

AGA KHAN UNIVERSITY EXAMINATION BOARD

HIGHER SECONDARY SCHOOL CERTIFICATE

CLASS XI

ANNUAL EXAMINATIONS (THEORY) 2025

Biology Paper I

Time: 1 hour 30 minutes Marks: 50

INSTRUCTIONS

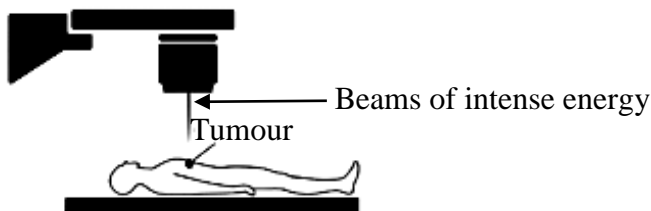
1. Read each question carefully.
2. Answer the questions on the separate answer sheet provided. DO NOT write your answers on the question paper.
3. There are 100 answer numbers on the answer sheet. Use answer numbers 1 to 50 only.
4. In each question, there are four choices A, B, C, D. Choose ONE. On the answer grid, black out the circle for your choice with a pencil as shown below.

Correct Way	Incorrect Ways
1 (A) (B) ● (D)	1 (A) (B) (C) (D)
	2 (A) (B) (C) (D)
	3 (A) (B) (C) (D)
	4 (A) (B) (C) (D)

Candidate's Signature

5. If you want to change your answer, ERASE the first answer completely with a rubber, before blacking out a new circle.
6. DO NOT write anything in the answer grid. The computer only records what is in the circles.
7. You may use a scientific calculator if you wish.

1. In which levels of biological organisation, interactions such as predation, parasitism and commensalism are commonly observed among organisms?
 - A. Atomic and molecular levels
 - B. Cellular and organelle levels
 - C. Molecular and species levels
 - D. Population and community levels
2. The given diagram shows a modern diagnostic method used for the treatment of tumour.



The given method is identified as

- A. radiotherapy.
 - B. gene therapy.
 - C. immunisation.
 - D. chemotherapy.
3. Which type of bond is formed when two water molecules interact with each other?
 - A. Ionic bond between the oxygens in each water molecule
 - B. Hydrogen bond between the hydrogens in each water molecule
 - C. Covalent bond between the hydrogen of one water molecule and oxygen of the other
 - D. Hydrogen bond between the hydrogen of one water molecule and oxygen of the other
 4. A single strand of DNA contains 830 adenine, 929 cytosine, 774 guanine and 615 thymine bases.

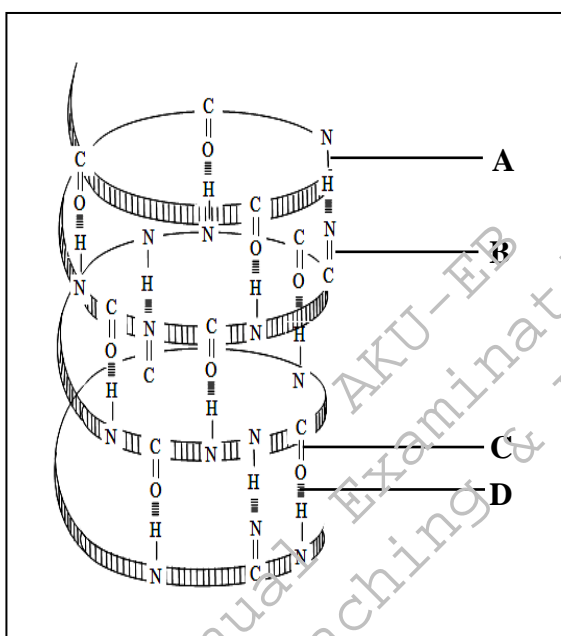
How many guanine bases would be in the complementary strand?

 - A. 615
 - B. 774
 - C. 830
 - D. 929
 5. Lipids are insoluble in water due to the presence of
 - A. long carbon chains.
 - B. branched saturated fatty acids.
 - C. large number of nonpolar C-H bonds.
 - D. C=C bonds in unsaturated fatty acids.

6. The option that identifies the levels of protein structure present in a haemoglobin molecule is

	Primary Structure	Secondary Structure	Tertiary Structure	Quaternary Structure
A	✓	✗	✗	✗
B	✓	✓	✗	✗
C	✓	✗	✗	✓
D	✓	✓	✓	✓

7. The component of the given α -helical structure of protein that maintains its stability is



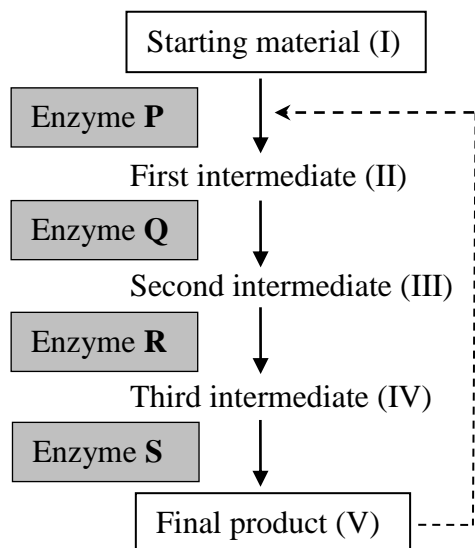
8. Enzymes lower the activation energy of a reaction by

- A. remaining unchanged during a reaction.
- B. increasing the kinetic energy of substrate molecules.
- C. keeping the reactant molecules stable for a longer period.
- D. binding the reactants at the active site to provide better orientation.

