1. Biology as a Science. Definition. Objectives.
2. History of Biology. Branches of Biology.
3. Features of Prokaryotic Cell Organization. Structure and Types of Bacteria.
4. Structure and Functions of the Main Cell Components: Membrane, Nucleus, Cytoplasm.
5. Structure and Functions of General Intracellular Organelles: Endoplasmic Reticulum, Golgi Apparatus, Mitochondria, Lysosomes.
6. Organelles with Temporary Functions. Cell Inclusions.
7. Structure and Functions of General Intracellular Organelles: Ribosomes, Centrosome, Microtubules.
8. Protein Biosynthesis. Transcription: Stages and Characteristics.
9. Protein Biosynthesis. Translation: Stages and Characteristics.
10. Cell Structure. Features of Eukaryotic Cell Organization.
11. Cytoskeleton: Structure and Functions.
12. Chromosomal Disorders. Patau Syndrome.
13. Structure, Functions, and Classification of Nucleic Acids. DNA Structure.
14. DNA Replication. Formation of the Replication Complex. Mechanism.
15. Structure, Properties, and Functions of Biological Membranes. Significance of Membranes.
16. Transport Across Membranes: Active Transport of Low-Molecular Substances.
17. Transport Across Membranes: Passive Transport of Low-Molecular Substances.
18. Transport Across Membranes: Transport of Macromolecules. Endocytosis.
19. Transport Across Membranes: Transport of Macromolecules. Exocytosis.
20. Types of RNA in Cells. Functions of RNA. Spatial Organization of mRNA.
21. Types of RNA. Functions and Spatial Organization of rRNA.
22. Types of RNA. Functions and Spatial Organization of tRNA.
23. Characteristics of Interphase Periods: G1, S, G2, M.
24. Ontogenesis. Types of Ontogenesis. Aging.
25. Ontogenesis. Embryonic Period: Cleavage, Blastula, Gastrula, Neurula. Histogenesis and Organogenesis.
26. Chromosome Structure and Functions.
27. Mutagenesis and Mutagenic Factors. Classification.
28. Mutations. Types of Mutations.
29. Types of Allelic Gene Interactions: Complete Dominance, Incomplete Dominance, Codominance.
30. Types of Non-Allelic Gene Interactions: Complementation, Epistasis, Polygeny.
31. Key Terms and Concepts: Gene and Chromosome.
32. Mendelian Traits. Law of Uniformity in the First Generation. Law of Segregation.

33. Law of Independent Assortment. Features of Dihybrid and Polyhybrid Crosses.
34. Genetic Apparatus of Viruses. DNA- and RNA-containing Viruses.
35. Fundamentals of Population Genetics. Population and Its Types.
36. Population. Hardy–Weinberg Law.
37. Biological Significance of Meiosis. Meiosis I.
38. Biological Significance of Meiosis. Meiosis II.
39. Genetic Code: Concept and Properties.
40. Structural Organization of Proteins.
41. Biological Significance of Mitosis: Prophase, Metaphase, Anaphase, Telophase.
42. Gene Mutations: Types. Neutral, Missense, Nonsense, and Regulatory Mutations.
43. Chromosomal Mutations: Types — Deletion, Duplication, Translocation, etc.
44. Genomic Mutations: Types — Haploidy, Polyploidy, Aneuploidy.
45. Spatial Organization of DNA: Features, Properties, and Functions.
46. Chromosomal Disorders. Klinefelter Syndrome.
47. Chromosomal Disorders. Cri du Chat Syndrome.
48. Proteins: Classification, Properties, and Functions.
49. Hormones: Classification by Chemical Structure. Hydrophilic and Hydrophobic Hormones. Hormone-Producing Structures.
50. Levels of Biological Organization.
51. Morphological Classification of Chromosomes: Metacentric, Acrocentric, Submetacentric, Telocentric.
52. Genetics as a Science: Definition, Objectives, History.
53. Chromosomal Disorders. Down Syndrome.
54. Chromosomal Disorders. Edwards Syndrome.
55. Chromosomal Disorders. Turner Syndrome.
56. Basics of Ecology.
57. Gametogenesis and Its Stages. Spermatogenesis.
58. Gametogenesis and Its Stages. Oogenesis.
59. Plant Root: Types of Roots and Root Systems.
60. Leaf: External Structure and Venation.
61. Simple and Compound Leaves. Leaf Arrangement.
62. Plant Reproduction and Its Significance. Methods of Reproduction.
63. Structure, Vital Functions, and Reproduction of Bacteria.
64. Role of Bacteria in Nature, Industry, Medicine, Agriculture. Pathogenic Bacteria and Control Measures.
65. Algae: Structure and Life Processes of Unicellular and Multicellular Algae.
66. Algae Reproduction. Filamentous and Marine Algae.
67. General Characteristics of Fungi. Cap Fungi: Structure and Nutrition.

