

### Notes from E-Marking Centre on HSSC-II Biology Annual Examinations 2024

### Introduction

This document has been produced for the teachers and candidates of Higher Secondary School Certificate (HSSC) Part II Biology. It contains comments on candidates' responses to the 2024 HSSC-II Examination indicating the quality of the responses and highlighting their relative strengths and weaknesses.

### **E-Marking Notes**

This includes overall comments on candidates' performance on every question and *some* specific examples of candidates' responses that support the mentioned comments. Please note that the descriptive comments represent an overall perception of the better and weaker responses as gathered from the e-marking session. However, the candidates' responses shared in this document represent some specific example(s) of the mentioned comments.

Teachers and candidates should be aware that examiners may ask questions that address the Student Learning Outcomes (SLOs) in a manner that requires candidates to respond by integrating knowledge, understanding and application skills they have developed during study. Candidates are advised to read and comprehend each question carefully before writing the response to fulfil the demand of the question.

Candidates need to be aware that the marks allocated to the questions are related to the answer space provided on the examination paper as a guide to the length of the required response. A longer response will not in itself lead to higher marks. Candidates need to be familiar with the command words in the SLOs which contain terms commonly used in examination questions. However, candidates should also be aware that not all questions will start with or contain one of the command words. Words such as 'how', 'why' or 'what' may also be used.

### **General Observations**

Most candidates successfully constructed strong responses, particularly in recognising the key characteristics of cancerous cells. Many also excelled in describing the physiological and behavioural adaptations in animals for regulating body temperature in cold environments. However, to ensure a deeper understanding, it is crucial for teachers to emphasise the following content areas and provide candidates with additional practice:

- Comparison of the sympathetic and parasympathetic nervous systems across various aspects.
- Comprehension of reasoning questions related to different diseases, such as type-II diabetes mellitus (non-insulin-dependent diabetes) and osteoarthritis.
- Understanding the factors that drive cell differentiation during embryonic development.
- Adeptness of analytical questions concerning the different stages of DNA replication.

- Insight into how restriction enzymes cut DNA and facilitate the insertion of desired genes.
- A thorough understanding of how the distribution of auxin within plant cells drives phototropic and geotropic movements in plants.

Note: Candidates' responses shown in this report have not been corrected for grammar, spelling, format, or information.

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OverallOverall, candidates demonstrated a moderate undersePerformancepressure on red blood cells in varying salt concentration			
<b>Performance</b> pressure on red blood cells in varying salt concentration	Overall, candidates demonstrated a moderate understanding of the effects of osmotic		
but their explanations often lacked precision.	pressure on red blood cells in varying salt concentrations. They correctly identified general trends, such as cell shrinkage in hypertonic solutions and swelling in hypotonic solutions,		
<b>Description of</b> <i>Better responses</i> in part a, correctly identified that red bl	<i>Better responses</i> in part a, correctly identified that red blood cells will shrink or plasmolysed		
	as salt concentration increases, accurately linking the concentration gradient to osmotic		
<b>Responses</b> pressure and its effect on cell volume.			
when placed in a 0.1% salt solution. They concisely de cell due to the lower solute concentration outside, cau	In part b, the better responses provided a comprehensive explanation of changes in cell <b>4</b> when placed in a 0.1% salt solution. They concisely described swelling as water enters the cell due to the lower solute concentration outside, causing the cell to swell. Additionally, they accurately explained haemolysis, noting that if too much water enters, the cell may		

## **DETAILED COMMENTS**

Image of Better Response	If the conc. is of salt sol. is increased it will cause the water molecules inside the RBC to move out & celling will shaink. 1) The cell will gain water from the outside which will cause it to swell & and burst 2) This will also change the concentration of salt inside the cell (incase if it does not burd).
Description of Weaker Responses	Weaker responses in part a, often demonstrated confusion between hypotonic and hypertonic solutions, leading to incorrect descriptions of how increasing salt concentration causes red blood cells to shrink. In part b, these responses also misused scientific terminology when describing the changes in cell <b>4</b> in a 0.1% salt solution. Common misconceptions among candidates include incorrect explanations of swelling and haemolysis, which indicates a need for a better understanding of water movement in hypotonic solutions leads to cell swelling and potential bursting due to excess pressure.
Image of Weaker Response	The cells become more hyperbonic that have high concentration and muy burst. Athe cell become hypotonic that is has high concentration of solvent than solute e)Cell's become shrink and can loose "I's shape and even it cause lack of functioning.

Maximising SLO Achievement	Preferred Pedagogy** Used for this SLO	Assessment Strategies
<ul> <li>Identify the expectation of command words (use Command Word Guide)</li> <li>Ensure the content is taught at the relevant cognitive level</li> <li>Identify necessary content required (skills + concepts)</li> <li>Review past paper questions on the concept</li> <li>Utilise the resource guide for additional materials</li> </ul>	<ul> <li>Story Board</li> <li>Cause and Effect</li> <li>Fish and Bone</li> <li>Concept Mapping</li> <li>Audio Visual Resources</li> <li>Think, Pair and Share</li> <li>Knowledge Platform videos</li> <li>Questioning Technique (Socratic approach)</li> <li>Practical Demonstration</li> <li>** For description of each Pedagogy, refer to Annexure A</li> </ul>	<ul> <li>Past paper questions</li> <li>Discussion on E-Marking Notes</li> <li>AKU-EB Digital Learning Solution powered by Knowledge Platform</li> <li>https://akueb.knowledgeplatform.com/login</li> </ul>

Any Additional Suggestion: Teachers should present hypothetical scenarios and ask candidates to predict and explain the outcomes using their knowledge of osmosis. This approach will encourage deeper comprehension and facilitate the application of their understanding.

\*K = Knowledge U = Understanding A = Application and other higher-order cognitive skills

Question Text			
Question Text	The given image shows X-rays of a normal and overweight patient's hip joints.		
	Normal joint space Femur Normal hip joint Hip joint of an		
	Normal hip joint Hip joint of an		
	overweight patient		
	a. Identify the skeletal disease based on the features shown in the joint of an overweight patient.		
	b. Write any ONE change (other than shown in the image) that occurs in the hip joint of the patient.		
SLO No.	16.4.8		
SLO Text	Discuss skeleton related diseases and their preventive measures, i.e., a. disc slip b. spondylitis c. sciatica d. osteoarthritis.		
Max Marks	2		
Cognitive Level	U		
Checking Hints	a. 1 mark for the correct identification of disease		
Overall	<ul><li>b. 1 mark for writing the changes in joint (any TWO required)</li><li>Candidates displayed an average level of understanding of the disease, identifying</li></ul>		
Performance	osteoarthritis with varying degrees of accuracy. While the responses demonstrated a basic grasp of the condition, there is room for improvement in detailing and applying medical terminology and concepts more accurately.		
Description of	In better responses to part a, candidates correctly identified osteoarthritis as the disease		
Better Responses	based on features shown in the image, such as bone spurs and narrowing of the joint space. They demonstrated an understanding of the condition's link to joint degeneration in overweight patients. For part b, candidates accurately mentioned changes such as reduced cartilage, swelling, inflammation, a thickened synovial membrane and bone erosion, reflecting a clear comprehension of osteoarthritis and its impact on the hip joint.		
Images of Better			
Responses	Osteo-authritis. Degeneration of cartilage occurs due to increaring forction blue pelvic bornes @ and femule.		
Description of	In <i>weaker responses</i> to part a, candidates failed to accurately identify the disease, confusing		
Weaker Responses	osteoarthritis with other joint conditions such as sciatica, disc slip or spondylitis. Many responses simply copied features from the question, such as bone spurs and joint space narrowing, without providing correct information. In part b, candidates provided vague or incorrect descriptions of changes in the hip joint, using general terms rather than addressing		

	specific pathological processes like cartilage breakdown or inflammation. These responses indicated a limited understanding of osteoarthritis and its clinical manifestations.	
Images of	Spondolysis	
Weaker	It causes pressure on Spinal nerve arising from spinal	
Responses	Cord in Cervix region between diltas and druis	

