

Satyug Darshan Institute of Engineering & Technology, Faridabad

Department of Computer Science and Engineering

Academic year 2025-26

Programme: B.Tech	Year & Semester: 2025-sem 5
Course Name: Biology	Course Code: BSC-01
Prepared by: Dr. Mansi Rastogi	

Unit I

Short answer questions

Q.N.	Question	KL
1	Define science and engineering. State one fundamental difference between them.	KL1
2	Mention two differences between the human eye and a camera.	KL2
3	State how bird flight differs from the working of an aircraft.	KL2
4	What is Brownian motion? Name the scientist who observed it.	KL1
5	Why is biology considered an independent scientific discipline?	KL2

Long answer questions

Q.N.	Question	KL
1.	Who discovered Brownian motion, and what is its scientific significance?	KL1
2.	How did Julius Mayer's observation contribute to the origin of thermodynamics?	KL2
3.	Define the term hierarchy of life forms and mention its major levels.	KL1
4.	What is the difference between prokaryotic and eukaryotic organisms based on cellular structure?	KL1
5.	Give one example each of model organisms used in biological studies and mention their importance.	KL1

Unit II

Short answer questions

Q.N.	Question	KL
1	Define the hierarchy of life forms at the phenomenological level.	KL1
2	What is the common thread that weaves together the hierarchy of life forms?	KL2
3	Differentiate between unicellular and multicellular organisms with one example each.	KL2
4	What is molecular taxonomy? Name the three major domains of life.	KL1
5	Name any two model organisms used in biological research and mention one reason for their selection.	KL1

Long answer questions

Q.N.	Question	KL
1	Describe the hierarchy of life forms at the phenomenological level and explain the common thread that connects all levels of biological organization.	KL3
2	Discuss biological classification based on cellularity, ultrastructure, energy and carbon utilization, ammonia excretion, and habitat with suitable examples.	KL3
3	Explain molecular taxonomy and discuss the three major domains of life, highlighting their distinguishing features.	KL3
4	Explain how a single organism can be placed into different categories based on various classification criteria, with suitable examples.	KL4

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5	Discuss the importance of model organisms in biological research, citing examples such as <i>E. coli</i> , <i>S. cerevisiae</i> , <i>D. melanogaster</i> , <i>C. elegans</i> , <i>A. thaliana</i> , and <i>M. musculus</i> .	KL3
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Unit-III

Short answer questions

Q.N.	Question	KL
Q. No.	Question	Knowledge Level (KL)
1	State Mendel's laws of inheritance.	KL1
2	Define the terms allele, dominance, and recessiveness.	KL1
3	What is the law of segregation and why is it important in inheritance?	KL2
4	What is gene mapping? Mention its significance in genetics.	KL2
5	Define epistasis and give one example.	KL2

Long answer questions

Q.N.	Question	KL
1	Explain how Mendel's laws form the foundation of genetics and justify the statement, "Genetics is to biology what Newton's laws are to physical sciences."	KL4
2	Discuss the role of meiosis and mitosis in inheritance, emphasizing how genetic material is transmitted from parent to offspring rather than the mechanics of cell division.	KL3
3	Explain gene interaction and epistasis with suitable examples and discuss how they modify Mendelian inheritance patterns.	KL3
4	Discuss the concept of mapping phenotypes to genes and explain the principles of gene mapping with suitable examples.	KL3
5	Discuss single-gene disorders in humans and explain how the concept of complementation helps in understanding genetic defects using examples from human genetics.	KL4

Unit-IV

Short answer questions

Q.N.	Question	KL
1	What are monomers and polymers? Give one example of each.	KL1
2	Name the monomeric units of carbohydrates, proteins, nucleic acids, and lipids.	KL1
3	Differentiate between starch and cellulose based on structure and function.	KL2
4	What are nucleotides? Name the components of a nucleotide.	KL1
5	What are amino acids, and why are they important for proteins?	KL1

Long answer questions

Q.N.	Question	KL
1	Describe the monomeric units and polymeric structures of carbohydrates, proteins, nucleic acids, and lipids.	KL3
2	Discuss the structure and function of sugars, starch, and cellulose, highlighting their differences.	KL3

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3	Explain the structure of amino acids and how they form proteins, including the four levels of protein organization.	KL3
4	Discuss nucleotides, DNA, and RNA structure, and explain their role in storing and transferring genetic information.	KL3
5	Explain the structure and biological significance of lipids, including two-carbon units, and discuss their role in energy storage and cellular membranes.	KL4

Unit-V

Short answer questions

Q.N.	Question	KL
1	What are enzymes, and how do they catalyze biochemical reactions?	KL1
2	Name the main classes of enzymes based on their type of catalysis.	KL1
3	How can enzyme-catalyzed reactions be monitored experimentally?	KL2
4	Define enzyme kinetics and explain the significance of the Michaelis-Menten constant (K_m).	KL2
5	What is RNA catalysis? Give one example of a ribozyme.	KL1

