ASSESSMENT FRAMEWORK AND MODEL QUESTION PAPER

BIOLOGY

Grade IX

NATIONAL CURRICULUM
2022-23

INCLUSIVE SCHEME OF STUDIES 2024



FEDERAL BOARD OF INTERMEDIATE AND SECONDARY EDUCATION, ISLAMABAD

WE WORK FOR EXCELLENCE

FEDERAL BOARD OF INTERMEDIATE AND SECONDARY EDUCATION

H-8/4, ISLAMABAD

ASSESSMENT FRAMEWORK

FOR BIOLOGY GRADE-IX

CURRICULUM 2022-23

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ACKNOWLEDGEMENT

It is a great honour that we, at the Federal Board of Intermediate and Secondary Education, have developed the Assessment Framework (AF) for the subject of Biology for Grade-IX. The primary objective of the AF is to optimize the current curriculum 2022-23. This comprehensive framework has been crafted meticulously by subject matter and assessment experts who conducted an in-depth review of all learning outcomes for Grade-IX Biology curriculum. They evaluated these outcomes in terms of their scope, cognitive level, and progression across the grade.

This significant undertaking was the result of a series of extensive meetings and collaborative efforts of the subject and assessment experts. Their dedication and expertise have been instrumental in bringing this framework to fruition.

The Assessment Framework will serve as a guiding document for students, teachers and paper setters. Students will receive clear directions for preparing themselves for the annual examination. Similarly, teachers will use it as a guide to understand what to teach in class and to prepare students for the final examinations accordingly. Similarly paper setters will also seek guidance from this document.

Following subject as well as assessment experts/committee members remained constantly engaged in the development of the AF:

1. Dr. Muhammad Ilyas, Associate Professor, Islamabad Model College for Boys, G-10/4, Islamabad
2. Ms. Ruqayya Shaikh, Associate Professor, Islamabad Model College for Girls, F-6/2, Islamabad
3. Dr. Kashif Ali, Associate Professor, Islamabad Model College for Boys, F-7/3, Islamabad
4. Mrs. Samina Tahira, Associate Professor, Islamabad Model College for Girls, Korang Town, Islamabad

The whole work was successfully accomplished under the able supervision and guidance of Syed Junaid Akhlaq, Chairman, FBISE and due to the hard work and dedication of the staff of Research Section of FBISE, in particular, Syed Zulfiqar Shah, Deputy Secretary, Research and Academics who played a pivotal and leading role in finalizing the AF.

MIRZA ALI
Director (Research & Academics)
FBISE, Islamabad

ASSESSMENT FRAMEWORK FOR BIOLOGY GRADE-IX, CURRICULUM 2022-23

To ensure clarity and precision in assessment, the learning outcomes have been categorized into two distinct groups: formative and summative. This classification helps in effectively measuring student progress and understanding. Each Student learning outcome (SLO) has been carefully marked as either formative or summative within the newly developed Assessment Framework. SLOs of Summative Assessment Format will be part of the Final Examination while SLOs of Formative Assessment will although be part of the teaching-learning activity but they will **NOT** be part of Final Examinations. Estimated cognitive levels i.e Knowledge (K), Understanding (U) and Application (A) of all the SLOs have also been indicated. It may be noted that all the higher cognitive levels have been collectively accumulated in the cognitive level of 'Application'. In subjects involving Practicals (Lab work), it has been mentioned categorically whether an SLO is summative for theory or summative for Practical Based Assessment (PBA). If an SLO is summative for PBA, it means that Laboratory work is required in the teaching-learning activity and it will be part of the Practical Examination/ Practical Based Assessment.

The Assessment Framework will act as a comprehensive guide for students, teachers and paper setters. Students will have clear instructions on how to prepare for the annual examinations. Teachers will use the framework to understand the curriculum and effectively prepare their students for the final examination. Additionally, paper setters will refer to this document for guidance in setting examination papers.

A model question paper has also been developed to provide a clear structure and format for upcoming examinations. The model question paper ensures consistency and fairness, offering students a comprehensive understanding of what to expect in their examinations. By aligning the paper with the Student Learning Outcomes (SLOs) of the curriculum, we ensured that the questions accurately reflect the skills and knowledge that students are expected to acquire.

A detailed Table of Specifications (ToS) has been created to ensure equitable coverage of cognitive levels and content domains in order to generate a balanced question paper. The ToS serves as drawing scale and action plan for the question paper, ensuring that all important areas of the curriculum are adequately and proportionately assessed.

FORMATIVE ASSESSMENT: AN ESSENTIAL COMPONENT OF EFFECTIVE LEARNING

Formative assessment is a pivotal element in the educational process, distinguished by its role in providing ongoing feedback to both students and educators. Unlike summative assessments, which evaluate student learning at the end of an instructional period, formative assessments are integrated into the learning process to monitor student understanding and guide instructional decisions.

The primary objective of formative assessment is to identify learning gaps and misunderstandings as they occur, enabling timely interventions. This dynamic approach allows teachers to adjust their teaching strategies to better meet the needs of their students. For instance, if a teacher notices through a quick quiz or class discussion that a significant portion of the class struggles with a particular concept, they can revisit that topic, providing additional explanations or alternative methods of instruction. This adaptability is crucial for fostering a deeper understanding of the material.

Formative assessments come in various forms, ranging from informal methods like classroom discussions, observations, and questioning, to more structured approaches such as quizzes, peer assessments, and self-reflections. These methods are not limited to paper-and-pencil tasks but can include digital tools that provide instant feedback. The versatility of formative assessments allows educators to cater to diverse learning styles and preferences, ensuring that all students are engaged and supported in their learning journey.

Formative assessment plays a significant role in creating a supportive classroom environment. It shifts the focus from merely achieving grades to understanding the learning process. This approach reduces the pressure on students, as they perceive assessments not as a final judgment of their abilities but as a part of their learning journey. Consequently, formative assessment can lead to increased student motivation and engagement.

In conclusion, formative assessment is a powerful tool that, when effectively implemented, can significantly enhance the learning experience. It provides invaluable insights for both teachers and students, promotes a growth-oriented learning environment, and supports the continuous development of essential skills. As education evolves, the role of formative assessment will undoubtedly continue to be central in fostering successful and meaningful learning experiences.

