

ASSESSMENT FRAMEWORK AND MODEL QUESTION PAPER

BIOLOGY

Grade XI

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-XI
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-XI. 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-XI 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. Ms. 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-XI, 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-XI (HSSC I)
Details of Content Areas/ SLOs

Content Domain / Area	NCP SLOs Description	Form of Assessment	Cognitive Level	Remarks	Number of Periods Required (1 period=40 minutes)
B	[SLO:B-11-B-01] Explain that evolution happens due to variation in organisms and the selection pressures that organisms face	Summative	U	Question(s) will be asked in annual examination.	15
	[SLO:B-11-B-02] Discuss the evidence that is provided by biogeography	Summative	U	Question(s) will be asked in annual examination	
	[SLO:B-11-B-03] Analyse the evidence of evolution that comes from molecular biology.	Summative	A	Question(s) will be asked in annual examination	
	[SLO:B-11-B-04] Differentiate between convergent and divergent evolution on the basis of inheritance of the homologous and analogous structures.	Summative	A	Question(s) will be asked in annual examination	
	[SLO:B-11-B-05] Describe the Endosymbiotic theory about the mechanism of evolution of eukaryotes from prokaryotes	Summative	U	Question(s) will be asked in annual examination	
	[SLO:B-11-B-06] Describe the theory of inheritance of acquired characters, as proposed by Lamarck with example of giraffe neck	Summative	U	Question(s) will be asked in annual examination	
	[SLO:B-11-B-07] State the drawbacks in Lamarckism.	Summative	K	Question(s) will be asked in annual examination	
	[SLO:B-11-B-08] Describe non vascular plants (Bryophytes,)	Summative	U	Question(s) will be asked in annual examination	
	[SLO:B-11-B-09] Explain the life cycle of polytrichome	Formative	U	This SLO is part of regular teaching and learning but will not be assessed in annual examination.	

Content Domain / Area	NCP SLOs Description	Form of Assessment	Cognitive Level	Remarks	Number of Periods Required (1 period=40 minutes)
	[SLO:B-11-B-10] Describe the general features of vascular plants	Summative	U	Question(s) will be asked in annual examination	
	[SLO:B-11-B-11] Identify the division between vascular plants (pteridophytes, gymnosperms, angiosperms)	Summative	K	Question(s) will be asked in annual examination	
	[SLO:B-11-B-12] Explain the general characteristics pteridophytes	Summative	U	Question(s) will be asked in annual examination	
	[SLO:B-11-B-13] Explain the life cycle of ferns	Summative for Practical Based Assessment (PBA)	U	Laboratory work- will be assessed in PBA.	
	[SLO:B-11-B-14] Describe the general characteristic of gymnosperms and classify them	Formative	U	This SLO is part of regular teaching and learning but will not be assessed in annual examination.	
	[SLO:B-11-B-15] Describe the life cycle of pinus	Summative for PBA	U	Laboratory work- will be assessed in PBA.	
	[SLO:B-11-B-16] Describe the general characteristic of angiosperms and classify them	Summative	U	Question(s) will be asked in annual examination	
	[SLO:B-11-B-17] Explain the life cycle of angiosperms	Formative	U	Same as [SLO: B-09-Q-21] This SLO is part of regular teaching and learning but will not be assessed in annual examination.	
	[SLO:B-11-B-18] Describe general characteristics and economic importance of the following angiospermic families Brassicaceae Solanaceae Poaceae	Formative	U	This SLO is part of regular teaching and learning but will not be assessed in annual examination .	

Content Domain / Area	NCP SLOs Description	Form of Assessment	Cognitive Level	Remarks	Number of Periods Required (1 period=40 minutes)
	[SLO:B-11-B-19] Identify that animals are divided into two major groups as invertebrate and vertebrate	Summative	K	Question(s) will be asked in annual examination	
	[SLO:B-11-B-20] Describe the general characteristics, importance and example of sponges cnidarians, Platyhelminthes, Aschelminthes (nematodes), molluscs, annelid, arthropods and echinoderms	Summative	A	Question(s) will be asked in annual examination	
	[SLO:B-11-B-21] Describe the general characteristics of chordates and vertebrates.	Summative	U	Question(s) will be asked in annual examination	
	[SLO:B-11-B-22] Describe the general characteristics of amphibians, reptiles, birds and mammals.	Summative For PBA	U	Laboratory work- will be assessed in PBA.	
C	[SLO:B-11-C-01] Define biochemistry/molecular biology	Summative	K	Question(s) will be asked in annual examination	13
	[SLO:B-11-C-02] Describe Briefly the different types of bonds found in biology (hydrogen bonds, covalent bonds, interactions, ionic, hydrophobic and hydrophilic interactions etc.)	Formative	U	This SLO is part of regular teaching and learning but will not be assessed in annual examination. (Studied in grade 10 th will be covered in first year chemistry)	
	[SLO:B-11-C-03] Distinguish carbohydrates, proteins, lipids and nucleic acids as the four fundamental kinds of biological molecules.	Summative	U	Question(s) will be asked in annual examination	
	[SLO:B-11-C-04] Describe and draw sketches of the condensation - synthesis and hydrolysis reactions for the making and breaking of macromolecule polymers.	Formative	A	This SLO is part of regular teaching and learning but will not be assessed in annual examination.	
	[SLO:B-11-C-05] State the properties of water (high polarity, hydrogen bonding, high specific heat, high heat of vaporization, cohesion, hydrophobic exclusion, ionization and lower density	Summative	K	Question(s) will be asked in annual examination	

Content Domain / Area	NCP SLOs Description	Form of Assessment	Cognitive Level	Remarks	Number of Periods Required (1 period=40 minutes)
	of ice) allow it to be the medium of life.				
	[SLO:B-11-C-06] Define carbohydrates and classify them.	Summative	K	Question(s) will be asked in annual examination	
	[SLO:B-11-C-07] Compare and contrast the properties and roles of monosaccharides and write their formula	Summative	A	Question(s) will be asked in annual examination	
	[SLO:B-11-C-08] Compare the isomers and stereoisomers of glucose.	Formative	A	This SLO is part of regular teaching and learning but will not be assessed in annual examination.(Will study in chemistry as well)	
	[SLO:B-11-C-09] Distinguish the properties and roles of disaccharides	Summative	A	Question(s) will be asked in annual examination	
	[SLO:B-11-C-10] Describe glycosidic bonds in disaccharides.	Summative	U	Question(s) will be asked in annual examination	
	[SLO:B-11-C-11] Describe the structure properties and roles of polysaccharides starch, glycogen, cellulose and chitin.	Summative	U	Question(s) will be asked in annual examination	
	[SLO:B-11-C-12] Define protein, amino acid and recognized essential amino acid and structural formula of amino acid.	Summative	K	Question(s) will be asked in annual examination	
	[SLO:B-11-C-13] Outline the synthesis and breakage of peptide linkages.	Summative	A	Question(s) will be asked in annual examination	
	[SLO:B-11-C-14] Justify the significance of the sequence of amino acids through the example of sickle cell haemoglobin.	Summative	A	Question(s) will be asked in annual examination	
	[SLO:B-11-C-15] Classify proteins as globular and fibrous proteins.	Summative	U	Question(s) will be asked in annual examination	
	[SLO:B-11-C-16] List the roles of structural proteins and functional proteins with 3 examples	Summative	K	Question(s) will be asked in annual examination	
	[SLO:B-11-C-17] Define lipids	Summative	K	Question(s) will be asked in annual examination	

Content Domain / Area	NCP SLOs Description	Form of Assessment	Cognitive Level	Remarks	Number of Periods Required (1 period=40 minutes)
	[SLO:B-11-C-18] Describe the properties and roles of acylglycerols, phospholipids, terpenes and waxes.	Summative	U	Question(s) will be asked in annual examination	
	[SLO:B-11-C-19] Illustrate the molecular structure (making and breaking) of an acylglycerol, a phospholipid and a terpene	Summative	A	Question(s) will be asked in annual examination	
	[SLO:B-11-C-20] Evaluate steroids and prostaglandins as important groups of lipids	Summative	A	Question(s) will be asked in annual examination	
	[SLO:B-11-C-21] Describe nucleic acids and molecular structure of nucleotides.	Summative	U	Question(s) will be asked in annual examination	
	[SLO:B-11-C-22] Distinguish among the nitrogenous bases found in the nucleotides of nucleic acids.	Summative	A	Question(s) will be asked in annual examination	
	[SLO:B-11-C-23] Outline the examples of a mononucleotide (ATP) and a dinucleotide (NAD).	Formative	U	This SLO is part of regular teaching and learning but will not be assessed in annual examination.	
	[SLO:B-11-C-24] Illustrate the formation of phosphodiester bond.	Summative	A	Question(s) will be asked in annual examination	
	[SLO:B-11-C-25] Explain the double helical structure of DNA as proposed by Watson and Crick.	Summative	U	Question(s) will be asked in annual examination	
	[SLO:B-11-C-26] Explain the general structure of RNA.	Summative	U	Question(s) will be asked in annual examination	
	[SLO:B-11-C-27] Distinguish in terms of functions and roles, the three types of RNA	Summative	A	Question(s) will be asked in annual examination	
	[SLO:B-11-C-28] Discuss the Central Dogma.	Formative	U	This SLO is part of regular teaching and learning but will not be assessed in annual examination. (Discussed in [SLO: B-11-H-48])	

Content Domain / Area	NCP SLOs Description	Form of Assessment	Cognitive Level	Remarks	Number of Periods Required (1 period=40 minutes)
	[SLO:B-11-C-29] Define conjugated molecules and describe the roles of common conjugated molecules i.e. glycolipids, glycoproteins, lipoproteins and nucleoproteins.	Summative	K	Question(s) will be asked in annual examination	
D	[SLO:B-11-D-01] Describe that cells are the basic unit of life with respect to 7 properties of Life. (Movement, Respiration, Homeostasis, Growth, Reproduction, Excretion, Nutrition)	Formative	U	This SLO is part of regular teaching and learning but will not be assessed in annual examination.	11
	[SLO:B-11-D-02] Identify the ultrastructure of animal and plant cells.	Summative	K	Question(s) will be asked in annual examination	
	[SLO:B-11-D-03] Describe the structure and functions of subcellular organelles. (mitochondria, nucleus -cell membrane, chloroplast, lysosomes, cell wall, centrioles, - Golgi apparatus, smooth endoplasmic reticulum, rough endoplasmic reticulum, vesicles, peroxisome, vacuoles, ribosomes)	Summative	U	Question(s) will be asked in annual examination	
	[SLO:B-11-D-04] Define cell signalling.	Summative	K	Question(s) will be asked in annual examination	
	[SLO:B-11-D-05] Discuss the pathway of a signal from outside the cell to the inside. (Protein signal and steroid signal)	Summative	A	Question(s) will be asked in annual examination	
	[SLO:B-11-D-06] Define Stem cells and advantages of using stem cells	Summative	K	Question(s) will be asked in annual examination	
	[SLO:B-11-D-07] Categorize different types of stem cells	Summative	U	Question(s) will be asked in annual examination	
	[SLO:B-11-D-08] Evaluate the advantages and disadvantages of using induced Pluripotent Stem Cells.	Summative	A	Question(s) will be asked in annual examination	
	[SLO:B-11-D-09] Explain the structure of the cell membrane and the techniques that can be used to study it.	Formative	U	This SLO is part of regular teaching and learning but will not be assessed in annual examination.	

