

ASSESSMENT FRAMEWORK AND MODEL QUESTION PAPER

BIOLOGY

Grade IX

NATIONAL CURRICULUM
2022-23



50% MCQs & 50% Descriptive
INCLUSIVE SCHEME OF STUDIES 2024



FEDERAL BOARD OF
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**ASSESSMENT FRAMEWORK
FOR
BIOLOGY GRADE-IX
CURRICULUM 2022-23
SCHEME OF STUDIES 2024**

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. Abid Ali Mughal, Associate Professor, Islamabad Model College for Boys, H-9, Islamabad
2. Dr. Kashif Ali, Associate Professor, Islamabad Model College for Boys, F-7/3, Islamabad
3. Mrs. Ruqayya Shaikh, Associate Professor, Islamabad Model College for Girls, F-6/2, Islamabad
4. Mrs. Tayyaba Malik, Subject Experts, APSAC Secretariat Rawalpindi

The whole work was successfully accomplished under the able supervision and guidance of Dr. Ikram Ali Malik, 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 Assessment Framework.

MIRZA ALI
Director
FBISE, Islamabad

ASSESSMENT FRAMEWORK FOR BIOLOGY GRADE-X, 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	Summative	Understanding	Question(s) will be asked in	

Content Domain / Area	SLO No./ Description	Form of Assessment	Cognitive Level (Knowledge, Understanding, Application)	Remarks	Number of Periods Required (1 period=40 minutes)
	that is: Recognition Observation Hypothesis Deduction Experiments Results			annual examination.	
	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	Summative	Understanding	Question(s) will be asked in	

Content Domain / Area	SLO No./ Description	Form of Assessment	Cognitive Level (Knowledge, Understanding, Application)	Remarks	Number of Periods Required (1 period=40 minutes)
	schemes			annual examination.	
	[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	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)
	pairing in between the two helices through complementary base pairing				
	[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	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)
	organelles) - multicellular organisms (across cells)				
	[SLO: B-09-D-07] Describe Cell Specialization.	Summative	Understanding	Question(s) will be asked in annual examination.	
	[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.	

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-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.	
	[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	Summative	Knowledge	Question(s) will be asked in	

Content Domain / Area	SLO No./ Description	Form of Assessment	Cognitive Level (Knowledge, Understanding, Application)	Remarks	Number of Periods Required (1 period=40 minutes)
	into macronutrients and micronutrients			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.	
	[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.	

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-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.	
	[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	Summative for PBA	Application	Laboratory work- will be assessed in PBA.	20 periods

Domain	NCP SLOs Description	Form of Assessment	Cognitive Level	Remarks	Number of Periods Required (1 period=40 minutes)
	- temperatures - times - lengths				
	[SLO: B-09-10-X-02] Students should be able to carry out simple experiments of: - diffusion - osmosis - food tests - 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	Summative for PBA	Application	Laboratory work- will be assessed in PBA.	
	[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	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)
	- 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 - 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 if the same or similar result is obtained when the measurement is	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)
	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 - 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: - Identify the independent variable and dependent variable - describe how and explain why variables should be controlled - suggest an appropriate number and range of values for the independent variable	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)
	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 – 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				

Domain	NCP SLOs Description	Form of Assessment	Cognitive Level	Remarks	Number of Periods Required (1 period=40 minutes)
	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 STANDS FOR “PRACTICAL BASED ASSESSMENT”

FINAL CONCEPTUAL PATTERN OF SSC-I & II

Physics, Chemistry, Biology and Computer Science

Total Marks: 60 Marks (Theory Paper)

Components	Detail
Marks Allocated to MCQs	30 marks
Total MCQs	60
Marks per MCQ	0.5
Objective Portion – MCQs (30 Marks)	(Time Allowed: 1:20 hours) Section-A 40 straight MCQs ($40 \times 0.5 = 20 \text{ marks}$) 20 MCQs with (stimulus/situations/scenario) ($20 \times 0.5 = 10 \text{ marks}$)
Subjective Portion – SRQs & ERQs (30 Marks)	(Time Allowed: 1:40 hours) Section- B Section B having 6 questions. Each question has internal choice. Each question having 3 marks. ($3 \times 6 = 18 \text{ marks}$) Section -C Section C having 2 questions. Each question has internal choice. Each question having 6 marks. ($2 \times 6 = 12 \text{ marks}$)
Subjective Portion Structure	6 straight SRQs (with no sub parts) 2 straight ERQs (may have part but with same concept)

Important Note:

- i) Summative SLOs of NCP Biology 2022-23 for grades IX or X will only be included.
- ii) Ensure balanced domain coverage using the Table of Specifications (ToS).