SUMMATIVE ASSESSMENT: EVALUATING LEARNING OUTCOMES IN THE FORM OF TERMINAL/FINAL EXAMINATION

Summative assessment is a fundamental component of the educational process, designed to evaluate student learning at the conclusion of an instructional period. Unlike formative assessment, which provides ongoing feedback during the learning process, summative assessment serves as a final measure of what students have learned. Typically administered at the end of a unit, course, or academic year. Summative assessment aims to determine the extent to which educational objectives have been achieved.

The primary purpose of summative assessment is to assess the overall effectiveness of instruction and learning. It provides a conclusive evaluation of student performance, often in the form of tests, final projects, or standardized exams. These assessments generate grades or scores that reflect a student's achievement in a given subject area over a specific period or time duration.

Summative assessment is often used to make critical decisions regarding student progression, certification, or placement in subsequent educational levels. Additionally, summative assessments provide valuable data that inform curriculum development and instructional strategies. By analyzing summative assessment results, educators can identify trends, strengths, and weaknesses within their instructional approaches, allowing for improvements in future teaching.

In conclusion, summative assessment plays a critical role in the educational process by providing a final evaluation of student learning. While it differs from formative assessment in its focus and application, it is an essential tool for measuring academic achievement. When balanced with formative assessments, summative assessments contribute to a well-rounded and effective approach to evaluating and supporting student learning.

National Curriculum of Pakistan 2022-2023
ASSESSMENT FRAME WORK BIOLOGY Grade-IX (SSC I)
Details of Content Areas/ SLOs

Content Domain / Area	SLO No./ Description	Form of Assessment	Cognitive Level (Knowledge, Understanding, Application)	Remarks	Number of Periods Required (1 period=40 minutes)
A	[SLO: B-09-A-01] Define biology	Summative	Knowledge	Question(s) will be asked in annual examination.	10 periods
	[SLO: B-09-A-02] State Quran instructs to reveal the study of Life	Summative	Knowledge	Question(s) will be asked in annual examination.	
	[SLO: B-09-A-03] Define major fields of biology as Botany, zoology and Microbiology	Summative	Knowledge	Question(s) will be asked in annual examination.	
	[SLO: B-09-A-04] Define with examples that biology has many sub-fields. (Cytology) (Embryology) (Genetics) (Molecular Biology) (Pathology) (Ecology) (Marine Biology) (Immunology) (Morphology) (Anatomy) (Histology) (Physiology) (Taxonomy) (Palaeontology) (Pharmacology)	Summative	Knowledge	Question(s) will be asked in annual examination.	
	[SLO: B-09-A-05] Relate that biology connects with other natural sciences. Students should be able to distinguish in terms of the broad subject matter the below fields: (Biophysics) (Biochemistry) (Computational Biology) (Biogeography) (Biostatistics) (Biotechnology) (Bio economics)	Summative	Understanding	Question(s) will be asked in annual examination.	
	[SLO: B-09-A-06] Identify the careers in Biology and Explain with examples how biology is a subset of the natural sciences and of the life sciences.	Summative	Understanding	Question(s) will be asked in annual examination.	
	[SLO: B-09-A-07] Justify with examples that science is a collaborative field that requires interdisciplinary researchers working together to share knowledge and critique ideas	Summative	Application	Question(s) will be asked in annual examination.	
	[SLO: B-09-A-08] Describe the steps of the scientific method that is: Recognition Observation Hypothesis Deduction Experiments Results	Summative	Understanding	Question(s) will be asked in annual examination.	

Content Domain / Area	SLO No./ Description	Form of Assessment	Cognitive Level (Knowledge, Understanding, Application)	Remarks	Number of Periods Required (1 period=40 minutes)
	SLO: B-09-A-09] Evaluate the terms 'hypothesis', 'theory' and 'law' in the context of research in the natural sciences	Summative	Application	Question(s) will be asked in annual examination.	
B	[SLO: B-09-B-01] Explain the theory of evolution by natural selection with example	Summative	Understanding	Question(s) will be asked in annual examination.	20 periods
	[SLO: B-09-B-02] Define Species	Summative	Knowledge	Question(s) will be asked in annual examination.	
	[SLO: B-09-B-03] Describe speciation	Summative	Understanding	Question(s) will be asked in annual examination.	
	[SLO: B-09-B-04] Discuss briefly the observations Darwin made during his voyage on HMS Beagle	**Formative**	Understanding	This SLO is part of regular teaching and learning but will not be assessed in annual examination. (As numerous observations were done in this voyage so it is included in formative assessment.)	
	[SLO: B-09-B-05] Describe sources of variation which can lead to speciation and evolution	Summative	Understanding	Question(s) will be asked in annual examination.	
	[SLO: B-09-B-06] Describe evidence of evolution with regards to the following - Palaeontology (fossil record) - Comparative anatomy (homologous structures, vestigial structures) - Selective breeding	Summative	Understanding	Question(s) will be asked in annual examination.	
	[SLO: B-09-B-07] Define biodiversity and classification	Summative	Knowledge	Question(s) will be asked in annual examination.	
	[SLO: B-09-B-08] Describe advantages of classification	Summative	Understanding	Question(s) will be asked in annual examination.	
	[SLO: B-09-B-09] Discuss the history of classification schemes	Summative	Understanding	Question(s) will be asked in annual examination.	

Content Domain / Area	SLO No./ Description	Form of Assessment	Cognitive Level (Knowledge, Understanding, Application)	Remarks	Number of Periods Required (1 period=40 minutes)
	[SLO: B-09-B-10] List the three distinct domains into which living organisms are broadly classified into	Summative	Knowledge	Question(s) will be asked in annual examination.	
	[SLO: B-09-B-11] List the taxonomic ranks of classification	Summative	Knowledge	Question(s) will be asked in annual examination.	
	[SLO: B-09-B-12] Outline the binomial nomenclature system	Summative	Understanding	Question(s) will be asked in annual examination.	
	[SLO: B-09-B-13] Describe the complications of classifying viruses	Summative	Understanding	Question(s) will be asked in annual examination.	
C	[SLO: B-09-C-1] Define Biochemistry/molecular biology	Summative	Knowledge	Question(s) will be asked in annual examination.	20 periods
	[SLO: B-09-C-2] Outline the various types of common biomolecules (DNA, RNA, Proteins, Lipids, Carbohydrates) including their locations inside the cell and main roles	Summative	Understanding	Question(s) will be asked in annual examination.	
	[SLO: B-09-C-3] Outline the structure and function and sources of proteins with structure of amino acids	Summative	Knowledge/ understanding/ Application	Question(s) will be asked in annual examination.	
	[SLO: B-09-C-4] Outline the structure, function and sources of lipids	Summative	Knowledge/ understanding/ Application	Question(s) will be asked in annual examination. This SLO is compound SLO. All three levels can be asked.	
	[SLO: B-09-C-05] Define Carbohydrates and Outline the structure, function and sources of Carbohydrates	Summative	Knowledge/ understanding/ Application	Question(s) will be asked in annual examination. This SLO is compound SLO. All three levels can be asked.	
	[SLO: B-09-C-06] Identify carbohydrates as monosaccharides, disaccharides and polysaccharides	Summative	Understanding	Question(s) will be asked in annual examination.	
	[SLO: B-09-C-07] Describe briefly the structure of DNA as a double helix macromolecule made of nucleotides with base pairing in between the two helices through complementary base pairing	Summative	Application	Question(s) will be asked in annual examination.	

