Seat No.	

Set **P**

B.Sc. (Biotechnology) (Semester - II) (New/Old) (CBCS) Examination: October/November - 2025
Metabolism (Paper - I) (BT1202)

Day & Date: Wednesday, 12-11-2025 Max. Marks: 40
Time: 09:00 AM To 11:00 AM

Instructions: 1) All questions are compulsory.
2) Figures to the right indicate full marks.
3) Draw neat and well labeled diagrams wherever necessary.

Q.1 Multiple Choice Questions. **08**

1) Aminopterin inhibits the enzyme _____.
a) dihydrofolate reductase b) Ribonucleotide reductase
c) Nucleotide kinase d) phosphoribosyl transferase

2) Triglycerides (fats) can be hydrolysed to produce glycerol and ____ fatty acids.
a) One b) two
c) three d) four

3) _____ is an enzyme complex that catalyses the synthesis of ATP.
a) ATP kinase b) ATP synthase
c) GTP synthase d) CTP synthase

4) An _____ system cannot exchange energy and mass with its surroundings.
a) Open b) isolated
c) closed d) insulated

5) _____ metabolic pathway responsible for eliminating excess nitrogen from the body.
a) Glycolysis b) TCA
c) Urea cycle d) Salvage pathway

6) Each beta-oxidation cycle produces _____, 1 NADHA + $H^+$and 1 acetyl CoA.
a) 1 $FADH_2$ b) 2 $FADH_2$
c) 3 $FADH_2$ d) 4 $FADH_2$

7) The citric acid cycle occurs in the _____ in the eukaryotes.
a) Cytoplam b) golgi apparatus
c) mitochondrial matrix d) RER

8) Complex I of ETS is also known as _____.
a) Cytochrome C oxidase
b) Succinate dehydrogenase
c) NADH ubiquinone oxidoreductase
d) Cytochrome oxidoreductase

Q.2 Answer the following question briefly. (Any Four) **08**
a) Write a note on deamination reaction.
b) Give any four examples of ketogenic amino acids.
c) Define anabolism and catabolism.
d) Write a note on significance of HMP pathway.
e) Give an account on carnitine.

Q.3 Write short notes. (Any Two) **08**
a) Biosynthesis of cholesterol.
b) Explain in detail glycogen synthesis.
c) Irreversible steps in gluconeogenesis.

Q.4 Write short notes. (Any Two) **08**
a) Describe salvage pathway.
b) Laws of thermodynamics.
c) PFK as pacemaker enzyme.

Q.5 Answer the following question. (Any One) **08**
a) Explain in detail glycolysis and its energetics.
b) Give an account on β-oxidation of palmitic acid.

Seat No.	

Set **P**

B.Sc. (Biotechnology) (Semester - II) (New/Old) (CBCS) Examination: October/November – 2025
Enzymology Paper - II (BT1203)

Day & Date: Thursday, 13-11-2025 Max. Marks: 40
Time: 09:00 AM To 11:00 AM

Instructions: 1) All questions are compulsory.
2) Draw neat diagrams and give equations wherever necessary.
3) Figures to the right indicate full marks.
4) Use of logarithmic table and calculator is allowed.

Q.1 Multiple choice questions **08**

1) Mark the CORRECT function of enzyme, Peptidase _____.
a) Cleave phosphodiester bond
b) Cleave amino bonds
c) Remove phosphate from a substrate
d) Removal of H_2O

2) Glycosidases, lipases, and proteases belong to _____ class of enzymes.
a) Hydrolases b) Ligases
c) Isomerases d) Transferases

3) Lineweaver-Burk plot is also known as _____.
a) Double reciprocal plot b) Hanes-Woolf plot
c) Eadie-Hofstee plot d) Steady-state equation

4) _____ is not a coenzyme.
a) NADH b) ATP
c) Synzyme d) NADPH

5) Enzymes that catalyze the transfer of atom or group between two molecules is known as _____.
a) Oxidoreductases b) transferases
c) ligases d) isomerases

6) SI unit of enzyme activity is _____.
a) Mol b) m/s
c) Katal d) Newton

7) Multiple forms of the same enzyme is referred to as _____.
a) Allosteric enzyme b) Biosensor
c) Isoenzyme d) Effectors

8) _____ of these is not a plasma specific enzyme.
a) Ferroxidase b) Pseudocholinesterase
c) Lipoprotein lipase d) Acid phosphatase

Q.2 Answer the following question. (Any Four) **08**

a) Define Allosteric enzymes.
b) Define Coenzymes.
c) Define Enzyme Immobilization.
d) Write short note enzyme commission number.
e) Write short note on active site of enzyme.
f) Write short note enzyme activators.

Q.3 Write short notes on the following. (Any Two) **08**

a) Non-genetic regulation of enzyme activity.
b) Lineweaver Burk plot.
c) Types of immobilizations.

Q.4 Answer the following question. (Any Two) **08**

a) Describe Michaelis-Menten equation.
b) Describe types of enzymes.
c) Describe pH and temperature affecting on enzyme activity.

Q.5 Answer the following question. (Any One) **08**

a) Define Isoenzymes explain in details lactate dehydrogenase and its application in disease diagnosis.
b) What is enzyme? Explain in details its IUB system of classification and nomenclature.

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Set **P**

B.Sc. (Biotechnology) (Semester - II) (New/Old) (CBCS) Examination: October/November – 2025
Cell Physiology (Paper - I) (BT1204)

Day & Date: Friday, 14-11-2025 Max. Marks: 40
Time: 09:00 AM To 11:00 AM

Instructions: 1) All questions are compulsory.
2) Draw neat diagrams and give equations wherever necessary.
3) Figures to the right indicate full marks.

Q.1 Multiple choice questions. **08**

1) Most cell membranes are composed principally of _____.
a) DNA and ATP b) proteins and lipids
c) chitin and starch d) nucleotides and amino acids

2) The sodium-potassium ATPase (sodium pump) is _____.
a) a symporter
b) an uniporter
c) an antiporter
d) an example of secondary active transport.

3) Which of the following is characterized by carrier-mediated transport down a chemical concentration gradient?
a) active transport b) facilitated diffusion
c) diffusion d) osmosis

4) The mode of communication between the neurons by sending electrical impulses known as _____.
a) Membrane potentials b) Neuromodulators
c) Neurotransmitters d) Action potentials

5) Steroids, a biologically active organic compound, are derived from _____.
a) Hormones b) Chemicals
c) Cholesterol d) Carbohydrates

6) Binding of cells to extracellular matrix occurs through _____.
a) Integrins b) plasmodesmata
c) cellulose d) pectin

7) Which of the following is a second messenger?
a) acetyl choline b) glycine
c) Inositol triphosphate d) Glutamate

8) _____ are clusters of intercellular channels that allow direct diffusion of ions and small molecules between adjacent cells.

a) Tight junction b) Desmosomes
c) Gap junctions d) Centromeres

Q.2 Answer the following question. (Any Four) **08**

a) Define quorum sensing.
b) Explain in brief neurotransmission.
c) Explain in brief gap junctions?
d) Differentiate between osmosis and diffusion.
e) What is stress response in microbes?
f) Define exocytosis.

Q.3 Write short notes on the following. (Any Two) **08**

a) Cell adhesion.
b) epinephrine signaling in glycogen metabolism.
c) Membrane pumps.

Q.4 Answer the following question. (Any Two) **08**

a) Cell structure and function in digestive system.
b) Vesicle trafficking.
c) Microbial Growth yield and characteristics.

Q.5 Answer the following question. (Any One) **08**

a) Membrane transport.
b) Cell structure and function in different systems.

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Set **P**

B.Sc. (Biotechnology) (Semester - II) (New/Old) (CBCS) Examination: October/November – 2025
Bioinstrumentation (Paper - II) (BT1205)

Day & Date: Saturday, 15-11-2025 Max. Marks: 40
Time: 09:00 AM To 11:00 AM

Instructions: 1) All questions are compulsory.
2) Figures to the right indicate full marks.
3) Draw neat diagrams and give equations wherever necessary.

Q.1 Multiple choice questions. **08**

1) The wavelength of visible light is within the range of _____.
a) 400-780 nm b) 240-480 nm
c) 100-240 nm d) 200-600 nm

2) Electrophoresis apparatus consist of _____.
a) Gel, buffer chamber and fire pack
b) Buffer chamber and electrophoresis unit
c) Electrophoresis unit and gel separator
d) Power pack and electrophoresis unit

3) p wave on ECG represents _____.
a) Depolarization of the atria
b) Depolarization of the ventricles
c) Represents the repolarization of the ventricles
d) Depolarization of the atria and ventricles

4) Centrifugation is based on _____.
a) Pascal's law b) Stokes law
c) Stain law d) Patrick's law

5) Biosensoris used to find concentration of _____.
a) fructose b) sucrose
c) glucose d) galactose

6) Flow cytometry uses _____.
a) Heavy isotope b) Radioactive elements
c) Immunological techniques d) Energy content

7) Western blotting is the technique for detection of _____.
a) Protein b) RNA
c) DNA d) Nucleic acid

8) Chromatography is a physical method that is used to separate and analyze ____.

a) simple mixture
b) complex mixture
c) viscous mixture
d) Metals

Q.2 Answer the following question. (Any Four) **08**

a) What is colorimeter?
b) What is the difference between agarose gel and polyacrylamide gel?
c) Why is CT SCAN used for?
d) What makes the stationery and mobile phase in TLC?
e) What is the use of thermometric biosensor is used?
f) What is the use of flow cytometry?

Q.3 Write short notes on the following. (Any Two) **08**

a) Principle and application of spectrophotometer.
b) SDS PAGE.
c) MRI SCAN.

Q.4 Answer the following question. (Any Two) **08**

a) Write down the principle and application of centrifuge.
b) What is biosensor? Explain in brief about Electrochemical biosensor.
c) What is autoradiography? Write its applications.

Q.5 Answer the following question. (Any One) **08**

a) Write in brief about care and maintenance laboratory instruments.
b) Write in brief about blotting techniques.

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Set **P**

B.Sc. (Biotechnology) (Semester - II) (New/Old) (CBCS) Examination: October/November – 2025
Tissue Culture (Paper - II) (BT1207)

Day & Date: Tuesday, 18-11-2025 Max. Marks: 40
Time: 09:00 AM To 11:00 AM

Instructions: 1) All questions are compulsory.
2) Draw neat diagrams and give equations wherever necessary.
3) Figures to the right indicate full marks.
4) Use of logarithmic table and calculator is allowed.
(At. Wts. : H=l, C=12, O=16, N= 14, Na =23, Cl = 35.5)

Q.1 Multiple choice questions. **08**

1) Tissue culture technique was first practised by _____.
a) White b) Haberlandt
c) Halperin d) Skoog

2) Name the type of culture which is prepared by inoculating directly from the tissue of an organism to culture media?
a) Primary cell culture b) Secondary cell culture
c) Cell lines d) Transformed cell culture

3) What is a cell line?
a) Multilayer culture
b) Transformed cells
c) Multiple growth of cells
d) Sub culturing of primary culture

4) In animal cell culture co2 levels in the incubators are usually maintained at _____.
a) 2% b) 5%
c) 1% d) 10%

5) The PH indicator in animal cell culture is _____.
a) HEPES b) Phenol Red
c) FBS d) L-Glutamine

6) _____ is the primary equipment required for animal tissue culture laboratories.
a) Glassware's b) Laminar flow
c) Sterilizers d) All

7) What is animal tissue culture?
- a) Growth and maintenance of animal cells
- b) Growth and selling of animal cells
- c) Only maintenance of animal cells
- d) All

8) The following are methods of sterilization EXCEPT: _____.
- a) Dry heat sterilization
- b) Autoclaving
- c) Sterilization by filters
- d) Co2 Incubator

Q.2 Answer the following question. (Any Four) **08**

a) What is the primary culture?
b) Write about the sterilization of apparatus used in animal tissue laboratories.
c) What is mean by the trypsinization?
d) Define plasma clot technique.
e) Explain the equipment required for animal tissue culture laboratory.
f) Write the characteristics of animal cell culture.