Content Domain / Area	NCP SLOs Description	Form of Assessment	Cognitive Level	Remarks	Number of Periods Required (1 period=40 minutes)
	[SLO:B-11-D-10] Explain the 4 membrane transport mechanisms with diagrams: (simple diffusion, Facilitated diffusion, Osmosis, Active transport).	Summative	U	Question(s) will be asked in annual examination	
	[SLO:B-11-D-11] Differentiate between prokaryotic and eukaryotic cells with diagrams.	Summative	U	Question(s) will be asked in annual examination	
	[SLO:B-11-D-12] State cell theory (including how to validate it and exceptions to it.)	Formative	K	This SLO is part of regular teaching and learning but will not be assessed in annual examination.	
	[SLO:B-11-D-13] Compare and contrast the workings of a light microscope and electron microscope with focus on resolution and magnification and live vs dead samples.	Formative	U	This SLO is part of regular teaching and learning but will not be assessed in annual examination. (Basic techniques related more to physics)	
	[SLO:B-11-D-14] Write the chemical structure of a single phospholipid (Glycerol as a three carbon molecule, phosphate group, one unsaturated fatty acid tail and one saturated fatty acid tail).	Summative	U	Question(s) will be asked in annual examination	
	[SLO:B-11-D-15] Describe endocytosis and exocytosis with diagrams.	Summative	U	Question(s) will be asked in annual examination	
	[SLO:B-11-D-16] Compare and contrast simple and facilitated diffusion.	Formative	U	This SLO is part of regular teaching and learning but will not be assessed in annual examination. (Information given in SLO:B-11-D-10.)	
	[SLO:B-11-D-17] Explain the steps of mitosis and meiosis with diagrams.	Formative	U	This SLO is part of regular teaching and learning but	

Content Domain / Area	NCP SLOs Description	Form of Assessment	Cognitive Level	Remarks	Number of Periods Required (1 period=40 minutes)
				will not be assessed in annual examination.(Same as [SLO: B-09-D-09])	
F	[SLO:B-11-F-01] Identify the role and component parts of the active site of an enzyme.	Summative	K	Question(s) will be asked in annual examination	15
	[SLO:B-11-F-02] Differentiate among the three types of cofactors i.e. in organic ions, prosthetic group and coenzymes, with examples.	Summative	U	Question(s) will be asked in annual examination	
	[SLO:B-11-F-03] Explain the mechanism of enzyme action through the Induced Fit Model, including comparing it with Lock and Key Model.	Summative	U	Question(s) will be asked in annual examination	
	[SLO:B-11-F-04] Explain enzyme catalysis with example of specific reactions	Summative	U	Question(s) will be asked in annual examination	
	[SLO:B-11-F-05] Define energy of activation and discuss through graph how an enzyme speeds up a reaction by lowering the energy of activation.	Summative	U	Question(s) will be asked in annual examination	
	[SLO:B-11-F-06] Explain the effect of temperature on the rate of enzyme action with example of human and thermophilic bacteria	Summative	U	Question(s) will be asked in annual examination	
	[SLO:B-11-F-07] Investigate the effect of pH on enzyme activity Compare the optimum pH of different enzymes like trypsin, pepsin, papain.	Summative for PBA	A	Laboratory work- will be assessed in PBA.	
	[SLO:B-11-F-08] Demonstrate that the concentration of enzyme affects the rate of enzyme action	Summative for PBA	A	Laboratory work- will be assessed in PBA.	
	[SLO:B-11-F-09] Describe enzymatic inhibition, its types and its significance with examples.	Summative	U	Question(s) will be asked in annual examination	
	[SLO:B-11-F-10] Name the molecules which act as inhibitors.	Formative	K	This SLO is part of regular teaching and learning but will not be assessed in annual examination.	

Content Domain / Area	NCP SLOs Description	Form of Assessment	Cognitive Level	Remarks	Number of Periods Required (1 period=40 minutes)
	[SLO:B-11-F-11] Categorize inhibitors into competitive and non-competitive inhibitors.	Summative	U	Question(s) will be asked in annual examination	
	[SLO:B-11-F-12] Explain feedback inhibition.	Summative	U	Question(s) will be asked in annual examination	
	[SLO:B-11-F-13] Classify enzymes on the basis of the reactions catalysed (oxido-reductases, transferases, hydrolases, isomerases, and ligases).	Summative	A	Question(s) will be asked in annual examination	
	[SLO:B-11-F-14] Classify enzymes on the basis of the substrates they use (lipases, diastase, amylase, proteases etc.)	Summative	A	Question(s) will be asked in annual examination	
	[SLO:B-11-F-15] Explain the role of light, carbon dioxide and water in photosynthesis	Summative	U	Question(s) will be asked in annual examination	
	[SLO:B-11-F-16] Identify the two general kinds of photosynthetic pigments (carotenoids and chlorophylls)	Formative	K	This SLO is part of regular teaching and learning but will not be assessed in annual examination.	
	[SLO:B-11-F-17] Describe the roles of photosynthetic pigments in the absorption and conversion of light energy	Summative	U	Question(s) will be asked in annual examination	
	[SLO:B-11-F-18] Differentiate between the absorption spectra of chlorophyll „a“ and „b“	Summative	A	Question(s) will be asked in annual examination	
	[SLO:B-11-F-19] Describe the arrangement of photosynthetic pigments in the form of Photosystem-I and II.	Formative	U	This SLO is part of regular teaching and learning but will not be assessed in annual examination.	
F	[SLO:B-11-F-20] Describe the events of non-cyclic photophosphorylation and cyclic photophosphorylation.	Summative	A	Question(s) will be asked in annual examination	
	[SLO:B-11-F-21] Explain the Calvin cycle (the regeneration of RuBP should be understood in outline only.)	Summative	A	Question(s) will be asked in annual examination	
	[SLO:B-11-F-22] Explain the process of anaerobic respiration in terms of glycolysis and conversion of pyruvate into lactic acid or	Summative	U	Question(s) will be asked in annual examination	

Content Domain / Area	NCP SLOs Description	Form of Assessment	Cognitive Level	Remarks	Number of Periods Required (1 period=40 minutes)
	ethanol.				
	[SLO:B-11-F-23] Illustrate the links reaction as conversion of pyruvate to acetyl CoA.	Summative	A	Question(s) will be asked in annual examination	
	[SLO:B-11-F-24] Outline the steps of Krebs cycle.	Summative	U	Question(s) will be asked in annual examination	
	[SLO:B-11-F-25] Trace the passage of electrons through the electron transport chain.	Summative	U	Question(s) will be asked in annual examination	
	[SLO:B-11-F-26] Describe chemiosmosis and Relate it with electron transport chain.	Summative	A	Question(s) will be asked in annual examination	
	[SLO:B-11-F-27] Explain the substrate level phosphorylation during which exergonic reactions are coupled with the synthesis of ATP.	Summative	U	Question(s) will be asked in annual examination	
	[SLO:B-11-F-28] Justify the importance of G3P in photosynthesis	Formative	A	This SLO is part of regular teaching and learning but will not be assessed in annual examination.	
	[SLO:B-11-F-29] Outline the formation of acetyl CoA from fats	Formative	U	This SLO is part of regular teaching and learning but will not be assessed in annual examination. (Discussed in [SLO: B-11-F-23])	
	[SLO:B-11-F-30] Compare and contrast respiration of fats and glucose.	Formative	U	This SLO is part of regular teaching and learning but will not be assessed in annual examination.	
	[SLO:B-11-F-31] Define photorespiration	Formative	K	This SLO is part of regular teaching and learning but will not be assessed in	

Content Domain / Area	NCP SLOs Description	Form of Assessment	Cognitive Level	Remarks	Number of Periods Required (1 period=40 minutes)
				annual examination.	
	[SLO:B-11-F-32] Outline the events occurring through photorespiration.	Formative	U	This SLO is part of regular teaching and learning but will not be assessed in annual examination.	
	[SLO:B-11-F-33] Rationalize how the disadvantageous process of photorespiration evolved.	Formative	A	This SLO is part of regular teaching and learning but will not be assessed in annual examination.	
	[SLO:B-11-F-34] Explain the effect of temperature on the oxidative activity of RuBP carboxylase.	Formative	U	This SLO is part of regular teaching and learning but will not be assessed in annual examination.	
	[SLO:B-11-F-35] Outline the process of C 4 photosynthesis as an adaptation evolved in some plants to deal with the problem of photorespiration.	Formative	U	This SLO is part of regular teaching and learning but will not be assessed in annual examination.	
H	[SLO:B-11- H-01] Describe the structures of the male reproductive system and identify their functions	Summative	U	Question(s) will be asked in annual examination	
	[SLO:B-11-H-02] Define male reproductive hormones and explain their functions	Summative	U	Question(s) will be asked in annual examination	
	[SLO:B-11-H-03] Explain the structures of female reproductive system and describe their functions	Summative	U	Question(s) will be asked in annual examination	26
	[SLO:B-11-H-04] Describe the menstrual cycle and the hormones involved.	Summative	A	Question(s) will be asked in annual examination	
	[SLO:B-11-H-05] Define gene (as a sequence of nucleotides as part of DNA, which codes for the formation of a polypeptide.)	Summative	K	Question(s) will be asked in annual examination	
	[SLO:B-11-H-06] Explain the law of segregation and independent assortment, using a suitable example related to the	Formative	U	This SLO is part of regular teaching and learning but	

Content Domain / Area	NCP SLOs Description	Form of Assessment	Cognitive Level	Remarks	Number of Periods Required (1 period=40 minutes)
	pea plants.			will not be assessed in annual examination. (Same as [SLO: B-10-H-07])	
	[SLO:B-11-H-07] Relate the Law of independent assortment to random orientation of chromosomes during Meiosis.	Formative	U	This SLO is part of regular teaching and learning but will not be assessed in annual examination. (Same as [SLO: B-10-H-07])	
	[SLO:B-11-H-08] Express limitations of independent assortment and its usefulness.	Formative	U	This SLO is part of regular teaching and learning but will not be assessed in annual examination.	
	[SLO:B-11-H-09] Show that independent assortment leads to variation in the gametes.	Formative	U	This SLO is part of regular teaching and learning but will not be assessed in annual examination.	
	[SLO:B-11-H-10] Evaluate that inheritance of genes and their mixing during fertilization is based on mathematical probabilities.	Formative	A	This SLO is part of regular teaching and learning but will not be assessed in annual examination.	
	[SLO:B-11-H-11] Describe the exceptions to the Mendel's laws of inheritance.	Formative	A	This SLO is part of regular teaching and learning but will not be assessed in annual examination.	
	[SLO:B-11-H-12] Explain incomplete dominance and exemplify it through the inheritance of flower colour in 4 O'clock plant	Summative	A	Question(s) will be asked in annual examination	
	[SLO:B-11-H-13] Differentiate between incomplete dominance and codominance.	Summative	U	Question(s) will be asked in annual examination	
	[SLO:B-11-H-14] Define alleles and multiple alleles	Summative	K	Question(s) will be asked in	

Content Domain / Area	NCP SLOs Description	Form of Assessment	Cognitive Level	Remarks	Number of Periods Required (1 period=40 minutes)
				annual examination	
	[SLO:B-11-H-15] State the alleles responsible for the trait of ABO blood groups.	Summative	K	Question(s) will be asked in annual examination	
	[SLO:B-11-H-16] Explain the case where two alleles have equal dominance through the genetics of human blood group AB.	Summative for PBA	U	Laboratory work- will be assessed in PBA.	
	[SLO:B-11-H-17] Name the various human blood group systems.	Formative	K	This SLO is part of regular teaching and learning but will not be assessed in annual examination.	
	[SLO:B-11-H-18] Investigate the reasons for O -ve individual as the Universal donor and AB +ve as the Universal recipient.	Summative	A	Question(s) will be asked in annual examination	
	[SLO:B-11-H-19] Describe the occurrence of some other blood group systems.	Formative	U	This SLO is part of regular teaching and learning but will not be assessed in annual examination. (As there are more than 30 blood group systems)	
	[SLO:B-11-H-20] Associate the positive and negative blood groups with the presence and absence of Rh factor.	Summative	U	Question(s) will be asked in annual examination	
	[SLO:B-11-H-21] Justify why Rh incompatibility could be a danger to the developing foetus and mother.	Formative	A	This SLO is part of regular teaching and learning but will not be assessed in annual examination.	
	[SLO:B-11-H-22] Explain Erythroblastosisfetalis in the light of antigen-antibody reaction.	Formative	U	This SLO is part of regular teaching and learning but will not be assessed in annual examination.	
	[SLO:B-11-H-23] Suggest measures to counter the problem of Erythroblastosisfetalis before it occurs.	Formative	U	This SLO is part of regular teaching and learning but	

