaminants? Describe any two methods of detection of mycoplasma.

b) Describe application of CO_2 incubator in ATC. **[4]**

Q3) a) Mention different cytogenetic methods of cell line characterization. **[6]**

OR

Explain concept of organotypic cultures. Also describe different techniques to establish the same.

b) Enlist disadvantages of serum as supplement in animal tissue culture medium. **[4]**

P.T.O.

Q4) a) Explain maintenance of cell lines. **[6]**

OR

Mention need of cryopreservation of cell lines. Also describe the method in detail.

b) Elaborate on any two applications of animal cell cultures. **[4]**

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

a) Feeder layer

b) Serum free media

c) Transformed cell lines.

d) Growth conditions of insect cell lines.

e) Suspension culture.

f) Cell line distribution.

Total No. of Questions : 5]

SEAT No. :

P5195

[Total No. of Pages : 2

[5824] - 505
T.Y.B.Sc. (Biotechnology)
BBt - 505 : APPLIED BIOTECHNOLOGY-I
(2019 Pattern) (Semester -V)

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

a) Characteristics of RFPs.

b) Applications of collagen from marine phase.

c) Bottom up approach.

d) C/N ratio in composting

e) Bioactive peptides.

f) Microalgae.

Q2) a) Explain composting, write a note on infrastructure and maturity parameters. **[6]**

OR

Describe Nanoparticles and give any two methods of its synthesis & characteristics.

b) Explain Basophilic organisms, give its application. **[4]**

Q3) a) Attempt any two of the following. **[6]**

i) Briquetting

ii) Marine oils

iii) GFP.

b) Explain immunodiagnostics with example. **[4]**

P.T.O.

Q4) a) Explain 'Chitosan' and its applications. **[6]**

OR

Describe the use of seaweeds in removal of metal pollutants.

b) Explain Biochip with applications. **[4]**

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

a) PCR

b) Cellular diagnostics.

c) Functional genomics in diagnostics

d) Nanospheres

e) Dendrimers.

f) Top down approach.

Total No. of Questions : 5]

SEAT No. :

P5196

[Total No. of Pages : 2

[5824] - 506
T.Y.B.Sc.
BIOTECHNOLOGY
BBt - 506 : Biodiversity and Systematics
(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 carrying capacity of an ecosystem.

b) Define species richness.

c) Enlist important NGO's in India.

d) Define genetic diversity.

e) Role of forest research institute in conservation.

f) Define Urbanbiodiversity.

Q2) a) Explain the strategies used for conservation of biodiversity. **[6]**

OR

Explain the shannon & simpson's biodiversity index.

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

Q3) a) Explain in brief a CITES and TRAFFIC a non-governmental organisations working for coildlife protection. **[6]**

OR

Explain the uses of biodiversity.

b) Justify the advantages of molecular tools over morphological tools used in taxonomy. **[4]**

P.T.O.

Q4) a) Explain the importance of forest research Institute & Zoological survey of India in the conservation of biodiversity. **[6]**

OR

Explain the Artificial and natural system of classification.

b) Explain the biodiversity hotspots. **[4]**

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

a) Principles and objectives of taxonomy.

b) Biodiversity in cities and towns.

c) species diversity.

d) Explain Habitat and niche.

e) Role of Panipanchayat.

f) Logistic growth of population.

Total No. of Questions : 5]

SEAT No. :

P5196

[Total No. of Pages : 2

[5824] - 506
T.Y.B.Sc.
BIOTECHNOLOGY
BBt - 506 : Biodiversity and Systematics
(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 carrying capacity of an ecosystem.

b) Define species richness.

c) Enlist important NGO's in India.

d) Define genetic diversity.

e) Role of forest research institute in conservation.

f) Define Urbanbiodiversity.

Q2) a) Explain the strategies used for conservation of biodiversity. **[6]**

OR

Explain the shannon & simpson's biodiversity index.