Maximising SLO Achievement	Preferred Pedagogy Used for this SLO	Assessment Strategies
<ul> <li>Identify the expectation of command words (use Command Word Guide)</li> <li>Ensure the content is taught at the relevant cognitive level</li> <li>Identify necessary content required (skills + concepts)</li> <li>Review past paper questions on the concept</li> <li>Utilise the resource guide for additional materials</li> </ul>	<ul> <li>Story Board</li> <li>Cause and Effect</li> <li>Fish and Bone</li> <li>Concept Mapping</li> <li>Audio Visual Resources</li> <li>Think, Pair and Share</li> <li>Knowledge Platform videos</li> <li>Questioning Technique (Socratic approach)</li> </ul>	<ul> <li>Past paper questions</li> <li>Discussion on E-Marking Notes</li> <li>AKU-EB Digital Learning Solution powered by Knowledge Platform</li> <li>https://akueb.knowledgeplatform.com/login</li> </ul>

 Practical Demonstration

 Any Additional Suggestion: Teachers should provide detailed feedback on assignments and exam papers, pointing out areas where responses were too general or lacked specificity. This feedback should be used as a tool to guide further study and enhance candidates' performance.

		Question No. 3		
Question Text	Differentiate between the sympathetic and parasympathetic nervous systems in the given table.			
	CharacteristicSympathetic Nervous SystemParasympathetic Nervous System			
	Neurotransmitter			
	Response			
SLO No.	17.4.5			
<b>SLO Text</b>	Differentiate between sympathetic and parasympathetic nervous system.			
Max Marks	2			
Cognitive Level	U			
Checking Hints	1 mark for each difference (TWO required)			
Overall Performance	The overall performance of candidates on this question was below average. Most candidates struggled to accurately identify the neurotransmitters involved in the sympathetic and parasympathetic nervous systems. While some responses correctly described the functions of both systems, many candidates failed to distinguish between them clearly. This indicated a need for improved understanding and differentiation of the sympathetic and parasympathetic systems.			

Description of Better Responses	In <i>better responses</i> , candidates correctly identified the neurotransmitters and functions of both the sympathetic and parasympathetic nervous systems. They accurately noted that the sympathetic nervous system uses noradrenaline/ norepinephrine and is involved in the fight-or-flight response, while the parasympathetic nervous system uses acetylcholine and is responsible for rest-and-digest functions. These responses demonstrated a clear understanding of how each system affects the body's physiological state.				
Image of Better	Characteristic	Characteristic Sympathetic Nervous System Parasympathetic Nervous System			
Response	Neurotransmitter	Sector field and the sector of			
	Response	Response flight on fight response normalize the body functions			
Description of Weaker Responses	In <i>weaker responses</i> , candidates struggled to correctly identify the neurotransmitters and functions of both the sympathetic and parasympathetic nervous systems. Many responses incorrectly described the neurotransmitters or confused the functions of the two systems. Common misconceptions included attributing the fight-or-flight response to acetylcholine or suggesting that noradrenaline is involved in rest-and-digest functions. These errors indicated a lack of understanding of how each system regulates physiological processes.				
Image of Weaker	Characteristic Sympathetic Nervous System Parasympathetic Nervous System				
Response	Neurotransmitter	Aceyty I choline	epi-nephine / seratonin.		
	Response Reflex action. fight / flight				

Maximising SLO Achievement	Preferred Pedagogy Used for this SLO	Assessment Strategies
<ul> <li>Identify the expectation of command words (use Command Word Guide)</li> <li>Ensure the content is taught at the relevant cognitive level</li> <li>Identify necessary content required (skills + concepts)</li> <li>Review past paper questions on the concept</li> <li>Utilise the resource guide for additional materials</li> </ul>	<ul> <li>Story Board</li> <li>Cause and Effect</li> <li>Fish and Bone</li> <li>Concept Mapping</li> <li>Audio Visual Resources</li> <li>Think, Pair and Share</li> <li>Knowledge Platform videos</li> <li>Questioning Technique (Socratic approach)</li> <li>Practical Demonstration</li> </ul>	<ul> <li>Past paper questions</li> <li>Discussion on E-Marking Notes</li> <li>AKU-EB Digital Learning Solution powered by Knowledge Platform</li> <li>https://akueb.knowledgeplatform.com/login</li> </ul>

 for additional materials

 Any Additional Suggestion: Teachers can use tables or charts to visually compare the sympathetic and parasympathetic nervous systems, emphasising differences in neurotransmitters, functions and physiological effects.

Question No. 4		
Describe why type-II diabetes mellitus is referred as non-insulin dependent diabetes.		
22.7.2		
Differentiate between type I and type II of diabetes mellitus.		
2		
U		

Checking	1 mark for each point (any TWO required)		
Hints			
Overall	The overall performance of candidates on this question was below average. Most answers		
Performance	lacked depth and failed to address the key mechanisms underlying type-II diabetes. This		
	suggests a need for a deeper focus on the pathophysiology of diabetes to enhance		
	candidates' comprehension and performance in future assessments.		
Description of	In better responses, candidates correctly noted that individuals with type-II diabetes		
Better	produce endogenous insulin, but their body cells develop resistance due to changes in		
Responses	insulin receptors, impairing glucose uptake. Additionally, they mentioned the progressive		
	insulin deficiency in susceptible individuals due to the pancreatic $\beta$ cells' inability to meet		
	increased insulin demand. The comprehensive responses demonstrated a clear		
	understanding of the pathophysiology of type-II diabetes, addressing both insulin resistance		
	and progressive insulin deficiency effectively.		
Image of	TYPE I diabetes mellitus is non-insulin dependent diabetes as the		
Better			
Response	B-cells of pancreas still produce insulin normally but the blood		
	cells become insulin se resistant and do not respond to it. Be The		
	patients do not require exogenous insulin rather bring changes in lifesty		
Description of	Weaker responses provided inaccurate explanations of type-II diabetes. These responses		
Weaker	incorrectly stated that patients with type-II diabetes do not produce insulin and referred to		
Responses	it as non-insulin dependent diabetes. This demonstrates a fundamental misunderstanding of		
-	the condition, as type-II diabetes is characterised by the body's cells developing resistance		
	to insulin rather than a lack of insulin production. These responses lacked details about		
	insulin resistance and the gradual decline in pancreatic $\beta$ cells' function.		
Image of	Type I diabetes mellitus is a non-insulin dependent diabetes since,		
Weaker			
Response	the sugar level in blood does not rise like type I. The It doe snot		
	require ADH to regulate blood conventuation in the body.		

Maximising SLO Achievement	Pedagogy Used for that SLO	Assessment Strategies
<ul> <li>Identify the expectation of command words (use Command Word Guide)</li> <li>Ensure the content is taught at the relevant cognitive level</li> <li>Identify necessary content required (skills + concepts)</li> <li>Review past paper questions on the concept</li> <li>Utilise the resource guide for additional materials</li> </ul>	<ul> <li>Story Board</li> <li>Cause and Effect</li> <li>Fish and Bone</li> <li>Concept Mapping</li> <li>Audio Visual Resources</li> <li>Think, Pair and Share</li> <li>Knowledge Platform videos</li> <li>Questioning Technique (Socratic approach)</li> <li>Practical Demonstration</li> </ul>	<ul> <li>Past paper questions</li> <li>Discussion on E-Marking Notes</li> <li>AKU-EB Digital Learning Solution powered by Knowledge Platform</li> <li>https://akueb.knowledgeplatform.com/login</li> </ul>

Any Additional Suggestion: Teachers can invite healthcare professionals or endocrinologists to deliver lectures, offering students real-world insights into diabetes management and treatment.