Content Domain / Area	NCP SLOs Description	Form of Assessment	Cognitive Level	Remarks	Number of Periods Required (1 period=40 minutes)
				will not be assessed in annual examination.	
	[SLO:B-11-H-24] Define and relate the terms; polygenic and epistasis.	Summative	K	Question(s) will be asked in annual examination	
	[SLO:B-11-H-25] Describe polygenic inheritance using suitable examples from plants (grain colour in wheat) and animals (skin colour in man).	Summative	A	Only one example i.e., grain colour in wheat will be asked in annual examination	
	[SLO:B-11-H-26] List at least five polygenic traits discovered in humans.	Summative	K	Question(s) will be asked in annual examination	
	[SLO:B-11-H-27] Give one example of epistasis from mammals (coat colour inheritance in Labrador retrievers) and one from plants (pigment phenotype in foxgloves) and justify modified Mendelian ratios.	Summative	A	Only one example i.e., coat colour inheritance in Labrador retrievers will be asked in annual examination	
	[SLO:B-11-H-28] Describe the terms gene linkage and crossing over.	Summative	U	Question(s) will be asked in annual examination	
	[SLO:B-11-H-29] Explain that gene linkage counters independent assortment and crossing-over modifies the progeny.	Formative	U	This SLO is part of regular teaching and learning but will not be assessed in annual examination.	
	[SLO:B-11-H-30] Suggest that linkage can be observed / evaluated only if the number of progeny is quite large.	Formative	U	This SLO is part of regular teaching and learning but will not be assessed in annual examination.	
	[SLO:B-11-H-31] Explain the XX-XY mechanism of sex determination in mammals.	Summative	U	Question(s) will be asked in annual examination	
	[SLO:B-11-H-32] Identify male and female individuals from the karyotype of man.	Summative	K	Question(s) will be asked in annual examination	

Content Domain / Area	NCP SLOs Description	Form of Assessment	Cognitive Level	Remarks	Number of Periods Required (1 period=40 minutes)
	[SLO:B-11-H-33] Solve the genetics problems related to XX-XY, sex determination.	Summative	A	Question(s) will be asked in annual examination	
	[SLO:B-11-H-34] Describe the concept of sex linkage.	Summative	U	Question(s) will be asked in annual examination	
	[SLO:B-11-H-35] Explain the inheritance of sex linked traits (eye colour) in Drosophila.	Formative	U	This SLO is part of regular teaching and learning but will not be assessed in annual examination.	
	[SLO:B-11-H-36] Describe the sex linked inheritance of male characters due to Y-chromosome and the effect of Hollandric genes.	Summative	U	Question(s) will be asked in annual examination	
	[SLO:B-11-H-37] Describe the X linked disorders with reference to the patterns of inheritance.	Summative	U	Only one example Haemophilia will be asked in annual examination	
	[SLO:B-11-H-38] Name some of the sex-linked disorders of man (Red green colour blindness, Haemophilia) .	Summative	K	Question(s) will be asked in annual examination	
	[SLO:B-11-H-39] Explain the techniques employed for embryonic screening e.g., Amniocentesis and Chorionic Villus Sampling	Formative	U	This SLO is part of regular teaching and learning but will not be assessed in annual examination.	
	[SLO:B-11-H-40] Annotate the detailed structure of a chromosome.	Summative	U	Question(s) will be asked in annual examination	
	[SLO:B-11-H-41] Narrate the experimental work of Griffith and Hershey Chase, which proved that DNA is the hereditary material.	Summative	A	Question(s) will be asked in annual examination	
	[SLO:B-11-H-42] Describe the three models proposed about the mechanism of DNA replication.	Summative	U	Question(s) will be asked in annual examination	
	[SLO:B-11-H-43] Narrate the work of Meselson and Stahl to justify the semiconservative replication as the correct method of	Summative	U	Question(s) will be asked in annual examination	

Content Domain / Area	NCP SLOs Description	Form of Assessment	Cognitive Level	Remarks	Number of Periods Required (1 period=40 minutes)
	replication.				
	[SLO:B-11-H-44] Describe the events of the process of DNA replication.	Summative	U	Question(s) will be asked in annual examination	
	[SLO:B-11-H-45] Describe DNA stability and variability as two characters of the replicating DNA molecule.	Formative	U	This SLO is part of regular teaching and learning but will not be assessed in annual examination.	
	[SLO:B-11-H-46] Describe the characteristics of genetic code (universal, triplet, non-overlapping, degenerate, has no punctuation).	Summative	U	Question(s) will be asked in annual examination	
	[SLO:B-11-H-47] Differentiate between the terms genetic code and codon.	Summative	U	Question(s) will be asked in annual examination	
	[SLO:B-11-H-48] Explain the mechanism of transcription.	Summative	A	Question(s) will be asked in annual examination	
	[SLO:B-11-H-49] Explain why the length of transcribed mRNA molecule (in Eukaryotes) shortens as it enters the cytoplasm for translation.	Summative	U	Question(s) will be asked in annual examination	
	[SLO:B-11-H-50] Describe the mechanism of protein synthesis.	Summative	A	Question(s) will be asked in annual examination	
	[SLO:B-11-H-51] State the difference between protein synthesis in prokaryotes and eukaryotes.	Formative	U	This SLO is part of regular teaching and learning but will not be assessed in annual examination.	
	[SLO:B-11-H-52] Suggest possible ways in which the synthesized protein can be used within or outside a cell that synthesized it.	Summative	U	Question(s) will be asked in annual examination	
	[SLO:B-11-H-53] State the importance of the regulation of gene expression.	Summative	K	Question(s) will be asked in annual examination	
	[SLO:B-11-H-54] Describe the negative control of gene	Formative	U	This SLO is part of regular	

Content Domain / Area	NCP SLOs Description	Form of Assessment	Cognitive Level	Remarks	Number of Periods Required (1 period=40 minutes)
	expression by repressor proteins.			teaching and learning but will not be assessed in annual examination.	
	[SLO:B-11-H-55] Describe the positive control of gene expression by activator proteins.	Formative	U	This SLO is part of regular teaching and learning but will not be assessed in annual examination.	
	[SLO:B-11-H-56] Define mutation and identify various sources of mutation.	Summative	K	Question(s) will be asked in annual examination	
	[SLO:B-11-H-57] Differentiate between natural and induced mutations and mutagens.	Summative	U	Question(s) will be asked in annual examination	
	[SLO:B-11-H-58] Justify most mutations are harmful.	Summative	A	Question(s) will be asked in annual examination	
	[SLO:B-11-H-59] Rationalize that mutations might be a contributing factor towards evolution.	Summative	A	Question(s) will be asked in annual examination	
	[SLO:B-11-H-60] Describe the symptoms, causes and possible available treatments of some of the chromosomal mutations. (Down's, Klinefelter's and Turner's syndrome)	Summative	U	Only one example Down's syndrome will be asked in annual examination	
	[SLO:B-11-H-61] Describe the symptoms, causes and possible available treatments of some of the gene mutations.	Summative	U	Only one example Sickle cell anaemia will be asked in annual examination	
N	[SLO:B-11-N-01] Define species, population, community and ecosystem.	Summative	K	Question(s) will be asked in annual examination	10
	[SLO:B-11-N-02] Distinguish between the various modes of nutrition different species possess.	Summative	U	Question(s) will be asked in annual examination	
	[SLO:B-11-N-03] Identify plants as producers for converting light energy to chemical energy	Formative	K	This SLO is part of regular teaching and learning but will not be assessed in annual examination.	

Content Domain / Area	NCP SLOs Description	Form of Assessment	Cognitive Level	Remarks	Number of Periods Required (1 period=40 minutes)
				(Discussed in bioenergetics)	
	[SLO:B-11-N-04] Define trophic levels.	Summative	K	Question(s) will be asked in annual examination	
	[SLO:B-11-N-05] Discuss the loss of energy between trophic levels.	Summative	U	Question(s) will be asked in annual examination	
	[SLO:B-11-N-06] Explain the greenhouse effect with examples of gases that exhibit this behaviour.	Summative	U	Question(s) will be asked in annual examination	
	[SLO:B-11-N-07] Describe the harmful effects of greenhouse gases on the environment.	Summative	U	Question(s) will be asked in annual examination	
	[SLO:B-11-N-08] Explain with regards to ocean acidification coral reefs are used as a barometer for the health of an aquatic ecosystem.	Formative	U	This SLO is part of regular teaching and learning but will not be assessed in annual examination.	
	[SLO:B-11-N-09] Define biogeochemical cycles and locate the primary reservoirs of the chemicals in these cycles.	Summative	K	Question(s) will be asked in annual examination	
	[SLO:B-11-N-10] Describe the water cycle in detail.	Formative	U	This SLO is part of regular teaching and learning but will not be assessed in annual examination.	
	[SLO:B-11-N-11] Define the terms aquifers and water table.	Summative	K	Question(s) will be asked in annual examination	
	[SLO:B-11-N-12] Discuss nitrogen cycle in detail.	Summative	A	Question(s) will be asked in annual examination	
	[SLO:B-11-N-13] Describe productivity in terms of gross primary productivity and net primary productivity.	Formative	U	This SLO is part of regular teaching and learning but will not be assessed in annual examination.	
	[SLO:B-11-N-14] Interpret the pyramids of number, biomass and energy.	Formative	U	This SLO is part of regular teaching and learning but	

Content Domain / Area	NCP SLOs Description	Form of Assessment	Cognitive Level	Remarks	Number of Periods Required (1 period=40 minutes)
				will not be assessed in annual examination.	
	[SLO:B-11-N-15] Define ecological succession as the process through which ecosystems change from simple to complex.	Summative	U	Question(s) will be asked in annual examination	
	[SLO:B-11-N-16] Describe primary and secondary succession.	Summative	U	Question(s) will be asked in annual examination	
	[SLO:B-11-N-17] Differentiate between xerarch and hydrarch succession.	Summative	U	Question(s) will be asked in annual examination	
	[SLO:B-11-N-18] Explain the xerarch succession on a bare rock starting from the small pockets of lichens to the vegetations of flowering plants.	Summative	U	Question(s) will be asked in annual examination	
	[SLO:B-11-N-19] Describe characteristics of a population, such as growth, density, distribution, carrying capacity, minimum/viable size.	Formative	U	This SLO is part of regular teaching and learning but will not be assessed in annual examination.	
	[SLO:B-11-N-20] Explain the effect of growth of human population on the ecosystem.	Summative	U	Question(s) will be asked in annual examination	
	[SLO:B-11-N-21] Describe the 4 important ecosystems of Pakistan	Formative	U	This SLO is part of regular teaching and learning but will not be assessed in annual examination.	22
O	[SLO:B-11-0-01] Outline the taxonomic position of prokaryotes in terms of domains archaea and bacteria and in terms of kingdom monera.	Formative	U	This SLO is part of regular teaching and learning but will not be assessed in annual examination.	
	[SLO:B-11-0-02] Explain the phylogenetic position of prokaryotes.	Formative	U	This SLO is part of regular teaching and learning but will not be assessed in annual examination.	