Content Domain / Area	SLO No./ Description	Form of Assessment	Cognitive Level (Knowledge, Understanding, Application)	Remarks	Number of Periods Required (1 period=40 minutes)
	[SLO: B-09-C-08] Outline function of DNA as carrier of, hereditary information	Summative	Application	Question(s) will be asked in annual examination.	
	[SLO: B-09-C-09] Describe briefly the structure of RNA as single stranded macromolecule made of nucleotides with nitrogenous base overhangs	Summative	Application	Question(s) will be asked in annual examination.	
	[SLO: B-09-C-10] Outline the function of RNA as aid in converting hereditary information into useful proteins	Summative	Understanding	Question(s) will be asked in annual examination.	
	[SLO: B-09-C-11] Outline how information in the DNA is converted to information on RNA and then into proteins	Summative	Understanding	Question(s) will be asked in annual examination.	
D	[SLO: B-09-D-1] Describe cell as the basic unit of life	Summative	Understanding	Question(s) will be asked in annual examination.	28 periods
	[SLO: B-09-D-2] Compare with diagrams the structure of animal and plant cells	Summative	Knowledge/ understanding/ Application	Question(s) will be asked in annual examination. This SLO is compound SLO. All three levels can be asked.	
	[SLO: B-09-D-3] Sketch different sub-cellular organelles (nucleus, mitochondria, cell membranes, etc.) and outline their roles	Summative	Knowledge/ understanding/ Application	Question(s) will be asked in annual examination. This SLO is compound SLO. All three levels can be asked.	
	[SLO: B-09-D-4] Outline structural advantages of plant and animal cells	Summative	Application	Question(s) will be asked in annual examination.	
	[SLO: B-09-D-05] Identify different types of cells (mesophyll cell, epidermal cell, neurons, muscle, red blood cell, liver cell) and sketch their structures	Summative	Knowledge/ understanding/ Application	Question(s) will be asked in annual examination. This SLO is compound SLO. All three levels can be asked.	
	[SLO: B-09-D-06] Describe the concept of division of labour and how it applies to - within cells (across subcellular organelles) - multicellular organisms (across cells)	Summative	Application	Question(s) will be asked in annual examination.	
	[SLO: B-09-D-07] Describe Cell Specialization.	Summative	Understanding	Question(s) will be asked in annual examination.	

Content Domain / Area	SLO No./ Description	Form of Assessment	Cognitive Level (Knowledge, Understanding, Application)	Remarks	Number of Periods Required (1 period=40 minutes)
	[SLO: B-09-D-08] Describe Cell cycle	Summative	Understanding	Question(s) will be asked in annual examination.	
	[SLO: B-09-D-09] Explain mitosis, meiosis and stages of mitosis, meiosis (by use of sketch and diagrams)	Summative	Knowledge/ understanding/ Application	Question(s) will be asked in annual examination. This SLO is compound SLO. All three levels can be asked.	
	[SLO: B-09-D-11] Compare the processes of mitosis and meiosis	Summative	Understanding	Question(s) will be asked in annual examination.	
	[SLO: B-09-D-12] Outline the significance of mitosis and meiosis	Summative	Understanding	Question(s) will be asked in annual examination.	
	[SLO: B-09-D-13] Define stem cells as unspecialized cell	Summative	Understanding	Question(s) will be asked in annual examination.	
E	[SLO: B-09-E-1] Distinguish between tissues, organs and system with examples from animals and plants	Summative	Understanding	Question(s) will be asked in annual examination.	8 periods
	[SLO: B-09-E-2] Describe the concept of emergent properties as gain in functionalities and how it applies to the following going from sub-cellular organelles to cells - going from cells to tissues - going from tissues to organs - going from organs to systems - going from systems to living organisms	Summative	Application	Question(s) will be asked in annual examination.	
	[SLO: B-09-E-3] Enlist the different types of tissue come together to form the stomach organ in the human body	Summative	Understanding	Question(s) will be asked in annual examination.	
	[SLO: B-09-E-4] Discuss the different types of tissue come together to form the leaf	Summative	Understanding	Question(s) will be asked in annual examination.	
	[SLO: B-09-E-5] Discuss the organ system come together to form the human body	Summative	Understanding	Question(s) will be asked in annual examination.	
	[SLO: B-09-E-06] Describe the advantages of homeostasis	Summative	Understanding	Question(s) will be asked in annual examination.	
	[SLO: B-09-E-07] Discuss the various organs and systems of the human body work to maintain homeostasis	Summative	Understanding	Question(s) will be asked in annual examination.	