PHY/CHEM/BIO/COMP SSC-I

CORRECTLY FILLED



WRONG METHOD

To be filled-in by the Candidate

PAPER VERSION	(A)	(B)	(C)	(D)	(E)
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Time Allowed: 1:20 Hours

Total Marks: 30

Candidate Sign. _____

Invigilator Sign. _____

Question Booklet No. _____

Roll No. _____

FILL ONLY ONE BUBBLE FOR EACH CORRECT ANSWER. USE BLACK BALL POINT/MARKER

1	(A)	(B)	(C)	(D)	16	(A)	(B)	(C)	(D)	31	(A)	(B)	(C)	(D)	46	(A)	(B)	(C)	(D)
2	(A)	(B)	(C)	(D)	17	(A)	(B)	(C)	(D)	32	(A)	(B)	(C)	(D)	47	(A)	(B)	(C)	(D)
3	(A)	(B)	(C)	(D)	18	(A)	(B)	(C)	(D)	33	(A)	(B)	(C)	(D)	48	(A)	(B)	(C)	(D)
4	(A)	(B)	(C)	(D)	19	(A)	(B)	(C)	(D)	34	(A)	(B)	(C)	(D)	49	(A)	(B)	(C)	(D)
5	(A)	(B)	(C)	(D)	20	(A)	(B)	(C)	(D)	35	(A)	(B)	(C)	(D)	50	(A)	(B)	(C)	(D)
6	(A)	(B)	(C)	(D)	21	(A)	(B)	(C)	(D)	36	(A)	(B)	(C)	(D)	51	(A)	(B)	(C)	(D)
7	(A)	(B)	(C)	(D)	22	(A)	(B)	(C)	(D)	37	(A)	(B)	(C)	(D)	52	(A)	(B)	(C)	(D)
8	(A)	(B)	(C)	(D)	23	(A)	(B)	(C)	(D)	38	(A)	(B)	(C)	(D)	53	(A)	(B)	(C)	(D)
9	(A)	(B)	(C)	(D)	24	(A)	(B)	(C)	(D)	39	(A)	(B)	(C)	(D)	54	(A)	(B)	(C)	(D)
10	(A)	(B)	(C)	(D)	25	(A)	(B)	(C)	(D)	40	(A)	(B)	(C)	(D)	55	(A)	(B)	(C)	(D)
11	(A)	(B)	(C)	(D)	26	(A)	(B)	(C)	(D)	41	(A)	(B)	(C)	(D)	56	(A)	(B)	(C)	(D)
12	(A)	(B)	(C)	(D)	27	(A)	(B)	(C)	(D)	42	(A)	(B)	(C)	(D)	57	(A)	(B)	(C)	(D)
13	(A)	(B)	(C)	(D)	28	(A)	(B)	(C)	(D)	43	(A)	(B)	(C)	(D)	58	(A)	(B)	(C)	(D)
14	(A)	(B)	(C)	(D)	29	(A)	(B)	(C)	(D)	44	(A)	(B)	(C)	(D)	59	(A)	(B)	(C)	(D)
15	(A)	(B)	(C)	(D)	30	(A)	(B)	(C)	(D)	45	(A)	(B)	(C)	(D)	60	(A)	(B)	(C)	(D)



Federal Board SSC-I Examination

Biology Model Question Paper

National Curriculum 2022-2023 (Inclusive Scheme of Studies 2024)
(50% MCQs & 50% Descriptive)

SECTION - A (Marks 30)

Time Allowed: 1:20 hours

Section – A is compulsory. All parts of this section are to be answered on the OMR Sheet given in the E-Sheet and handed over to the Centre Superintendent.
Deleting/ overwriting is not allowed. Do not use lead pencil.

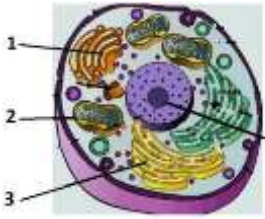
Roll Number						Paper Version
						A

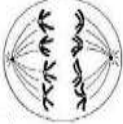
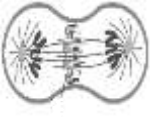
Candidate Sign. _____

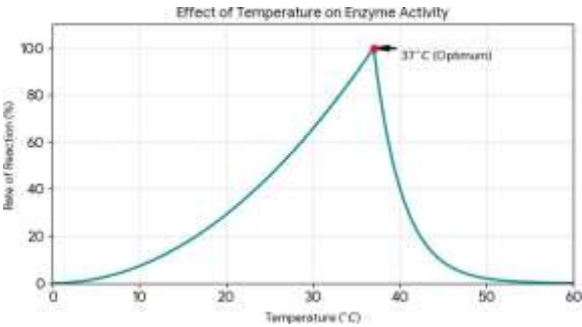
Invigilator Sign. _____

Note: Fill the correct bubble for each question on OMR Sheet given in the E-Sheet. Each question carries 0.5 mark.