Content Domain / Area	NCP SLOs Description	Form of Assessment	Cognitive Level	Remarks	Number of Periods Required (1 period=40 minutes)
	[SLO:B-11-0-03] Justify the occurrence of bacteria in the widest range of habitats.	Summative	A	Question(s) will be asked in annual examination	
	[SLO:B-11-0-04] Draw an annotated diagram of a generalized bacterial cell.	Formative	U	This SLO is part of regular teaching and learning but will not be assessed in annual examination.	
	[SLO:B-11-0-05] Justify cyanobacteria are considered as the most prominent of the photosynthetic bacteria	Summative	A	Question(s) will be asked in annual examination	
	[SLO:B-11-0-06] Describe detailed structure and chemical composition of bacterial cell wall and other coverings.	Summative	U	Question(s) will be asked in annual examination	
	[SLO:B-11-0-07] Compare cell wall differences in Gram-positive and Gram negative bacteria.	Formative	A	This SLO is part of regular teaching and learning but will not be assessed in annual examination.	
	[SLO:B-11-0-08] Illustrate with diagrams the great diversity of shapes and sizes found in bacteria.	Summative	A	Question(s) will be asked in annual examination	
	[SLO:B-11-0-09] Justify the endospore formation in bacteria as a mechanism of survival to withstand unfavourable conditions.	Summative	A	Question(s) will be asked in annual examination	
	[SLO:B-11-0-10] Explain motility in bacteria.	Summative	U	Question(s) will be asked in annual examination	
	[SLO:B-11-0-11] Describe with diagram structure of bacterial flagellum.	Summative	U	Question(s) will be asked in annual examination	
	[SLO:B-11-0-12] Describe genomic organization of bacteria with respect to circular DNA and plasmids.	Summative	U	Question(s) will be asked in annual examination	
	[SLO:B-11-0-13] Classify bacteria on the basis of methods of obtaining energy and carbon.	Summative	U	Question(s) will be asked in annual examination	
	[SLO:B-11-0-14] Differentiate between the photosynthesis mechanisms in cyanobacteria and other photosynthetic bacteria.	Summative	U	Question(s) will be asked in annual examination	
	[SLO:B-11-0-15] List the phases in the growth of bacteria.	Summative	K	Question(s) will be asked in	

Content Domain / Area	NCP SLOs Description	Form of Assessment	Cognitive Level	Remarks	Number of Periods Required (1 period=40 minutes)
				annual examination	
	[SLO:B-11-0-16] Describe different methods of reproduction in bacteria.	Summative	U	Question(s) will be asked in annual examination	
	[SLO:B-11-0-19] Describe bacteria as recyclers of nature. Outline the ecological and economic importance of bacteria.	Summative	U	Question(s) will be asked in annual examination	
	[SLO:B-11-0-20] Explain the use of bacteria in research and technology.	Formative	U	This SLO is part of regular teaching and learning but will not be assessed in annual examination.	
	[SLO:B-11-0-21] Describe important bacterial diseases in man e.g. cholera, typhoid, tuberculosis, and pneumonia; emphasizing their symptoms, causative bacteria, treatments, and preventative measures.	Formative	U	This SLO is part of regular teaching and learning but will not be assessed in annual examination.	
	[SLO:B-11-0-22] Describe important bacterial diseases in plants in terms of spots, blights, soft rots, wilts, and galls; emphasizing their symptoms, causative bacteria, and preventative measures.	Formative	U	This SLO is part of regular teaching and learning but will not be assessed in annual examination.	
	[SLO:B-11-0-23] Define the term normal flora.	Summative	K	Question(s) will be asked in annual examination	
	[SLO:B-11-0-24] Describe the benefits of the bacterial flora of humans.	Summative	A	Question(s) will be asked in annual examination	
	[SLO:B-11-0-25] List the chemical and physical methods used to control harmful bacteria.	Summative	K	Question(s) will be asked in annual examination	
	[SLO:B-11-0-26] Explain protists as a diverse group of eukaryotes that has polyphyletic origin and defined only by exclusion from other groups.	Summative	U	Question(s) will be asked in annual examination	
	[SLO:B-11-0-27] Describe the salient features with examples of protozoa, algae, myxomycota and oomycota as the major groups of protists.	Summative for PBA	U	Laboratory work- will be assessed in PBA. (Life cycles not required	

Content Domain / Area	NCP SLOs Description	Form of Assessment	Cognitive Level	Remarks	Number of Periods Required (1 period=40 minutes)
				Classification of algae not required)	
	[SLO:B-11-0-28] Justify how protists are important for humans.	Formative	A	This SLO is part of regular teaching and learning but will not be assessed in annual examination.	
	[SLO:B-11-0-31] Classify fungi into zygomycota, ascomycota, deutromycota and basidiomycota and give the diagnostic features of each group.	Summative for PBA	U	Laboratory work- will be assessed in PBA. (Life cycles not required)	
	[SLO:B-11-0-32] Explain yeast as unicellular fungi that are used for baking and brewing and are also becoming very important for genetic research.	Formative	U	This SLO is part of regular teaching and learning but will not be assessed in annual examination.	
	[SLO:B-11-0-33] Name a few fungi from which antibiotics are obtained.	Formative	K	This SLO is part of regular teaching and learning but will not be assessed in annual examination.	
	[SLO:B-11-0-34] Explain the mutualism established in mycorrhizae and lichen associations.	Summative	U	Question(s) will be asked in annual examination	
	[SLO:B-11-0-35] Give examples of edible fungi.	Summative	K	Question(s) will be asked in annual examination	
	[SLO:B-11-0-36] Describe the ecological impact of fungi causing decomposition of recycling of materials.	Summative	U	Question(s) will be asked in annual examination	
	[SLO:B-11-0-37] Discuss the pathogenic role of fungi	Summative	U	Question(s) will be asked in annual examination	
P	[SLO:B-11-P-01] Justify the status of viruses among living and non-living things.	Formative	A	This SLO is part of regular teaching and learning but will not be assessed in annual examination.	15

Content Domain / Area	NCP SLOs Description	Form of Assessment	Cognitive Level	Remarks	Number of Periods Required (1 period=40 minutes)
				(Already covered in SSC)	
	[SLO:B-11-P-02] Trace the history of viruses since their discovery.	Formative	K	This SLO is part of regular teaching and learning but will not be assessed in annual examination.	
	[SLO:B-11-P-03] Classify viruses on the bases of their hosts and structure.	Summative	U	Question(s) will be asked in annual examination	
	[SLO:B-11-P-04] Describe the structure of a model bacteriophage, and HIV	Summative	U	Question(s) will be asked in annual examination	
	[SLO:B-11-P-05] Justify that a virus must have a host cell to parasitize in order to complete its life cycle.	Formative	A	This SLO is part of regular teaching and learning but will not be assessed in annual examination.	
	[SLO:B-11-P-06] Explain a virus survives inside a host cell, protected from the immune system.	Formative	U	This SLO is part of regular teaching and learning but will not be assessed in annual examination.	
	[SLO:B-11-P-07] Determine the method a virus employs to survive/ pass over unfavourable conditions when it does not have a host to complete the life cycle.	Summative	A	Question(s) will be asked in annual examination	
	[SLO:B-11-P-08] Describe the Lytic and Lysogenic life cycles of a virus.	Summative	U	Question(s) will be asked in annual examination	
	[SLO:B-11-P-09] Outline the usage of bacteriophage in genetic engineering.	Formative	U	This SLO is part of regular teaching and learning but will not be assessed in annual examination.	
	[SLO:B-11-P-10] Explain the life cycle of HIV.	Summative	A	Question(s) will be asked in annual examination	
	[SLO:B-11-P-11] Justify the name of the virus i.e., “Human	Summative	A	Question(s) will be asked in	

Content Domain / Area	NCP SLOs Description	Form of Assessment	Cognitive Level	Remarks	Number of Periods Required (1 period=40 minutes)
	Immunodeficiency Virus” by establishing T helper cells as the basis of immune system.			annual examination	
	[SLO:B-11-P-12] Reason out the specificity of HIV on its host cells.	Summative	A	Question(s) will be asked in annual examination	
	[SLO:B-11-P-13] List the symptoms of AIDS.	Summative	K	Question(s) will be asked in annual examination	
	[SLO:B-11-P-14] Explain opportunistic diseases that may attack an AIDS victim.	Summative	U	Question(s) will be asked in annual examination	
	[SLO:B-11-P-15] Describe the treatments available for AIDS.	Summative	U	Question(s) will be asked in annual examination	
	[SLO:B-11-P-16] List some common control measures against the transmission of HIV.	Summative	K	Question(s) will be asked in annual examination	
	[SLO:B-11-P-17] Describe the causative agent, symptoms, treatment and prevention of the following viral diseases: hepatitis C, herpes, polio and leaf curl virus disease of cotton.	Formative	U	This SLO is part of regular teaching and learning but will not be assessed in annual examination.	
	[SLO:B-11-P-18] List the sources of transmission for each of the above-mentioned diseases.	Formative	K	This SLO is part of regular teaching and learning but will not be assessed in annual examination.	
	[SLO:B-11-P-19] Describe the structure of prions and viroids.	Summative	U	Question(s) will be asked in annual examination	
	[SLO:B-11-P-20] List the diseases caused by prions and viroids.	Summative	K	Question(s) will be asked in annual examination	
	[SLO:B-11-P-21] Interpret how viral infections cause global economic loss.	Formative	A	This SLO is part of regular teaching and learning but will not be assessed in annual examination.	
	[SLO:B-11-P-22] Describe the limitations of the vaccine for the	Formative	U	This SLO is part of regular	

Content Domain / Area	NCP SLOs Description	Form of Assessment	Cognitive Level	Remarks	Number of Periods Required (1 period=40 minutes)
	common cold / flu virus			teaching and learning but will not be assessed in annual examination.	
Q	[SLO:B-11-Q-01] List the macro and micronutrients of plants highlighting the role of each nutrient	Formative	K	This SLO is part of regular teaching and learning but will not be assessed in annual examination.	22
	[SLO:B-11-Q-02] State the examples of carnivorous plant.	Summative	K	Question(s) will be asked in annual examination	
	[SLO:B-11-Q-03] Explain the role of stomata and palisade tissue in the exchange of gasses in plants.	Summative	U	Question(s) will be asked in annual examination	
	[SLO:B-11-Q-04] Relate transpiration with gas exchange in plants.	Summative	A	Question(s) will be asked in annual examination	
	[SLO:B-11-Q-05] Assess the structure of xylem vessel elements, sieve tube elements, companion cells, tracheids and relate their structures with functions.	Summative	U	Question(s) will be asked in annual examination	
	[SLO:B-11-Q-06] Discuss the movement of water between plant cells, and between the cells and their environment in terms of water potential.	Formative	U	This SLO is part of regular teaching and learning but will not be assessed in annual examination.	
	[SLO:B-11-Q-07] Describe the movement of water through roots in terms of symplast, apoplast and vacuolar pathways.	Summative	U	Question(s) will be asked in annual examination	
	[SLO:B-11-Q-08] Explain the movement of water in xylem through TACT mechanism.	Summative	A	Question(s) will be asked in annual examination	
	[SLO:B-11-Q-09] Describe the mechanisms involved in the opening and closing of stomata.	Summative	U	Question(s) will be asked in annual examination	
	[SLO:B-11-Q-10] Explain the movement of sugars within plants.	Summative	U	Question(s) will be asked in annual examination	
	[SLO:B-11-Q-11] Define osmotic adjustment.	Summative	K	Question(s) will be asked in	

Content Domain / Area	NCP SLOs Description	Form of Assessment	Cognitive Level	Remarks	Number of Periods Required (1 period=40 minutes)
				annual examination	
	[SLO:B-11-Q-12] - State movement of water into or out of the cell in isotonic, hypotonic, and hypertonic conditions.	Summative	U	Question(s) will be asked in annual examination	
	[SLO:B-11-Q-13] Explain the osmotic adjustments in hydrophytic (marine and freshwater), xerophytic and mesophytic plants and plants in saline soil.	Summative	U	Question(s) will be asked in annual examination	
	[SLO:B-11-Q-14] List the adaptations in plants to cope with low and high temperatures	Summative	K	Question(s) will be asked in annual examination	
	[SLO:B-11-Q-15] Describe Explain the turgor pressure and its significance in providing support to herbaceous plants.	Summative	U	Question(s) will be asked in annual examination	
	[SLO:B-11-Q-16] Describe the structure of supporting tissues in plants.	Summative	U	Question(s) will be asked in annual examination	
	[SLO:B-11-Q-17] Define growth and explain primary and secondary growth in plants.	Summative	U	Question(s) will be asked in annual examination	
	[SLO:B-11-Q-18] Justify the formation of annual rings	Summative	A	Question(s) will be asked in annual examination	
	[SLO:B-11-Q-19] Explain influence of apical meristem on the growth of lateral shoots.	Summative	U	Question(s) will be asked in annual examination	
	[SLO:B-11-Q-20] Outline the role of important plant growth regulators.	Formative	K	This SLO is part of regular teaching and learning but will not be assessed in annual examination.	
	[SLO:B-11-Q-21] Explain the types of movement in plants in response to light, force of gravity, touch and chemicals.	Summative	U	Question(s) will be asked in annual examination	
	[SLO:B-11-Q-22] Define photoperiodism.	Summative	K	Question(s) will be asked in annual examination	
	[SLO:B-11-Q-23] Classify with examples plants on the basis of photoperiodism and Describe the mechanism of photoperiodism with reference to the mode of action of phytochromes.	Summative	A	Question(s) will be asked in annual examination	