Content Domain / Area	SLO No./ Description	Form of Assessment	Cognitive Level (Knowledge, Understanding, Application)	Remarks	Number of Periods Required (1 period=40 minutes)
	[SLO: B-09-E-08] Explain plant physiology in terms of structures and roles of various plant organs	Summative	Understanding	Question(s) will be asked in annual examination.	
F	[SLO: B-09-F-01] Define metabolism, catabolism and anabolism with examples	Summative	Understanding	Question(s) will be asked in annual examination.	18 periods
	[SLO: B-09-F-02] Define Enzymes and describe their characteristics	Summative	Knowledge/ understanding	Question(s) will be asked in annual examination. This SLO is compound SLO. Both levels can be asked.	
	[SLO: B:09-F-03] Show the mechanism of enzyme action	Summative	Application	Question(s) will be asked in annual examination.	
	[SLO: B-09-F-04] Assess the factors which could influence enzyme activity	Summative	Application	Question(s) will be asked in annual examination.	
	[SLO: B-09-F-05] Describe competitive, and non-competitive inhibition	Summative	Understanding	Question(s) will be asked in annual examination.	
	[SLO: B-09-F-06] Discuss the role of ATP as energy currency	Summative	Understanding	Question(s) will be asked in annual examination.	
	[SLO: B-09-F-07] Describe photosynthesis in plants	Summative	Knowledge/ understanding/ Application	Question(s) will be asked in annual examination. This SLO is compound SLO. All three levels can be asked.	
	[SLO: B-09-F-08] Explain aerobic respiration and anaerobic respiration	Summative	Understanding	Question(s) will be asked in annual examination.	
Q	[SLO: B-09-Q-01] Define mineral nutrition in plants	Summative	Knowledge	Question(s) will be asked in annual examination.	40 periods
	[SLO: B-09-Q-02] Categorize minerals nutrients of plants into macronutrients and micronutrients	Summative	Knowledge	Question(s) will be asked in annual examination.	
	[SLO: B-09-Q-03] State that nitrogen is important in protein synthesis and magnesium for chlorophyll formation	Summative	Understanding	Question(s) will be asked in annual examination.	
	[SLO: B-09-Q-04] Conceptualize transport and its needs	Summative	Application	Question(s) will be asked in annual examination.	

Content Domain / Area	SLO No./ Description	Form of Assessment	Cognitive Level (Knowledge, Understanding, Application)	Remarks	Number of Periods Required (1 period=40 minutes)
	[SLO: B-09-Q-05] Explain the internal structure of root and root hair	Summative	Understanding	Question(s) will be asked in annual examination.	
	[SLO: B-09-Q-06] Describe how roots take up water and mineral salts by active and passive absorption	Summative	Understanding	Question(s) will be asked in annual examination.	
	[SLO: B-09-Q-07] Describe transpiration and relate this process with cell surface and stomatal opening and closing	Summative	Understanding	Question(s) will be asked in annual examination.	
	[SLO: B-09-Q-08] Describe temperature, wind and humidity as the factors affecting the rate of transpiration	Summative	Knowledge/ understanding/ Application	Question(s) will be asked in annual examination. This SLO is compound SLO. All three levels can be asked.	
	[SLO: B-09-Q-09] Describe the mechanism of transport of water and salt in plants	Summative	Application	Question(s) will be asked in annual examination.	
	[SLO: B-09-Q-10] Explain the mechanism of food translocation by, the theory of Pressure Flow Mechanism	Summative	Application	Question(s) will be asked in annual examination.	
	[SLO: B-09-Q-11] Describe the process of gaseous exchange in plants	Summative	Understanding	Question(s) will be asked in annual examination.	
	[SLO: B-09-Q-12] Define homeostasis and describe its importance	Summative	Knowledge/ understanding	Question(s) will be asked in annual examination. This SLO is compound SLO. Both levels can be asked.	
	[SLO: B-09-Q-13] Describe the mechanism and adaptations in plants for the excretion	Summative	Understanding	Question(s) will be asked in annual examination.	
	[SLO: B-09-Q-14] Explain osmotic adjustments in plants	Summative	Understanding	Question(s) will be asked in annual examination.	
	[SLO: B-09-Q-15] Describe different types of asexual reproduction i.e. binary fission, budding, spore formation and vegetative propagation	Summative	Understanding	Question(s) will be asked in annual examination.	
	[SLO: B-09-Q-16] Distinguish between vegetative propagation and artificial propagation	Summative	Application	Question(s) will be asked in annual examination.	
	[SLO: B-09-Q-17] Explain vegetative propagation in plants (through stem, suckers and leaves)	Summative	Understanding	Question(s) will be asked in annual examination.	

Content Domain / Area	SLO No./ Description	Form of Assessment	Cognitive Level (Knowledge, Understanding, Application)	Remarks	Number of Periods Required (1 period=40 minutes)
	[SLO: B-09-Q-18] Describe the two methods of artificial vegetative propagation (stem cuttings and grafting)	Summative	Understanding	Question(s) will be asked in annual examination.	
	[SLO: B-09-Q-19] Rationalize how parthenogenesis is a type of asexual reproduction	Summative	Understanding	Question(s) will be asked in annual examination.	
	[SLO: B-09-Q-20] Define cloning	Summative	Knowledge	Question(s) will be asked in annual examination.	
	[SLO: B-09-Q-21] Explain sexual reproduction in plants	Summative	Knowledge/ understanding/ Application	Question(s) will be asked in annual examination. This SLO is compound SLO. All three levels can be asked.	

PRACTICAL SLOs

Domain	NCP SLOs Description	Form of Assessment	Cognitive Level	Remarks	Number of Periods Required (1 period=40 minutes)
X	[SLO: B-09-10-X-01] Students should be able to simple measurements in SI Units of: • volumes of gases or solutions/liquids • masses • temperatures • times • lengths	**Summative for PBA**	Application	Laboratory work- will be assessed in PBA.	20 periods
	[SLO: B-09-10-X-02] Students should be able to carry out simple experiments of: • diffusion • osmosis • food tests	**Summative for PBA**	Application	Laboratory work- will be assessed in PBA.	