	Question No. 5		
Question Text	How does the obstruction of umbilical cord during pregnancy affect the development of foetus?		
SLO No.	18.6.7		
SLO Text	Describe the roles of placenta, umbilical cord and extra-embryonic coats.		
Max Marks	2		
Cognitive	U		
Level			
Checking Hints	1 mark for each point (any TWO required)		
Overall Performance	The overall performance of candidates on this question was average. While some responses demonstrated a solid understanding of the physiological implications of umbilical cord obstruction, many lacked depth and specificity. Candidates generally recognised that the obstruction could lead to foetal harm, but few detailed the exact mechanisms or consequences.		
Description of	Better responses effectively explained that obstruction of the umbilical cord disrupts the		
Better	transport of nutrients and oxygen to the foetus and impedes the removal of waste products.		
Responses	Candidates accurately described the potential consequences, including foetal hypoxia, growth restriction, or miscarriage, due to the lack of essential exchanges between the placenta and foetus. They demonstrated a clear understanding of the critical role of the umbilical cord in foetal development and the severe impact of its obstruction.		
Image of	The obstruction of umbilical cord during pregnancy would cease		
Better	the flow of mutrients and minerals from mother's body for development		
Response			
	of foetus. The nutrition being provided from placenta would be		
	limited. Moreover the maste materials would also not be exchanged. It would ultimately lead to death of foether:		
Degemine 41	Western manage looked a clean understanding of the second second second second		
Description of Weaker	<i>Weaker responses</i> lacked a clear understanding of the consequences of umbilical cord obstruction. Condidates failed to mention the disruption of putrient and oxygen transport		
Responses	obstruction. Candidates failed to mention the disruption of nutrient and oxygen transport and the removal of waste products. Many responses were vague, simply stating that the		
responses	and the removal of waste products. Many responses were vague, simply stating that the foetus would not develop properly without explaining the specific mechanisms involved.		
	Some incorrectly suggested that the obstruction would have minimal impact or focused on		
	unrelated aspects of pregnancy.		
Image of			
Weaker	The obstruction of umbilical cord during pregnacy is		
Response	very dangenous and it also affect the development		
•	of baby due to which poetus is also effected &		
	the new baby may be born abnormal		
-			

# Suggestions for improvement (Highlight all that apply)

Maximising SLO	Pedagogy Used for that	Assessment Strategies
Achievement	SLO	

<ul> <li>Identify the expectation of command words (use Command Word Guide)</li> <li>Ensure the content is taught at the relevant cognitive level</li> <li>Identify necessary content required (skills + concepts)</li> <li>Review past paper questions on the concept</li> <li>Utilise the resource guide for additional materials</li> </ul>	<ul> <li>Story Board</li> <li>Cause and Effect</li> <li>Fish and Bone</li> <li>Concept Mapping</li> <li>Audio Visual Resources</li> <li>Think, Pair and Share</li> <li>Knowledge Platform videos</li> <li>Questioning Technique (Socratic approach)</li> <li>Practical Demonstration</li> </ul>	<ul> <li>Past paper questions</li> <li>Discussion on E-Marking Notes</li> <li>AKU-EB Digital Learning Solution powered by Knowledge Platform</li> <li>https://akueb.knowledgeplatform.com/login</li> </ul>
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Any Additional Suggestion: Teachers should encourage candidates to explain concepts to each other during peer-teaching sessions. This approach can reinforce their understanding and help identify any gaps in knowledge.

development.SLO No.19.6.3SLO TextExplain cell differentiation with examples.Max Marks2Cognitive LevelULevelImark for each point (any TWO required)HintsImark for each point (any TWO required)Overall embryonic development.The overall performance of candidates on this question was below par. Many responses lacked a clear understanding of the fundamental factors driving cell differentiation during embryonic development.Description of Better ResponsesBetter responses accurately identified key factors causing cell differentiation during embryonic development. Candidates correctly mentioned cytoplasmic segregation of morphogenetic determinants during cleavage and induction or interaction with neighbouring cells. They demonstrated a clear understanding of how these processes influence cell fate and development. Additionally, some responses included alterations in gene expression, apoptosis and migration of cells during gastrulation, highlighting the complexity of differentiation. These responses were concise, well-structured, and		Question No. 6		
SLO No.       19.6.3         SLO No.       19.6.3         SLO Text       Explain cell differentiation with examples.         Max Marks       2         Cognitive       U         Level       1         Checking       1         Hints       7         Overall       Performance         Performance       The overall performance of candidates on this question was below par. Many responses lacked a clear understanding of the fundamental factors driving cell differentiation during embryonic development.         Description of Better       Better responses accurately identified key factors causing cell differentiation during embryonic development. Candidates correctly mentioned cytoplasmic segregation of morphogenetic determinants during cleavage and induction or interaction with neighbouring cells. They demonstrated a clear understanding of how these processes influence cell fate and development. Additionally, some responses included alterations in gene expression, apoptosis and migration of cells during gastrulation, highlighting the complexity of differentiation. These responses were concise, well-structured, and effectively covered the primary mechanisms involved in embryonic development.         Image of Better       The factors which cause the cell differentiation in embryonic developments.         Image of Better       The factors which cause the cell differentiation in embryonic developments.         Image of Better       Image of Image for production of differentide to identified have agroprinte. <t< th=""><th><b>Question Text</b></th><th colspan="3">Write any TWO factors which cause cell differentiation during the process of embryonic</th></t<>	<b>Question Text</b>	Write any TWO factors which cause cell differentiation during the process of embryonic		
SLO Text       Explain cell differentiation with examples.         Max Marks       2         Cognitive Level       U         Checking       I mark for each point (any TWO required)         Hints       The overall performance of candidates on this question was below par. Many responses lacked a clear understanding of the fundamental factors driving cell differentiation during embryonic development.         Description of Better Responses       Better responses accurately identified key factors causing cell differentiation during embryonic development. Candidates correctly mentioned cytoplasmic segregation of morphogenetic determinants during cleavage and induction or interaction with neighbouring cells. They demonstrated a clear understanding of how these processes influence cell fate and development. Additionally, some responses included alterations in gene expression, apoptosis and migration of cells during gastrulation, highlighting the complexity of differentiation. These responses were concise, well-structured, and effectively covered the primary mechanisms involved in embryonic cell differentiation, reflecting a strong grasp of developmental biology concepts.         Image of Better Response       The factors which cause the cell differentiation in embryonic developments information for production of different cells. It also has grag creacet- information for production of different cells. It also has grag creacet- information for production of different cells. It also has grag creacet- information for production of different cells. It also has grag creacet- information for production of different cells. It also has grag creacet- information for production of different cells. It also has grag creacet- information for production of different cells. It also has gr		development.		
Max Marks       2         Cognitive Level       U         Checking Hints       1 mark for each point (any TWO required)         Overall Performance       1 mark for each point (any TWO required)         Description of Better       Enter responses accurately identified key factors causing cell differentiation during embryonic development.         Description of Better       Better responses accurately identified key factors causing cell differentiation during embryonic development. Candidates correctly mentioned cytoplasmic segregation of morphogenetic determinants during cleavage and induction or interaction with neighbouring cells. They demonstrated a clear understanding of how these processes influence cell fate and development. Additionally, some responses included alterations, ingene expression, apoptosis and migration of cells during gastrulation, highlighting the complexity of differentiation. These responses were concise, well-structured, and effectively covered the primary mechanisms involved in embryonic cell differentiation, reflecting a strong grasp of developmental biology concepts.         Image of Better Response       The factors which cause the cell differentiation in embryonic developments; (i)Cytoplasm has morphogenetic determinants that have oppropriate information for production of different cells. It also has gray creacent- (ii)Due to embryonic induction; i.e., the neighbouring cells also influence the famelion of different cells.         Description of Weaker       Weaker responses generally failed to identify the key factors causing cell differentiation. Many candidates provided irrelevant information, such as focusing on unrelated processes	SLO No.	19.6.3		
Cognitive LevelULevelI mark for each point (any TWO required)HintsI mark for each point (any TWO required)Overall PerformanceThe overall performance of candidates on this question was below par. Many responses lacked a clear understanding of the fundamental factors driving cell differentiation during embryonic development.Description of Better ResponsesBetter responses accurately identified key factors causing cell differentiation during embryonic development. Candidates correctly mentioned cytoplasmic segregation of morphogenetic determinants during cleavage and induction or interaction with neighbouring cells. They demonstrated a clear understanding of how these processes influence cell fate and development. Additionally, some responses included alterations in gene expression, apoptosis and migration of cells during gastrulation, highlighting the complexity of differentiation. These responses were concise, well-structured, and effectively covered the primary mechanisms involved in embryonic cell differentiation, reflecting a strong grasp of developmental biology concepts.Image of Better ResponseThe factors which cause the cell differentiation in embryonic development; (i)Cytoplasm has morphogenetic determinants that have oppropriate information for production of different cells. It also has gray creaced- (ii)Due to embryonic inductiof(i): c. the neighbouring cells also influence the formation of different cellsDescription of WeakerWeaker responses generally failed to identify the key factors causing cell differentiation. Many candidates provided irrelevant information, such as focusing on unrelated processes	SLO Text	Explain cell differentiation with examples.		
LevelChecking Hints1 mark for each point (any TWO required)Overall PerformanceThe overall performance of candidates on this question was below par. Many responses lacked a clear understanding of the fundamental factors driving cell differentiation during embryonic development.Description of Better ResponsesBetter responses accurately identified key factors causing cell differentiation during embryonic development. Candidates correctly mentioned cytoplasmic segregation of morphogenetic determinants during cleavage and induction or interaction with neighbouring cells. They demonstrated a clear understanding of how these processes influence cell fate and development. Additionally, some responses included alterations in gene expression, apoptosis and migration of cells during gastrulation, highlighting the complexity of differentiation. These responses were concise, well-structured, and effectively covered the primary mechanisms involved in embryonic development; influence cell a strong grasp of developmental biology concepts.Image of Better ResponseThe factors which cause the cell diffrentiation in embryonic development; information for production of differentia cells. It also has grag creacent- (ii)Due to embryonic induction, i-c, the neighbouring cells also influence the formation of differentiation. Many candidates provided irrelevant information, such as focusing on unrelated processesDescription of WeakerWeaker responses generally failed to identify the key factors causing cell differentiation. Many candidates provided irrelevant information, such as focusing on unrelated processes	Max Marks	2		
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Better Response       (i) Cytoplasm has morphogenetic determinants that have appropriate information for production of different cells. It also has gray crescent- (ii) Due to embrgonic induction, i.e. the neighbouring cells also influence the formation of different cells.         Description of Weaker       Weaker responses generally failed to identify the key factors causing cell differentiation. Many candidates provided irrelevant information, such as focusing on unrelated processes	U	The factors which cause the cell diffrentiation in embryonic development:		
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Description of Weaker       Weaker responses generally failed to identify the key factors causing cell differentiation. Many candidates provided irrelevant information, such as focusing on unrelated processes		information for production of different cells. It also has gray crescent.		
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Weaker Many candidates provided irrelevant information, such as focusing on unrelated processes				
Weaker Many candidates provided irrelevant information, such as focusing on unrelated processes	Description of	Weaker responses generally failed to identify the key factors causing cell differentiation		
	-			
responses of misinterpreting the meenanisms involved. Some answers lacked specificity of were				
	ксэронэсэ	or misinterpreting the meenanisms involved. Some answers lacked specificity of were		