Q.3 Write short notes on the following. (Any Two) **08**

a) Establishment of cell line.
b) Trypsinization.
c) Sterilization of Media.

Q.4 Answer the following question. (Any Two) **08**

a) Write a detailed information about the establishment of cell line.
b) Write the information about equipment required for animal cell culture.
c) Write in detail answer about physiochemical property of media.

Q.5 Answer the following question. (Any One) **08**

a) Write a detail answer about methods of organ culture.
b) Explain in detail about animal tissue culture application.

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Set **P**

B.Sc. (Biotechnology) (Semester - II) (New/Old) (CBCS) Examination: October/November – 2025
Computer Science (Paper - I) (BT1208)

Day & Date: Wednesday, 19-11-2025 Max. Marks: 40
Time: 09:00 AM To 11:00 AM

Instructions: 1) All questions are compulsory.
2) Draw neat diagrams and give equations wherever necessary.
3) Figures to the right indicate full marks.

Q.1 Choose the correct alternative. **08**

1) From which menu you can insert Table?
a) Insert Menu b) View Menu
c) Format menu d) Tools Menu

2) What is the full form of www?
a) World Wide Web b) World Wise Web
c) Whole World Wide d) World Will Well

3) Which one of the following is an input device?
a) Key board b) Printer
c) Monitor d) Projector

4) In computing, _____ is information that has been translated into a form that is efficient for movement or processing.
a) Data b) Program
c) Hardware d) Software

5) _____ is a program that manages a computer's hardware and software resources, and provides services for computer programs.
a) Search engine b) Operating system
c) MS Office d) Adobe

6) Slide orientation can be changed by using _____ menu in MS PowerPoint.
a) Design Menu b) View Menu
c) Transitions menu d) Animations Menu

7) In Excel, _____ is a box in the grid of a worksheet that is the intersection of a row and a column.
a) Table b) border
c) cell d) formula

8) _____ is a worldwide system of interconnected computer networks and electronic devices that communicate with each other using an established set of protocols.

a) Computer b) Mobile
c) Internet d) LAN

Q.2 Answer the following (Any Four) **08**

a) What is the difference between Hardware and Software?
b) What is a cell in MS-Excel?
c) What for find and replace is used in Word?
d) What is binary number system?
e) Enlist Basic Components of a Digital Computer.

Q.3 Answer the following question. (Any Two) **08**

a) Explain input and output devices.
b) Explain Different types of Search engines.
c) What are bits and bytes? Explain Decimal Number System.

Q.4 Answer the following question. (Any Two) **08**

a) Discuss Types of Computers.
b) Explain Operating System with an example.
c) Discuss Uses of Internet.

Q.5 Answer the following question. (Any One) **08**

a) Give a detailed account on Basic Components of a Digital Computer.
b) Explain MS-Office and add a note on features of MS-Word.

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Set P

B.Sc. (Biotechnology) (Semester - II) (New/Old) (CBCS) Examination: October/November - 2025
Biostatistics (Paper - II) (BT1209)

Day & Date: Thursday, 20-11-2025 Max. Marks: 40
Time: 09:00 AM To 11:00 AM

Instructions: 1) All questions are compulsory.
2) Figures to the right indicate full marks.
3) Draw neat diagrams and give equations wherever necessary.

Q.1 Fill in the blanks by choosing correct alternatives: **08**

1) The mean of the data a, a, a, a will be _____.
a) Zero b) a
c) 2 d) 4

2) The mean of the square deviation about mean is known as _____.
a) Mean b) variance
c) Median d) Standard Deviation

3) If sum of 20 values is 300 then mean of the data is _____.
a) 15 b) 30
c) 20 d) 300

4) When “n” is an odd number then median is defined as _____.
a) Middle value b) Median of two middle values
c) Sum of the values d) most repeated value

5) The most frequent occurring observation is _____.
a) Mean b) Median
c) Mode d) SD

6) _____ is not measures of central tendency.
a) Correlation b) Mode
c) Mean d) Median

7) _____ is considered the founding father of biostatistics.
a) Fischer b) Karl Pearson
c) Francis Galton d) Francis Bacon

8) The name of the table is called _____
a) Body b) title
c) footnote d) Stub

Q.2 Answer the following question. (Any Four) **08**

a) What is meant by Primary data and give its example?
b) State merits of Mean.
c) Explain properties of Median.
d) Define Mean deviation with example.
e) Define 'cumulative frequency distribution' and give an example.
f) Compute the coefficient of range for data 36, 19, 75, 61, 71, 35, 23, 8, 54.

Q.3 Write short notes on the following. (Any Two) **08**

a) Explain applications of biostatistics.
b) Write a brief account on classification of Measures of central tendency.
c) Write various parts of table and its definitions.

Q.4 Answer the following question. (Any Two) **08**

a) Draw histogram from following data:

Marks	0-10	10-20	20-30	30-40	40-50	50-60	60-70
No. of students	05	07	10	15	13	10	06

b) Calculate mean from the following data:

Marks	10-20	20-30	30-40	40-50	50-60	60-70	70-80
No. of Students	10	18	20	26	30	28	18

c) Find out the median for following data:

Marks	0-10	10-20	20-30	30-40	40-50
Frequency	22	38	46	34	20

Q.5 Answer the following question. (Any One) **08**

a) Calculate standard deviation and variance for following data:

Wages in Rs.	55-65	65-75	75-85	85-95	95-105	105-115	115-125
No. of Workers	10	12	15	20	14	7	2

b) Write brief account on ANOVA.

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Set **P**

B.Sc. (Biotechnology) (Semester - III) (New) (CBCS) Examination: October/November - 2025
Genetics – I (BT1301)

Day & Date: Monday, 03-11-2025 Max. Marks: 40
Time: 09:00 AM To 11:00 AM

Instructions: 1) All questions are compulsory.
2) Figures to the right indicate full marks.
3) Draw neat & well labeled diagrams wherever necessary.

Q.1 Fill in the blanks by choosing correct alternatives (eight): 08

1) Drosophila follows _____ type of sex determination.
a) XX/XY b) ZZ/ZW
c) XX/XQ d) MM/NN

2) _____ is a small, extranuclear DNA molecule within a bacterial cell is called _____.
a) Mitochondrial DNA b) Chloroplast DNA
c) Plasmid DNA d) Plastome

3) _____ is the ratio of Supplementary gene action.
a) 9:7 b) 9:3:4
c) 12:3:1 d) 15:1

4) The diploid garden pea plant has_____ number of chromosome.
a) 7 b) 12
c) 14 d) 8

5) X- Linked human genetic disorders are more common in _____
a) Male than female b) Female than male
c) In male and female d) Only in male

6) In monohybrid cross phenotypic ratio is ___.
a) 3:1 b) 1:1:1:1
c) 9:3:4 d) 1:2:1

7) Bernstein in 1925 proposed the inheritance of _____.
a) Wings pattern in Drosophila
b) Eye pattern in Drosophila
c) Coat color in Rabbit
d) Blood type in human

8) Tetrad formation takes place in_____stage of meiosis in cell cycle.
a) Prophase b) Metaphase
c) Anaphase d) Telophase

Q.2 Answer the following questions briefly (Any Four): 08

a) Gene Interaction.
b) Alleles.
c) Plasmid.
d) Test Cross.
e) Transformation.
f) Tetrad Analysis.

Q.3 Write notes on the following: (Any Two) 08

a) Explain about Intra-allelic gene interaction with example?
b) Write a note on Allosomes?
c) Explain in brief about Linkage & Types?

Q.4 Write notes on the following: (Any Two) 08

a) Multiple alleles with example?
b) Complementary gene interaction?
c) Write a note on genetic system in Mitochondria.

Q.5 Answer the following. (Any One) 08

a) Explain in detail about the Mendelian Principles of Inheritance?
b) What is Crossing over & explain the Mechanism of Crossing over?

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Set **P**

B.Sc (Biotechnology) (Semester - III) (New) (CBCS)
Examination: October/November – 2025
Genetics-II (BT1302)

Day & Date: Tuesday, 04-11-2025 Max. Marks: 40
Time: 09:00 AM To 11:00 AM

Instructions: 1) All questions are compulsory.
2) Figures to the right indicate full marks.

Q.1 Multiple choice question: **08**

1) Number of Barr bodies in nucleus of female chromosome is _____.
a) 2 b) 1
c) 3 d) 0

2) Genes located on the loops of lamp brush chromosome is _____.
a) Holandric genes b) Sex linked genes
c) Slave genes d) Jumping genes

3) Aniridia which is the absence of the Iris of Eye occur due to _____ mutation.
a) Recessive b) Dominant
c) Lethal d) Missense

4) Crossing over does not occur in meiotic cell of _____.
a) Drosophila b) Bombay x mori
c) C, elegance d) None of the above

5) Chromonemal fibrils which can be easily separable from their coil is called _____.
a) Paranemic b) Plectonemic
c) Supercoil d) Linear coil

6) The X chromosome is placed in _____ of the Human karyotype Analysis.
a) Group B b) Group E
c) Group C d) Group D

7) Rado cabbage is an example of _____.
a) Auto polyploid b) Allopolyploid
c) Polyploid d) Aneyploid

8) The transposon Tn 9 has _____ antibiotic resistance.
a) Tetracyclin b) Chloramphenicol
c) Ampicillin d) Kanamycin

Q.2 Answer the following. (Any Four) **08**

a) Define chromatin.
b) Define SINES.
c) Define Mutagenesis.
d) Define Variance.
e) Define Translocation.
f) Define Solenoid.

Q.3 Write short notes on the following. (Any Two) **08**

a) Euchromatin.
b) Deletion
c) Karyotyping.

Q.4 Answer the following question. (Any Two) **08**

a) Write in detail about Lamp brush chromosome with neat, labelled diagram.
b) Write in detail types of Bacterial transposons.
c) Write in detail of factors affecting gene frequency.

Q.5 Answer the following question. (Any One) **08**

a) Explain mitosis with neat labelled Diagram.
b) Explain multiple factor Hypothesis.

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B.Sc. (Biotechnology) (Semester - III) (New) (CBCS) Examination: October/November - 2025
General Microbiology – I (BT1303)

Day & Date: Thursday, 06-11-2025 Max. Marks: 40
Time: 09:00 AM To 11:00 AM

Instructions: 1) All questions are compulsory.
2) Draw neat diagrams and give equations wherever necessary.
3) Figures to the right indicate full marks.