Content Domain / Area	NCP SLOs Description	Form of Assessment	Cognitive Level	Remarks	Number of Periods Required (1 period=40 minutes)
	[SLO:B-11-Q-24] Explain the role of low temperature treatment on flower production especially to biennials and perennials.	Summative	U	Question(s) will be asked in annual examination	

PRACTICAL SLOs

NCP SLOs Description	Form of Assessment	Cognitive domain	Remarks	Number of Periods Required (1 period=40 minutes)
[SLO:B-11-X-01] Decisions relating to measurements and observations	Formative for PBA	Psychomotor	Question will not be asked in PBA, however, it will be part of Lab work.	16
[SLO:B-11-X-02] Within an investigation, students should be able to: - identify the independent variable and dependent variable - decide a suitable range of values to use for the independent variable at which measurements of the dependent variable are recorded - decide the number of different values of the independent variable (a minimum of five) and the intervals between them - decide how to change the value of the independent variable - decide how the dependent variable should be measured - decide the number of replicates at each value - decide on appropriate controls for the experiment or investigation	Formative for PBA	Psychomotor	Question will not be asked in PBA, however, it will be part of Lab work.	
	Formative for PBA		As above	
	Formative for PBA		As above	
	Formative for PBA		As above	
	Formative for PBA		As above	
	Formative for PBA		As above	
	Formative for PBA		As above	

NCP SLOs Description	Form of Assessment	Cognitive domain	Remarks	Number of Periods Required (1 period=40 minutes)
- decide which variables need to be standardized and how to standardize them. (Variables expected to have a minimal effect, such as variation between test-tubes of the same type, do not need to be standardized. When using the light microscope and photomicrographs, students should be able to: - set up a light microscope to view and observe specimens - follow instructions to find and draw particular tissues in plant and animal specimens and label the drawings appropriately - follow instructions to find and draw particular cells and structures within the cells - make a temporary slide of stained cells or tissues - calculate actual sizes of tissues or cells from measurements of photomicrographs, using magnifications, scale bars or representations of eyepiece graticules and stage micrometers - estimate the number of cells or cell organelles in a given area using a sampling method, such as grids or fields of view.	Formative for PBA Summative for PBA Summative for PBA Summative for PBA Summative for PBA Summative for PBA Summative for PBA		As above Laboratory work- will be assessed in PBA. As above As above As above As above As above	
[SLO:B-11-X-03] Within an investigation, students should be able to: - follow instructions to collect results - consider the hazards of the procedure, including the use of any solutions and reagents, and assess the risk as low, medium or high - take readings to obtain accurate data (quantitative results) or observations (qualitative results). When using the light microscope and photomicrographs, Students should be able to: - draw plan diagrams to show the distribution of tissues in a specimen, with no cells drawn and the correct proportions of layers of tissues	Formative for PBA Formative for PBA Formative for PBA Formative for PBA	Psychomotor	Question will not be asked in PBA, however, it will be part of Lab work. As above As above Question will not be asked in PBA, however, it will be part of Lab work	

NCP SLOs Description	Form of Assessment	Cognitive domain	Remarks	Number of Periods Required (1 period=40 minutes)
- draw the observable features of cells in a specimen showing: — the correct shapes — the thicknesses of cell walls where applicable (drawn with two lines or drawn with three lines where two cells touch) — the relative sizes and proportions — observable cell contents only - measure tissue layers or cells from photomicrographs using a ruler or given scale, including representations of eyepiece graticule - make accurate observations from specimens including counting numbers of cells or cell organelles - record similarities and differences between two specimens using only their observable features.	Formative for PBA Summative for PBA Formative for PBA Formative for PBA		As above Laboratory work- will be assessed in PBA. Question will not be asked in PBA, however, it will be part of Lab work As above	
[SLO:B-11-X-04] Recording data and observations Within an investigation, students should be able to: - record raw results (unprocessed) and calculated results (processed) in an appropriate table with: — descriptive headings, including any required units (no units in body of table) — heading for the independent variable to the left of (or above, if the table is in rows) the dependent variable - record quantitative data to the number of decimal places that is appropriate for the measuring instrument used - record qualitative observations using clear descriptions - record calculated values (processed results) in an appropriate table. - When using the light microscope and photomicrographs, Students should be able to: - record the fine details of the specimen, including drawing the detailed shapes of layers or outlines of specimens in plan diagrams and drawing the shape and position of observable cell organelles in cells.	Formative for PBA	Psychomotor	Question will not be asked in PBA, however, it will be part of Lab work.	
[SLO:B-11-X-05] Display of calculation and reasoning	Formative for PBA	Psychomotor	Question will not be asked in PBA, however, it will be part of Lab work.	

NCP SLOs Description	Form of Assessment	Cognitive domain	Remarks	Number of Periods Required (1 period=40 minutes)
[SLO:B-11-X-06] Within an investigation and when using the light microscope and photomicrographs, students should be able to: - display calculations clearly, showing all the steps and reasoning - use the correct number of significant figures for calculated quantities. This should be the same as, or one more than, the smallest number of significant figures in the data used in the calculation.	Formative for PBA Formative for PBA	Psychomotor	Question will not be asked in PBA, however, it will be part of Lab work.	
[SLO:B-11-X-07] Within an investigation, Students should be able to: - display data as a graph (continuous data), bar chart (discontinuous or categorical) or histogram (frequency data) - draw a graph, bar chart or histogram clearly and accurately with: — the independent variable on the x-axis and the dependent variable on the y-axis — axes labelled to match the relevant table headings, including units where appropriate — a scale where both axes should use most or all of the grid available and allow the graph to be read easily to within half a square — all graph points plotted accurately using a sharp pencil, as a small cross or a small dot in a circle, with the intersection of the cross or center of the dot exactly on the required point — the plotted points of a graph connected with a clear, sharp and unbroken line, either as a line of best fit, a smooth curve or with ruled straight lines joining the points — no extrapolation of graph lines unless this can be assumed from the data — all bars on a bar chart or histogram plotted accurately, with clear, unbroken lines that are drawn with a sharp pencil and ruler.	Formative for PBA	Psychomotor	Question will not be asked in annual examination, however, it will be part of Lab work.	
[SLO:B-11-X-08] When using the light microscope and photomicrographs, students should be able to: - make drawings, using a sharp pencil to give finely drawn lines that are clear and unbroken - make drawings that use most of the available space and show all the features observed in the specimen, with no shading - organize comparative observations, showing differences and similarities	Formative for PBA	Psychomotor	Question will not be asked in annual examination, however, it will be part of Lab work.	

NCP SLOs Description	Form of Assessment	Cognitive domain	Remarks	Number of Periods Required (1 period=40 minutes)
between specimens.				
[SLO:B-11-X-09] Interpreting data and observations	Formative for PBA	Psychomotor	Question will not be asked in PBA, however, it will be part of Lab work.	
[SLO:B-11-X-10] Within an investigation, students should be able to: - calculate an answer with the correct number of significant figures using quantitative results or data provided - use a graph to find unknown values - estimate the concentrations of unknown solutions from qualitative results - identify the contents of unknown solutions using biological molecule tests - identify anomalous results and suggest how to deal with anomalies - describe patterns and trends using the data provided in tables and graphs - evaluate the confidence with which conclusions might be made. When using the light microscope and photomicrographs, Students should be able to: - calculate an answer with the correct number of significant figures using quantitative results or data provided - compare observable features of specimens of biological material including similarities and differences between specimens on a microscope slide and specimens in photomicrographs	Formative for PBA	Psychomotor	Question will not be asked in PBA, however, it will be part of Lab work.	
[SLO:B-11-X-11] From results, observations or information provided, students should be able to: - summarize the main conclusions - state and explain whether a hypothesis is supported - make predictions from the patterns and trends in data - suggest explanations for observations, results, patterns, trends and conclusions.	Formative for PBA	Psychomotor	Question will not be asked in PBA, however, it will be part of Lab work.	
[SLO:B-11-X-12] Within an investigation and when using the light microscope and photomicrographs, students should be able to: identify systematic or random errors in an investigation, understanding that systematic errors may not affect the trend in results whereas a random error	Formative for PBA	Psychomotor	Question will not be asked in PBA, however, it will be part of Lab work.	

NCP SLOs Description	Form of Assessment	Cognitive domain	Remarks	Number of Periods Required (1 period=40 minutes)
may affect the trend - identify the main sources of error in a particular investigation suggest improvements to a procedure that will increase the accuracy of the observations or measurements, Formative - including: — using a more effective method to standardize relevant variables — using a more accurate method of measuring the dependent variable — using smaller intervals for the values of the independent variable — collecting replicate measurements so that a mean can be calculated - suggest how to extend the investigation to answer a new question, for example by investigating a different independent variable or applying the method to a new context - describe clearly, in words or diagrams, improvements to the procedure or modifications to extend the investigation.				

Note: PBA STANDS FOR “PRACTICAL BASED ASSESSMENT”

FINAL CONCEPTUAL PATTERN OF HSSC-I & II

Physics, Chemistry, Biology and Computer Science

Total Marks: 80 Marks (Theory Paper)

Components	Detail
Marks Allocated to MCQs	40 marks
Total MCQs	80
Marks per MCQ	0.5
Objective Portion – MCQs (40 Marks)	Section-A (MCQs) 56 straight MCQs ($56 \times 0.5 = 28$ marks) 24 MCQs with (6-stimulus/situations/scenario) ($24 \times 0.5 = 12$ marks)
Subjective Portion – SRQs & ERQs Structure (40 Marks)	Section-B (SRQs) Section B having 7 questions. Each question has internal choice. Each question having 4 marks. ($7 \times 4 = 28$ marks) Section –C (ERQs) Section C having 2 questions. Each question has internal choice. Each question having 6 marks. ($2 \times 6 = 12$ marks)
Subjective Portion Structure	7 straight SRQs (with no sub parts) 2 straight ERQs (may having parts but with same concept)

Important Note:

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

PHY/CHEM/BIO/COMP HSSC-I

To be filled-in by the Candidate

PAPER VERSION	(A)	(B)	(C)	(D)	(E)
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CORRECTLY FILLED