	overly vague, failing to address factors like cytoplasmic segregation, induction, or gene expression changes. These responses indicated a limited understanding of the core processes driving cell differentiation during embryonic development.	
Image of Weaker Response	Due to embroynic development the cell is affected in which there is mitoris, interphase in the cell It also affects the membrane of cell which later causes many deficiencis in body.	

Maximising SLO Achievement	Pedagogy Used for that SLO	Assessment Strategies
<ul> <li>Identify the expectation of command words (use Command Word Guide)</li> <li>Ensure the content is taught at the relevant cognitive level</li> <li>Identify necessary content required (skills + concepts)</li> <li>Review past paper questions on the concept</li> <li>Utilise the resource guide for additional materials</li> </ul>	<ul> <li>Story Board</li> <li>Cause and Effect</li> <li>Fish and Bone</li> <li>Concept Mapping</li> <li>Audio Visual Resources</li> <li>Think, Pair and Share</li> <li>Knowledge Platform videos</li> <li>Questioning Technique (Socratic approach)</li> <li>Practical Demonstration</li> </ul>	<ul> <li>Past paper questions</li> <li>Discussion on E-Marking Notes</li> <li>AKU-EB Digital Learning Solution powered by Knowledge Platform</li> <li>https://akueb.knowledgeplatform.com/login</li> </ul>

Any Additional Suggestion: Teachers should offer practice questions and quizzes specifically focusing on cell differentiation to help candidates familiarise themselves with the material and allowing them to test their knowledge.

	Question No. 7	
Question Text	To initiate the process of DNA replication in a laboratory, polymerase enzymes are added along with DNA template and nucleotides. The result shows that the DNA does not replicate by using these components alone. Identify TWO other essential components which are missing in this process.	
SLO No.	20.4.1	
SLO Text	Illustrate semi-conservative replication of DNA.	
Max Marks	2	
Cognitive	U	
Level		
Checking	1 mark for identifying primase enzyme	
Hints	1 mark for identifying RNA primer	
Overall	The overall performance of candidates on this question was below average. Many responses	
Performance	indicated a misunderstanding of the specific components required for the initiation of DNA replication.	
<b>Description of</b>	Better responses accurately identified the essential components missing in the DNA	
Better	replication process such as primase enzyme and an RNA primer. These responses	
Responses	demonstrated a clear understanding of the roles these components play in initiating DNA replication.	

Image of Better Response	Component 1: ) > Primers Component 2: \$10 - sequence of nucleotid RNA, >RNA primerase -		
Description of	Weaker responses often mentioned enzymes like ligase, helicase, or polymerase, which are		
Weaker	not directly involved in the initiation of DNA replication. These responses demonstrated a		
Responses	misunderstanding of the specific components required to start replication. Candidates failed		
_	to identify the primase enzyme and RNA primer, which are crucial for providing the initial		
	starting point for DNA polymerase. The incorrect focus on unrelated enzymes indicated a		
	lack of clarity regarding the roles of different components in the DNA replication process.		
Image of	Component 1:		
Weaker	DNA primase enzyme		
Response	Component 2:		
	DNA helicase		

Maximising SLO Achievement	Pedagogy Used for that SLO	Assessment Strategies
<ul> <li>Identify the expectation of command words (use Command Word Guide)</li> <li>Ensure the content is taught at the relevant cognitive level</li> <li>Identify necessary content required (skills + concepts)</li> <li>Review past paper questions on the concept</li> <li>Utilise the resource guide for additional materials</li> </ul>	<ul> <li>Story Board</li> <li>Cause and Effect</li> <li>Fish and Bone</li> <li>Concept Mapping</li> <li>Audio Visual Resources</li> <li>Think, Pair and Share</li> <li>Knowledge Platform videos</li> <li>Questioning Technique (Socratic approach)</li> <li>Practical Demonstration</li> </ul>	<ul> <li>Past paper questions</li> <li>Discussion on E-Marking Notes</li> <li>AKU-EB Digital Learning Solution powered by Knowledge Platform</li> <li>https://akueb.knowledgeplatform.com/login</li> </ul>

Any Additional Suggestion: Teachers should provide more focused instructions on the steps and components of DNA replication, including the roles of primase and RNA primer. Additional practice and targeted feedback could also help improve understanding and accuracy.