S #	Question	(A)	(B)	(C)	(D)
1.	Biology is considered a subset of natural sciences because it deals with:	natural phenomena without observation or experimentation	only the physical characteristics of living organisms	living organisms and their interactions with nature	living organisms only from a historical perspective
2.	Which statement best describes the teaching of the Quran regarding the nature?	It encourages observation and study of nature	It presents nature mainly as resources for human use.	It discusses nature only in relation to historical events	It encourages appreciation of nature but not its investigation
3.	Pharmacology is related to:	Defense against germs	Study of drugs and their effect	Study of diseases	Study of form and function of body
4.	A group of scientists from Biology and Chemistry work together to develop a new vaccine. Which other field can contribute for quick and accurate development of vaccine?	Computer science	Physics	Mathematics	Geography
5.	Scientists are investigating how a mutation in a gene is passed from one generation to the next. This research belongs to:	Pharmacology	Immunology	Genetics	Physiology
6.	A well-tested explanation supported by evidence but still open to revision is called:	Law	Observation	Hypothesis	Theory
7.	Which kingdom contains eukaryotes with cell walls and an absorptive mode of nutrition?	Fungi	Plantae	Protista	Animalia
8.	Which one of the following best defines “biodiversity”?	The study of living organisms and their environment	The grouping of organisms into categories based on similarities	The variety of living organisms found in a specific area or on Earth	The identification and naming of organisms

9.	In the taxonomic hierarchy starting from kingdom, which rank comes immediately after Family ?	Class	Order	Genus	Specie
10.	Earliest classification systems were mainly based on:	Genetic makeup	Cellular structure	DNA sequencing	Physical characteristic
11.	Identify the organelle that plays a role in lipid synthesis and detoxification in a cell.	Chloroplast	Smooth endoplasmic reticulum	Rough endoplasmic reticulum	Golgi Apparatus
12.	Identify the cells that are responsible for coordination within the animal bodies.	Nerve cells	Muscle cells	Epithelial cells	Blood cells
13.	Which example best represents division of labour at the cellular level?	Cell dividing to produce new cells	Nucleus controlling cellular activities	Muscles contracting for movement	Lungs exchanging gases
14.	In which of the following labeled part, the ribosomes are formed? 	1	2	3	4
15.	All of these organelles are involved in protein synthesis and modification EXCEPT :				
16.	A table differentiating the structural advantage of plant and animal cells is given below. identify the INCORRECT row:				
		Organelles	Occurrence	advantage in plant cells	advantage in animal cells
	A	Centrioles	Absent in plant cell	-	Cell division
	B	Cell membrane	Absent in plant cell	-	Selective permeability
	C	Cell wall	Absent in animal cell	Structural support and protection.	-
	D	Chloroplast	Absent in animal cell	Sites of photosynthesis	-
17.	All of the following are correct about importance of Meiosis, EXCEPT :	Genetic stability	Genetic variation.	Sexual reproduction.	Maintenance of number chromosomes in a species.
18.	A student observes a cell where chromosomes are condensed and nuclear membrane is disappearing. This stage is:	Prophase	Metaphase	Anaphase	Telophase
19.	Interphase is important because it:	Divides the cell	Ensures DNA replication	Disintegrates the nuclear membrane	Forms spindle apparatus
20.	In which of the following stage the cells may exit the cell cycle and stop to divide?	G1	G2	S	G0
21.	Which one of the following best explains the role of stem cells?	Transporting oxygen throughout the body	Repair of damaged tissues by forming new cells	Breaking down food into simpler substances	Causing genetic changes in body cells

22.	Which one of the following diagrams correctly represents anaphase-I?				
23.	Identify the structure/region that is involved in the regulation of temperature in the human body:	Lymph nodes	Pituitary gland	Kidney	Hypothalamus
24.	Homeostasis helps the body to:	Change rapidly with environment	Maintain stable internal environment	Control body growth and development	Stimulates digestive activity
25.	Which of the following correctly matches the structure with its level of organization?	Root – Cell	Heart – Tissue	Muscle – Organ System	Brain – Organ
26.	A mitochondrion produces only energy, but a cell can perform all life processes. This shows:	Cells are smaller than organelles	Emergent properties at cell level	All organelles are independent organisms	Organelles survive independently like a cell
27.	The correct sequence of biological organization is:	Tissue → Cell → Organ → System → organelles	Organelle → Cell → Tissue → Organ → System → Organism	Cell → Organelle → Tissue → Organism → System	Organ → Tissue → Cell → System → organism
28.	Muscular tissue in the stomach is important for:	Producing enzymes	Mechanical digestion	Chemical digestion	Absorbing nutrients
29.	The cells that are carriers for transfer of genetic information to next generation are:	Gametes	Stem cells	Zygote	Brain cells
30.	Identify which is NOT a primary function of lipids?	Act as enzymes	Long-term energy storage	Insulation and protection	Formation of cell membranes
31.	Molecular biology mainly focuses on the study of:	The organs and organ systems	The microscopic organisms around us	Molecules present in cells and their reactions	Formation and breakdown of molecules in soil
32.	What do the Carbohydrates do in our body?	Gaseous transport	Immunity	Instant source of energy	Speed up chemical reactions
33.	A person is suffering from a deficiency of proteins. Which food group will help him to overcome the issue?	Milk, eggs, fish	Oranges, spinach, mangoes	Butter, cheese, oil	Fruits, cereal grains, potatoes
34.	Excess carbohydrates in humans are mainly stored as:	Protein	Glycogen	Cellulose	Vitamins
35.	Which is the correct complementary base pairing in DNA double helix?	Guanine ≡ Adenine	Guanine ≡ Cytosine	Adenine = Cytosine	Thymine = Guanine
36.	In which of the following processes ATP is used as an energy currency?	Osmosis	Active transport	Diffusion	Facilitated diffusion
37.	Which characteristics best indicate the osmotic adjustment in hydrophytes?	Large surface area of leaves	Shedding off the leaves to save water	Closing of stomata to lose water	Spiny leaves
38.	All of these are related to sexual reproduction in plants EXCEPT :	Mega spore formation	Microspore formation	Cuttings and grafting	Double fertilization
39.	Which of the following are micronutrient in plants?	Carbon and hydrogen	Phosphorus and Sulphur	Oxygen and nitrogen	Iron and manganese