9. The group of enzymes that catalyses the formation of a new bond between two substrate molecules with the release of energy is

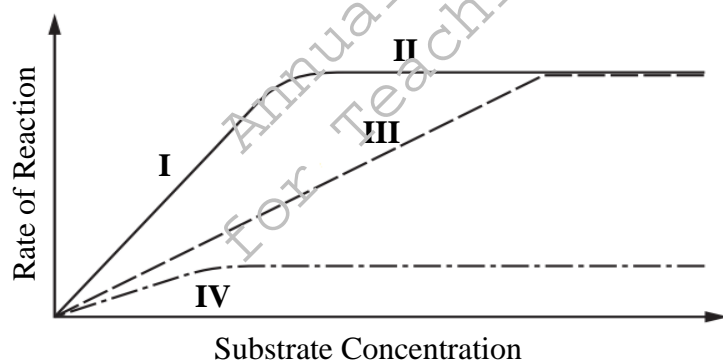
- A. lyases.
- B. ligases.
- C. hydrolases.
- D. transferases.

10. The diagram below shows the action of enzymes in a series of chemical reactions.



In the given enzyme catalysed reactions, which component(s) would act as inhibitor(s) of enzyme **P**?

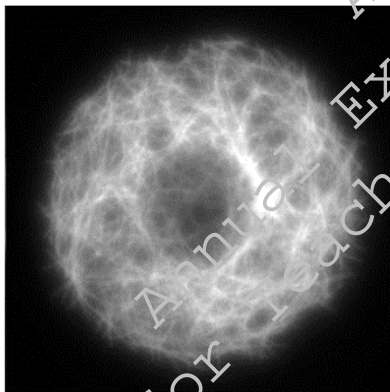
- A. I only
 - B. V only
 - C. II and III
 - D. III and IV
11. The given graph shows the effect of increasing concentration of substrate, in the presence of competitive and non-competitive inhibitor on the rate of an enzyme-catalysed reaction.



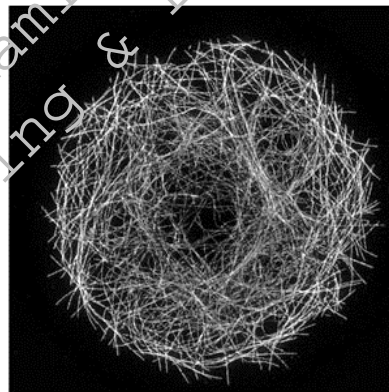
The option that identifies the limiting factors at points **I**, **II**, **III** and **IV** is

	I	II	III	IV
A	enzyme concentration	substrate concentration	competitive inhibitor	non-competitive inhibitor
B	enzyme concentration	substrate concentration	non-competitive inhibitor	competitive inhibitor
C	substrate concentration	enzyme concentration	competitive inhibitor	non-competitive inhibitor
D	substrate concentration	enzyme concentration	non-competitive inhibitor	competitive inhibitor

12. Centrifugation is a technique that involves the use of centrifugal force for the separation of
- bacteria based on Gram staining.
 - organelles based on their density.
 - biological molecules based on their polarity.
 - chlorophyll pigments based on their ability to absorb light.
13. In eukaryotic cells, primary lysosomes are formed by budding-off from the
- Golgi bodies.
 - nuclear membrane.
 - rough endoplasmic reticulum.
 - smooth endoplasmic reticulum.
14. Which of the following cellular functions is NOT served by plasma membrane?
- Transportation of materials
 - Production of membrane proteins
 - Anchorage cells to their extra-cellular matrix
 - Facilitation of structural linkage between cells
15. The given micrographs (I and II) show the comparison of images of a same specimen obtained from two different microscopes.



Micrograph- I



Micrograph- II

In contrast to micrograph-I, micrograph-II is obtained from a microscope with

	Magnification	Resolution
A	higher	higher
B	poor	poor
C	poor	higher
D	higher	poor

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16. In an experiment, a cell was isolated from an animal's embryo at a four-cell stage and allowed to divide. Even after repeated divisions, this isolated cell fails to develop into a complete animal, showing determinate cleavage pattern.