	Question No. 8
<b>Question Text</b>	Mention any THREE distinguishing characteristics of cancerous cells.
SLO No.	21.2.4
SLO Text	Describe cancer as uncontrolled cell division.
Max Marks	3
Cognitive	U
Level	
Checking	1 mark for mentioning each characteristic (any THREE required)
Hints	
Overall	Overall, the candidates performed excellently. They accurately identified the distinguishing
Performance	characteristics of cancerous cells and demonstrated a thorough understanding of the topic.
	Their responses were detailed and reflected a high level of insight into the complexities of
	cancer cell biology.

Description of Better Responses	In <i>better responses</i> , candidates accurately mentioned abnormal rapid division and growth, high nucleus-to-cytoplasm ratio with prominent nucleoli and undifferentiated or poorly differentiated cells. These responses demonstrated a clear understanding of the hallmarks of cancerous cells, reflecting a solid grasp of the physiological and structural changes associated with cancer. These responses were precise, relevant and covered the major distinguishing features comprehensively, showing an insightful understanding of cancerous		
Image of Better Response	<u>(ancerous cells are less differentiated as compare to other</u> <u>(aells)</u> <u>(ancerous cells have Large nucleus to cytoplasm ratio)</u> <u>(ancerous cells have Large nucleus to cytoplasm ratio)</u> <u>(ancerous cells have Large nucleus to cytoplasm ratio)</u> <u>(ancerous cells)</u> <u>(ancerous cells)</u> <u>(to infect other tissues as well)</u>		
Description of Weaker Responses	<i>Weaker responses</i> were often superficial and failed to accurately identify key characteristics of cancerous cells. Many candidates provided vague or incomplete answers, mentioning general terms without specifying distinguishing features. For instance, some candidates listed broad concepts like 'rapid growth' without detailing its implications or the specific attributes of cancer cells. This lack of specificity and depth indicated a limited understanding of the fundamental characteristics that differentiate cancerous cells from normal cells.		
Image of Weaker Response	Many in numbers Different structure and size than a normal cell Useless, deal and inactive cells.		

Maximising SLO Achievement	Pedagogy Used for that SLO	Assessment Strategies
<ul> <li>Identify the expectation of command words (use Command Word Guide)</li> <li>Ensure the content is taught at the relevant cognitive level</li> <li>Identify necessary content required (skills + concepts)</li> <li>Review past paper questions on the concept</li> <li>Utilise the resource guide for additional materials</li> </ul>	<ul> <li>Story Board</li> <li>Cause and Effect</li> <li>Fish and Bone</li> <li>Concept Mapping</li> <li>Audio Visual Resources</li> <li>Think, Pair and Share</li> <li>Knowledge Platform videos</li> <li>Questioning Technique (Socratic approach)</li> <li>Practical Demonstration</li> </ul>	<ul> <li>Past paper questions</li> <li>Discussion on E-Marking Notes</li> <li>AKU-EB Digital Learning Solution powered by Knowledge Platform</li> <li>https://akueb.knowledgeplatform.com/login</li> </ul>

Any Additional Suggestion: Teachers can use concept mapping techniques to help candidates organise and visualise the relationships between different characteristics of cancerous cells.

	Question No. 9
Question Text	a. In recombinant DNA technology, how do restriction enzymes cleave DNA and facilitate
	the insertion of desired gene?
	b. Identify the four nucleotides sequence as a specific cutting site for restriction enzyme in
	the given part of DNA duplex.
SLO No.	23.2.1
SLO Text	Explain steps of genetic engineering through recombinant DNA technology, i.e. a. isolation
	of the gene of interest b. amplifying the gene of interest c. insertion of the gene of interest
	in bacteria d. cloning of recombinant DNA.
Max Marks	2
Cognitive	U
Level	
Checking	a. 1 mark for each point (TWO required)
Hints	b. 1 mark for the correct identification of palindromic sequence
Overall	The overall performance of candidates on this question was moderate. This indicates a
Performance	general familiarity with the topic but highlights areas where more detailed knowledge and
<b>-</b>	clarity are needed.
Description of	Better responses accurately addressed both parts of the question. For part (a), candidates
Better	correctly explained that restriction enzymes cut DNA at specific palindromic sequences and
Responses	produce staggered cuts, creating sticky ends that facilitate the insertion of desired genes.
	For part (b), they correctly identified the four-nucleotide sequence AATT or TTAA as a specific cutting site. These responses demonstrated a clear understanding of the mechanisms
	of restriction enzymes and their role in recombinant DNA technology.
Image of	Restriction enzymes cut the DNA at a specific
Better	sequence of nucleotides called Palindromic Sequences
Response	
	In result, skicky ends are produce. The sticky ends being single stranded nucleotide requence is complementary which gene is incerted.
	single stranded nucleotide requence is complementary which gene is incerted.
	AATT is the palinaramic sequence
	AATT is the palindromic sequence at which nechiction enzyme will cut
Description of	Weaker responses were often superficial and lacked detail. For part (a), candidates provided
Weaker	vague or incomplete explanations about restriction enzymes and their function, failing to
Responses	address key concepts like palindromic sequences and sticky ends. For part (b), their
	responses often missed the correct sequence or were too general, not specifying the exact
	cutting site. These responses demonstrated a limited understanding of the precise
	mechanisms and technical aspects of restriction enzymes in recombinant DNA technology.
Image of	In recombinant DNA technology The enjyme are restricted
Weaker	but facilitate The insertion of gene by adding desire gene according to the neuclookide requerce.
Response	desire gene according to the neucloobide requerce.
	TTCC
	$\Lambda + G$

Maximising SLO Achievement	Pedagogy Used for that SLO	Assessment Strategies
<ul> <li>Identify the expectation of command words (use Command Word Guide)</li> <li>Ensure the content is taught at the relevant cognitive level</li> <li>Identify necessary content required (skills + concepts)</li> <li>Review past paper questions on the concept</li> <li>Utilise the resource guide for additional materials</li> </ul>	<ul> <li>Story Board</li> <li>Cause and Effect</li> <li>Fish and Bone</li> <li>Concept Mapping</li> <li>Audio Visual Resources</li> <li>Think, Pair and Share</li> <li>Knowledge Platform videos</li> <li>Questioning Technique (Socratic approach)</li> <li>Practical Demonstration</li> </ul>	<ul> <li>Past paper questions</li> <li>Discussion on E-Marking Notes</li> <li>AKU-EB Digital Learning Solution powered by Knowledge Platform</li> <li>https://akueb.knowledgeplatform.com/login</li> </ul>

Any Additional Suggestion: Teachers should consider integrating case studies or real-world examples that demonstrate the practical applications of restriction enzymes in genetic engineering. This approach helps students see the relevance of the concepts and reinforces their learning through concrete, real-life scenarios.