68. Mold Fungi: Penicillium and Its Use in Antibiotics. Yeasts. Parasitic Fungi and Plant Diseases.
69. Diversity of Animal Life. Main Differences and Similarities Between Animals and Plants.
70. Animal Systematics.
71. Amoeba Proteus: Cell Structure of a Unicellular Organism. Habitat, Movement, Nutrition, Respiration, Excretion, Reproduction, Cyst Formation.
72. Diversity of Unicellular Animals: Euglena — Structure and Nutrition; Paramecium.
73. Freshwater Hydra: Habitat, External and Internal Structure.
74. Lancelet: Habitat and Features of Primitive Chordates. General Characteristics of the Phylum.
75. Class Fish: Habitat, Structure, and Reproduction.
76. Class Amphibians: Frog — Structure and Reproduction.
77. Class Reptiles: Lizard — Habitat, Structure, Reproduction, Adaptations to Life on Land. Regeneration.
78. Class Birds: Structure, Reproduction, and Development.
79. Class Mammals: External and Internal Structure, Reproduction, Types of Mammals.
80. Overview of the Human Body. Importance of Knowledge on Human Anatomy, Physiology, and Hygiene.
81. Musculoskeletal System: Importance, Human Skeleton, Comparison with Animal Skeletons, Bone Composition and Growth.
82. Muscles and Their Functions. Major Muscle Groups. Muscle Work.
83. Blood and Circulation. Internal Environment of the Body (Blood, Interstitial Fluid, Lymph) and Its Homeostasis.
84. Blood Composition. Blood Groups. Blood Donation.
85. Organs of the Circulatory System: Heart and Blood Vessels (Arteries, Capillaries, Veins).
86. Heart: Structure and Function. Pulmonary and Systemic Circulations. Lymphatic Circulation.
87. Respiration: Importance, Structure and Functions of the Respiratory Organs.
88. Digestive System: Functions, Structure, Teeth and Dental Health, Digestive Enzymes, Liver and Pancreas.
89. Excretory System: Organs and Their Functions. Disease Prevention.
90. Structure and Functions of the Skin. Thermoregulation. Skin Hygiene. Clothing and Footwear Requirements.
91. Endocrine System and Its Role in Growth, Development, and Function Regulation. Hormones. Gonads and Puberty.

92. Nervous System and Its Role in Regulation and Coordination. CNS and PNS. Spinal Cord and Brain Structure.
93. Fertilization and Prenatal Development. Birth. Growth and Development of a Child.
94. T. Morgan's Laws. Chromosomal Theory of Inheritance.
95. Phylum Platyhelminthes: Diversity. Structure and Life Cycle of the Liver Fluke.
96. Phylum Platyhelminthes: Siberian Fluke Structure and Life Cycle.
97. Phylum Nematoda. Human Ascaris — Human Parasite.
98. Phylum Nematoda. Human Pinworm — Human Parasite.
99. Phylum Arthropoda. Class Arachnida: Structure, Nutrition, Respiration. Ticks.
100. Class Insecta: Structure, Life Processes, Reproduction. Lice and Their Types.