Domain	NCP SLOs Description	Form of Assessment	Cognitive Level	Remarks	Number of Periods Required (1 period=40 minutes)
	• rates of enzyme-catalysed reactions • pH and the use of hydrogen carbonate indicator, litmus and universal indicator • photosynthesis (rate and limiting factors) • heart rate and breathing rate • effect of mineral ions on plant growth • Respiration • Nervous responses • transpiration • tropic responses • observation and dissection of seeds and flowers • germination • continuous and discontinuous variation • sampling techniques				
	[SLO: B-09-10-X-03] Should be able to use of a microscope to examine biological specimens	**Summative for PBA**	Application	Laboratory work- will be assessed in PBA.	
	[SLO: B-09-10-X-04] Calculating the magnification of biological specimens	**Summative for PBA**	Application	Laboratory work- will be assessed in PBA.	
	[SLO: B-09-10-X-05] Students should be able to: • select and safely use techniques, apparatus and materials • identify apparatus from diagrams or descriptions • draw, complete or label diagrams of apparatus and biological specimens • use, or explain the use of common techniques, apparatus and materials • select the most appropriate apparatus or method for the task and justify the choice made • describe food tests	**Formative for PBA**	Application	These skills will be observed while performing practical. However, question will not be asked in the PBA	

Domain	NCP SLOs Description	Form of Assessment	Cognitive Level	Remarks	Number of Periods Required (1 period=40 minutes)
	• describe tests to determine the pH of solutions and substances using a universal indicator • describe and explain techniques • describe and explain hazards and identify safety precautions • to ensure the accuracy of observations and data				
	[SLO: B-09-10-X-06] Students should be able to understand for: • safety measurements and precautions • understand the need to wear PPE • tie up long hair • wear goggles when dealing with caustic materials	**Formative for PBA**	Application	These skills will be observed while performing practical. However, question will not be asked in the PBA	
	[SLO: B-09-10-X-07] Students are able to Understand and express scientific ideas using the below terms: -True value: the value that would be obtained in an ideal measurement -Measurement error the difference between a measured value and the true value of a quantity -Accuracy: a measurement result is described as accurate if it is close to the true value -Precision, how close the measured values of a quantity are to each other -Repeatability a measurement is repeatable ifthe same or similar result is obtained when the measurement is repeated under the same conditions, using the same method, within the same experiment - Reproducibility: a measurement is reproducible If the same or similar result is obtained when the measurement is made under either different conditions or by a different method or in a different experiment - Validity of experimental design: an experiment is valid if the experiment tests what it says it will test. The experiment must be a fair test where only the independent variable and dependent variable may change, and controlled variables are kept constant -Range: the maximum and minimum value of the independent or dependent variables	**Formative for PBA**	Application	These skills will be observed while performing practical. However, question will not be asked in the PBA	

Domain	NCP SLOs Description	Form of Assessment	Cognitive Level	Remarks	Number of Periods Required (1 period=40 minutes)
	- Anomaly: an anomaly is a value in a set of results that appears to be outside the general pattern of the results, i.e. an extreme value that is either very high or very low in comparison to others -Independent variables: independent variables are the variables that are changed in a scientific experiment by the scientist. Changing an independent variable may cause a change in the dependent variable -Dependent variables, dependent variables are the variables that are observed or measured in a scientific experiment. Dependent variables may change based on changes made to the independent variables				
	[SLO: B-09-10-X-08] Students are able to: a. Identify the independent variable and dependent variable b. describe how and explain why variables should be controlled c. suggest an appropriate number and range of values for the independent variable d. suggest the most appropriate apparatus or technique and justify the choice made e. describe experimental procedures f. identify risks and suggest appropriate safety precautions g. describe how to record the results of an experiment h. describe how to process the results of an experiment to form a conclusion or to evaluate a prediction make reasoned predictions of expected results — take readings from apparatus (analogue and digital) or from diagrams of apparatus — take readings with appropriate precision, reading to the nearest half-scale division where required — correct for zero errors where required — make observations, measurements or estimates that are in agreement with expected results or values — take sufficient observations or measurements — repeat observations or measurements where appropriate — record qualitative observations from tests	Formative for PBA	Application	These skills will be observed while performing practical. However, question will not be asked in the PBA	

Domain	NCP SLOs Description	Form of Assessment	Cognitive Level	Remarks	Number of Periods Required (1 period=40 minutes)
	— record observations and measurements systematically, for example in a suitable table, to an appropriate degree of precision and using appropriate units — process data, including for use in further calculations or for graph plotting, using a calculator as appropriate — present data graphically, including the use of best-fit lines where appropriate — analyse and interpret observations and data, including data presented graphically — use interpolation and extrapolation graphically to determine a gradient or intercept — form conclusions justified by reference to observations and data and with appropriate explanation — evaluate the quality of observations and data, identifying any anomalous results and taking appropriate action — comment on and explain whether results are equal within the limits of experimental accuracy (assumed to be + 10% at this level of study) — evaluate experimental arrangements, methods and techniques, including the control of variables — identify sources of error, including measurement error, random error and systematic error — identify possible causes of uncertainty in data or in a conclusion — suggest possible improvements to the apparatus, experimental arrangements, methods or techniques				

Note:

i. Student Learning Outcomes (SLOs) included in formative assessment will be part of regular teaching and learning process but they will not be assessed in annual examinations

ii. Student Learning Outcomes (SLOs) included in summative assessment will be part of regular teaching and learning, and they will also be assessed in annual examinations.

PBA STAND FOR "PRACTICAL BASED ASSESSMENT"

Federal Board SSC-I Examination
Biology Model Question Paper

Curriculum 2022-2023 (Inclusive Scheme of Studies 2024)

Section - A (Marks 12)

Time Allowed: 20 minutes

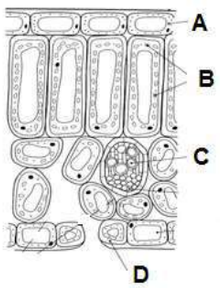
Section – A is compulsory. All parts of this section are to be answered on this page and handed over to the Centre Superintendent. Deleting/ overwriting is not allowed. *Do not use lead pencil.*

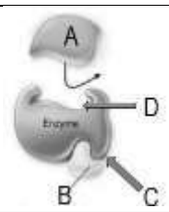
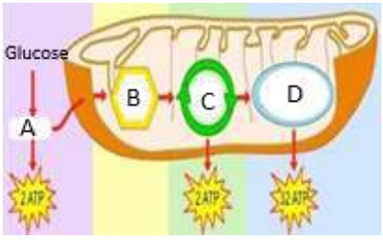
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Candidate Sign._____ **Invigilator Sign**. _____

Q1. **Fill the relevant bubble against each question**. **Each part carries one mark.**