### **Extended Response Questions (ERQs)**

Extended response questions offered a choice between parts 'a' and 'b'

Question No. 10(a)		
Question Text	Describe any THREE physiological and FOUR behavioural adaptations in animals for regulating their body temperature in cold environment.	
SLO No.	15.9.2	
SLO Text	Describe structural, physiological, behavioural adaptations in animals for temperature regulation.	
Max Marks	7	
Cognitive Level	U	
Checking Hints	<ol> <li>mark for describing each physiological adaptation (any THREE required)</li> <li>(1 mark will be awarded when candidates state three adaptations only without any description)</li> <li>mark for describing each behavioural adaptation (any FOUR required)</li> <li>(Marks will be awarded for any relevant behavioural adaptation)</li> </ol>	
Overall Performance	Most candidates were drawn to this part of the question and demonstrated a strong understanding of both physiological and behavioural adaptations for thermoregulation in cold environments. Overall, their responses were comprehensive and precise, reflecting a high level of knowledge and insight into the topic.	
Description of Better Responses	<i>Better responses</i> showed a comprehensive understanding of both physiological and behavioural adaptations in animals for thermoregulation in cold environments. Candidates accurately identified key structural adaptations, such as insulation through fur, fat, or feathers, and circulatory adaptations like vasoconstriction. They also highlighted the importance of behavioural strategies, including basking in the sun, huddling, and the use of external heat sources. The use of specific examples, like penguin chicks huddling and birds orienting their wings to the sun, demonstrated a strong grasp of the concepts. Additionally,	

	they also included how these adaptations help animals maintain body temperature in cold
	conditions.
Image of Better Response	Part a: The physiological adaptations in animals far trajulating this body temperature in cold environment are mailtoned below. I vancen traction: such type of adaptation where brain send message to contract the blood vessels so that blood may vernain in them which will core the heat to escape out. I) Shivening: Shivening is the contineous contraction and relaxation of invices, which generates heat. This head helps to normalize body temperature. II) Gross bumps. The hair on mammalian bodies stand erect and act as an insulator by traping the heat in the inside the hair This plays a role of blanchet. Basking : Animals (including human) intake heat from sun to mointain their body temperature. II) Huddling : queh behaviour are is mostly shown by cats. The family of a eto cat steep together beside coelester to stay worm
Description of	
Weaker Responses	adaptations for thermoregulation in hot environments instead of cold. Common errors included mentioning sweating and panting-cooling mechanisms rather than focusing on heat retention strategies. Additionally, many candidates failed to explain how each adaptation works for thermoregulation in cold conditions. For example, they listed insulation methods without describing how fur, fat, or feathers minimise heat loss. Some also omitted the role of behaviours like basking or huddling in conserving heat.

Imaga of	
Image of	A) Physiological and behavioural adaption in animals for
Weaker	regulating their body temperature in cold environment :-
Response	physiological =- ) Animal make their body hair thick to
	Prevent cold environments like fox and sheep.
	2) Animal living in hot regions have & large ears for maximum heat of take but organisms living in cold -
	region have smaller ear of minimum heat to go outside.
	Slike Plant living in cold region Produce Anti-freeze
	hormone to Prevent coldness simer Similarly animal
	create a insulting sheath to avoid coldness.
	Behaviour =- 1) Animal living in cold-region change
	their habitat, because of the environment like got
	goats living on mountain region which has a cold
	environment so they, during cold season Trame down.
	Lo avoid coldness.
	2) Animal did maximum movement to avoid cold and
	due to movement warm heat develop in their body.
	3) some animal like monkey develop a insight learning behaviour
	in their body due to which, when they saw humans
	rubbing hands so that a warm feeling develop in their
	body, so they did the same.
	4) Some animal like duckling develop a Imprinting behaviour
	means sensitive Process of development so they saw their
	Parents to how they Prevent cold then they did the
	Same.
Suggestions for im	provement (Highlight all that apply)
Maximising SLC	

Maximising SLO	Treferreu Teuagogy Useu	Assessment Strategies
Achievement	for this SLO	
• Identify the expectation	<ul> <li>Story Board</li> </ul>	• Past paper questions
<mark>of command words (use</mark>	• Cause and Effect	<ul> <li>Discussion on E-Marking Notes</li> </ul>
Command Word Guide)	• Fish and Bone	AKU-EB Digital Learning Solution
<ul> <li>Ensure the content is</li> </ul>	<ul> <li>Concept Mapping</li> </ul>	powered by Knowledge Platform
taught at the relevant	Audio Visual	https://akueb.knowledgeplatform.com/login
cognitive level	Resources	പ്രത്തില്ല് പ്രത്തിന്
<ul> <li>Identify necessary</li> </ul>	• Think, Pair and Share	
<mark>content required (skills +</mark>	Knowledge Platform	56651 <i>6</i> %
concepts)	videos	1946.66.7
<ul> <li>Review past paper</li> </ul>	• Questioning Technique	2503 H S
questions on the concept	(Socratic approach)	
• Utilise the resource guide	Practical	
for additional materials	Demonstration	

Any Additional Suggestion: Teachers should incorporate real-life examples and case studies to contextualise adaptations.

Question No. 10(b)	
Question Text	i. Describe how the distribution of auxin within the plant cells induces phototropic and geotropic movements in plants.
	ii. Describe any THREE types of tropic movements in plants other than phototropic and
	geotropic movements.
SLO No.	16.2.8 and 16.2.5
SLO Text	Describe the role of growth substances (plant hormones) in plant movement. Describe types of tropic movements, i.e., geotropism, thigmotropism, hydrotropism, chemotropism and phototropism.

Max Marks	7
Cognitive	U U
Level	
Checking Hints	<ul> <li>i. 1 mark for each key point of phototropic movement (any TWO required)</li> <li>1 mark for each key point of geotropic movement (any TWO required)</li> <li>ii. 1 mark for describing each type of movement (any THREE required)</li> <li>(Note: One mark will be awarded if a candidate has written only three names of tropic movements.)</li> </ul>
Overall Performance	Fewer candidates attempted this part of the question, and their performance was average. Many responses lacked detail and precision, indicating a basic grasp of the concepts. To achieve higher marks, candidates need to provide more thorough explanations and demonstrate a deeper understanding of the material.
Description of Better Responses	In <i>better responses</i> , candidates demonstrated a solid understanding of auxin distribution in phototropic and geotropic movements. They accurately described how auxin redistributes to the shaded side in shoots, promoting cell elongation and positive phototropism, and how it inhibits cell elongation in roots, causing positive geotropism. Additionally, they correctly identified and explained other tropic movements, such as thigmotropism, chemotropism, and hydrotropism, providing clear examples and mechanisms. The detailed explanations and appropriate use of terminology reflected a strong grasp of the concepts.
Image of Better Response	(D) Auxin is responsible for inducing phototropic and geotrophic movaments. i. here l'hototropism: Auxin forms in the presence of light, but a being an enzyme it
	Auxin forms on the side of stem fring the con did octer on the appointe cide, hence clangilian occurs mathing auxies in the direction of counts i. Acotropicm: Auxin tigh concentration of auxies induction in root and stimulates growith in
	Thighologism: His che movement of plant parts in response to standa or mater. Rost droues Highologism: Short shows wegaling photo tropism Highologism: Short shows wegaling photo tropism Highologism: His che movement of plant parts in response to standaus of mater. Rost droues Highologism: His che movement of plant parts in response to standus of mater. Rost droues Highologism: His che movement of plant parts in response to standus of mater. Rost droues Rostine physiologism short shows wegaling photo tropism Thigmologism: His che movement of plant parts in response to standus of mater. Rost droues Rostine physiologism short shows wegaling photo tropism Thigmologism: His che movement of plant parts in response to touch stimulus . ex: Stem of Rostine physiologism short shows wegaling photo tropism Supports (rods)
Description of Weaker Responses	In <i>weaker responses</i> , candidates generally struggled with part 'i', often failing to accurately describe how auxin distribution induces phototropic and geotropic movements. Many did not explain the role of auxin in promoting or inhibiting cell elongation in shoots and roots, leading to incomplete or incorrect answers. In part 'ii', while some candidates mentioned

T	of the topic.
Image of Weaker Response	i) Phototeopic movement occurs in plant when a plant moves in the direction of light. Shoots pollow politive phototrophism, where as noth follow negative phototeophism. Auxin being more in shoots causes cell to divide and grow. (thoot spiral) . Geotropic movement is occurs in a plant when a plant moves in the direction of gravity. Shoots follow negative geotrophism where as roots follow positive geotrophism. Poots having more
	auxin in them. (Root aprical) ii). Chemotrophism: - Movement of plant in the direction of chemical skinder. Ez:- Formation of pollen tube-
	2. The public phonen Movement of plant in the direction of touch strawles. 3. Kydrotrophism. Movement of the plant in the direction of water strawls.