WRONG METHOD

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Time Allowed: 1:40 Hours

Total Marks: 40

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)	21	(A)	(B)	(C)	(D)	41	(A)	(B)	(C)	(D)	61	(A)	(B)	(C)	(D)
2	(A)	(B)	(C)	(D)	22	(A)	(B)	(C)	(D)	42	(A)	(B)	(C)	(D)	62	(A)	(B)	(C)	(D)
3	(A)	(B)	(C)	(D)	23	(A)	(B)	(C)	(D)	43	(A)	(B)	(C)	(D)	63	(A)	(B)	(C)	(D)
4	(A)	(B)	(C)	(D)	24	(A)	(B)	(C)	(D)	44	(A)	(B)	(C)	(D)	64	(A)	(B)	(C)	(D)
5	(A)	(B)	(C)	(D)	25	(A)	(B)	(C)	(D)	45	(A)	(B)	(C)	(D)	65	(A)	(B)	(C)	(D)
6	(A)	(B)	(C)	(D)	26	(A)	(B)	(C)	(D)	46	(A)	(B)	(C)	(D)	66	(A)	(B)	(C)	(D)
7	(A)	(B)	(C)	(D)	27	(A)	(B)	(C)	(D)	47	(A)	(B)	(C)	(D)	67	(A)	(B)	(C)	(D)
8	(A)	(B)	(C)	(D)	28	(A)	(B)	(C)	(D)	48	(A)	(B)	(C)	(D)	68	(A)	(B)	(C)	(D)
9	(A)	(B)	(C)	(D)	29	(A)	(B)	(C)	(D)	49	(A)	(B)	(C)	(D)	69	(A)	(B)	(C)	(D)
10	(A)	(B)	(C)	(D)	30	(A)	(B)	(C)	(D)	50	(A)	(B)	(C)	(D)	70	(A)	(B)	(C)	(D)
11	(A)	(B)	(C)	(D)	31	(A)	(B)	(C)	(D)	51	(A)	(B)	(C)	(D)	71	(A)	(B)	(C)	(D)
12	(A)	(B)	(C)	(D)	32	(A)	(B)	(C)	(D)	52	(A)	(B)	(C)	(D)	72	(A)	(B)	(C)	(D)
13	(A)	(B)	(C)	(D)	33	(A)	(B)	(C)	(D)	53	(A)	(B)	(C)	(D)	73	(A)	(B)	(C)	(D)
14	(A)	(B)	(C)	(D)	34	(A)	(B)	(C)	(D)	54	(A)	(B)	(C)	(D)	74	(A)	(B)	(C)	(D)
15	(A)	(B)	(C)	(D)	35	(A)	(B)	(C)	(D)	55	(A)	(B)	(C)	(D)	75	(A)	(B)	(C)	(D)
16	(A)	(B)	(C)	(D)	36	(A)	(B)	(C)	(D)	56	(A)	(B)	(C)	(D)	76	(A)	(B)	(C)	(D)
17	(A)	(B)	(C)	(D)	37	(A)	(B)	(C)	(D)	57	(A)	(B)	(C)	(D)	77	(A)	(B)	(C)	(D)
18	(A)	(B)	(C)	(D)	38	(A)	(B)	(C)	(D)	58	(A)	(B)	(C)	(D)	78	(A)	(B)	(C)	(D)
19	(A)	(B)	(C)	(D)	39	(A)	(B)	(C)	(D)	59	(A)	(B)	(C)	(D)	79	(A)	(B)	(C)	(D)
20	(A)	(B)	(C)	(D)	40	(A)	(B)	(C)	(D)	60	(A)	(B)	(C)	(D)	80	(A)	(B)	(C)	(D)



Federal Board HSSC-I Examination
Biology Model Question Paper
National Curriculum 2022-2023 (Inclusive Scheme of Studies 2024)
(50% MCQs & 50% Descriptive)
SECTION - A (Marks 40)

Time Allowed: 1:40 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 relevant bubble against each question on OMR Sheet given in the E-Sheet. Each part carries 0.5 mark.

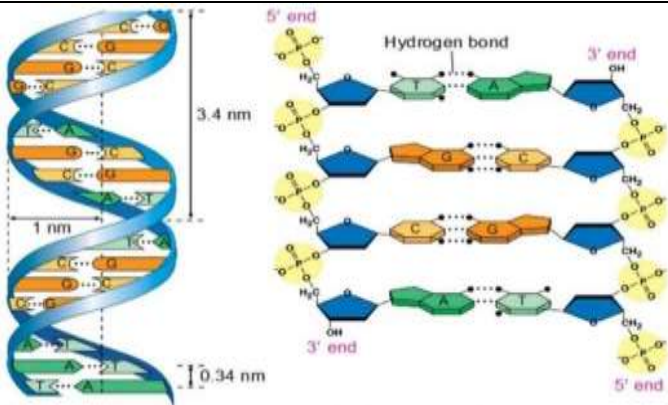
S #	Question	(A)	(B)	(C)	(D)																									
1.	A certain poison disrupts the cytoskeleton of cell. Which of the following functions would be affected most probably by the poison?	Digestion within lysosomes	Protein synthesis	Cell division	Cellular respiration																									
2.	Identify heteropolysaccharide from the following:	Chitin	Glycogen	Pectin	Cellulose																									
3.	What will happen to reaction if available activation energy is decreased from optimum level?	Rate of reaction decreases	Rate of reaction increases	No effect on the rate of reaction	Reaction is stopped immediately																									
4.	Which one of the following viruses have complex capsid:	Influenza virus	Bacteriophage	Adenovirus	Tobacco mosaic virus																									
5.	We have one billion bacteria per square centimetre of our skin. Why we have so many bacteria on our skin?	To produce acne, eczema and pimples on the skin	To limit the growth of pathogens by colonization resistance	To provide essential minerals and nutrients to the body	To help in decomposition after the death of a person																									
6.	Sundew is a/an:	Mutualistic plant	Parasitic plant	Carnivorous plant	Epiphytic plant																									
7.	Which column in the given table contains the correct chemical composition of acylglycerols?	<table><tr><td>Substances</td><td>A</td><td>B</td><td>C</td><td>D</td></tr><tr><td>Amino acid</td><td>✓</td><td>x</td><td>x</td><td>x</td></tr><tr><td>Glucose</td><td>x</td><td>x</td><td>✓</td><td>✓</td></tr><tr><td>Fatty acid</td><td>x</td><td>✓</td><td>x</td><td>x</td></tr><tr><td>Glycerol</td><td>x</td><td>✓</td><td>x</td><td>x</td></tr></table>				Substances	A	B	C	D	Amino acid	✓	x	x	x	Glucose	x	x	✓	✓	Fatty acid	x	✓	x	x	Glycerol	x	✓	x	x
Substances	A	B	C	D																										
Amino acid	✓	x	x	x																										
Glucose	x	x	✓	✓																										
Fatty acid	x	✓	x	x																										
Glycerol	x	✓	x	x																										

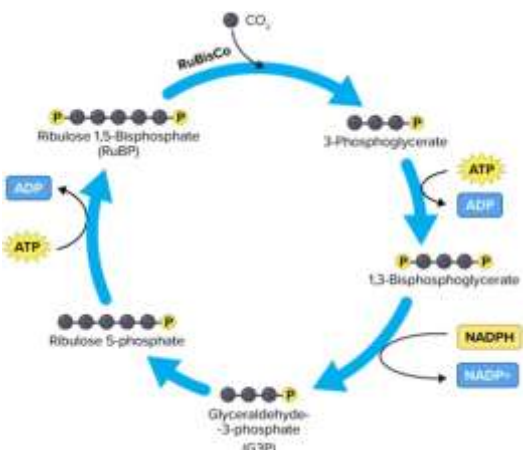
8.	Trees with mycorrhizal association grow:	Slower than other trees	Better than other trees	Small roots and leaves	Only in favourable conditions
9.	The function of saprotrophs in an ecosystem is to:	Provide oxygen to producers	Decrease competition among consumers	Increase complexity of food chain	Return nutrients to the environment
10.	Which of the following is NOT common to all divisions of vascular plants?	Development of seeds	Alternation of generations	Presence of xylem and phloem	Dominance of diploid generation
11.	All organ systems are less developed in parasitic flatworms EXCEPT :	Circulatory system	Digestive system	Reproductive system	Respiratory system
12.	Traits which exhibit continuous phenotypic variation are typically determined by which of the following inheritance form:	Incomplete dominance	Polygenic inheritance	Multiple-allelic inheritance	Sex-linked inheritance
13.	When two yellow <i>Labrador retriever</i> cross with each other, what is the probability that they produce yellow offsprings:	Zero %	25%	50%	100%
14.	Ovulation is stimulated by the sharp increase of which of the following hormones?	FSH	Estrogen	LH	Progesterone
15.	All organisms share the same genetic code. This commonality is evidence that:	All organisms are descended from common ancestor	Convergent evolution has occurred	Evolution is occurring now	Evolution occurs gradually
16.	If you want to label amino acids but not DNA, which of the following radioactive isotopes would you use?	^{18}F	^{35}S	^{14}C	^{32}P
17.	Phospholipids are ideal for membranes because they are composed of:	Hydrophilic head and tail	Hydrophobic head and tail	Hydrophobic head and Hydrophilic tail	Hydrophilic head and Hydrophobic tail
18.	An organism with jointed appendages and exoskeleton belongs to:	Mollusca	Arthropoda	Annelida	Echinodermata
19.	A nucleotide is composed of:	Sugar + base + phosphate	Amino acid + base + phosphate	Lipid + sugar + phosphate	Protein + base + phosphate
20.	Chordates are characterized by:	Absence of backbone	Presence of notochord at some stage	Absence of symmetry	Presence of exoskeleton
21.	Protists are considered a polyphyletic group because they:	Have identical evolutionary origin	Are all multicellular	Lack cellular organization	Have different ancestry
22.	Fungi play an important ecological role by:	Producing primary biomass	Recycling the nutrients	Fixing atmospheric nitrogen	Reducing oxygen levels

23.	Binary fission in bacteria results in:	Identical daughter cells	Genetic recombination	Genetically different daughter cells	Spore formation only
24.	During protein synthesis, the RNA that carries amino acids to the ribosome is:	Messenger RNA	Ribosomal RNA	Transfer RNA	Ribozyme RNA
25.	Fungal infections in humans often occur because:	Fungi are always human parasites	Fungi produce toxins or invade tissues	All humans are susceptible to fungi	Fungi need human protein for reproduction
26.	A bacteriophage differs from HIV mainly because it:	Infects human immune cells	Possesses a head-tail structure	Contains RNA only	Lacks protein coat
27.	Cell signalling is best described as:	Movement of molecules across membrane	Communication between cells	Continuous Energy production	Continuous cell growth
28.	Stem cells are unique because they:	Can only perform one specialized function	Regulate the activities of other cells	Are highly differentiated cells	Can divide to produce specialized cells
29.	When no host is available, viruses may survive by:	Performing anaerobic respiration	Remaining inactive as virions	Getting energy from environment	Forming spores
30.	In lysogenic cycle, viral DNA:	Integrates into host DNA	Immediately destroys host DNA	Forms complementary DNA	Is disintegrated by host enzymes
31.	Movement of water molecules across plasma membrane is known as:	Diffusion	Active transport	Phagocytosis	Osmosis
32.	Which feature is present in eukaryotes but absent in prokaryotes?	Ribosomes	Cell membrane	Nuclear membrane	Cytoplasm
33.	HIV weakens the immune system primarily by infecting and destroying:	Plasma B-cells	Helper T-cells	Memory T-cells	Cytotoxic T-cells
34.	Palisade mesophyll contributes to plants mainly by:	Performing more photosynthesis	Providing large surface for gas exchange	Helping with opening and closing of stomata	Providing mechanical support to leaves
35.	The active site of an enzyme is the region where:	Products are stored	No charge is present	Non-competitive inhibitors are attached	Substrate binds specifically
36.	Activators differ from coenzymes because activators are:	Metallic ions	Polypeptide	Organic molecules	Amino acids
37.	In induced fit model, active site of enzyme:	Remains rigid	Changes shape to fit substrate	Breaks substrate randomly	Does not bind substrate
38.	Enzymes increase reaction rate without:	Changing substrate	Forming enzyme-substrate complex	Lowering activation energy	Being consumed in reaction

39.	Water moving through cell walls without entering cytoplasm follows:	Apoplast pathway	Symplast pathway	Vacuolar pathway	Active transport
40.	A plant cell placed in hypotonic solution will:	Shrink due to water loss	Remain unchanged	Swell due to water entry	Burst immediately
41.	Secondary growth in plants results in:	Increase in length of stem	Increase in thickness of stem	Increase in length of root	The formation of apical bud
42.	Removal of apical bud in some plants leads to:	Reduced growth	Reduced photosynthesis	Increased length of plant	Increased lateral branching
43.	A plant that flowers only when night length is more than a critical limit is:	Long-day plant	Short-day plant	Day neutral plant	Annual plant
44.	Which of the following molecules is the source of oxygen released during photosynthesis?	Water	Glucose	Carbon dioxide	ATP
45.	While studying the anatomy of forelimbs of humans and wings of bats it was observed that they are:	Analogous organs	Homologous organs	Vestigial organs	Identical organs
46.	The theory of Lamarckism has been rejected because:	It did not explain the evolution	It did not explain the origin of life	All acquired traits are not heritable	It was limited to giraffes and snakes only
47.	According to endosymbiotic theory, mitochondria originated from:	Bacteria	Viruses	Unicellular protozoans	Unicellular algae
48.	Vascular plants differ from non-vascular plants by:	Absence of roots	Presence of dominant sporophyte	Absence of seed	Presence of dominant gametophyte
49.	At which step of the Krebs cycle, substrate level phosphorylation occurs:	Oxaloacetate to citrate	Isocitrate to α -ketoglutarate	Succinyle Co-A to Succinate	Fumarate to Malate
50.	Which exclusive feature justifies that the mango is an angiospermic plant?	Presence of seeds	Presence of flowers and fruits	Presence of micro and megaspores	Presence of vascular bundles
51.	In which structure of human reproductive system, sperms are stored and get mature?	Seminiferous tubules	Prostate gland	Vas deferens	Epididymis
52.	Which of the following is the function of testosterone?	Matures ova	Develops male secondary sex characteristics	Regulates menstruation	Stimulates LH/ICSH release
53.	In humans, the uterus mainly functions to/as:	Produce ova	Site of fertilization	Store sperms	Implant and nourish the embryo
54.	A gynecologist observes in the report of a patient that there is no LH peak during her menstrual cycle. She concluded that the directly affected process is:	Ovulation	Menstruation	Fertilization	Implantation
55.	A gene codes for:	Lipid synthesis	Polypeptide formation	ATP production	Glucose synthesis
56.	A cross between two heterozygous pink flowers 4 O'clock plants result in phenotypic ratio:	3:1	1:1	2:1	1:2:1