Q.1 Multiple Choice Question. **08**

1) _____ discovered Penicillin antibiotic.
a) Alexander Fleming b) Leunhook
c) Pasteur d) Linaus

2) The type of ribosome present in a prokaryotic cell is _____.
a) 25 S b) 70 S
c) 100 S d) 120 S

3) The organisms which can grow best in the presence of a low concentration of oxygen are called as _____.
a) Anaerobes b) Aerobes
c) Microaerophilic d) Aerophilic

4) The first phase of growth curve is _____.
a) log b) lag
c) decline d) Stationery

5) The famous swan-neck flask used by _____ during his studies on spontaneous generation.
a) Pasteur b) Leeuwenhoek
c) Koch d) Lister

6) What is a taxon?
a) A group of related families b) A type of living organisms
c) A group of related species d) A group of any ranking

7) An organism that can synthesize all its required organic components from CO_2 using energy from the sun is a _____.
a) Photoautotroph b) photoheterotroph
c) chemoautotroph d) chemoheterotroph

8) _____ is a treatment that frees the treated object of all living organisms.
a) Incubation b) Sterilization
c) Growth d) Digestion

Q.2 Answer the following question briefly. (Any Four) **08**

a) Write the general characteristics of Eubacteria.
b) Enlist physical agents of Sterilization.
c) Explain numerical taxonomy.
d) Define contamination.
e) What is phonetic classification?
f) Write about the contribution of Louis Pasteur.

Q.3 Write short notes on the following. (Any Two) **08**

a) Structure of Gram-positive cell wall.
b) Nutritional requirement of microorganisms.
c) Structure and function of flagella.

Q.4 Answer the following question. (Any Two) **08**

a) Pasteurization.
b) Growth curve.
c) Radiation method for sterilization.

Q.5 Answer the following question. (Any One) **08**

a) Give a comparative account on Prokaryotic and Eukaryotic microorganisms.
b) Explain structure and general characteristics of viruses.

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B.Sc. (Biotechnology) (Semester - III) (New) (CBCS) Examination: October/November – 2025
General Microbiology – II (BT1304)

Day & Date: Friday, 07-11-2025 Max. Marks: 40
Time: 09:00 AM To 11:00 AM

Instructions: 1) All questions are compulsory.
2) Draw neat diagrams and give equations wherever necessary.
3) Figures to the right indicate full marks.

Q.1 Choose the correct alternative and rewrite the sentences again. 08

1) _____ is an example of neutral stain.
a) Methylene blue b) India ink
c) Leishman Stain d) Basic fuchsin

2) Albert's staining method is used to stain _____.
a) cell membrane b) Volutin granules
c) Capsule d) cell wall

3) _____ is the example of living nutrient medium.
a) Nutrient broth b) MacConkeys agar
c) Potato Dextrose agar d) Egg

4) _____ is the main nitrogen source in the nutrient medium.
a) Peptone b) Meat extract
c) NaCl d) Agar

5) Acid and gas production by microbes can be detected in _____ containing nutrient media.
a) Peptone b) meat extract
c) NaCl d) Sugar

6) In the compound microscope, objective lenses are fixed on _____ of microscope.
a) body tube b) Condenser
c) revolving nose d) mechanical stage

7) Resolving power of light microscope is ____.
a) 2 mm b) 0.2 mm
c) 0.1 mm d) 1 mm

8) Microbes from large volume of liquid are enumerated in a single temp using _____.
a) pour plate technique b) spread plate technique
c) streak plate technique d) membrane filtration technique

Q.2 Answer in short. (Any Four) **08**

a) What is eye piece?
b) What is natural media?
c) What is pure culture?
d) What is bacterial capsule?
e) What is mordant?
f) What is oxidase?

Q.3 Write short notes on the following. (Any Two) **08**

a) Electron microscope.
b) Differential media.
c) Cell enumeration.

Q.4 Answer the following question. (Any Two) **08**

a) Explain in brief the IMViC test.
b) Describe in brief the living media.
c) Write in brief the classification of Stain.

Q.5 Answer the following question. (Any One) **08**

a) Explain in detail Gram staining.
b) Write in detail working, principle and applications of Bright Field Microscopy.

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Set P

B.Sc. (Biotechnology) (Semester - III) (New) (CBCS) Examination: October/November – 2025
Plant Biotechnology – I (BT1305)

Day & Date: Saturday, 08-11-2025 Max. Marks: 40
Time: 09:00 AM To 11:00 AM

Instructions: 1) All questions are compulsory.
2) Draw neat diagrams and give equations wherever necessary.
3) Figures to the right indicate full marks.

Q.1 Multiple choice questions **08**

1) _____ are used to analyse the various parameters of embryonic growth.
a) Adventives Embryo b) Undifferentiated Embryo
c) Inviable Embryo d) Mature Embryo

2) Greenhouse is also termed as a _____.
a) Farmhouses b) Glasshouse
c) Nursery d) Animal House

3) Haploid plants can be developed from ovary is referred as _____
a) Gynogenesis b) Androgenesis
c) Distant hybridization d) Irradiation

4) _____ are substances added to the freezing mixtures to protect cells from effect of freeze-drying.
a) Plasmolyticum b) Osmoticum
c) Cryoprotectants d) Fusagens

5) Preservation of germplasm in their natural habitat is referred as ___.
a) Germplasm preservation b) In-situ preservation
c) Ex-situ preservation d) Cryo-preservation

6) The early developmental stages of the embryo is _____.
a) Pro-embryo. b) Adventives Embryo
c) Abortive Embryo. d) Undifferentiated Embryo.

7) Haploid plants can be obtained from _____.
a) Anther culture b) Bud culture
c) Leaf culture d) Root culture

8) Plunging the frozen samples in ampoules into a warm water bath with robust swirling is termed as _____.
a) Re-culture b) Thawing
c) Storage d) Freezing

Q.2 Answer the following question. (Any Four) **08**

a) Define primary cell culture.
b) Define gynogenesis.
c) Define plant Breeding.
d) Define Explant.
e) Define haploid.
f) Define totipotency.

Q.3 Write short notes on the following. (Any Two) **08**

a) Describe advantage of greenhouse technology.
b) Describe origin Plant Biotechnology.
c) Describe aseptic manipulation.

Q.4 Answer the following question. (Any Two) **08**

a) Describe types of embryo culture with its objectives.
b) Describe embryo rescue.
c) Describe germplasm storage.

Q.5 Answer the following question. (Any One) **08**

a) Define cryopreservation, describe in detail steps involved in its method.
b) What anther culture? Explain its types in details.

Seat No.	

Set **P**

B.Sc. (Biotechnology) (Semester - III) (New) (CBCS) Examination: October/November - 2025
Plant Biotechnology - II (BT1306)

Day & Date: Monday, 10-11-2025 Max. Marks: 40
Time: 09:00 AM To 11:00 AM

Instructions: 1) All questions are compulsory.
2) Draw neat diagrams wherever necessary.
3) Figures to the right indicate full marks.

Q.1 Multiple choice questions. **08**

1) The genes responsible for T-DNA transfer are located in a separate part of the Ti plasmid called the ____.
a) Conjugation principle b) border sequences
c) vir region d) Transformation principle

2) Introduction of foreign genes into plant cells using micropipettes is _____.
a) Electroporation
b) Chemical - mediated gene transfer
c) Microinjection
d) Particle gun

3) Conversion of a substance into a product by an organism or an enzyme is called _____.
a) Biodegradation b) Biotransformation
c) Bioaugmentation d) Bioleaching

4) A fertile plant that carries an introduced gene(s) in its germ line is known as _____.
a) Transgenic plant b) Elite plant
c) Wild plant d) Tissue cultured plant

5) Hairy roots are produced due to infection by _____.
a) E. coli b) A. rhizogenes
c) A. tumefeciens d) Superbug

6) _____ is the conversion of atmospheric nitrogen (N2) into ammonia andamino acids.
a) Shikimate pathway b) Nitrogen fixation
c) Phytoremediation d) Biotransformation

7) _____ are products of plant metabolism that are not primarily related to growth and reproduction; some of these are used as pharmaceuticals, dyes, pesticides etc.

a) Amino acids b) Secondary metabolites
c) Antibiotics d) Antibodies

8) _____ is a protein-extracted from the biomass or dried cells of microorganism-s-like-algae bacteria, yeasts, and fungi.

a) Single-cell protein b) Synthetic seed
c) Therapeutic protein d) Albumin

Q.2 Answer the following question briefly. (Any Four) **08**

a) Explain vector with an example.
b) Define biotransformation.
c) What is nodulation?
d) What is VAM?
e) Explain edible vaccines with an example.
f) Explain characteristic features of Golden Rice.

Q.3 Write short notes on the following. (Any Two) **08**

a) Crop improvement, productivity, performance and fortification of agricultural product – Btbrinjal.
b) Biocontrol of phytopathogens.
c) Plant cell culture for production of secondary metabolites.

Q.4 Answer the following question. (Any Two) **08**

a) Direct method of gene transfer - Particle bombardment.
b) Single Cell Proteins.
c) Bt cotton.

Q.5 Answer the following question. (Any One) **08**

a) Discuss in detail *Agrobacterium* - mediated gene transfer.
b) Write an account on Hydroponic culture and Nutrient Film Technology.

Seat No.		Set	P

B.Sc. (Biotechnology) (Semester - IV) (New) (CBCS) Examination: October/November – 2025
Molecular Biology (Paper - I) (BT1401)

Day & Date: Monday, 03-11-2025 Max. Marks: 40
Time: 12:00 PM To 02:00 PM

Instructions: 1) All questions are compulsory.
2) Draw neat diagram and give equations wherever necessary.
3) Figures to the right indicate full marks.

Q.1 Multiple choice questions. **08**

1) What is Central Dogma of Molecular Biology?
a) DNA replication. Transcription, Translation
b) Formation of DNA from RNA
c) Protein folding
d) Structure of DNA and RNA

2) Frederick Griffith discovered: ____.
a) DNA is a genetic material
b) RNA can be the genetic material
c) Sterptococcus has two strains
d) Bacterial transformation

3) The early replication method of bacteriophage lambda involves the production of _____ form intermediates.
a) Alpha b) beta
c) gamma d) Theta

4) _____ is an enzyme that change the degree of supercoiling in DNA by cutting one or both strands.
a) DNA polymerase b) RNA polymerase
c) Topoisomerase d) Endonuclease

5) _____ is a numerical term that represents the total linking within a DNA molecule.
a) linking number b) Nucleiotide number
c) Cot curve d) Chromosome number

6) The short strand of _____ primer is required for the replication of DNA:
a) DNA b) RNA
c) Histone d) chromosome

7) DNA polymerase III holoenzyme possesses:
a) polymerase activity only
b) 3'→5' endonuclease activity
c) 3'→ 5' exonuclease activity and polymerase activities
d) 5'→ 3' exonuclease activity

8) The master regulator of the SOS repair pathway is _____.
a) RecA b) UvrABC
c) Uracyl glycosylase d) DNA polymerase V

Q.2 Answer the following question briefly. (Any Four) **08**
a) Enlist Types of RNA.
b) What is bidirectional replication?
c) Explain cot curve.
d) Write the functions of DNA polymerase.
e) Write any 2 differences between prokaryotic and eukaryotic replication.
f) What are Mutagenic agents?

Q.3 Write Short Notes on the following. (Any One) **08**
a) Griffith's experiment.
b) Watson and Crick model of DNA.
c) SOS repair mechanism.

Q.4 Answer the following. (Any Two) **08**
a) Explain the properties of genetic code.
b) Describe the rolling circle of DNA replication.
c) Write in short organization of DNA in prokaryotes.