S #	Question	(A)	(B)	(C)	(D)	(A)	(B)	(C)	(D)
(i)	Which of the following organelle is NOT present in plant cell?	Centriole	Golgi body	Mitochondria	Ribosomes	○	○	○	○
(ii)	The statement on the basis of observations is called:	Hypothesis	Deduction	Theory	Law	○	○	○	○
(iii)	Identify the correctly matched pair in a cell cycle.	G_1- Preparation for cell division	G_2 - Increase in cell size	S-DNA replication	G_0 – Cell divides into two	○	○	○	○
(iv)	The scientific study of organisms and their evolutionary relationship is called:	Classification	Taxonomy	Systematics	Binomial nomenclature	○	○	○	○
(v)	The diagram shows cells in part of the leaf of a green plant. Which  region contains cells which are responsible for the transport of water?	A	B	C	D	○	○	○	○
(vi)	Non-competitive inhibitors inactivate the enzyme. Identify non-competitive inhibitor in this figure.	A	B	C	D	○	○	○	○

						
(vii)	If tissue level is not developed in the level of organization, which next level will not form?	Molecular level	Atomic level	Organ level	Organelle level	○ ○ ○ ○
(viii)	Which combination of molecules is related to lipids?	Amino acid and glycerol	Glucose and glycerol	Fatty acids and glycerol	Glucose and fatty acids	○ ○ ○ ○
(ix)	Which one of the following is NOT the part of embryo in a seed?	Radicle	Plumule	Endosperm	Cotyledon	○ ○ ○ ○
(x)	The diagram shows an overview of aerobic respiration.  In which labelled process oxygen is used?	A	B	C	D	○ ○ ○ ○
(xi)	The example of vestigial organ is:	Wing of a bird	Flipper of a whale	Arm of man	Appendix in human	○ ○ ○ ○
(xii)	The nitrogenous bases between two DNA strands are held together by:	Ionic Bonds	Hydrogen Bonds	Covalent Bonds	Peptide Bonds	○ ○ ○ ○

Federal Board SSC-I Examination
Model Question Paper Biology

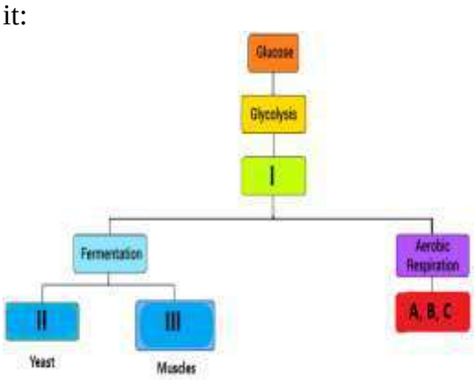
Curriculum 2022-2023 (Inclusive Scheme of Studies 2024)

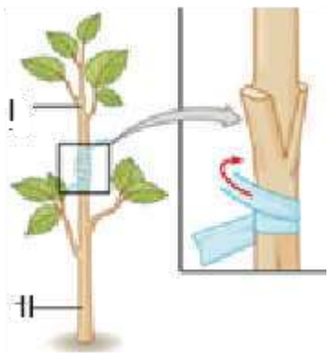
Time allowed: 2.40 hours | Total Marks: 48

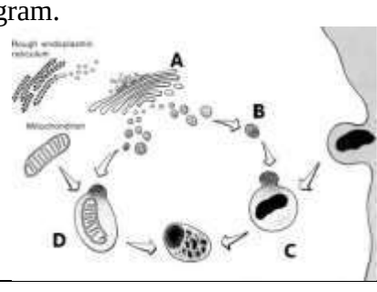
Note: Answer all parts from Section 'B' and all questions from Section 'C' on the **E-sheet**. Write your answers on the allotted /given spaces.

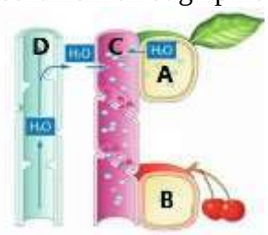
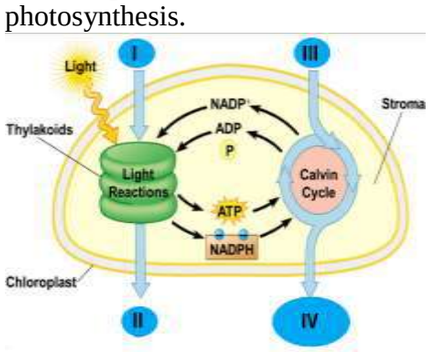
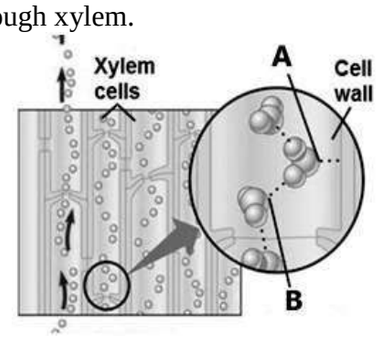
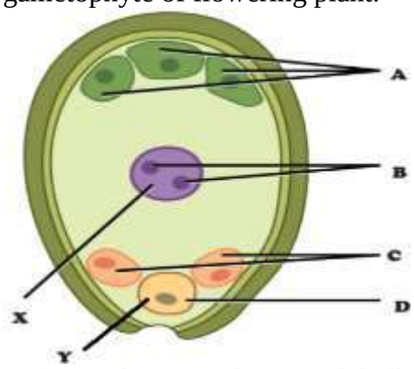
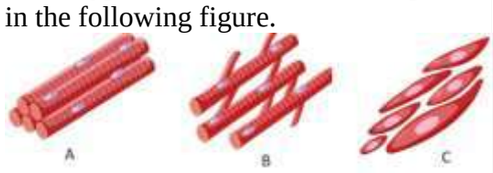
SECTION–B (Marks 30)

Q.2 Attempt the following questions **(10x3 = 30)**

<table>
<tr><th>Q#</th><th>Question</th><th>Marks</th><th></th><th>Question</th><th>Marks</th></tr>
<tr><td>(i)</td><td>Complete the following table by matching the branch of biology with the aspect of living things it describes.
<table>
<tr><th>Branch of biology</th><th>Aspect of living things described</th></tr>
<tr><td>Pharmacology</td><td></td></tr>
<tr><td></td><td>Defense against pathogens</td></tr>
<tr><td>Physiology</td><td></td></tr>
<tr><td></td><td>Classification and naming</td></tr>
<tr><td></td><td>Relations between organisms and environment</td></tr>
<tr><td>Pathology</td><td></td></tr>
</table></td><td>0.5x6</td><td>OR</td><td>Show the complete taxonomic classification of human beings.</td><td>3</td></tr>
<tr><td>(ii)</td><td>The given flow chart illustrates the cellular respiration. Answer the questions related to it:


<table>
<tr><th>(a) Name the phases of aerobic respiration</th><th>(b) Label the products</th></tr>
<tr><td>A.</td><td>I</td></tr>
<tr><td>B.</td><td>II</td></tr>
<tr><td>C.</td><td>III</td></tr>
</table></td><td>0.5x6</td><td>OR</td><td>A method of vegetative propagation in plants is shown here.


a. Name the parts labelled as I and II.
b. Name the type of vegetative propagation shown and its benefits.
c. Give any two examples of plants in which this method is applied.</td><td>1+1
+1</td></tr>
<tr><td>(iii)</td><td>Compare DNA and RNA in a tabular manner for any six features</td><td>0.5x6</td><td>OR</td><td>Draw the chemical structure of a typical amino acid labelling its components.</td><td>3</td></tr>
<tr><td>(iv)</td><td>Describe the role of ATP as energy currency for living systems.</td><td>3</td><td>OR</td><td>List the key points of Darwin's theory of natural selection.</td><td>3</td></tr>
<tr><td>(v)</td><td>Complete the following table for union of biology with other sciences.
<table>
<tr><th>Interdisciplinary science</th><th>Aspect of living organisms</th></tr>
<tr><td></td><td>Analysis of data related to organisms</td></tr>
<tr><td>Biochemistry</td><td></td></tr>
</table></td><td>0.5x6</td><td>OR</td><td>Carefully observe the following diagram.

</td><td>1+2</td></tr>
</table>

		Cost and benefit analysis of organisms			a. Correctly name the organelles A and B. b. Name and define the processes labelled as C and D.	
		Computational biology				
		Distribution of organisms in geographic regions				
		Biophysics				
(vi)	The diagram shows pressure flow mechanism through phloem.  a. Name the parts labelled as A, B, C and D. b. Name the carbohydrates that is mainly transported through C.		2+1	**OR**	The diagram shows an overview of photosynthesis.  Write the names of molecules shown as I, II, III and IV and mention which one is organic?	2+1
(vii)	Why multiple organs are needed to develop an organ system?		3	**OR**	The figure given below shows part of the mechanism for the movement of water through xylem.  a. Identify forces A and B. b. Despite the gravitational force, how the upward movement of water takes place through xylem.	1+2
(viii)	List the osmotic adaptations found in hydrophytes.		3	**OR**	How cytokinesis takes place in plant cell?	03
(ix)	Following is the diagram of female gametophyte of flowering plant.  a. Correctly name the parts labelled as A, B, C and D. b. What is the fate of X and Y after fertilization?		2+1	**OR**	Three types of muscle cells are depicted in the following figure.  a. Correctly name the types of cells labeled as A, B and C. b. Mention the location of these cell types in the body.	1.5 + 1.5
(x)	Give any three sources of variation that can lead to evolution.		3	OR	Name three distinct domains of living organisms with one distinguishing feature of each?	3

SECTION– C(Marks18) $(3x6 = 18)$

Note: Attempt all questions. Marks of all question are equal.

Q.3	How biological method may help to find the cause of any infectious disease using different steps of biological method.	6	**OR**	Describe different steps of karyokinesis in mitosis with the help of diagrams.	6
Q.4	Describe structure of enzymes. Explain the role of cofactors and give types of cofactors with examples.	2+1 +3	**OR**	Describe the internal structure of a typical leaf focusing on all tissue types found in it. Also draw its diagram.	5+1
Q.5	Describe structural advantages of any two animal and two plant cells.	1.5x 4	**OR**	Compare vegetative propagation and artificial propagation. Which one is better for rapid propagation? Give reasons.	4+2

Federal Board SSC-I Examination

Biology Model Question Paper

(Curriculum 2022-2023)

Alignment of Questions with Student Learning Outcomes

Sr No	Section: Q. No. (Part no.)	Content Domain / Area	Student Learning Outcomes	Cognitive Level *	Allocated Marks in Model Paper
1.	A: Q1(1)	B	[SLO: B-09-D-1] Describe cell as the basic unit of life	K	1
2.	A: Q1(2)	A	SLO: B-09-A-08] Describe the steps of the scientific method that is: Recognition Observation Hypothesis Deduction Experiments Results	K	1
3.	A: Q1(3)	D	[SLO: B-09-D-08] Describe Cell cycle	U	1
4.	A: Q1(4)	B	SLO: B-09-B-07] Define biodiversity and classification	K	1
5.	A: Q1(5)	E	[SLO: B-09-E-08] Explain plant physiology in terms of structures and roles of various plant organs	U	1
6.	A: Q1(6)	F	[SLO: B-09-F-05] Describe competitive, and non-competitive inhibition	U	1
7.	A: Q1(7)	E	[SLO: B-09-E-1] Distinguish between tissues, organs and system with examples from animals and plants	U	1
8.	A: Q1(8)	C	[SLO: B-09-C-4] Outline the structure, function and sources of lipids	K	1
9.	A: Q1(9)	Q	[SLO: B-09-Q-21] Explain sexual reproduction in plants	K	1
10.	A: Q1(10)	F	[SLO: B-09-F-08] Explain aerobic respiration and anaerobic respiration	U	1
11.	A: Q1(11)	B	[SLO: B-09-B-06] Describe evidence of evolution with regards to the following - Paleontology (fossil record) - Comparative anatomy (homologous structures, vestigial structures) - Selective breeding	U	1
12.	A: Q1(12)	C	[SLO: B-09-C-07] Describe briefly the structure of DNA as a double helix macromolecule made of nucleotides with base pairing in between the two helices through complementary base pairing	K	1
13.	B: Q 2 (i)	A B	[SLO: B-09-A-04] Define with examples that biology has many sub-fields. (Cytology) (Embryology) (Genetics) (Molecular Biology) (Pathology) (Ecology) (Marine Biology) (Immunology) (Morphology) (Anatomy) (Histology) (Physiology) (Taxonomy) (Paleontology) (Pharmacology) OR [SLO: B-09-B-11] List the taxonomic ranks of classification	K	3
14.	B: Q 2 (ii)	B Q	[SLO: B-09- F -08] Explain aerobic respiration and anaerobic respiration OR [SLO: B-09-Q-18] Describe the two methods of artificial vegetative propagation (stem cuttings and grafting)	U	3
15.	B: Q 2 (iii)	C	[SLO: B-09-C-07] Describe briefly the structure of DNA as a double helix macromolecule made of nucleotides with base pairing in between the two helices through complementary base pairing & Describe briefly the structure of RNA as single stranded macromolecule made of nucleotides with nitrogenous base overhangs	A	3