Maximising SLO	Preferred Pedagogy Used	Assessment Strategies
Achievement	for this SLO	
<ul> <li>Identify the expectation of command words (use Command Word Guide)</li> <li>Ensure the content is taught at the relevant cognitive level</li> <li>Identify necessary content required (skills + concepts)</li> <li>Review past paper questions on the concept</li> <li>Utilise the resource guide for additional materials</li> </ul>	<ul> <li>Story Board</li> <li>Cause and Effect</li> <li>Fish and Bone</li> <li>Concept Mapping</li> <li>Audio Visual Resources</li> <li>Think, Pair and Share</li> <li>Knowledge Platform videos</li> <li>Questioning Technique (Socratic approach)</li> <li>Practical Demonstration</li> </ul>	<ul> <li>Past paper questions</li> <li>Discussion on E-Marking Notes</li> <li>AKU-EB Digital Learning Solution powered by Knowledge Platform</li> <li>https://akueb.knowledgeplatform.com/login</li> </ul>

Any Additional Suggestion: Teachers can use analogies to simplify complex concepts, such as comparing auxin distribution to traffic control directing plant growth. Further, they can develop mnemonics to help candidates remember key points about auxin's role in phototropism and geotropism.

Question No. 11(a)		
Question Text	i. Identify the site of antidiuretic hormone (ADH) formation.	
	ii. Describe any ONE function and any ONE disorder caused by the hyposecretion of each of the following hormones.	
	<ul> <li>Somatotrophin hormone (STH)/ Growth hormone</li> </ul>	
	<ul> <li>Thyroxine hormone/ T4 hormone</li> </ul>	
	<ul> <li>Antidiuretic hormone (ADH)/ Vasopressin</li> </ul>	
SLO No.	17.5.3	
SLO Text	Explain endocrine glands of mammals, hormones secreted from them and their disorders.	
Max Marks	7	
Cognitive	U	
Level		
Checking	i. 1 mark for mentioning the site of formation of antidiuretic hormone	
Hints	ii. 1 mark for describing the function of each hormone (THREE required)	
	1 mark for describing the disorder as a result of hyposecretion of each hormone (THREE required)	
Overall	Most candidates attempted this part and exhibited a very good understanding of hormone	
Performance	functions and disorders. Their responses showed a strong grasp of the material, effectively	
	linking the physiological roles of hormones with their clinical implications. Overall, the candidates' answers were thorough and reflected a high level of knowledge.	
Description of	In better responses, candidates provided accurate and detailed information. They correctly	
Better	identified the hypothalamus as the site of antidiuretic hormone (ADH) formation. For each	
Responses	hormone, they effectively described one function and one disorder related to its	
	hyposecretion. The explanation for somatotrophin hormone (STH) included its role in growth and the disorder of dwarfism. Thyroxine's function and disorders, including	
	cretinism and myxedema, were well-articulated. For ADH, the function of water	
	conservation and the disorder of diabetes insipidus were clearly explained. Overall, the	
	responses demonstrated a strong understanding of hormonal functions and associated	
	disorders.	

Image of	
Better	(a) (i) ADH or responsesion is produced in the hypothelamus
Response	which travels down to the postenior lobe of the pituatary gland
	(ii) . Somatotrophin hormone: It is the growth hormone which
	brings about the structural changes which is produced in the anterior
	pituatary gland. SRF (somatotrophin releasing factor) from the
	hypothalamus causes it release from pituatory throughout the life
	to bring growth and after growth has ceased, it is involved in protein
	synthesis. If it is released in less amount during development, it
	may lead to "dworthism" and effect on thryoid and advend gland.
	. Thyroxine hormone : It is released from two thyroid glands cituated
	below the largex. TSH (theyroid stimulating hormone) is released thoughout
	the life but especially during the periods of rapid growth. In fregs, it to the topped
	brings about metamorphosis. If it is undersecreted, the Eboos don't
	convert into frogs rather stay as large tadpoles. In humans, it is
	involved is increasing the basal metabolic rate and breakdown of
	glucose to produce ATP and heat and also bring sexual maturity. I.F.
	is not secreted in appropriate amounts in children, may cause cretinism that
	ore small scarby hair, defective brains where is in adults it can cause retention
	of water (ordema), obesity and goiter (this may be due to love of indire in did
	· ADH/vertopression is secreted by hypetholomus to be stored in posterior pitrotory which
	acts on collecting turbules for increased water reabsorption. If it is understated, it may cause "districts insorptus" in which great amount of dilute cume is produced and gost twin
	may cause diatetes insorphus in which great amount of dilute curine is produced and great tain
Decemination of	Weaken normonage revealed several migunderstandings and emissions. Mensuer lideter
Description of Weaker	<i>Weaker responses</i> revealed several misunderstandings and omissions. Many candidates incorrectly identified the site of ADH formation as the pituitary gland instead of the
Responses	hypothalamus. Common errors included inaccurate descriptions of hormone functions and
•	disorders, with some confusing the roles of somatotrophin and thyroxine or providing
	incomplete details about related disorders. Additionally, there were misconceptions about

incomplete details about related disorders. Additionally, there were misconceptions about ADH, with some candidates inaccurately describing the role of adrenaline instead of ADH.

Image of	-> Ribeating gland (martergland)
Weaker Response	Somatopophen = It is a growth hormon which helps in body to grow if it
	moduce in large omount it causes gegantion & when it produce mivery low
	amount it cause dwarfam. Simpling of these is not proper production of the
	hormone it distrubs the growth
	Thyporenettormone. It is also known as TY hormone. If it produce in
	lange amount it affects the thypoid & it cause goiler. It remain
	they wid in good condition it it produce in perfectance.
	AD14 renopression - It also not good for the body. It causes publican.
	ettelps in fight activity marks.

Maximising SLO Achievement	Pedagogy Used for that SLO	Assessment Strategies
<ul> <li>Identify the expectation of command words (use Command Word Guide)</li> <li>Ensure the content is taught at the relevant cognitive level</li> <li>Identify necessary content required (skills + concepts)</li> <li>Review past paper questions on the concept</li> <li>Utilise the resource guide for additional materials</li> </ul>	<ul> <li>Story Board</li> <li>Cause and Effect</li> <li>Fish and Bone</li> <li>Concept Mapping</li> <li>Audio Visual Resources</li> <li>Think, Pair and Share</li> <li>Knowledge Platform videos</li> <li>Questioning Technique (Socratic approach)</li> <li>Practical Demonstration</li> </ul>	<ul> <li>Past paper questions</li> <li>Discussion on E-Marking Notes</li> <li>AKU-EB Digital Learning Solution powered by Knowledge Platform</li> <li>https://akueb.knowledgeplatform.com/login</li> </ul>

Any Additional Suggestion: Teachers should pose challenging scenarios related to hormone treatments and have students debate or analyse them. This encourages critical thinking and a more subtle understanding of the subject matter.