Q.5 Answer the following. (Any One) **08**
a) What are mutagenic agents? Explain DNA Repair by Photoreactivation.
b) Explain mechanism of DNA replication in eukaryotes.

Seat No.		Set	P

B.Sc. (Biotechnology) (Semester - IV) (New) (CBCS) Examination: October/November – 2025
Immunology (Paper - I) (BT1403)

Day & Date: Thursday, 06-11-2025 Max. Marks: 40
Time: 12:00 PM To 02:00 PM

Instructions: 1) All questions are compulsory.
2) Draw neat diagrams and give equations wherever necessary.
3) Figures to the right indicate full marks.

Q.1 Choose correct alternatives: (MCQ) **08**

1) Which one of the following is not the characteristic feature of Adaptive Immunity?
a) specificity b) diversity
c) memory d) non-specific

2) T helper (T_H) cells are _____.
a) CD4+ b) CD8+
c) mIg+ d) NK+

3) Peripheral antigens are trapped in _____ (secondary lymphoid organ).
a) Bone marrow b) Thymus
c) Spleen d) Lymph node

4) _____ is any substance (usually foreign) that binds specifically to an antibody or a T-cell receptor.
a) Antibody b) Antigen
c) Immunoglobulin d) Adjuvant

5) _____ are low-molecular-weight secretory proteins that regulate the intensity and duration of the immune response by exerting a variety of effects on lymphocytes and other immune cells that express the appropriate receptor.
a) Cytokines b) Antigens
c) Immunoglobulins d) Immunogens

6) _____ Is the deposition of opsonin's on an antigen, thereby promoting stable adhesive contact with an appropriate phagocytic cell.
a) Programmed Cell Death b) Apoptosis
c) Amebiosis d) Opsonization

7) _____ is the complex of complement components C5-C9 that mediates cell lysis by creating a membrane pore in the target cell.
a) C3 convertase b) C5 convertase
c) LBP d) Membrane attack complex

8) _____ is a group of genes encoding cell-surface molecules that are required for antigen presentation to T cells and for rapid graft rejection.

a) Immunogen b) Epitope
c) hapten d) MHC

Q.2 Answer the following. (Any four) **08**

a) Explain phagocytic barrier of First line of Defense of innate immunity.
b) Enlist primary and secondary lymphoid organs.
c) Explain immunogenicity and antigenicity.
d) What is an immunoglobulin? Enlist its types.
e) Explain any 2 functions of cytokines.
f) Explain complement system.

Q.3 Answer the following. (Any two) **08**

a) Explain properties of immunogen.
b) Explain Cellular Processes in nonspecific defense mechanism - inflammation.
c) Write a general account on classical pathway of complement activation.

Q.4 Answer the following. (Any two) **08**

a) Explain the structure and functions of B lymphocyte.
b) Describe the structure of class I MHC molecule.
c) Explain properties of cytokines.

Q.5 Answer the following. (Any one) **08**

a) Discuss in detail the structure and functions of lymph node.
b) Explain in detail basic structure and biological functions of antibody.

Seat No.		Set	P

B.Sc. (Biotechnology) (Semester - IV) (New) (CBCS) Examination: October/November – 2025
Immunology (Paper - II) (BT1404)

Day & Date: Friday, 07-11-2025 Max. Marks: 40
Time: 12:00 PM To 02:00 PM

Instructions: 1) All questions are compulsory.
2) Draw neat diagrams and give equations wherever necessary.
3) Figures to the right indicate full marks.

Q.1 Multiple choice questions. **08**

1) Host defences that are mediated by antibody present in the plasma, lymph, and tissue fluids are collectively known as ____.
a) Humoral immune response b) Autoimmunity
c) Allergy d) Cancer

2) _____ antigens are processed by endocytic pathway.
a) Cytosolic b) Endogenous
c) Exogenous d) Intracellular

3) _____ is a hypersensitivity reaction that can include hay fever, asthma, serum sickness.
a) Anergy b) Allergy
c) Energy d) Enthalpy

4) _____ is an organ specific autoimmune disorder.
a) Grave's disease b) Rheumatoid Arthritis
c) Cardiac Attack d) SLE

5) _____ is an antigen-antibody interaction that aggregates particulate soluble antigens, forming a macromolecular complex that yields a visible clump.
a) Agglutination b) Hypersensitive reaction
c) Precipitation d) Solvation

6) _____ is a preparation of immunogenic material used to induce immunity against pathogenic organisms.
a) Serum b) Plasma
c) Vaccine d) Antibiotic

7) _____ vaccines are made from a protein or other small pieces taken from a killed virus or bacteria.
a) Live-attenuated b) Killed
c) Subunit d) Conjugate

8) _____ is an antigen dependent phase of B cell development.

a) maturation b) activation
c) apoptosis d) aging

Q.2 Answer the following question briefly. (Any Four) **08**

a) Differentiate between humoral and cell mediated immune response.
b) Write in brief about AIDS.
c) Define Autoimmunity.
d) Explain Hypersensitivity with an example.
e) Explain active and passive immunization.
f) Explain cross reactivity.

Q.3 Write short notes on the following. (Any Two) **08**

a) Specific and Nonspecific immunity to Bacteria.
b) Primary and secondary immune response.
c) Haemolytic autoimmune disease.

Q.4 Answer the following question. (Any Two) **08**

a) Write a comparative account on Live-attenuated and killed vaccine.
b) Explain the principle of ELISA.
c) Explain Mechanism of CTL mediated cytotoxicity.

Q.5 Answer the following question. (Any One) **08**

a) Give a detailed account on precipitation reaction of antigen-antibody complex.
b) Explain in detail Processing of Exogenous Antigens by the Endocytic Pathway.

Seat No.	

Set **P**

B.Sc. (Biotechnology) (Semester - IV) (New) (CBCS) Examination: October/November – 2025
Animal Biotechnology (Paper - I) (BT1405)

Day & Date: Saturday, 08-11-2025 Max. Marks: 40
Time: 12:00 PM To 02:00 PM

Instructions: 1) All questions are compulsory.
2) Draw neat diagrams and give equations whenever necessary.
3) Figures to right indicate full marks.

Q.1 Multiple Choice Questions: **08**

1) Pronuclear microinjections usually involve the direct transfer of DNA into the _____ of the fertilized mouse egg.
a) female pronucleus b) male pronucleus
c) both a and b d) none of these

2) _____ are also known as somatic stem cells.
a) Adult stem cells b) Cancer cells
c) Endometrial cells d) Epithelial cell

3) _____ is a cell line.
a) Multilayer culture b) Transformed cells
c) Multiple growth of cells d) Sub culturing of primary culture

4) _____ was the first mammal to be generated by nuclear transfer from an adult cell.
a) Bonnie b) Dolly
c) Morag d) Megan

5) _____ techniques is lacing bioethical issues.
a) DNA microarray b) Fluorescence activated cell
c) Sorter d) Embryonic stem cell therapy

6) _____ means that attachment to the substrate is a prerequisite for cell proliferation.
a) Anchorage dependence b) Confluence
c) Contact inhibition d) All of these

7) IVF stands for _____.
a) In vivo fertilization b) In vitro fertilization
c) In vivo fermentation d) In vitro fermentation

8) Embryonic stem cells are derived from the ____ of the blastocyst.
a) Inner cell mass b) Ectoderm
c) Blastocoel d) Mesoderm

Q.2 Attempt the following: (Any Three) **08**

a) Define viability.
b) Define transgenesis.
c) Define microinjection.
d) Define cell adhesion.
e) Define animal cell culture.

Q.3 Attempt the following: (Any Two) **08**

a) Explain Cartagena protocol on biosafety.
b) Explain Stem cell culture techniques and their applications.
c) Explain cell culture environment.

Q.4 Write note on: (Any Two) **08**

a) Types of stem cell.
b) Embryo transfer techniques.
c) Characterization of cultured cells.

Q.5 Attempt the following: (Any One) **08**

a) What is primary Cell Culture? Explain in detail about its culture techniques along with establishment.
b) What is biosafety? Explain in detail about levels of containment along with GLP and GMP.

Seat No.		Set	P

B.Sc. (Biotechnology) (Semester - IV) (New) (CBCS) Examination: October/November – 2025
Animal Biotechnology (Paper - II) (BT1406)

Day & Date: Monday, 10-11-2025 Max. Marks: 40
Time: 12:00 PM To 02:00 PM

Instructions: 1) All questions are compulsory.
2) Draw neat diagrams and give equations wherever necessary.
3) Figures to the right indicate full marks.

Q.1 Multiple choice questions **08**

1) A fertile animal that carries an introduced gene(s) in its germ line is a _____ animal.
a) hybrid b) transgenic
c) cancerous d) extinct

2) A sheep named Dolly was cloned by transfer of a _____ from a mammary (udder) cell of an adult sheep into an egg cell.
a) nucleus b) mitochondria
c) chloroplast d) nucleolus

3) _____ is the use of a gene or cDNA to treat a disease.
a) Gene cloning b) Gene therapy
c) Gene mapping d) Organ implantation

4) _____ antibody is a single type of antibody that is directed against a specific epitope (antigenic determinant) and is produced by a hybridoma cell line.
a) Pluripotent b) Multipotent
c) Polyclonal d) Monoclonal

5) The first successfully cloned animal was _____.
a) monkey b) Gibbon
c) sheep d) Rabbit

6) The Ethical, Legal, and Social Implications (ELSI) program was founded in 1990 as an integral part of the
a) Convention on Biological Diversity
b) Cartegena Protocol
c) Human Stem Cell Research
d) Human Genome Project

7) Bioethics is a field of _____.
a) Virtue ethics b) Ethics of care
c) Applied ethics d) Professional ethics

8) Transgenic mouse models for Alzheimer disease were created with transgenes that contain mutations in the _____ gene.

a) Insulin b) $\beta - amyloid\ precursor\ protien$

c) Ig d) CFTR

Q.2 Answer the following questions briefly (Any Four) **08**

a) What is Foot-and mouth disease?
b) What are Transgenic Animals? Give example.
c) Enlist vectors in gene therapy.
d) Define monoclonal antibodies.
e) Explain Bioethics.
f) How can cell cultures be used as alternative for animal models for research?

Q.3 Write notes on any two of the following. **08**

a) Describe ethical issues of genetically modified animals.
b) Explain Importance of Biotechnology in Animal diseases - Foot-and mouth disease.
c) Write a note on Gene augmentation therapy.

Q.4 Answer the following. (Any Two) **08**

a) Describe vectors in gene therapy.
b) Write a note on monoclonal antibodies production.
c) Discuss Transgenic mice model for tackling human diseases.

Q.5 Answer any one of the following. **08**

a) What is animal biotechnology? Give its application in detail.
b) Explain in detail - Gene therapy.

Seat No.		Set	P

B.Sc. (Biotechnology) (Semester - V) (New) (CBCS) Examination: October/November - 2025
English
Business English (BT1501)

Day & Date: Tuesday, 28-10-2025 Max. Marks: 40
Time: 09:00 AM To 11:00 AM

Instructions: 1) All questions are compulsory.
2) Figures to the right indicate full marks.