Long answer questions

Q.N.	Question	KL
1	Describe the mechanism of enzyme action and explain how enzymes lower activation energy. Illustrate with two examples.	KL3
2	Discuss the classification of enzymes with examples and explain how enzyme specificity is determined.	KL3
3	Explain the principles of enzyme kinetics and the importance of kinetic parameters (V_{max} , K_m) in understanding biological systems.	KL3
4	Describe RNA catalysis and discuss its biological significance with examples.	KL3
5	Explain why knowledge of enzyme kinetics is crucial for understanding metabolism and other biological processes.	KL4

Unit-VI

Short answer questions

Q.N.	Question	KL
1	Why is DNA considered the genetic material?	KL1
2	Describe the hierarchy of DNA structure from single-stranded DNA to nucleosomes.	KL2
3	What is the genetic code?	KL1
4	Explain the terms universality and degeneracy of the genetic code.	KL2
5	Define a gene in terms of complementation and recombination.	

Long answer questions

Q.N.	Question	KL
1	Discuss the evidence that supports DNA as the genetic material.	KL3
2	Explain the hierarchy of DNA organization, from nucleotide to nucleosome, and its significance in genetic regulation.	KL3
3	Describe the concept of the genetic code and discuss its universality and degeneracy.	KL3

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4	Explain how the definition of a gene based on complementation and recombination differs from the classical definition.	KL3
5	Discuss the molecular basis of information transfer in cells, integrating the concepts of DNA structure and the genetic code.	KL4

Unit-VII

Short answer questions

Q.N.	Question	KL
1	Define a protein and list its four levels of structure.	KL1
2	Differentiate between primary and secondary protein structures.	KL2
3	Name the main types of bonds and interactions that stabilize tertiary protein structure.	KL2
4	Give two examples of proteins functioning as enzymes, transporters, receptors, or structural elements.	KL1
5	What is the biological significance of quaternary protein structure?	KL2

Long answer questions

Q.N.	Question	KL
1	Describe the hierarchy of protein structure—primary, secondary, tertiary, and quaternary—with suitable examples and diagrams.	KL3
2	Explain the various functions of proteins in living systems, focusing on their roles as enzymes, transporters, receptors, and structural elements.	KL3
3	Discuss the types of chemical bonds and interactions responsible for stabilizing each level of protein structure.	KL3
4	Explain how protein structure relates to function, using examples such as hemoglobin, enzymes, or antibodies.	KL4
5	Describe how mutations affecting protein structure can impact protein function, providing one example.	KL4

Unit-VIII

Short answer questions

Q.N.	Question	KL
Q. No.	Question	Knowledge Level (KL)
1	Differentiate between exothermic and endothermic reactions with examples.	KL2
2	Explain the difference between endergonic and exergonic reactions in biological systems.	KL2
3	What is ATP, and why is it called the energy currency of the cell?	KL1
4	Define the equilibrium constant (K_{eq}) and explain its relationship with standard free energy (ΔG°).	KL2
5	What is meant by energy charge in a cell?	KL1

Long answer questions

Q.N.	Question	KL
1	Discuss the laws of thermodynamics as applied to biological systems, with examples of energy transformations.	KL3

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2	Explain the concept of spontaneity in biological reactions and how ΔG and K_{eq} determine whether a reaction occurs.	KL3
3	Describe ATP structure, its role in energy metabolism, and why it is considered the energy currency of the cell.	KL3
4	Compare energy-yielding processes (glycolysis and Krebs cycle) with energy-consuming processes (photosynthesis), highlighting ATP production and consumption.	KL4
5	Explain the concept of energy charge and its importance in maintaining metabolic balance in cells.	KL4

Unit-IX

Short answer questions

Q.N.	Question	KL
1	Define single-celled organisms and give two examples.	KL1
2	Differentiate between species and strain with respect to microorganisms.	KL2
3	What is the principle of microscopy in studying microorganisms?	KL1
4	Define sterilization and explain its importance in microbial culture preparation.	KL2
5	What are the ecological roles of single-celled organisms?	KL2

Long answer questions

Q.N.	Question	KL
1	Discuss the methods used for identification and classification of microorganisms.	KL3
2	Explain the principles and applications of microscopy in microbial studies.	KL3
3	Describe various sterilization techniques and the types of culture media used in microbiology.	KL3
4	Discuss microbial growth kinetics, including the lag, log, stationary, and death phases of a growth curve.	KL3
5	Explain the ecological importance of single-celled organisms and their role in nutrient cycles and ecosystems.	KL4