STIMULUS/SITUATION/SCENARIO BASED MCQs						
Scenario for MCQ# 57 to 60		A pharmaceutical company is developing a synthetic hormone-like drug intended to regulate blood glucose levels. During laboratory testing, scientists observe that the drug is affecting the liver cell functioning. Despite not entering the cell, the drug successfully triggers a series of events leading to intracellular biochemical reactions that ultimately decrease the blood glucose level.				
57.	The drug would most likely be _____ and binds with _____:	Protein : intracellular receptor	Steroid : intracellular receptor	Protein : Cell surface receptors	Steroid : Cell surface receptors	
58.	After receptor binding, the signal is transmitted within the cell mainly by:	DNA replication	ATP production	Protein digestion	second messenger production	
59.	If the receptor is defective or blocked, the most probable direct effect will be:	Increased response	No cellular response	Faster diffusion	DNA mutation	
60.	All the following statements justify that this drug is a protein hormone EXCEPT:	Drug binds the cell surface receptors	Drug directly enter the cells	Drug does not directly interact with DNA	Drug produces second messenger	
Scenario for MCQ# 61 to 64		A group of biology students is studying classic experiments that led to the discovery of genetic material. Their teacher presents experimental setup: - In the first experiment by Fredrick Griffith, harmless (non-virulent) <i>Streptococcus pneumoniae</i> bacteria are mixed with heat-killed virulent bacteria and injected into healthy mice. Surprisingly, the mice die, and live virulent bacteria are recovered from their bodies. - Findings of the above experiments were later confirmed by another group of scientists. Students are asked to interpret the results of these experiments.				
61.	The observation that mice died after injection of heat-killed virulent bacteria mixed with non-virulent bacteria indicates that:	Heat-killed bacteria became alive again	Some factor from dead bacteria transformed the non-virulent bacteria	Non-virulent bacteria were naturally pathogenic	Mice were already infected before experiment	
62.	Which material was confirmed in later experiments that converted the non-virulent bacteria into virulent in Griffith's experiment?	Protein	Lipid	DNA	RNA	
63.	Which process converts the non-virulent bacteria into virulent form in the above experiment?	Conjugation	Transduction	Transformation	Binary fission	
64.	Which conclusion is best supported by given experiment?	Proteins carry hereditary information in bacteria	DNA is the genetic material responsible for inheritance	Lipids control bacterial transformation	RNA is the only hereditary material in all organisms	
Scenario for MCQ# 65 to 68		DNA is a double helical molecule that consists of two anti parallel, complementary polynucleotide chain. Following is a short stretch of long DNA molecule. Each turn of the DNA helix is 3.4 nm long and comprises 10 base pairs.				

						
65.	What will be the length of the DNA if it consists of 100 turns?	0.34 nm	3.4 nm	34 nm	340 nm	
66.	How many base pairs would be present in the DNA if it consists of 100 turns?	10	100	340	1000	
67.	If the amount of adenine in this DNA is 16% of total nitrogenous bases, what would be the amount of cytosine?	16%	32%	34%	84%	
68.	How many hydrogen bonds would be present in the DNA if it consists of 100 turns and 50% base pairs are G-C base pairs?	100	1000	2500	3000	
Scenario for MCQ# 69 to 72		A rapidly industrializing city has reported a steady rise in average annual temperature over the past decade. Environmental scientists attribute this trend to increased emissions of gases such as carbon dioxide, methane and sulfur dioxide from factories, vehicles, and urban activities. These gases accumulate in the atmosphere and cause air pollution				
69.	The increase in air temperature is mainly due to:	Oxygen	Carbon dioxide	Nitrogen	Sulfur dioxide	
70.	Greenhouse gases cause warming by:	Reflecting sunlight	Breaking ozone	Producing oxygen	Absorbing infrared radiation	
71.	Supposed that level of all greenhouse gases become extremely low, what will be the possible consequence?	Earth will become over cooled	Earth will attain stable climate	Earth will become over heated	Increased trapping of infrared radiations	
72.	Increased greenhouse effect may lead to:	Cooling of Earth	Stable climate	Ocean acidification	Reduced radiation	
Scenario for MCQ# 73 to 76		During a genetic counselling session in a college, students asked questions about how the sex of the babies is determined. The counsellor explained to the students that the mother has two X chromosomes (XX), while the father has one X and one Y chromosome (XY).				
73.	The sex of the child is determined by:	Mother only	Father only	Both equally	Environment	
74.	If sperm carries X chromosome fertilizes the normal egg, the child will be:	Intersex	Male	Sterile	Female	

75.	Probability of male childbirth in each pregnancy is :	25%	50%	75%	100%	
76.	Which combination of chromosomes produces a child with Klinefelter's syndromes?	XXY	XXX	XYY	XO	
Scenario for MCQ# 77 to 80		Following is a metabolic pathway that occurs during dark reaction of photosynthesis. It involves the fixation of carbon dioxide to make carbohydrates				
						
77.	The first phase of this cycle is called carbon fixation because during this phase:	Carbon dioxide acceptor is regenerated	inorganic carbon becomes the part of organic compound	Inorganic carbon of carbon dioxide is reduced	Inorganic carbon of carbon dioxide is oxidized	
78.	What is/are the output(s) of this cycle?	three molecules of RuBP	six molecules of G3P	one molecule of G3P	Two molecules of NADPH	
79.	Which metabolite of this cycle, sometime react with oxygen because its enzyme sometime act as oxygenase?	Ribulose 1,5-Bisphosphate	Glyceraldehyde-3-Phosphate	3-Phosphoglycerate	Ribulose phosphate	
80.	This cycle is found in:	some C3 plants	some C4 plants	all C3 plants	all C3 and C4 plants	



Federal Board HSSC-I Examination

Model Question Paper Biology

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

(50% MCQs & 50% Descriptive)

Time allowed: 1 hour 20 Minutes

Total Marks: 40

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 (7x4 = 28 marks)

1.	Name any four fungal diseases and their pathogens in human.	1+1+1+1	OR	Enlist the two supporting/mechanical tissues in plants and write three characteristics of each.	1+3
2.	What are the chemical compositions and significance of primary and secondary layers of cell wall in plant cell?	2+2	OR	State any four physical methods used to control harmful bacteria.	1+1+1+1
3.	Enlist any four hydrolytic enzymes responsible for breakdown of carbohydrates. Write their substrates and products as well.	1+1+1+1	OR	State four basic characteristics of Chordates.	1+1+1+1
4.	Write any four general features of non-vascular plants.	1+1+1+1	OR	State the two steps involved in nitrification (a phase of nitrogen cycle) along with the specific bacteria responsible for each step.	2+2
5.	A pharmaceutical company designs a drug that blocks the functioning of the enzyme Reverse Transcriptase. Explain how this drug will disrupt the life cycle of HIV inside a helper T-lymphocyte, and what will be the impact of this drug on viral integrase functioning.	2+2	OR	During a severe summer drought, the soil becomes completely dry, and a tall tree is unable to absorb water. Explain how this lack of water in the soil can break the continuous water column inside the xylem vessels? What consequence does this have on the transport of minerals?	2+2
6.	Draw a flow chart of hormonal control of human male reproductive system showing positive and negative feedback.	4	OR	Explain the evolution of giraffe neck according to Darwin's theory of evolution by natural selection.	4
7.	Following are the five codons specifying the amino acids: AUU= 1 GCC= 2 CUG= 3 AGG=4 UCG=5 A polypeptide composed of these amino acids is: 1-5-2-1-3-4-5 Write down the complete nucleotide sequence of following with reference to the given	1+1+1+1	OR	The Calvin cycle (dark reaction) requires 9 ATP molecules and 6 NADPH molecules to produce one molecule of G3P. Why can non-cyclic photophosphorylation alone <i>not</i> satisfy this specific ratio, and how does the chloroplast resolve this deficit during the light reaction?	2+2

	polypeptide: (i) mRNA (ii) DNA template (antisense) strand (iii) coding strand (sense strand) (iv) tRNA anticodons				
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Section-C (2x6 = 12)					
8.	How components of respiratory electron transport chain (ETC) are involved in ATP generation and trace the passage of electrons through ETC by drawing the labelled diagram.	4+2	OR	Draw and describe the chemical structure of following polysaccharides: starch, glycogen, cellulose and chitin.	1.5+1.5+ 1.5+1.5
9.	Explain the process of initiation phase of Transcription in Prokaryotes and Eukaryotes. Illustrate your answer with relevant diagrams.	3+3	OR	Explain recessive epistasis in animals with example. Sketch its genetic cross to show the deviation from standard Mendelian ratio.	3+3

Federal Board HSSC-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-11-D-03] Describe the structure and functions of subcellular organelles. (mitochondria, nucleus -cell membrane, chloroplast, lysosomes, cell wall, centrioles, - Golgi apparatus, smooth endoplasmic reticulum, rough endoplasmic reticulum, vesicles, peroxisome, vacuoles, ribosomes	U	0.5
A: 2	[SLO:B-11-C-11] Describe the structure properties and roles of polysaccharides starch, glycogen, cellulose and chitin	K	0.5
A: 3	[SLO:B-11-F-05] Define energy of activation and discuss through graph how an enzyme speeds up a reaction by lowering the energy of activation	U	0.5
A: 4	[SLO:B-11-P-03] Classify viruses on the bases of their hosts and structure	K	0.5
A: 5	[SLO:B-11-0-24] Describe the benefits of the bacterial flora of humans	A	0.5
A: 6	[SLO:B-11-Q-02] State the examples of carnivorous plants	K	0.5
A: 7	[SLO:B-11-C-19] Illustrate the molecular structure (making and breaking) of an acylglycerol, a phospholipid and a terpene	U	0.5
A: 8	[SLO:B-11-0-34] Explain the mutualism established in mycorrhizae and lichen associations	U	0.5
A: 9	[SLO:B-11-N-02] Distinguish between the various modes of nutrition different species possess	K	0.5
A: 10	[SLO:B-11-B-10] Describe the general features of vascular plants	U	0.5
A: 11	[SLO:B-11-B-20] Describe the general characteristics, importance and example of sponges cnidarians, Platyhelminthes, Aschelminthes (nematodes), molluscs, annelid, arthropods and echinoderms	K	0.5
A: 12	[SLO:B-11-H-25] Describe polygenic inheritance using suitable examples from plants (grain colour in wheat) and animals (skin colour in man)	U	0.5
A: 13	[SLO:B-11-H-27] Give one example of epistasis from mammals (coat colour inheritance in Labrador retrievers) and one from plants (pigment phenotype in foxgloves) and justify modified Mendelian ratios	A	0.5
A: 14	[SLO:B-11-H-04] Describe the menstrual cycle and the hormones involved	U	0.5
A: 15	[SLO:B-11-B-03] Analyse the evidence of evolution that comes from molecular biology	U	0.5
A: 16	[SLO:B-11-H-41] Narrate the experimental work of Griffith and Hershey Chase, which proved that DNA is the hereditary material	A	0.5
A: 17	[SLO: B-11-C-18] Describe properties and roles of lipids	U	0.5
A: 18	[SLO:B-11-B-20] Describe the general characteristics, importance and example of sponges cnidarians, Platyhelminthes, Aschelminthes (nematodes), molluscs, annelid, arthropods and echinoderms	K	0.5
A: 19	[SLO:B-11-C-21] Describe nucleic acids and molecular structure of nucleotides.	U	0.5
A: 20	[SLO:B-11-B-21] Describe the general characteristics of chordates and vertebrates.	U	0.5
A: 21	[SLO:B-11-0-26] Explain protists as a diverse group of eukaryotes that has polyphyletic origin and defined only by exclusion from other groups.	U	0.5
A: 22	[SLO:B-11-0-36] Describe the ecological impact of fungi causing decomposition of recycling of materials.	U	0.5
A: 23	[SLO:B-11-0-16] Describe different methods of reproduction in bacteria.	U	0.5
A: 24	[SLO:B-11-C-27] Distinguish in terms of functions and roles, the three types of RNA	U	0.5
A: 25	[SLO:B-11-0-37] Discuss the pathogenic role of fungi	U	0.5
A: 26	[SLO:B-11-P-04] Describe the structure of a model bacteriophage, and HIV	U	0.5
A: 27	[SLO:B-11-D-04] Define cell signaling.	K	0.5
A: 28	[SLO:B-11-D-06] Define Stem cells and advantages of using stem cells	U	0.5
A: 29	[SLO:B-11-P-07] Determine the method a virus employs to survive/ pass over unfavorable conditions when it does not have a host to complete the life cycle.	U	0.5
A: 30	[SLO:B-11-P-08] Describe the Lytic and Lysogenic life cycles of a virus.	U	0.5
A: 31	[SLO:B-11-D-10] Explain the 4 membrane transport mechanisms with diagrams: (simple diffusion, Facilitated diffusion, Osmosis, Active transport).	K	0.5