Q.1 Choose the correct word /phrase from the given options and complete the sentence. **08**

1) In which year Rabindranath Tagore won the Nobel Prize _____.
a) 1913 b) 1912
c) 1911 d) 1910

2) Who has written 'Ignited Minds'?
a) Dr. APJ Abdul Kalam b) Rabindranath Tagore
c) Sarojini Naidu d) Mahatma Gandhiji

3) Shakespeare lived and worked during the Reign of _____.
a) Henry - VII b) Edward - VI
c) Queen Elizabeth - I d) Mary - I

4) 'The Golden Threshold' published in the year _____.
a) 1905 b) 1904
c) 1903 d) 1902

5) The poem 'The Deserted Village ' by Oliver Goldsmith published in _____.
a) 1771 b) 1770
c) 1772 d) 1773

6) _____ has not written by D. H. Lawrence.
a) Woman in Love b) Sons and Lover
c) The Lost Girl d) The Rape of the Lucrece

7) _____ in sentence is used when the focus is on the receiver.
a) Active voice b) Doer of the action
c) Phrasal Verb d) Passive Voice

8) Phrasal Verb convey a special meaning different from the _____ of the verb.
a) Object b) Particle
c) Main Verb d) Original meaning

Q.2 Write answer in short. (Any Four) **12**

a) Why do men and women have exits and entrances in the poem of Shakespeare?

b) What did you think after reading the short story 'The Home-coming'?

c) Mention all the three visions of Dr. APJ Abdul Kalam.

d) Describe the character sketch of the Village School Master.

e) Why does poet criticize money madness?

f) What is the main theme of the poem 'The Queen's Rival'?

Q.3 Answer any one of the following questions. **10**

a) What are the 21st Century Skills? Write in detail.

OR

b) Write a detailed note on literary skills and life skills.

Q.4 Describe in detail the four C's into your own words. **10**

Seat No.	

Set **P**

B.Sc. (Biotechnology) (Semester - V) (New) (CBCS) Examination: October/November - 2025
Bioprocess Technology (BT1502)

Day & Date: Wednesday, 29-10-2025 Max. Marks: 80
Time: 09:00 AM To 12:00 PM

Instructions: 1) All questions are compulsory.
2) Draw neat diagrams and give equations wherever necessary.
3) Figures to the right indicate full marks.

Q.1 A) Select the correct alternative. **10**

1) The fermentation media whose exact chemical composition is known are called as _____ fermentation media.
   a) Semi-synthetic b) Complex
   c) Crude d) Synthetic

2) What do you mean by “Idiophase”?
   a) Production of waste materials
   b) Production of topical products
   c) Production of primary metabolites
   d) Production of secondary metabolites

3) After Centrifugation the sediment that accumulates at the bottom is called as ____.
   a) Supernatant b) Pellet
   c) Clot d) Filtrate

4) Process of extracting fermentation product from fermented broth is called as _____.
   a) Downstream process b) Solid liquid extraction
   b) Solvent recovery d) Solvent stabilization

5) Which of the following is not a product of fermentation?
   a) Oxygen b) Carbon dioxide
   c) Ethanol d) Lactate

6) Which Growth phase is usually longer in continuous culture?
   a) Lag b) Exponential
   c) Stationary d) Death

7) Fed-batch culture is a _____ culture system.
   a) Open b) Closed
   c) Isolated d) Semi-closed

8) Single Cell Protein (SCP) is the production of?
   a) Extracellular proteins
   b) Fermentation of waste products
   c) Intracellular proteins extraction
   d) Metabolites

9) What do you mean by 'Trophophase'?
   a) Production of waste materials
   b) Production of topical products
   c) Production of primary metabolites
   d) Production of secondary metabolites

10) Which of the following is an upstream process?
   a) Product recovery b) Product purification
   c) Media formulation d) Cell lysis

B) Answer in one sentence: **06**

1) Give one microbe involved in amylase production.
2) Define microbial culture.
3) State the significance of sparger.
4) Mention any one application of computer in fermentation technology.
5) Define mass transfer coefficient.
6) Define bioreactor.

Q.2 Solve any eight of the following. **16**

a) Write any two names of fermented products.
b) Give two examples of buffers used in media preparation.
c) Explain two microbial enzymes.
d) Draw neat labelled diagram of growth curve.
e) Mention any two roles of growth factors in media preparation.
f) Write any two uses of amylase.
g) Give any two applications of photobioreactor.
h) State any two significances of bioprocess technology.
i) Give two types of filtration methods.
j) Define precursors in media preparation with example.

Q.3 A) Attempt any two of the following. **10**

1) Write advantages and disadvantages of fed-batch culture.
2) Describe computer application in fermentation technology.
3) Write a note on Chronological development in fermentation industry.

B) Attempt the following. **06**

Differentiate between fed-batch and continuous culture.

Q.4 A) Attempt any two of the following. **08**

1) Write a note on product recovery.
2) Discuss in detail about principle of upstream process.
3) Explain sterilization of media.

B) Attempt the following: **08**

Explain the energy sources in fermentation media.

Q.5 Attempt any two of the following. **16**

a) Explain the factors affecting mass transfer coefficient.

b) Describe the role of inoculum and fermentation media in bioprocess technology with suitable example.

c) Discuss the construction of bioreactor and explain the significance of each part.

Seat No.		Set	P

B.Sc. (Biotechnology) (Semester - V) (New) (CBCS) Examination: October/November – 2025
Recombinant DNA Technology (BT1503)

Day & Date: Thursday, 30-10-2025 Max. Marks: 80
Time: 09:00 AM To 12:00 PM

Instructions: 1) All questions are compulsory.
2) Draw neat diagrams and give equations wherever necessary.
3) Figures to the right indicate full marks.

Q.1 A) Fill in the blanks by choosing correct alternatives. **10**

1) _____ was developed at University of California.
   a) pMB b) pBR
   c) pUC d) pBM

2) Polymerase used in PCR is extracted from _____.
   a) *Escherichia coli* b) *Vigna radiata*
   c) *Ocimum sativum* d) *Thermus acquaticus*

3) Monellin is _____ times sweeter than sucrose.
   a) 1000 b) 4000
   c) 2000 d) 3000

4) Maxam and Gilbert sequencing is also called as _____ sequencing.
   a) Chain Temination
   b) Sangers Method
   c) Denovo Sequencing
   d) Chemical Degradation Sequencing

5) Which of the following is edible vaccine _____.
   a) Golden rice b) Antigen
   c) BT brinjal d) Transgenic Potato

6) Cutting and joining of the DNA are which techniques?
   a) DNA degradation b) DNA synthesis
   c) DNA manipulation d) DNA replication

7) Which of the following is not a source of alkaline phosphatise?
   a) E. coli b) Artic shrimp
   c) Calf intestine tissue d) Calf thymus tissue

8) Which type of restriction endonuclease is used most in genetic engineering?
   a) Type I b) Type II
   c) Type III d) Type IV

9) Technique used for DNA blotting is _____.
   a) Southern Blotting b) Western Blotting
   c) Northern Blotting d) Eastern Blotting

10) _____ DNA polymerase has 5' to 3' exonuclease activity.
   a) Kornberg b) Klenew
   c) Klenow d) Cornberge

B) Define the following. **06**

1) Define probe.
2) Who developed PCR?
3) What is cosmid?
4) What is role of Kinases.
5) Explain sensescence.
6) What is a plant bioreactor?

Q.2 Solve the following. (Any Eight) **16**

a) Give 2 applications of Lambda Exonuclease.
b) Name any 2 pUC vectors commonly used.
c) What is RFLP?
d) Write a note on Flav savr tomato.
e) Criteria for selection of vector.
f) Explain in short Transformation.
g) Define Genetic engineering.
h) Write a note on DNA isolation.
i) Write a note on Alkaline Phosphatase.
j) Enlist Examples of proteins produced in animal cells.

Q.3 A) Attempt the following. (Any Two) **10**

1) Write a short note on immunological screening.
2) Give a brief about pUC vector.
3) Describe transduction.

B) Short note on Shuttle vectors **06**

Q.4 A) Attempt the following. (Any Two) **08**

1) Describe methods for direct DNA transfer.
2) Explain reverse transcriptase PCR.
3) Explain BAC vector.

B) Describe **any 2** plant vectors: **08**

Q.5 Attempt the following. (Any Two) **16**

a) Write an account on applications of Recombinant DNA Technology.
b) What is DNA sequencing? Explain one method of DNA sequencing.
c) Explain in brief about PCR.

Seat No.	

Set **P**

B.Sc. (Biotechnology) (Semester - V) (New) (CBCS) Examination: October/November – 2025
Bioinformatics (BT1504)

Day & Date: Friday, 31-10-2025 Max. Marks: 80
Time: 09:00 AM To 12:00 PM

Instructions: 1) All questions are compulsory.
2) Draw neat diagrams and give equations wherever necessary.
3) Figures to the right indicate full marks.

Q.1 A) Choose the correct alternative and rewrite the following sentences. **10**

1) _____ is an example of Homology and similarity tool.
   a) EMBOSS b) BLAST
   c) PROSPECT d) RasMol

2) SCOP stands for structural classification of _____.
   a) DNA b) Protein
   c) Carbohydrates d) Lipids

3) The information retrieval tool of NCBI GenBank is _____.
   a) Seqln b) Entrez
   c) Text search d) STAG

4) _____ database provides information on scientific literature and research publications in the field of biology.
   a) UniProt b) PDB
   c) PubMed d) GenBank

5) Primary protein sequence was analysed by using _____.
   a) RasMol b) SWISSModel
   c) SOPMA d) Protparam

6) Henikoff & Henikoff developed _____ scoring Matrices.
   a) BLOSUM b) PAM
   c) ENSEMBL d) MAP

7) Bioinformatics has been used for _____ analysis of biological queries using mathematical and statistical techniques.
   a) In situ b) In silico
   c) In vitro d) In vivo

8) The Scientists created the first Bioinformatics database is _____.
   a) Dayhoff b) Richard Durbin
   c) Michael.J.Dunn d) Pearson

9) The first secondary database developed was _____.
   a) PRINTS b) PIR
   c) PROSITE d) PDB

10) GenBank, the nucleic acid sequence database is maintained by _____.
   a) National Centre for Biotechnology Information (NCBI)
   b) European Molecular Biology laboratory (EMBL)
   c) Brookhaven laboratory
   d) DNA database of Japan (DDBJ)

B) Definition: **06**

1) Phylogenetic analysis.
2) NCB1 Bookshelf.
3) EMBL.
4) Domain.
5) Bioinformatics.
6) Databases.

Q.2 Attempt the following: (Any Eight) **16**

a) Write a note on branches of Bioinformatics.
b) What is MMDB?
c) Differentiate between Global and Local alignments.
d) Explain PubMed.
e) What is FASTA Format?
f) What is DDBJ?
g) Explain pyrimidine and purines with nomenclature.
h) What is PROSITE, Pfam?
i) What are Boolean operators and mention its importance?
j) What is Consensus sequences?

Q.3 A) Attempt the following. (Any Two) **10**

1) Explain in detail about Scope and applications of bioinformatics.
2) Discuss about Prokaryotic and eukaryotic gene prediction.
3) Add a detailed note on nomenclature code on DNA in detail.

B) Write a detailed note on NCBI: its role and resources. **06**

Q.4 A) Attempt the following. (Any Two) **08**

1) Write the application of bioinformatics.
2) Explain the methods of phylogenetic analysis.
3) Write a note on nucleic acid sequence database in detail.