40	In budding, the offspring is genetically identical to the parent because:	It involves meiosis.	It involves specialized reproductive cells.	It involves mitosis in the parent body.	It involves cross-pollination.
STIMULUS/SITUATION/SCENARIO BASED MCQs					
Scenario for MCQ# 41 to 44		Enzyme activity increases with temperature, reaches a peak at 37°C, and then sharply declines. 			
41	The peak of the graph represents:	Denaturation point	Optimum temperature	Freezing point	Substrate loss
42	Why the reaction was not taking place at 0°C	Amount of substrate was very low	Enzymes were denatured	Enzymes were inactive	Large number of inhibitors were present
43	The sharp decline after peak is due to:	Increased enzyme activity	Denaturation of enzyme	More ATP production	More substrate
44	If enzyme concentration is increased at 50°C, what will be the effect on reaction:	Show no change in reaction rate	Increase the rate of reaction even after 50°C	Shift optimum temperature to higher value	More products will be formed
Scenario for MCQ# 45 to 48		A plant is placed in a hot, dry environment. After some time: - Leaves wilt - Water movement slows - Sugar transport becomes inefficient			
45	Wilting occurs mainly due to failure of:	Phloem transport	High rate of Transpiration	Slow Respiration	Slow gaseous exchange
46	Reduced water availability affects photosynthesis because:	Leaves become enlarged	Chlorophyll is destroyed	Stomata close, reducing CO ₂ intake	Oxygen production increases excessively
47	Food transport is affected because:	Xylem breaks down	Pressure flow mechanism depends on water balance	Oxygen increases	Phloem is damaged
48	Which pair of plant tissues is mainly responsible for transporting water and sugars in the plant?	Xylem and phloem	Epidermis and cortex	Parenchyma and collenchyma	Meristem and epidermis
Scenario for MCQ# 49 to 52		Two cells are observed under different conditions of respiration: - Cell A: High oxygen, high ATP, no lactic acid - Cell B: Low oxygen, low ATP, lactic acid present			
49	Cell A is performing:	Anaerobic respiration	Aerobic respiration	Transport oxygen	Low metabolism
50	Cell B is most likely found in:	Resting muscle cell	Active exercising muscle	Mesophyll cells in plants	Bone cell
51	Which of the following information is correct about Cells A and B?	Cell A is performing Aerobic respiration	Cell B is performing Aerobic respiration	Both Cell A and Cell B are performing Aerobic respiration	Both Cell A and Cell B are performing Anaerobic respiration