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

Q3) a) Explain in brief a CITES and TRAFFIC a non-governmental organisations working for coildlife protection. **[6]**

OR

Explain the uses of biodiversity.

b) Justify the advantages of molecular tools over morphological tools used in taxonomy. **[4]**

P.T.O.

Q4) a) Explain the importance of forest research Institute & Zoological survey of India in the conservation of biodiversity. **[6]**

OR

Explain the Artificial and natural system of classification.

b) Explain the biodiversity hotspots. **[4]**

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

a) Principles and objectives of taxonomy.

b) Biodiversity in cities and towns.

c) species diversity.

d) Explain Habitat and niche.

e) Role of Panipanchayat.

f) Logistic growth of population.

Total No. of Questions : 5]

SEAT No. :

P5197

[Total No. of Pages : 2

[5824]-601

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) ***Questions 2 to 5 carries equal marks.***

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

a) DNAzyme

b) Km

c) Zymogen

d) Metabolism

e) Holoenzyme

f) Unit of enzyme

Q2) a) Give the applications of various enzymes used in industries. **[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 lysosomal enzyme degradation pathway. **[6]**

OR

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

b) Discuss the mechanism of action of serine protease with suitable example. **[4]**

P.T.O.

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

OR

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

b) Describe feed-back mechanism of regulation with suitable example. **[4]**

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

a) Glucose oxidase biosensor.

b) Carrier matrices used in enzyme immobilization.

c) Metalloenzyme.

d) Compartmentation of metabolic pathway.

e) Michaelis-Menten equation & its significance.

f) Active site of an enzyme.

Total No. of Questions : 5]

SEAT No. :

P5198

[Total No. of Pages : 2

[5824]-602
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) Explain use of molecular markers in plant breeding.

b) Define phytosanitation.

c) What are Biopesticides?

d) Give information on green house.

e) Define e-agriculture.

f) Describe non-conventional biofertilizer.

Q2) a) Write a note on development of salt tolerant crops. **[6]**

OR

Describe types of biofertilizers. **[6]**

b) Write a note on indirect gene transfer techniques in plants. **[4]**

Q3) a) Enlist methods for plant disease diagnosis explain PCR based methods for detection of fungal pathogens & bacterial pathogens. **[6]**

OR

Explain the concept of vertical farming with its advantages & disadvantages. **[6]**

b) Describes systems employed to control and regulate greenhouse environment. **[4]**

P.T.O.

Q4) a) What is urban agriculture? Write benefits of urban agriculture. **[6]**

OR

Write a note on transgenics against various abiotic stresses. **[6]**

b) Describe new technological advances in using microbial control of plant species for effective pest control. **[4]**

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

a) Detoxification of herbicides.

d) Gene gun/microprojectile bombardment method.

c) Role of agriculture biotechnology in India & World.

d) Industrial biopesticides.

e) Morphological symptoms of plant diseases.

f) Chemical tests for variety purity testing.

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Total No. of Questions : 5]

SEAT No. :

P5199

[Total No. of Pages : 2

[5824]-603
T.Y. B.Sc.
BIOTECHNOLOGY
BBt - 603 : Applied Biotechnology - II
(2019 Pattern) (Revised) (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) What is Syngas?

b) Define Green technology.

c) Scope of Precision medicines.

d) Two applications of bioactive peptide/Metabolites.

e) Two applications of Mesenchymal stem cells.

f) What is biohydrogen?

Q2) a) Write in detail various therapeutic uses of stem cells with suitable examples. **[6]**

OR

Describe in detail applications of system biology in Biotechnology.

b) What is the principle of DNA finger printing? Write its applications. **[4]**

Q3) a) What is green technology? Explain role of green technology toward sustainable development. **[6]**

OR

Describe various types of stem cells and their application in fighting human diseases.

b) What is functional genomics? Write its role in developing precision medicines. **[4]**

P.T.O.