B) Explain FASTA in detail. **08**

Q.5 Attempt the following. (Any Two) **16**

a) Write a detailed note on secondary and tertiary structure prediction from protein sequence.

b) Explain Multiple sequence analysis with its methods.

c) Explain methods of pairwise sequence analysis.

Seat No.	

Set **P**

B.Sc. (Biotechnology) (Semester - V) (New) (CBCS) Examination: October/November – 2025
Intellectual Property Rights (BT1505)

Day & Date: Saturday, 01-11-2025 Max. Marks: 80
Time: 09:00 AM To 12:00 PM

Instructions: 1) All questions are compulsory.
2) Draw neat diagrams wherever necessary.
3) Figures to the right indicate full marks.
4) Use of log table and calculator are allowed.

Q.1 A) Multiple Choice questions. **10**

1) _____ is the term of copyright for an author of book.
   a) 10 years b) 20 years
   c) author Life 30 Year d) author Life+60 Year

2) The use of information and ideas protected by IPR are _____.
   a) Cultural Value b) Social
   c) Commercial Value d) Moral Value

3) A company wishes to ensure that no one can use their logo.
   a) Patent b) Copyright
   c) Trade mark d) Design

4) India is not the member of _____ convention.
   a) Paris b) PCT
   c) UPOV d) Bern

5) Pre-grant Opposition can be filled by _____.
   a) Only Scientists b) Examiners
   c) Any person d) Patent officer

6) _____ is not an intellectual property law.
   a) Copyright Act, 1957 b) Trademark Act, 1999
   c) Design Act, 2000 d) Custom Act, 1962

7) Every application for a patent shall be for _____ invention only.
   a) One b) Two
   c) Three d) Four

8) Patent of addition can be filled by _____.
   a) Any person b) Inventor
   c) Assignee d) None of these

9) The headquarters of UPOV is in ____.
   a) Brazil b) Switzerland
   c) United Nation d) Africa

10) Indian patent system has _____ opposition.
   a) Pre- Grant b) post-grant
   c) Both a & b d) Publication

B) One sentence answer. **06**

1) What is UPOV.
2) What is WIPO.
3) What is Geographical Indication.
4) What is TRIPS Agreement.
5) What is Patentee.
6) What is Patent Revocation.

Q.2 Define following terms. (Any Eight) **16**

a) Enlist the territorial offices of IPR.
b) Enlist the different Conventions for IPR.
c) What is Patent Co-operation treaty.
d) Define trademark.
e) Define Infringement.
f) Define restoration.
g) Define IPR.
h) Define Plant breeders right.
i) Define surrender.
j) Define Copyright.

Q.3 A) Attempt the following: (Any Two) **10**

1) Explain about the Paris Convention.
2) Describe the rights of Patentee.
3) Explain about Compulsory License acquisition

B) What is invention? Explain the patentability criteria. **06**

Q.4 A) Attempt the following: (Any Two) **08**

1) Explain about the type of IPR.
2) Discuss about the Product patent and Process patent
3) Explain about advantages & disadvantages of IPR.

B) Explain in detail about the Plant breeders right & Farmers rights . **08**

Q.5 Attempt the following: (Any Two) **16**

a) What is patent? Explain about the procedure for registration of Patent India & abroad.
b) Explain in detail about the Patentable & Non patentable subject matters.
c) Elaborately discuss the International Treaties or Conventions

Seat No.	

Set **P**

B.Sc. (Biotechnology) (Semester - VI) (New) (CBCS) Examination: October/November - 2025
English
Business English (BT1601)

Day & Date: Tuesday, 28-10-2025 Max. Marks: 40
Time: 03:00 PM To 05:00 PM

Instructions: 1) All questions are compulsory.
2) Figures to the right indicate full marks.

Q.1 Choose the correct alternative. **08**

1) _____ was the second Prime Minister of Independent India.
a) Dr. APJ Abdul Kalam b) Lal Bahadur Shastri
c) Draupadi Murmu d) Dr. Radhakrishnan

2) Who did Akisionov meet on his way to the fair?
a) A fellow merchant b) Sun
c) Man d) His wife

3) The final stanza of the poem 'Tree at My Window' returns to the relationship between the speaker and ____.
a) Earth b) Sun
c) Convicts d) Tree

4) The poem Endless Time addressed to ____.
a) Nature b) Men
c) Women d) God

5) Robert Browning was a leading poet in the period known as ____ age of English literature.
a) Victorian era b) Romantic age
c) Metaphysical d) Elizabethan age

6) Keats belongs to the ____ generation of the romantic age.
a) First b) Second
c) Third d) Fourth

7) He felt better ____ resting for some time. (Choose the correct adverb.)
a) after b) afterwards
c) somewhere d) something

8) He wrote, "I'm waiting for my son's return from New York".
(Rewrite into reported speech)

a) He said that. Waiting for his sons return from New York.
b) He said that he will waiting for sons return from New York.
c) He said that he shall Fighting for sons return from New York.
d) He wrote that he was waiting for his son to return from New York.

Q.2 Answer the following question. (Any Four) **12**

a) Why are the voluntary restrains important for an organized society?
b) What was the major change in the character of Akisionov?
c) How does the poem convey the urgency and value of time in the poem 'Endless Time'?
d) Describe the personality of the Duchess.
e) What is the main theme of 'Tree at My Window'? And its relation to human experience.
f) What objects of nature does mention as a source of joy?

Q.3 Answer the following question. (Any One) **10**

a) Define literary skill in your own words. Give two uses of information literacy, media literacy and technology literacy.
b) There has been a spate of car robberies in your locality, give three steps that you would take as a civically literate person and as a leader.

Q.4 Answer the following question. **10**

Discuss in details life skills.

Seat No.	

Set **P**

B.Sc. (Biotechnology) (Semester - VI) (New) (CBCS) Examination: October/November - 2025
Bio-Analytical Tools (BT1602)

Day & Date: Wednesday, 29-10-2025 Max. Marks: 80
Time: 03:00 PM To 06:00 PM

Instructions: 1) All questions are compulsory.
2) Draw neat diagrams and give equations wherever necessary.
3) Figures to the right indicate full marks.
4) Use of logarithmic table and calculator is allowed.
(At. Wts.: H=1, C=12, O=16, N=14, Na=23, C1=35.5)

Q.1 A) Choose the correct alternative and rewrite the following sentences. **10**

1) Electrophoresis was developed by ____.
   a) Tiselius b) Tswett
   c) Tsvedberg d) Sanger

2) In hybridizing bands be located on ____.
   a) Autoradiography b) Infrared radiation
   c) Radiography d) UV radiation

3) The electrodes used in pH measurement ____internal resistances.
   a) No resistance b) Very low resistance
   c) Moderate resistance d) Very high resistance

4) The polymerization of the gel used in PAGE occurs between polyacrylamide and ____.
   a) N, N-acrylamide b) N, N-methylene bisacrylamide
   c) Bisacrylamide d) N- methylenearcylamide

5) Blotting describes the ____ of nucleic acids.
   a) Immobilization b) Monitoring
   c) Comparison d) Racing

6) Pulse field gel electrophoresis separates DNA molecules of size ____.
   a) 20 – 30 Kb b) 30 – 50 Kb
   c) 40 – 50 bp d) 10 – 20 bp

7) ____ is not a column-type of liquid chromatography.
   a) Paper Chromatography b) Liquid-Solid Chromatography
   c) Ion Chromatography d) Affinity Chromatography

8) Density gradient centrifugation is used to ____.
   a) To remove large particles
   b) To remove fine particles
   c) To remove dirt
   d) To purify viruses, ribosomes, membranes

9) Chromatography is a physical method that is used to separate and analyze _____.
   a) Complex mixtures b) Viscous mixtures
   c) Metals d) Simple mixtures

10) Gel electrophoresis separates nucleic acid molecules based on _____
   a) nature of the molecules i.e. whether DNA or RNA
   b) size of the molecules
   c) chemical properties of the nucleic acids
   d) charge on molecules

B) Fill in the Blanks/Definitions/One Sentence answer/ One word answer/Give the name etc. **06**

1) Autoradiography
2) pH Meter
3) Blotting
4) Chromatography
5) Spectroscopy
6) Electrophoresis

Q.2 Answer any eight of the following. **16**

a) Define immuno- electrophoresis.
b) What is Emission?
c) Enlist Errors in pH measurement.
d) Define Acids and Bases.
e) Define isoelectric focusing.
f) Explain Ultracentrugation.
g) Define pH indicators.
h) Define turbidometry.
i) What is nephelometer?
j) Define column chromatography.

Q.3 A) Write short notes on any two of the following. **10**

1) Discuss in detail about gas chromatography.
2) Add a note on Principles of Beer - Lambert's Law.
3) Explain Dissociation of acids and bases.

B) Write short note. **06**

Add a detailed note on Agarose gel electrophoresis and give its application.

Q.4 A) Answer any two of the following. **08**

1) Discuss about Atomic absorption spectroscopy.
2) Add a note on pulse field gel electrophoresis.
3) Write a note on pH indicators.

B) Answer the following: **08**

Discuss in detail about native and SDS PAGE electrophoresis with its application.

Q.5 Answer any two of the following: **16**

a) Explain in detail about Dot Blot technique.
b) Add a detailed note on affinity and ion exchange chromatography.
c) Discuss in detail about Nothern Blotting.

Seat No.	

Set **P**

B.Sc. (Biotechnology) (Semester - VI) (New) (CBCS) Examination: October/November – 2025
Genomics and Proteomics (BT1603)

Day & Date: Thursday, 30-10-2025 Max. Marks: 80
Time: 03:00 PM To 06:00 PM

Instructions: 1) All questions are compulsory.
2) Draw neat diagrams and give equations wherever necessary.
3) Figures to the right indicate full marks.
4) Use of logarithmic table and calculator is allowed.
(At. Wts.: H=1, C=12, O=16, N=14, Na=23, Cl=35.5)

Q.1 A) Choose the correct alternative and rewrite the following sentences. **10**

1) The full form of SDS-PAGE is _____.
   a) Sulphate Dodecyl Sulfate- Polyacrylamide Gel Electrophoresis
   b) Silicon Dodecyl Sulfate- Polyacrylamide Gel Electrophoresis
   c) Sodium Dodecyl Sulfate- Polyacrylamide Gel Electrophoresis
   d) Sodium bicarbonate Dodecyl Sulfate-Polyacrylamide Gel Electrophoresis

2) ____ is a branch of science that classifies organisms based on genetic differences, using data from hereditary material to understand evolutionary relationships and genetic relatedness.
   a) Physical taxonomy b) Molecular taxonomy
   c) Chemical taxonomy d) All of the above

3) Sequencing of genomic DNA is included in ____.
   a) Structural genomics b) Phenotypic function
   c) Molecular function d) Cellular function

4) ____ project started in January 2008.
   a) 1000 genome project b) The ENCODE Project
   c) Human genome project d) None of the above

5) ____ is used to characterized the 3D structure of every protein encoded by a genome.
   a) Functional genomics b) Structural genomics
   c) Comparative genomics d) All of above

6) Hemophilia is caused by ____.
   a) Bacteria b) Genetic mutation
   c) Cause unknown d) Virus

7) The effects of protein on an entire organism is described in ____
   a) Structural genomics b) Phenotypic function
   c) Molecular function d) Cellular function

8) The term genomics was coined by ____.
   a) Thomas Roderick b) James Watson
   c) Francis Collins d) William Bateson

9) ____ aimed to map human genetic variation, specifically the patterns of DNA sequence variation (haplotypes) across different populations.
   a) The Hap Map Project b) 1000 genome project
   c) The ENCODE Project d) The Human Genome Project

10) ____ caused by a mutation in the hemoglobin gene, leading to abnormal red blood cells that are crescent-shaped and less flexible, affecting oxygen transport.
   a) Thalassemia b) Sickle Cell Anemia
   c) Hemophilia d) All of the above

B) Fill in the Blanks/Definitions/One Sentence answer/ One word answer/Give the name etc. **06**

1) Genome.
2) Inheritance.
3) DNA.
4) IEF.
5) Scientific name of Human.
6) Ribosome.