52.	Compared to Cell A, Cell B produces less ATP because:	Glucose is not available	Oxygen is not used for complete oxidation	Cell B is a plant cell	Cell B is a prokaryotic cell	
Scenario for MCQ# 53 to 56		A gardener is trying to grow new plants from an existing rose plant. In different trials, he uses methods like burying a stem in soil, cutting a stem and planting it and using tissue culture in a lab				
53.	A gardener buries a rose stem in the soil while it is still attached to the main plant and it grows new roots. What is this method called?	Artificial propagation through cutting	Natural vegetative propagation through layering	Artificial propagation through grafting	Sexual reproduction through seeds	
54.	A gardener cuts off a healthy rose stem and plants it in wet soil, where it grows roots and becomes a new plant. What is this process called?	Natural vegetative propagation	Sexual reproduction	Artificial propagation through grafting	Artificial propagation through cutting	
55.	Which of the following best explains the main difference between vegetative propagation and artificial propagation in the above scenario?	Vegetative propagation involves seeds, artificial does not	Vegetative propagation occurs naturally, artificial requires human involvement	Artificial propagation occurs only in labs	Vegetative propagation produces variation, artificial does not	
56.	If the gardener observes that all newly grown plants are genetically identical to the parent plant, what can be concluded?	Sexual reproduction has occurred	Only artificial propagation produces identical plants	Both vegetative and artificial propagation can produce identical plants	Mutation has occurred	
Scenario for MCQ# 57 to 60		A biology student studying the Darwin's theory of evolution and learns that the human appendix and tailbone are reduced organs with little or no function at present.				
57.	The appendix is an example of:	Damaged structure	Vestigial structure	Analogous structure	Functional organ	
58.	This type of structures indicates that:	Organisms remain unchanged over time	Evolution has occurred over generations	Humans are the most advanced organisms	Only complex animals undergo evolution	
59.	Why are these structures reduced?	They never had any function in ancestors	They are artificially created by humans	They are newly evolved structures in modern organisms	They lost function over generations	
60.	Which of the following is another example of a such type of structure?	Hind limb bones of snake	Human heart	Bird wings	Fish gills	



Federal Board SSC-I Examination Model

Question Paper Biology

National Curriculum 2022-2023 (Inclusive Scheme of Studies 2024)

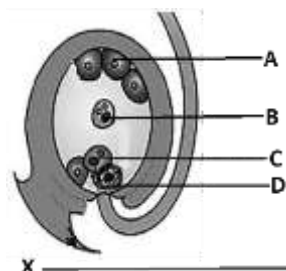
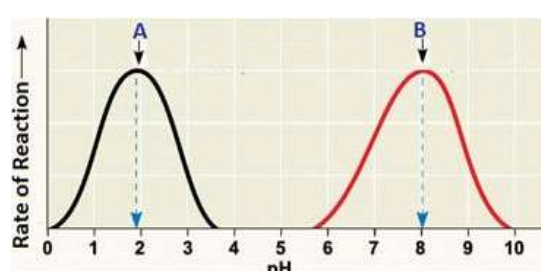
(50% MCQs & 50% Descriptive)

Time allowed: 1:40 hours

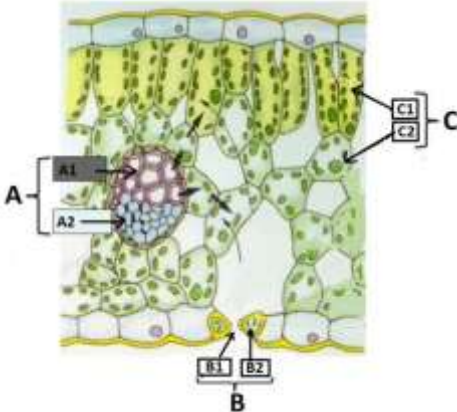
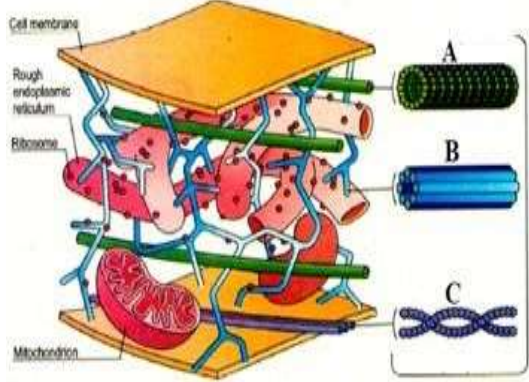
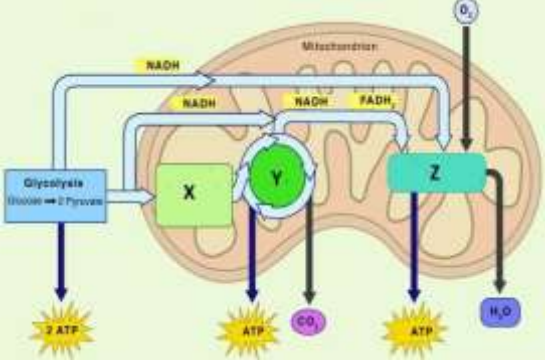
Total Marks: 30

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

SECTION-B (3x6 = 18 Marks)

1.	Define binomial nomenclature. Give scientific names of one animal and one plant using binomial nomenclature.	1+1 +1	OR	The given diagram X is a plant structure. Identify X and name the parts labeled as A, B, C and D.	1+2
					