		C	OR [SLO: B-09-C-03] Outline the structure and function and sources of proteins with structure of amino acids		
16.	B: Q 2 (iv)	F B	[SLO: B-09- F -06] Discuss the role of ATP as energy currency OR [SLO: B-09-B-01] Explain the theory of evolution by natural selection with example	U	3
17.	B: Q 2 (v)	A D	SLO: B-09- A-05] Relate that biology connects with other natural sciences. Students should be able to distinguish in terms of the broad subject matter the below fields: (Biophysics) (Biochemistry) (Computational Biology) (Biogeography) (Biostatistics) (Biotechnology) (Bio economics) OR [SLO: B-09-D-03] Sketch different sub-cellular organelles (nucleus, mitochondria, cell membranes, etc.) and outline their roles	K	3
18.	B: Q 2 (vi)	Q F	[SLO: B-09- Q-10] Explain the mechanism of food translocation by, the theory of Pressure Flow Mechanism OR [SLO: B-09- F-07] Describe photosynthesis in plants.	U	3
19.	B: Q 2 (vii)	E Q	[SLO: B-09- E-02] Describe the concept of emergent properties as gain in functionalities and how it applies to the following going from sub-cellular organelles to cells - going from cells to tissues - going from tissues to organs - going from organs to systems - going from systems to living organisms OR [SLO: B-09- Q-09] Describe the mechanism of transport of water and salt in plants	A	3
20.	B: Q 2 (viii)	Q D	[SLO: B-09- Q-14] Explain osmotic adjustments in plants OR [SLO: B-09- D-0]} Explain meiosis, mitosis and stages of mitosis, meiosis (by use of sketch of diagrams)	U	3
21.	B: Q 2 (ix)	Q D	[SLO: B-09- Q-21] Explain sexual reproduction in plants OR [SLO: B-09- D-05] Identify different types of cells (mesophyll cell, epidermal cell, neurons, muscle, red blood cell, liver cell) and sketch their structures	K	3
22.	B: Q 2 (x)	B B	[SLO: B-09- B-05] Describe sources of variation which can lead to speciation and evolution OR [SLO: B-09-B-10] List the three distinct domains into which living organisms are broadly classified into	K	3
23.	C: Q3	A D	[SLO: B-09- A-08] Describe the steps of the scientific method that is: Recognition Observation Hypothesis Deduction Experiments Results OR [SLO: B-09- D-0]} Explain meiosis, mitosis and stages of mitosis, meiosis (by use of sketch of diagrams) [SLO: B-09- D-012] outline the significance of mitosis and meiosis.	U	6

24.	C: Q4	F E	[SLO: B-09- F -02] Define Enzymes and describe their characteristics OR [SLO: B-09- E -04] Discuss the different types of tissue come together to form the leaf	U	6
25.	C: Q5	D Q	[SLO: B-09- D -04] Outline structural advantages of plant and animal cells OR [SLO: B-09- Q -16] Distinguish between vegetative propagation and artificial propagation	A	6

Table of specifications (ToS)
Model Paper Biology Grade IX (SSC I)

Content Domains/ Area	Domain A: Nature of Science in Biology	Domain B: Evolution and Biodiversity Classification	Domain D: Cells and Sub cells		Domain E: Tissue, Organ and Systems	Domain C: Molecular Biology	Domain F: Metabolism	Domain Q: Plants		Domain B: Evolution and Biodiversity Classification		
Assessment Objectives	**Unit 1: The science of biology (A1-A9)**	**Unit 2: Biodiversity (B7-B13)**	**Unit 3: Cell (D1-D7, D13)**	**Unit 4: Cell cycle (D8-D12)**	**Unit 5: Tissues, organs & organ system (E1-E8)**	**Unit 6: Molecular biology (C1-C11)**	**Unit 7: Metabolism (F1-F8)**	**Unit 8: Plant physiology (Q1-Q14)**	**Unit 9: Plant reproduction (Q15-Q21)**	**Unit 10: Evolution (B1-B6)**	**Total Marks**	**Percentage**
K (Knowledge)	Q1(ii) 1 Q2 (i/f) 3 Q2 (v/f) 3	Q1 (iv) 1 Q2 (i/s) 3 Q2 (x/s 3	Q1 (i) 1 Q2 (v/s) 3 Q2 (ix/s) 3			Q1 (viii) 1 Q1 (xii) 1			Q1 (ix) 1 Q2 (ix/f) 3	Q2 (x/f) 3	30	27.8%
U (Understanding)	Q3 (f) 6			Q1 (iii) 1 Q2 (viii/s) 3 Q3 (s) 6	Q1 (v) 1 Q1 (vii) 1 Q4 (s)6		Q1. (vi) 1 Q1 (x) 1 Q2(ii/f)3 Q2 (iv/f) 3 Q2 (vi/s) 3 Q4 (f) 6	Q2 (vi/f) 3 Q2 (viii/s) 3	Q2 (ii/s) 3	Q1 (xi) 1 Q2 (iv/s) 3	54	50%
A (Application)			Q5 (f) 6		Q2 (vii/f) 3	Q2 (iii/f) 3 Q2 (iii/s) 3		Q2 (vii/s) 3	Q5 (s) 6		24	22.2%
Total Marks	13	7	13	10	11	8	17	9	13	7	108	
Total Percentage	12%	6.5%)	12%	9.3%	10.2%	7.4%	15.7%	8.3%	12%	6.5%		100%

Note:

1 This ToS does not reflect policy, but it is particular to this model question paper.

2 Proportionate / equitable representation of the content areas may be ensured.

3 The percentage of cognitive Level is 30%, 50%, and 20% for knowledge, understanding, and application, respectively with **± 5%** variation.

4 While selecting alternative questions for Short Response Questions (SRQs) and Extended Response Questions (ERQs), it must be kept in mind that:

- Difficulty levels of two alternative questions of the internal choice will be same
- SLOs of the two alternative questions of the internal choice must be different

Key: Question Number (part/ first choice) marks. Example: **Q2 (i/f) 3**, Question Number (part/second choice) marks. Example: **Q2 (i/s) 3**



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