Q.2 Answer the following. (Any Eight) **16**

a) Enlist Computer Tools for Sequencing.
b) What is the aim of Human Genome Project.
c) Define HapMap Project.
d) Define toxicology.
e) Discuss about ENCODE Project.
f) Define Proteomics.
g) What is Genome diversity?
h) Define sequencing
i) Define glycobiology
j) Define Genomics.

Q.3 A) Write short notes on the following. (Any Two) **10**

1) Define omics and explain its importance.
2) Add a note on Analysis of Human genome.
3) Explain proteomics in plant breeding.

B) Write Short Note on the following: **06**

1) Explain in detail about RNA and DNA World.

Q.4 A) Answer the following. (Any Two) **08**

1) Explain significance of bacterial genome.
2) Discuss about Application of proteome analysis in drug development.
3) Write a note on Molecular diagnosis of human genetic diseases: Hemophilia.

B) Answer the following: **08**

1) Add a detailed note on applications of Genomics and proteomics.

Q.5 Answer the following. (Any Two) **16**

a) Explain Clone counting method and whole -genome shotgun sequencing.
b) Explain in detail about 1000 genome project.
c) Explain in detail 2-DE gel electrophoresis coupled with mass spectrometry.

Seat No.	

Set **P**

B.Sc. (Biotechnology) (Semester - VI) (New) (CBCS) Examination: October/November – 2025
Evolutionary Biology (BT1604)

Day & Date: Friday, 31-10-2025 Max. Marks: 80
Time: 03:00 PM To 06:00 PM

Instructions: 1) All questions are compulsory.
2) Draw neat diagrams and give equations wherever necessary.
3) Figures to the right indicate full marks.

Q.1 A) Fill in the blanks by choosing correct alternatives. **10**

1) Theory of Biogenesis is proposed by ____.
   a) Charles Waluin b) Lamarck
   c) Louis Pasture d) Thales

2) Paleontological evidences for evolution refers to the ____.
   a) Development of embryo b) Homologous organs
   c) Fossils d) Analogous organs

3) ____ Condition can be explained by Lamarkism.
   a) How giraffes got long neck
   b) How humans lost their tail
   c) How humans become bipedal
   d) All of the above

4) Evolution is a ____ process.
   a) Quick b) Stochastic
   c) Slow d) Fast

5) The earliest geological time period among the following is ____.
   a) Quaternary b) Permian
   c) Jurassic d) Cambrian

6) The last common ancestor of human is ____.
   a) Pan troglodytes b) homo neanderthalensis
   c) Lemuroided d) Dromalosourus

7) The force that initiates evolution is ____.
   a) Variation b) Mutation
   c) Extinction d) Adaptation

8) _____ is the evolution of geographically adjacent populations into distinct species.
   a) Allopatric b) Parapatric speciation
   c) Sympatric Speciation d) Heteropatric

9) An insect stuck in amber is an example of ___ types of fossil.
   a) Original remains b) Mold
   c) Trace d) Cast

10) The organs which were Functional in the ancestors but nonfunctional in descendants are called ____.
   a) Analogous organs b) Atavistic organs
   c) Vestigial organs d) Connecting links

B) Define the following: **06**

1) Define Darwinism.
2) Define Chemogeny.
3) Define Anagenesis.
4) Define fossils.
5) Define species
6) Define Extinction.

Q.2 Solve the following. (Any Eight) **16**

a) Write 2 examples of primates with their characters.
b) Write 2 examples of globin gene family with their importance.
c) What is genetic drift?
d) Write a note on parapatric speciation.
e) Give any two sources of variation and explain.
f) Explain in short Clines.
g) Define Dryopethecus.
h) Write a note on Organic Revolution.
i) Write a note on Neodarwinism.
j) What is petrified fossils and its importance.

Q.3 A) Attempt the following. (Any Two) **10**

1) Write a short note on industrial melanism.
2) Write briefly on contribution of Lamarck and theory of Lamarckism.
3) Describe K-T mass extinction.

B) Short note on microevolution. **06**

Q.4 A) Attempt the following. (Any Two) **08**

1) Describe the contribution of ‘S. Miller’ in brief.
2) Give a brief account on geological timescale.
3) Explain Macroevolution in detail.

B) Describe speciation and modes of speciation. **08**

Q.5 Attempt the following. (Any Two) **16**

a) Give a brief account on theories of evolution.
b) Describe the causes and effects of mass extinction.
c) Explain in detail why evolutionary studies are done on mitochondria DNA in humans.

Seat No.	

Set **P**

B.Sc. (Biotechnology) (Semester - VI) (New) (CBCS) Examination: October/November – 2025
Environmental Biotechnology (BT1605)

Day & Date: Saturday, 01-11-2025 Max. Marks: 80
Time: 03:00 PM To 06:00 PM

Instructions: 1) All questions are compulsory.
2) Draw neat diagrams and give equations wherever necessary.
3) Figures to the right indicate full marks.

Q.1 A) Multiple choice questions. **10**

1) _____ offers several advantages over conventional fuels.
   a) Coal b) Firewood
   c) Natural gas d) Bioethanol

2) ____ fuels, like fossil fuels (oil, coal, and natural gas), have several disadvantages including environmental pollution, climate change, and resource depletion.
   a) Conventional b) Modern
   c) Biogas d) Gasohol

3) ____ uses the roots (or stems and leaves) of plants to absorb, enrich, degrade and/or immobilize pollutants from soil and water.
   a) Mycoremediation b) Zooremediation
   c) Phytoremediation d) microbial remediation

4) ____ plastics are inexpensive, recyclable, more stable.
   a) High-density polyethylene b) Low-density polyethylene
   c) Polystyrene d) Nylon

5) _____ are also called as “microinoculants.”
   a) Biosurfactants b) Biofertilizers
   c) Refract ants d) Stabilizers

6) _____ is a free-living nitrogen fixing bacteria.
   a) Anabaena-Azolla b) Azotobacter
   c) Rhizobium d) Frankia

7) Use of microbial approaches for the recovery of base and valuable metals is known as ____.
   a) Bioremediation b) Mycoremediation
   c) Zooremediation d) Bioleaching

8) Environment Protection Act, a primary piece of legislation in India aimed at protecting and improving the environment, came in to play from ____ year.
   a) 1986 b) 1947
   c) 1960 d) 2025

9) ____ is not a method of biological waste treatment.
   a) Composting
   b) Bio methanation
   c) Mechanical-Biological treatment
   d) Incineration

10) ____ is a Phosphate-solubilizing bacteria.
   a) Rhizobium b) Azotobacter
   c) *Bacillus subtilus* d) Azospirillum

B) One sentence answer. **06**

a) Define gasohol.
b) Define biogas.
c) Name herbicides.
d) What are Cyanobacteria?
e) What do you mean by VAM?
f) What are genetically modified microbes?

Q.2 Solve the following. (Any Eight) **16**

a) According to the Waste Management Rules, 2016, name the three streams by which waste generators shall segregate and store the waste.
b) Enlist Conventional fuels.
c) What is Mycoremediation?
d) What is Biomedical waste?
e) Define bioleaching.
f) Write about Environment Protection Act.
g) What is Radioactive waste?
h) Differentiate between symbiotic and asymbiotic nitrogen fixing bacteria.
i) Write about Industrial Effluents.
j) Define bioremediation.

Q.3 A) Attempt the following: (Any Two) **10**

a) Describe Biomedical waste management.
b) Write Rules and regulations of Environment Protection Act (EPA).
c) Write a note on the types and chemistry of bioleaching.

B) Write a note on Phytoremediation. **06**

Q.4 A) Attempt the following: (Any Two) **08**

a) Explain Conversion of sugars, agriculture, and food industry waste to alcohol Gasohol.

b) Write the role of fungal and algal biofertilizer enhancement of soil fertility.

c) Describe brief microbial hydrogen production.

B) Explain in detail Role of Microorganisms in process and production of Biogas **08**

Q.5 Attempt the following: (Any Two) **16**

a) Describe in detail methods of treatment of industrial effluents.

b) Write a brief account on the use of genetically modified organisms for environmental cleanup.

c) Write a brief account on Bioremediation.

Seat No.	

Set **P**

B.Sc. (Biotechnology) (Semester - VI) (New/Old) (CBCS)
Examination: October/November - 2025
Bio-Analytical Tools (BT602)

Day & Date: Wednesday, 29-10-2025 Max. Marks: 80
Time: 03:00 PM To 06:00 PM

Instructions: 1) All questions are compulsory.
2) Figures to the right indicate full marks.

Q.1 A) Choose the correct alternative and rewrite the following sentences. **10**

1) ____ ion get released from the cation exchange column.
   a) Na+ b) H+
   c) Ca+2 d) K+

2) ____ type of gel is used for large nucleic acids.
   a) cellulose b) acrylamide
   c) agarose d) sephadex

3) _____ is not an advantage of Syringe type pumps used in High pressure liquid chromatography.
   a) Unlimited solvent capacity b) Independent of viscosity
   c) High pressure capability d) Pulse-less flow

4) The purpose of using bromophenol blue in the sample buffer is ____.
   a) To monitor the electrophoretic run.
   b) To ionize the sample.
   c) To act as standard control.
   d) To adjust the pH of sample.

5) ____ is used to lyse the nucleus and release the DNA.
   a) sodium dodecyl sulfate b) fluorine
   c) ferric phosphate d) ammonium sulfate

6) Gas-solid chromatography is used for the separation of ____.
   a) Volatile organic components
   b) Low molecular weight gaseous species
   c) Thermally stable inorganic components
   d) Thermally stable organic components

7) In purification steps of nucleic-acids, phenol is used for ____.
   a) deproteinization b) denaturation
   c) lowering viscosity d) lowering pH

8) ____ is called heat radiation.
   a) Microwave b) Infrared radiation
   c) X-rays d) Gamma rays

9) Differential centrifugation is based on the differences in ____ of biological particles of different ____.
   a) Size, structure.
   b) Mass, size.
   c) Size, density.
   d) Sedimentation rate, sizes and density.

10) Beer Lambert's law gives the relation between ____.
   a) Reflected radiation and concentration
   b) Energy absorption and concentration
   c) Energy absorption and reflected radiation
   d) Scattered radiation and concentration

B) Define the following: **06**

1) Absorption
2) Isopycnic Centrifugation
3) Bases
4) Nephalometer
5) Chromatography
6) Electromagnetic wave

Q.2 Solve any eight of the following. **16**

a) Isoelectric focusing
b) Atomic absorption spectroscopy (AAS)
c) Rotational UV-visible spectroscopy
d) Pulse field gel electrophoresis
e) Dissociation of acids and bases
f) pH indicators
g) Turbidometer
h) Rate-Zonal Centrifugation.
i) Define Lambert & beers law.
j) Write a note on dot blot technique.