2.	Define the primary structure of proteins. Sketch general formula of an amino acid. Mention the role of proteins in defense of body.	1+1 +1	OR	Write three characteristics of a good hypothesis.	3
3.	Differentiate micronutrients and macronutrients. State one important role of magnesium and one important role of nitrogen in the life of plants.	1+2	OR	Write any three important observations carried out by A.F.A King about the spread of Malaria?	1+1 +1
4.	Give THREE differences by comparing the structure of DNA and RNA.	1+1 +1	OR	How variations and adaptations are related to evolution?	1.5 + 1.5
5.	Sketch the diagram and label the components of an Angiospermic seed.	1.5+ 1.5	OR	Enlist any two main events that occur during Prophase-I of meiosis and draw diagram.	2+1
6.	Compare anaphase-I of meiosis with anaphase of mitosis and draw labeled diagrams.	1.5 + 1.5	OR	Enzyme activity is affected by different factors including pH and temperature. The graph shows the activity of two human enzymes Pepsin and Trypsin at different pH values and normal body temperature (37°C).  a. Relate the peak A and B with relevant enzyme with justification of your answer. b. Mention the site of action of both	2+1

SECTION-C (2x6 = 12 Marks)

7.	Recall your knowledge about the tissues, organs and organ system in plants and animals to answer the following questions. (a) Mention the role of parts labelled as A (tissue), B(structure) and C(tissue) in plant leaf.  (b) How respiratory and urinary systems of the human body work to maintain homeostasis?	1+1+1 1.5+1.5	OR Recall your knowledge about cell structure and function to answer the following questions. (a) State chemical composition of the labeled components: A, B and C and explain their role in cell structure and functioning?  (b) How lysosomes are produced? Give their roles in autophagy and intracellular digestion.	1+1+1 1.5+1.5
8.	 Given diagram shows the steps of aerobic respiration. Describe the steps X, Y and Z of aerobic respiration in detail. Mention the types and number of reactants, products and energy molecules in all steps (X, Y and Z).	2+2+2	OR Transpiration and excretion are important processes for homeostasis in plants. a. A gardener notices that trees shed their yellow leaves in autumn and central part of woody stem become darker and hard over time. Explain both observations in terms of excretion. b. Why there are higher chances of wilting of plants on hot sunny day? How plants survive in such harsh conditions?	1.5+1.5 1.5+1.5

Federal Board SSC-I Examination
Biology Model Question Paper
National Curriculum 2022-2023 (Inclusive Scheme of Studies 2024)
(50% MCQs & 50% Descriptive)
Alignment of Questions with Student Learning Outcomes

Section: Q. No. (Part no.)	Student Learning Outcomes	Cognitive Domain	Allocated Marks in Model Paper
A: 1	[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.	U	0.5
A: 2	[SLO: B-09-A-02] State Quran instructs to reveal the study of Life	K	0.5
A: 3	[SLO: B-09-A-04] Define with examples that biology has many subfields. (Cytology) (Embryology) (Genetics) (Molecular Biology) (Pathology) (Ecology) (Marine Biology) (Immunology) (Morphology) (Anatomy) (Histology) (Physiology) (Taxonomy) (Paleontology) (Pharmacology)	K	0.5
A: 4	[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	A	0.5
A: 5	[SLO: B-09-A-04] Define with examples that biology has many subfields. (Cytology) (Embryology) (Genetics) (Molecular Biology) (Pathology) (Ecology) (Marine Biology) (Immunology) (Morphology) (Anatomy) (Histology) (Physiology) (Taxonomy) (Paleontology) (Pharmacology)	K	0.5
A: 6	[SLO: B-09-A-09] Evaluate the terms 'hypothesis', 'theory' and 'law' in the context of research in the natural sciences	K	0.5
A: 7	[SLO: B-09-B-10] List the three distinct domains into which living organisms are broadly classified into	K	0.5
A: 8	[SLO: B-09-B-07] Define biodiversity and classification	K	0.5
A: 9	[SLO: B-09-B-13] Describe the complications of classifying viruses	U	0.5
A: 10	[SLO: B-09-B-09] Discuss the history of classification schemes	U	0.5
A: 11	[SLO: B-09-D-3] Sketch different sub-cellular organelles (nucleus, mitochondria, cell membranes, etc.) and outline their roles	U	0.5
A: 12	[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	0.5
A: 13	[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)	U	0.5
A: 14	[SLO: B-09-D-3] Sketch different sub-cellular organelles (nucleus, mitochondria, cell membranes, etc.) and outline their roles	A	0.5
A: 15	[SLO: B-09-D-3] Sketch different sub-cellular organelles (nucleus, mitochondria, cell membranes, etc.) and outline their roles	A	0.5
A: 16	[SLO: B-09-D-4] Outline structural advantages of plant and animal cells	A	0.5
A: 17	[SLO: B-09-D-12] Outline the significance of mitosis and meiosis	U	0.5
A: 18	[SLO: B-09-D-09] Explain mitosis, meiosis and stages of mitosis, meiosis (by use of sketch and diagrams)	A	0.5
A: 19			
A: 20	[SLO: B-09-D-08] Describe Cell cycle	U	0.5
A: 21	[SLO: B-09-D-13] Define stem cells as unspecialized cell	U	0.5
A: 22	[SLO: B-09-D-09] Explain mitosis, meiosis and stages of mitosis, meiosis (by use of sketch and diagrams)	A	0.5
A: 23	[SLO: B-09-E-07] Discuss the various organs and systems of the human body work to maintain homeostasis	U	0.5
A: 24	[SLO: B-09-E-06] Describe the advantages of homeostasis	U	0.5
A: 25	[SLO: B-09-E-2] Describe the concept of emergent properties as gain in functionalities and how it applies to the following going from subcellular	U	0.5