Q4) a) Write in detail alternative sources of energy and its various generations in human welfare. **[6]**

OR

Write a note on principle and application of synthetic biology in the production of bioactive compounds.

b) Explain in brief various findings of Human Genome Project. **[4]**

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

a) Algal fuel.

d) Stem all ethics.

c) Biohydrogen.

d) GM crops and health concern

e) Rice 3k Project.

f) Second generation Biofuel.

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Total No. of Questions : 5]

SEAT No. :

P5200

[Total No. of Pages : 2

[5824]-604

T.Y. B.Sc.

BIOTECHNOLOGY

BBt-604 : Food and Pharmaceutical Biotechnology

(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) Define Macronutrients.

b) What are non-alcoholic beverages?

c) What is edible packaging?

d) What is target identification?

e) What is clinical trial?

f) Explain the term full dose.

Q2) a) Write the WWO guidelines for quality control. **[6]**

OR

a) Describe British Pharmacopia (BP) in details. **[6]**

b) What is ED 50? **[4]**

Q3) a) What are food additives? Give its types with role in food industry. **[6]**

OR

a) What is HACCP? Give its principle. **[6]**

b) Describe health benefits of Tea. **[4]**

P.T.O.

Q4) a) Give an accounts biodegradable plastics as a food packaging material. **[6]**

OR

a) Explain the concept of TQM. **[6]**

b) Describe standard plate count technique for S. aurents from food sample. **[4]**

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

a) Water For Injection (WFI).

b) Transgenic plants.

c) Product potency

d) BIS

e) CGMP

f) Kombucha Tea

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Total No. of Questions : 5]

SEAT No. :

P5201

[Total No. of Pages : 2

[5824]-605

T.Y. B.Sc.

BIOTECHNOLOGY

BBt-605 : Bioinformatics

(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) Define Bioinformatics.

b) Give 2 examples of primary database.

c) What is data generation.

d) What is algorithm in Bioinformatics.

e) What is E-value in BLAST.

f) Give 2 examples of Boolean operators.

Q2) a) What is database? Explain protein database with suitable examples. **[6]**

OR

What is metadata? Give its types & importance in bioinformatics. **[6]**

b) Write a note on gap penalties and its types. **[4]**

P.T.O.

Q3) a) Enlist different alignment methods. Explain Dyanamic programming method in detail. **[6]**

OR

Enlist various file format available for data presentation. Explain Genbank file format in detail. **[6]**

b) Write short note on scoring matrices. **[4]**

Q4) a) How data generation is important for bioinformatics. Explain NGS genome sequencing in detail along with its types. **[6]**

OR

Enlist protein structure visualization tools in bioinformatics. Explain SPDBV in detail. **[6]**

b) Differentiate global & local alignment with suitable examples. **[4]**

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

a) Relation of Bioinformatics to Biotechnology.

b) Pubmed

c) Block based alignment.

d) Heuristic algorithm

e) NGS

f) BLAST varients

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Total No. of Questions : 5]

SEAT No. :

P5202

[Total No. of Pages : 2

[5824]-606
T.Y. B.Sc.
BIOTECHNOLOGY
BBt - 606 : Biosafety, Bioethics and Intellectual Property Rights
(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) Name different tools of IPR.

b) CDC.

c) What are GMOs? Give examples.

d) BSL - 2

e) How Intellectual Property should be protected?

f) Define ethics.

Q2) a) Discuss in detail objectives and basic principles of TRIPS. **[6]**

OR

Discuss legislations covering IPR in India.

b) Explain 'Principle of Beneficence'. **[4]**

Q3) a) Describe BSL and ABSL safety levels. **[6]**

OR

Describe role of EPA in regulating disinfectant.

b) What is WIPO? Describe various objectives of WIPO. **[4]**

P.T.O.

Q4) a) Describe the case study of 'Respect to Autonomy'. **[6]**

OR

Explain 'Declaration of Helsinki'.

b) IPR plays an important role in Biotechnology industry. Justify. **[4]**

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

a) Budapest Treaty.

b) BSL - 1 setup.

c) Trade secret.

d) Nuremberg code.

e) Geographical Indications.

f) Tuskegee Syphilis Study.

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