A: 32	[SLO:B-11-D-11] Differentiate between prokaryotic and eukaryotic cells with diagrams.	U	0.5
A: 33	[SLO:B-11-P-11] Justify the name of the virus i.e., “Human Immunodeficiency Virus” by establishing T helper cells as the basis of immune system.	U	0.5
A: 34	[SLO:B-11-Q-03] Explain the role of stomata and palisade tissue in the exchange of gasses in plants.	U	0.5
A: 35	[SLO:B-11-F-01] Identify the role and component parts of the active site of an enzyme.	K	0.5
A: 36	[SLO:B-11-F-02] Differentiate among the three types of cofactors i.e. in organic ions, prosthetic group and coenzymes, with examples.	U	0.5
A: 37	[SLO:B-11-F-03] Explain the mechanism of enzyme action through the Induced Fit Model, including comparing it with Lock and Key Model.	U	0.5
A: 38	[SLO:B-11-F-04] Explain enzyme catalysis with example of specific reactions	U	0.5
A: 39	[SLO:B-11-Q-07] Describe the movement of water through roots in terms of symplast, apoplast and vacuolar pathways.	U	0.5
A: 40	[SLO:B-11-Q-12] - State movement of water into or out of the cell in isotonic, hypotonic, and hypertonic conditions.	U	0.5
A: 41	[SLO:B-11-Q-17] Define growth and explain primary and secondary growth in plants.	U	0.5
A: 42	[SLO:B-11-Q-19] Explain influence of apical meristem on the growth of lateral shoots.	U	0.5
A: 43	[SLO:B-11-Q-23] Classify with examples plants on the basis of photoperiodism and Describe the mechanism of photoperiodism with reference to the mode of action of phytochromes.	U	0.5
A: 44	[SLO: B-11-F-15] Explain the role of light, carbon dioxide and water in photosynthesis	U	0.5
A: 45	[SLO:B-11-B-04] Differentiate between convergent and divergent evolution on the basis of inheritance of the homologous and analogous structures.	A	0.5
A: 46	[SLO:B-11-B-07] State the drawbacks in Lamarckism.	U	0.5
A: 47	[SLO:B-11-B-05] Describe the Endosymbiotic theory about the mechanism of evolution of eukaryotes from prokaryotes	U	0.5
A: 48	[SLO:B-11-B-10] Describe the general features of vascular plants	U	0.5
A: 49	[SLO:B-11-F-24] Outline the steps of Krebs cycle.	U	0.5
A: 50	[SLO:B-11-B-16] Describe the general characteristic of angiosperms and classify them	U	0.5
A: 51	[SLO:B-11- H-01] Describe the structures of the male reproductive system and identify their functions	U	0.5
A: 52	[SLO:B-11-H-02] Define male reproductive hormones and explain their functions	U	0.5
A: 53	[SLO:B-11-H-03] Explain the structures of female reproductive system and describe their functions	U	0.5
A: 54	[SLO:B-11-H-04] Describe the menstrual cycle and the hormones involved.	A	0.5
A: 55	[SLO:B-11-H-05] Define gene (as a sequence of nucleotides as part of DNA, which codes for the formation of a polypeptide.)	K	0.5
A: 56	[SLO:B-11-H-12] Explain incomplete dominance and exemplify it through the inheritance of flower colour in 4 O’ clock plant	A	0.5
A: 57	[SLO:B-11-D-05] Discuss the pathway of a signal from outside the cell to the inside. (Protein signal and steroid signal)	A	0.5
A: 58			0.5
A: 59			0.5
A: 60			0.5
A: 61	[SLO:B-11-H-41] Narrate the experimental work of Griffith and Hershey Chase, which proved that DNA is the hereditary material.	A	0.5
A: 62			0.5
A: 63			0.5
A: 64			0.5
A: 65	[SLO:B-11-C-25] Explain the double helical structure of DNA as proposed by Watson and Crick.	U	0.5
A: 66			0.5
A: 67			0.5
A: 68			0.5
A: 69	[SLO:B-11-N-06] Explain the greenhouse effect with examples of gases that exhibit this behaviour.	U	0.5
A: 70			0.5
A: 71			0.5
A: 72			0.5
A: 73	[SLO:B-11-H-33] Solve the genetics problems related to XX-XY, sex determination.	U	0.5
A: 74			0.5
A: 75			0.5
A: 76			0.5

A: 77	[SLO:B-11-F-21] Explain the Calvin cycle (the regeneration of RuBP should be understood in outline only.)	A	0.5
A: 78			0.5
A: 79			0.5
A: 80			0.5
B: 1	[SLO:B-11-0-37] Discuss the pathogenic role of fungi. OR [SLO:B-11-Q-16] Describe the structure of supporting tissues in Plants.	K	4
B: 2	[SLO:B-11-D-03] Describe the structure and functions of subcellular organelles. (mitochondria, nucleus -cell membrane, chloroplast, lysosomes, cell wall, centrioles, - Golgi apparatus, smooth endoplasmic reticulum, rough endoplasmic reticulum, vesicles, peroxisome, vacuoles, ribosomes. OR [SLO:B-11-0-25] List the chemical and physical methods used to control harmful bacteria.	K	4
B: 3	[SLO:B-11-F-14] Classify enzymes on the basis of the substrates they use (lipases, diastase, amylase, proteases etc.) OR [SLO:B-11-B-21] Describe the general characteristics of chordates and vertebrates.	K	4
B: 4	[SLO:B-11-B-08] Describe non vascular plants (Bryophytes,) OR [SLO:B-11-N-12] Discuss nitrogen cycle in detail..	K	4
B: 5	[SLO:B-11-P-10] Explain the life cycle of HIV. OR [SLO:B-11-Q-08] Explain the movement of water in xylem through TACT mechanism.	A	4
B: 6	[SLO:B-11-H-02] Define male reproductive hormones and explain their functions OR [SLO:B-11-B-01] Explain that evolution happens due to variation in organisms and the selection pressures that organisms face	U	4
B: 7	[SLO:B-11-H-50] Describe the mechanism of protein synthesis. OR [SLO:B-11-F-20] Describe the events of non-cyclic photophosphorylation and cyclic photophosphorylation.	A	4
C: 8	[SLO:B-11-F-25] Trace the passage of electrons through the electron transport chain. OR [SLO:B-11-C-11] Describe the structure properties and roles of polysaccharides starch, glycogen, cellulose and chitin.	U	6
C: 9	[SLO:B-11-H-48] Explain the mechanism of transcription. OR [SLO:B-11-H-27] Give one example of epistasis from mammals (coat colour inheritance in Labrador retrievers) and one from plants (pigment phenotype in foxgloves) and justify modified Mendelian Ratios.	U	6

Table of specifications (ToS) Model Paper Biology (50% MCQs Pattern) Grade XI (HSSC I)

Domains	Cells and subcellular organelles	Molecular biology	Metabolism		Acellular life	Prokaryotes, Protists and fungi		Evolution, Biodiversity and classification	Plants	Evolution, Biodiversity and classification	Reproduction and inheritance			Evolution, Biodiversity and classification	Ecology		
Assessment Objectives	Unit 1: Cell and Subcellular organelles (D1-D18)	Unit 2: Molecular Biology (C1-C29)	Unit 3: Enzymes (F1-F14)	Unit 4: Bioenergetics (F15- F35)	Unit 5: Acellular life (P1-P22)	Unit 6: Prokaryotes (O1-O25)	Unit 7: Protista and fungi (O26- O37)	Unit 8: Plantae (B8-B18)	Unit 9: Diversity in plant functions (Q1-Q24)	Unit 10: Animalia (B19- B22)	Unit 11: Reproduction (H1-H4)	Unit 12: Inheritance (H5- H39)	Unit 13: Chromosome and DNA (H40- H61)	Unit 14: Evolution (B1-B7)	Unit 15: Ecology (N1-N21)	Total Marks	%Age
K (Knowledge)	A(27)0.5 A(31)0.5 B (2, f) 4	A(2)0.5	A(35)0.5 B (3, f) 4		A(4)0.5	B (2, s) 4	B(1, f)4	B (4, f) 4	A(6)0.5 B (1, s)4	A(18)0.5 A(11)0.5 B (3, s) 4			A(55)0.5		A(9)0.5 B (4, s) 4	37	31%
U (Understanding)	A(1)0.5 A(28)0.5 A(32)0.5	A(7)0.5 A(17)0.5 A(19)0.5 A(24)0.5 A(65)0.5 A(66)0.5 A(67)0.5 A(68)0.5 C (8, s)6	A(3)0.5 A(36)0.5 A(37)0.5 A(38)0.5	A(44)0.5 A(49)0.5 C (8, f)6	A(26)0.5 A(29)0.5 A(30)0.5 A(33)0.5	A(23)0.5	A(8)0.5 A(21)0.5 A(22)0.5 A(25)0.5	A(10)0.5 A(48)0.5 A(50)0.5	A(34)0.5 A(39)0.5 A(40)0.5 A(41)0.5 A(42)0.5 A(43)0.5	A(20)0.5	A(14)0.5 A(51)0.5 A(52)0.5 A(53)0.5 B (6, f) 4	A(12)0.5 A(73)0.5 A(74)0.5 A(75)0.5 A(76)0.5 C (9, s)6	C (9, f)6	A(15)0.5 A(46)0.5 A(47)0.5 B (6, s) 4	A(69)0.5 A(70)0.5 A(71)0.5 A(72)0.5	58	48%
A (Application)	A(57)0.5 A(58)0.5 A(59)0.5 A(60)0.5			A(77)0.5 A(78)0.5 A(79)0.5 A(80)0.5 B(7, s)4	B (5, f) 4	A(5)0.5			B (5, s) 4		A(54)0.5	A(13)0.5 A(56)0.5	A(16)0.5 A(61)0.5 A(62)0.5 A(63)0.5 A(64)0.5 B(7, f)4	A(45)0.5		25	21%
Total Marks	8.5	10.5	6.5	13	6.5	5	6	5.5	11.5	5.5	6.5	9.5	13	6	6.5	120	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 $\pm 5\%$ 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: Section A (Question Number) marks. Example: **A (2) 0.5**,
Section B (Question Number, part/first or second choice) marks. Example: **B (2, s) 4**
Section C (Question Number, part/first or second choice) marks. Example: **C (8, f) 6**



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