	organelles to cells - going from cells to tissues - going from tissues to organs - going from organs to systems - going from systems to living organisms		
A: 26	[SLO: B-09-E-2] Describe the concept of emergent properties as gain in functionalities and how it applies to the following going from subcellular organelles to cells - going from cells to tissues - going from tissues to organs - going from organs to systems - going from systems to living organisms	U	0.5
A: 27	[SLO: B-09-E-2] Describe the concept of emergent properties as gain in functionalities and how it applies to the following going from subcellular organelles to cells - going from cells to tissues - going from tissues to organs - going from organs to systems - going from systems to living organisms	K	0.5
A: 28	[SLO: B-09-E-3] Enlist the different types of tissue come together to form the stomach organ in the human body	U	0.5
A: 29	[[SLO: B-09-C-08] Outline function of DNA as carrier of, hereditary information	K	0.5
A: 30	[SLO: B-09-C-4] Outline the structure, function and sources of lipids	U	0.5
A: 31	[SLO: B-09-C-1] Define Biochemistry/molecular biology	K	0.5
A: 32	[SLO: B-09-C-05] Define Carbohydrates and Outline the structure, function and sources of Carbohydrates	U	0.5
A: 33	[SLO: B-09-C-3] Outline the structure and function and sources of proteins with structure of amino acids	A	0.5
A: 34	[SLO: B-09-C-05] Define Carbohydrates and Outline the structure, function and sources of Carbohydrates	K	0.5
A: 35	[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	U	0.5
A: 36	[SLO: B-09-F-06] Discuss the role of ATP as energy currency	U	0.5
A: 37	[SLO: B-09-Q-14] Explain osmotic adjustments in plants	U	0.5
A: 38	[SLO: B-09-Q-21] Explain sexual reproduction in plants	U	0.5
A: 39	[SLO: B-09-Q-02] Categorize minerals nutrients of plants into macronutrients and micronutrients	K	0.5
A: 40	[SLO: B-09-Q-15] Describe different types of asexual reproduction i.e. binary fission, budding, spore formation and vegetative propagation	U	0.5
A: 41	[SLO: B-09-F-04] Assess the factors which could influence enzyme activity	U	0.5
A: 42	[SLO: B-09-F-02] Define Enzymes and describe their characteristics	K	0.5
A: 43	[SLO: B-09-F-04] Assess the factors which could influence enzyme activity	A	0.5
A: 44	[SLO: B-09-F-04] Assess the factors which could influence enzyme activity	A	0.5
A: 45	[SLO: B-09-Q-07] Describe transpiration and relate this process with cell surface and stomatal opening and closing	U	0.5
A: 46	[SLO: B-09-Q-07] Describe transpiration and relate this process with cell surface and stomatal opening and closing	U	0.5
A: 47	[SLO: B-09-Q-10] Explain the mechanism of food translocation by, the theory of Pressure Flow Mechanism	U	0.5
A: 48	[SLO: B-09-Q-06] Describe how roots take up water and mineral salts by active and passive absorption [SLO: B-09-Q-10] Explain the mechanism of food translocation by, the theory of Pressure Flow Mechanism	U	0.5
A: 49	[SLO: B-09-F-08] Explain aerobic respiration and anaerobic respiration	U	0.5
A: 50	[SLO: B-09-F-08] Explain aerobic respiration and anaerobic respiration	U	0.5
A: 51	[SLO: B-09-F-08] Explain aerobic respiration and anaerobic respiration	U	0.5
A: 52	[SLO: B-09-F-08] Explain aerobic respiration and anaerobic respiration	A	0.5
A: 53	[SLO: B-09-Q-17] Explain vegetative propagation in plants (through stem, suckers and leaves)	K	0.5
A: 54	[SLO: B-09-Q-18] Describe the two methods of artificial vegetative propagation (stem cuttings and grafting)	U	0.5
A: 55	[SLO: B-09-Q-16] Distinguish between vegetative propagation and artificial	U	0.5