Question No. 11(b)				
Question Text	The given pedigree shows inheritance of colour blindness in human. $\begin{array}{c}  & \\ & \\ & \\ & \\ & \\ & \\ & \\ & \\ & \\ & $			
SLO No.	<ul><li>ii. Describe the pattern of inheritance of X-linked genes.</li><li>22.6.4</li></ul>			
SLO Text	Illustrate sex-linked inheritance in human, i.e., a. colour blindness b. haemophilia.			
Max Marks	7			
Cognitive Level	A			
Checking Hints	i. 1 mark for determining each phenotype of P, Q and R (THREE required) ii. 1 mark for describing each point (FOUR required)			
Overall Performance	Fewer candidates attempted this part, but those who did, displayed a very strong understanding of X-linked inheritance. Their answers showed a thorough grasp of inheritance patterns and accurate application of genetic principles. Overall, the responses were detailed and reflected a high level of knowledge.			
Description of Better Responses	Better responses demonstrated a strong understanding of X-linked inheritance. Candidates accurately identified the phenotypes of $\mathbf{P}$ as a carrier female, $\mathbf{Q}$ as a colour-blind male and $\mathbf{R}$ as a normal male. Their descriptions of X-linked gene inheritance were comprehensive and precise. They correctly explained that males cannot pass X-linked traits to their sons but can to their daughters and that females with one normal and one defective X chromosome are carriers. Additionally, they emphasised that X-linked diseases are more common in males and that affected males inherit the trait from their mothers. Overall, the responses were well-informed and thorough.			

Images of				
Better	Bit P is a carrier fermale			
Responses	a is affected male			
	R is a Normal mate			
	ii) X-linked genes on associated with X chromosome, and they can			
	not be directedly passed from a poron father to his son, rather			
	bere a doughter is a corrier of the game from her father			
	to 6 her son.			
	For example homemophysics and colour blindness both are x-links			
	traits which are passed from an affected grandfather			
	to his grandson through his daugester. As it is X tinted so If a			
	mother is a corrier than ste one of her doughtors will balso be			
	a carrier and one of his son can be affeled with my of lince			
	disease. So there diseases doesnot affect a female, never the males			
	a luffer from such discuse.			
Description of Weaker Responses	<i>Weaker responses</i> demonstrated several misunderstandings and errors. Many candidates incorrectly identified the phenotypes of <b>P</b> , <b>Q</b> and <b>R</b> , such as confusing the carrier female with a colour-blind individual. Common mistakes included incorrect explanations of X-linked inheritance patterns, such as misunderstanding how traits are passed from parents to offspring or misinterpreting the frequency of X-linked disorders in males versus females. Some responses lacked clarity on how defective genes are transmitted, and there were inaccuracies in describing the roles of carriers and affected individuals.			
Image of				
Weaker	P is a conser female.			
Response	O is a normal male.			
	'B' is a normal male.			
	prominent in temples. Since males have only one			
	- X' chromo some and females have bear & chromismess			
	the chances of a X-control gene is litely to be inherited			
	and I passed down to the doughter of the manuscricer			
	frenche male's only recleve one. X champeomer from			
	Acts nothers. X-linked decimate genes are more likely			
to be downing in lender.				

Maximising SLO Achievement	Preferred Pedagogy Used for this SLO	Assessment Strategies	
<ul> <li>Identify the expectation of command words (use Command Word Guide)</li> <li>Ensure the content is taught at the relevant cognitive level</li> <li>Identify necessary content required (skills + concepts)</li> <li>Review past paper questions on the concept</li> <li>Utilise the resource guide for additional materials</li> </ul>	<ul> <li>Story Board</li> <li>Cause and Effect</li> <li>Fish and Bone</li> <li>Concept Mapping</li> <li>Audio Visual Resources</li> <li>Think, Pair and Share</li> <li>Knowledge Platform videos</li> <li>Questioning Technique (Socratic approach)</li> <li>Practical Demonstration</li> </ul>	<ul> <li>Past paper questions</li> <li>Discussion on E-Marking Notes</li> <li>AKU-EB Digital Learning Solution powered by Knowledge Platform</li> <li>https://akueb.knowledgeplatform.com/login</li> </ul>	
Any Additional Suggestion: Teachers can have candidates role-play as genetic counsellors, explaining			

Any Additional Suggestion: Teachers can have candidates role-play as genetic counsellors, explaining inheritance patterns and risks associated with X-linked disorders to families. This role-playing activity can enhance their understanding of complex concepts and improve their communication skills.

# Annexure A: Pedagogies Used for Teaching the SLOs

#### Pedagogy: Storyboard

**Description:** A visual pedagogy that uses a series of illustrated panels to present a narrative, encouraging creativity and critical thinking. It helps learners organise ideas, sequence events, and comprehend complex concepts through storytelling.

**Example:** In a Literature class, students are tasked with creating storyboards to visually retell a novel. They draw key scenes, write captions, and present their stories to the class, enhancing their reading comprehension and fostering their imagination.

#### Pedagogy: Cause and Effect

**Description:** This pedagogy explores the relationships between actions and consequences. By analysing cause-and-effect relationships, learners develop a deeper understanding of how events are interconnected and how one action can lead to various outcomes.

**Example:** In a History class, students study the causes and effects of the Industrial Revolution. They research and discuss how technological advancements in manufacturing led to significant societal changes, such as urbanisation and labour reform movements.

#### Pedagogy: Fish and Bone

**Description:** A method that breaks down complex topics into main ideas (the fish) and supporting details (the bones). This visual approach enhances comprehension by highlighting essential concepts and their relevant explanations.

**Example:** During a Biology class on human anatomy, the teacher uses the fish and bone technique to teach about the human skeletal system. The teacher presents the main components of the human skeleton (fish) and elaborates on each bone's structure and function (bones).

#### Pedagogy: Concept Mapping

**Description:** An effective way to visually represent relationships between ideas. Learners create diagrams connecting key concepts, aiding in understanding the overall structure of a subject and fostering retention.

**Example:** In a Psychology assignment, students use concept mapping to explore the various theories of personality. They interlink different theories, such as Freud's psychoanalysis, Jung's analytical psychology, and Bandura's social-cognitive theory, to see how they relate to each other.

#### Pedagogy: Audio Visual Resources

**Description:** Incorporating multimedia elements like videos, images, and audio into lessons. This approach caters to different learning styles, making educational content more engaging and memorable.

**Example:** In a General Science class, the teacher uses a documentary-style video to teach about the solar system. The video includes stunning visual animations of the planets, interviews with astronomers, and background music, enhancing students' interest and understanding of space.

### Pedagogy: Think, Pair, and Share

Description: A collaborative learning technique where students ponder a question or problem individually, then discuss their thoughts in pairs or small groups before sharing with the entire class. It fosters active participation, communication skills, and diverse perspectives.

**Example:** In a Literature in English class, the teacher poses a thought-provoking question about a novel's moral dilemma. Students first reflect individually, then pair up to exchange their opinions, and finally participate in a lively class discussion to explore different viewpoints.

### Pedagogy: Questioning Technique (Socratic Approach)

**Description:** Based on Socratic dialogue, this method stimulates critical thinking by posing thought-provoking questions. It encourages learners to explore ideas, justify their reasoning, and discover knowledge through a process of inquiry.

**Example:** In an Ethics class, the instructor uses the Socratic approach to lead a discussion on the meaning of justice. By asking a series of probing questions, the students engage in a deeper exploration of ethical principles and societal values.

### Pedagogy: Practical Demonstration

**Description:** A hands-on approach where learners observe real-life applications of theories or skills. Practical demonstrations enhance comprehension, skill acquisition, and problem-solving abilities by bridging theoretical concepts with real-world scenarios.

**Example:** In a Food and Nutrition class, the instructor demonstrates the proper technique for filleting a fish. Students observe and then practice the skill themselves, learning the practical application of knife skills and culinary precision.

(Note: The examples provided in this annexure serve as illustrations of various pedagogies. It is important to understand that these pedagogies are versatile and can be applied across subjects in numerous ways. Feel free to adapt and explore these techniques creatively to enhance learning outcomes in your specific context.)

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- Raabia Hirani, Manager, Curriculum Development, AKU-EB
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