Q.3 A) Attempt any two of the following: **10**

1) Explain agarose-gel electrophoresis.
2) Write a note on construction and working of colorimeter.
3) Discuss in detail about HPLC.

B) Short Note/Solve: **06**

Explain principle and working of Southern blotting.

Q.4 A) Attempt any two of the following. **08**

1) Explain Beer - Lambert's Law.
2) Add aa note on IR spectroscopy.
3) Write a note on Gas chromatography.

B) Describe / Explain /Solve: **08**

Describe in detail about polyacrylamide gel Electrophoresis (Native and SDS page).

Q.5 Attempt any two of the following: **16**

a) Write a detailed note on Thin Layer Chromatography.

b) Discuss principle and working of Northern blotting.

c) Explain principle, construction and working of pH meter.

Seat No.	

Set **P**

B.Sc. (Biotechnology) (Semester - VI) (New/Old) (CBCS)
Examination: October/November – 2025
Genomics and Proteomics (BT603)

Day & Date: Thursday, 30-10-2025 Max. Marks: 80
Time: 03:00 PM To 06:00 PM

Instructions: 1) All questions are compulsory.
2) Draw neat diagrams and give equations wherever necessary.
3) Figures to the right indicate full marks.

Q.1 A) Choose the correct alternative and rewrite the following sentences. **10**

1) The polymerization of the gel used in PAGE occurs between polyacrylamide and ____.
   a) N, N – acrylamide
   b) Bisacrylamide
   c) N, N–methylene bisacry lamide
   d) N-methyleneacrylamide

2) ____ is a trait of X-linked recessive.
   a) Huntington's disease b) Haemophilia
   c) Albinism d) None of these

3) The shotgun approach ____ sequences clones from_____ of cloned DNA.
   a) randomly, both ends b) randomly, one end
   c) specifically, one end d) specifically, both ends

4) The identification of drugs through the genomic study is called ____.
   a) Genomics b) Cheminformatics
   c) Pharmacogenetics d) Pharmacogenomics

5) Chain-termination is a type of ____.
   a) Vector generation b) Sequencing
   c) Antibiotic production d) Gene manipulation

6) Short DNA sequence having single occurrence in genome is ____.
   a) YAC b) Expressed sequence tag
   c) Sequence tagged site d) Contig

7) ____ biomolecule is distributed more widely in a cell.
   a) Spaherosomes b) DNA
   c) RNA d) Chloroplast

8) Proteomics refers to the study of ____.
   a) The entire set of expressed proteins in the cell
   b) Set of proteins in a specific region of the cell
   c) Biomolecules
   d) Set of proteins

9) Micro-molecules of the tissues are also known as ____.
   a) Biomolecules b) Nanoparticles
   c) Biomacromolecules d) bio compounds

10) the human genome contains approximately ____.
   a) 6 billion base pairs b) 4 billion base pairs
   c) 3 billion base pairs d) 5 billion base pairs

B) Fill in the blanks. **06**

1) Electrophoresis is used for ____.
2) The term genomics coined by ____.
3) ____ purine bases is present in RNA.
4) The entire set of proteins that is produced or modified by an organism or system is called ____.
5) ____ project is to determine the common patterns of DNA sequence variation in the human genome and to make this information freely available in the public domain.
6) The biological variation that occurs within species is ____.

Q.2 Attempt the following: (Any Eight) **16**

a) What is 2DE.
b) Define Genomics.
c) Define ENCODE Project.
d) Define sequencing.
e) Define Genome diversity
f) Define Molecular taxonomy
g) What is omics?
h) Define macromolecule.
i) Define Nucleotide.
j) Define mass spectrometry.

Q.3 A) Attempt the following: (Any Two) **10**

1) Discuss about Human genome project.
2) Explain about genome shotgun sequencing.
3) Add a note on Molecular diagnosis of human genetic diseases: Sickle cell anemia.

B) Write a note on Detecting proteins in Polyacrylamide gels. **06**

Q.4 A) Attempt the following. (Any Two) **08**

1) Write a detailed note on RNA world and DNA world.
2) Explain in brief about Analysis of Plasmodium falciparum Genomes.
3) Add a note on Two -dimensional polyacrylamide gel electrophoresis.

B) Explain in detail about General features and importance of omics. **08**

Q.5 Answer the following: (Any Two) **16**

a) Explain in detail about Mass spectrometry-based methods for protein identification.

b) Define and explain Application of proteome analysis.

c) Add a detailed note on 2-DE gel electrophoresis coupled with mass spectrometry.

Seat No.	

Set **P**

B.Sc. (Biotechnology) (Semester - VI) (New/Old) (CBCS)
Examination: October/November – 2025
Evolutionary Biology (BT604)

Day & Date: Friday, 31-10-2025 Max. Marks: 80
Time: 03:00 PM To 06:00 PM

Instructions: 1) All questions are compulsory.
2) Draw neat diagrams and give equations wherever necessary.
3) Figures to the right indicate full marks.
4) Use of logarithmic table and calculator is allowed.

Q.1 A) Multiple choice questions. **10**

1) Heredity or inheritance of specific traits become clearer due to ____.
   a) Lamarck's Theory b) Mendel theory
   c) Darwinism's d) Neo-Darwinism

2) Micro -evolution takes place due to ____.
   a) Somatogenic variation b) Blastogenic variation
   c) Continuous variation d) Inorganic salts

3) The differences between Homo-sapiens and Homo-erectus was ____.
   a) Homo-sapiens originated in Africa while Homo-erectus was Asia
   b) Homo-erectus where much smaller in size than Homo- sapiens
   c) Homo-erectus stayed in Africa while Homo-sapiens didn't
   d) The size of their brain of Homo-erectus was smaller to Homo-sapiens

4) ____ was a predecessor of Darwin developed theory or acquired characters.
   a) Weismann b) Mendel
   c) Malthus d) Lamarck's

5) Which of this not a living fossils ____.
   a) Frog b) Archaeoptery
   c) Lung fish d) Duck billed

6) Human Being belong to species of ____.
   a) Homo-erectus b) Habills
   c) Homo-sapiens d) Hominidae

7) Link between organisms that show branding pattern of ____.
   a) Living fossils b) Comparative embryology
   c) Phylogenic tree d) Two fossils layer

8) Which of the following is not source variation in population.
   a) Inherited genetic differences
   b) Due to health
   c) Age
   d) None of these

9) The surface temperature of the sun is ____.
   a) 6000°c b) 9000°c
   c) 1000°c d) 10,000°c

10) The First formed organism (Ribo-organism) used only ____ for catalyzing reaction.
   a) DNA b) Amino acid
   c) RNA d) Fatty acid

B) Fill in the blank/Definition/One sentence answer /one word answer /Give the name /predict the product etc. **06**

1) Define Evolution.
2) Explain Chemogeny.
3) Geological time scale.
4) Origin of man.
5) Define living fossils.
6) Gene flow.

Q.2 Solve the following. (Any Eight) **16**

a) Write note on Invagination of theory.
b) Write note on Chemo heterotrophs.
c) Explain in brief sympatric modes of speciation.
d) Describe on Clines.
e) Explain in brief Micro evolutionary changes.
f) What is the organic evolution?
g) Genetic code.
h) Explain in brief Protein Translation.
i) Any two examples of globin gene family.
j) Explain in brief Invagination theory.

Q.3 A) Attempt the following. (Any Two) **10**

a) Explain Natural Selection.
b) Describe on Primate phylogeny.
c) Describe Briefly Mass extinctions.

B) Short note/Solve. **06**

Lamarckism with example.

Q.4 A) Attempt the following. (Any Two) **08**

a) Write Protein synthesizing machinery.
b) Explain evolution of horse.
c) Write Heritable changes.

B) Describe /Explain /Solve. **08**

Synthetic theory of evolution of Eukaryotic cell.

Q.5 Attempt the following. (Any Two) **16**

a) Describe in detail Theories of evolution.

b) Explain in detail Modes of speciation.

c) Describe in detail Origin of man.

Seat No.	

Set **P**

B.Sc. (Biotechnology) (Semester - VI) (New/Old) (CBCS)
Examination: October/November – 2025
Environmental Biotechnology (BT605)

Day & Date: Saturday, 01-11-2025 Max. Marks: 80
Time: 03:00 PM To 06:00 PM

Instructions: 1) All questions are compulsory.
2) Draw neat diagrams and give equations wherever necessary.
3) Figures to the right indicate full marks.

Q.1 A) Fill in the blanks by choosing correct alternatives. 10

1) ____ is conventional non-renewable energy resource.
   a) Natural gas b) geothermal energy
   c) Biogas d) Solar energy

2) Gasohol is a mixture of ____.
   a) gasoline and methanol b) gasoline and ethanol
   c) gasoline and propanol d) ethanol and methanol

3) ____ is the process of usage of microbes to destroy environmental pollutants.
   a) Bio-augmentation b) Bio composting
   c) Bioremediation d) Biodegradation

4) ____ is not used as a bio-fertilizer.
   a) Bacteria b) Algae
   c) Cyanobacteria d) Fungi

5) Oxygen is not produced during photosynthesis by ____.
   a) Green Sulphur bacteria b) Cycas
   c) Nostoc d) Chara

6) The heavier inert matter in waste water is called as ____.
   a) Debris b) Wastes
   c) Screens d) Grits

7) Nitrification efficiency is significantly suppressed as the temperature is ____.
   a) Increased b) Maintained
   c) Neutral d) Decreased

8) Microbially catalyzed redox reaction leads to metal ____.
   a) Reduction b) Immobilization
   c) Mobilization d) Oxidation

9) Environment Protection Act was passed in the year ____.
   a) 1986 b) 1984
   c) 1982 d) 1988

10) ____ is the most commonly used bacteria for bioleaching.
   a) Spirillum b) Coccus
   c) Bacillus d) Streptococcus

B) Define the following: **06**

1) Modern fuel.
2) Pesticide.
3) Biofertilizer.
4) Cyanobacteria.
5) Genetically modified organisms.
6) My core mediation.

Q.2 Solve the following: (Any Eight) **16**

a) What is Gasohol and what is the source of it?
b) What is phytoremediation?
c) What is Radioactive waste?
d) Give an example symbiotic and asymbiotic nitrogen fixing bacteria each.
e) Give examples of any two genetically modified plants that are used for environment clean-up.
f) Which microorganisms are used for bioleaching copper?
g) Write down the steps of treatment of Industrial effluents.
h) How is Glyphosate harmful to environment?
i) List out the microorganisms used for biodegradation of lignin and cellulose.
j) Draw a neat, labelled diagram of Biogas plant.

Q.3 A) Attempt the following: (Any Two) **10**

1) Write a note on impact of conventional fuel on environment.
2) Write a note on Gasohol production.
3) Describe about bioremediation of water contaminated with oil spills, heavy metals and detergents

B) Describe in brief about microbial hydrogen production. **06**

Q.4 A) Attempt the following. (Any Two) **08**

1) Describe about bioremediation of petroleum products.
2) Write a note on Algal and fungal biofertilizers.
3) Write a note type and chemistry of bioleaching.

B) Write an account on Environment Protection Act (EPA) **08**

Q.5 Attempt the following: (Any Two) **16**

a) Write a brief account on Bioremediation.

b) Write a brief account on bioleaching.

c) Write a brief account on use of genetically modified organisms for environmental clean-up.