	propagation		
A: 56	[SLO: B-09-Q-15] Describe different types of asexual reproduction i.e. binary fission, budding, spore formation and vegetative propagation	U	0.5
A: 57	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	K	0.5
A: 58	[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	K	0.5
A: 59	[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	0.5
A: 60	[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	K	0.5
B: 1	[SLO: B-09-B-12] Outline the binomial nomenclature system. OR [SLO: B-09-Q-21] Explain sexual reproduction in Plants	K	3
B: 2	[SLO: B-09-C-03] Outline the structure and function and sources of proteins with structure of amino acids OR [SLO: B-09-A-08] Describe the steps of the scientific method that is: Recognition, Observation, Hypothesis, Deduction, Experiments and Results	K	3
B: 3	[SLO: B-09-Q-03] State that nitrogen is important in protein synthesis and magnesium for chlorophyll formation. OR [SLO: B-09-A-08] Describe the steps of the scientific method that is: Recognition, Observation, Hypothesis, Deduction, Experiments and Results	K	3
B: 4	[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. OR [SLO: B-09-B-05] Describe sources of variation which can lead to speciation and evolution.	U	3
B: 5	. [SLO: B-09-Q-21] Explain sexual reproduction in Plants OR SLO: 8-09-D-09] Explain mitosis, meiosis and stages of mitosis, meiosis (by use of sketch and diagrams	U	3
B: 6	[SIO: 8-09-D-11] Compare the processes of mitosis and meiosis OR [SLO: B-09-F-04] Assess the factors which could influence enzyme activity.	U	3
C: 7	c. [SLO:B-09-E-04] Discuss the different types of tissue come together to form the leaf d. [SLO: B-09-E-07] Discuss the various organs and systems of the human body work to maintain homeostasis OR a. [SLO: B-09-D-03] Sketch different subcellular organelles nucleus, mitochondria, cell membrane etc. and outline their roles b. [SLO: B-09-D-03] Sketch different subcellular organelles nucleus, mitochondria, cell membrane etc. and outline their roles	U	3+3
C: 8	[SLO: B-09-F-08] Explain aerobic respiration and anaerobic respiration OR (a) [SLO: B-09-Q-08] Describe temperature, wind and humidity as the factors affecting the rate of transpiration. (b) SLO: B-09-Q-13] Describe the mechanisms adaptations in plants for the excretion.	A A A	6 3 3

Table of specifications (ToS) Model Paper Biology (50% MCQs Pattern) Grade IX (SSC I)

Content/ Domains Areas	Domain A: Nature of Science in Biology	Domain B: Evolution and Biodiversity Classification	Domain D: Cells and Sub cellular Organelles		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	% Age
K (Knowledge)	A(2)0.5 A(3)0.5 A(5)0.5 A(6)0.5 B (2, s) 3 B (3,s) 3	A(7)0.5 A(8)0.5 B(1,f)3	A(12)0.5		A(27)0.5	A(29)0.5 A(31)0.5 A(34)0.5 B (2,f) 3	A(42)0.5	B(3,f)3	A(53)0.5 B(1,s)3	A(57)0.5 A(58)0.5 A(60)0.5	26	29 %
U (Understanding)	A(1)0.5	A(9)0.5 A(10)0.5	A(11)0.5 A(13)0.5 C (7,a/s) 3 C (7,b/s) 3	A(17)0.5 A(19)0.5 A(20)0.5 A(21)0.5 B (5,s) 3 B (6,f) 3	A(23)0.5 A(24)0.5 A(25)0.5 A(26)0.5 A(28)0.5 C(7,a/f) 3 C(7,b/f) 3	A(30)0.5 A(32)0.5 A(35)0.5 B (4,f) 3	A(36)0.5 A(41)0.5 A(49)0.5 A(50)0.5 A(51)0.5 B(6/s) 3	A(37)0.5 A(39)0.5 A(45)0.5 A(46)0.5 A(47)0.5 A(48)0.5	A(38)0.5 A(40)0.5 A(54)0.5 A(55)0.5 A(56)0.5 C (5,f) 3	A(59)0.5 B (4,s) 3	47	52 %
A (Application)	A(4)0.5		A(14)0.5 A(15)0.5 A(16)0.5	A(18)0.5 A(22)0.5		A(33)0.5	A(43)0.5 A(44)0.5 A(52)0.5 C(8/f) 6	C (8,a/s) 3 C(8,b/s)3			17	19 %
Total Marks	9	5	9	9	9	9.5	13.5	12	9	5	90	

Unit 1: The Science of Biology
Unit 2: Biodiversity
Unit 3: Cell
Unit 4: Cell cycle
Unit 5: Tissues, organs & organ system
Unit 6: Molecular biology
Unit 7: Metabolism
Unit 8: Plant physiology
Unit 9: Plant reproduction
Unit 10: Evolution

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 $\pm 5\%$ variation. The domain of Application also contains all other higher order Cognitive Levels of Bloom's Taxonomy.
- 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: Paper A (Question Number) marks. Example: **A (2) 0.5**,
 Paper B (Question Number, part/first or second choice) marks. Example: **B (2, a /s) 5**



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