The embryo used in the above experiment could be of a

- A. frog.
 B. snail.
 C. star fish.
 D. sparrow.
17. The CORRECT sequence of stages (from I to V) in the life cycle of a cnidarian that shows alternation of generation is

	I	II	III	IV	V
A	polyp	medusa	egg	planula larva	polyp
B	polyp	planula larva	egg	medusa	polyp
C	medusa	planula larva	polyp	egg	medusa
D	medusa	polyp	planula larva	egg	medusa

18. Choanocytes are flagellated cells found in the body wall of poriferans (sponges).
 Due to mutation, if the choanocytes becomes dysfunctional then the sponge will be unable to
- A. secrete skeletal spicules.
 B. carryout gaseous exchange.
 C. ingest food particles from water.
 D. maintain the osmotic potential of their body.
19. In phylum mollusca, torsion (twisting of the visceral mass) is a unique feature of class
- A. bivalvia.
 B. myriapoda.
 C. gastropoda.
 D. cephalopoda.
20. Which of the following diseases is caused by a viroid?
- A. Apple fruit crinkle
 B. Tobacco mosaic disease
 C. Scrapie in sheep and goats
 D. Fatal brain diseases in humans

21. The given diagrams illustrate different steps of lytic cycle.



The CORRECT sequence of their occurrence is

- A. II → III → IV → V → I
 - B. II → V → III → IV → I
 - C. III → II → IV → V → I
 - D. III → II → V → IV → I
22. Obligate anaerobes are defined as bacteria which
- A. are killed by free oxygen.
 - B. can live with free oxygen.
 - C. require free nitrogen to grow.
 - D. can live with or without free oxygen.
23. In bacteria, pili are involved in the process of
- A. conjugation.
 - B. transduction.
 - C. transformation.
 - D. endospore formation.
24. In a *Nostoc* filament, hormogonia is formed during
- A. vegetative reproduction.
 - B. dry and hot season.
 - C. nitrogen fixation.
 - D. binary fission.
25. The option that identifies the asexual and sexual spores of oomycetes (water molds) is

	Asexual Spore	Sexual Spore
A	zoospores	oospores
B	microspores	megaspores
C	zoospores	megaspores
D	microspores	oospores

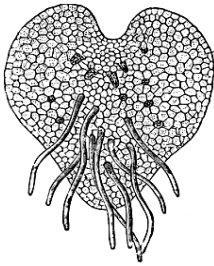
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26. The process through which ciliates reproduce sexually is
- budding.
 - conjugation.
 - fragmentation.
 - transformation.
27. The feature that is similar in both phyla, ascomycota and basidiomycota, of the kingdom fungi is the
- presence of septate hyphae.
 - absence of sexual reproduction.
 - use of conidia for asexual reproduction.
 - occurrence of eight sexual spores in internal sacs.
28. The ploidy of mycelium and zygospore in the life cycle of rhizopus (breadmold) is

	Mycelium	Zygospore
A	haploid	haploid
B	diploid	diploid
C	diploid	haploid
D	haploid	diploid

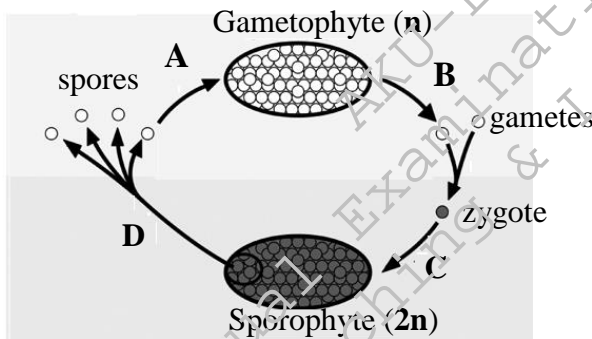
29. Deuteromycetes are also known as 'fungi imperfecti' because
- they produce haploid spores.
 - their mycelium has septate hyphae.
 - they lack a sexual stage in their life cycle.
 - their asexual spores are not produced in a sporangium.
30. Which of the following groups of plants is identified as tracheophytes due to the presence of vascular tissues?
- Anthoserospida
 - Hepaticopsida
 - Lycopsida
 - Bryopsida

31. The diagram below shows a stage of the life cycle of a plant belonging to group pteropsida.

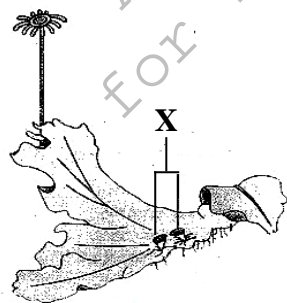


The given stage can be described as the

- A. dominant sporophyte which bears adventitious roots at the lower surface.
 - B. dominant gametophyte which produces diploid generation after fertilisation.
 - C. independent sporophyte which bears adventitious roots at the lower surface.
 - D. independent gametophyte which produces diploid generation after fertilisation.
32. In the given diagram of alternation of generation in plants, the stage where meiosis occurs is labelled as



33. The given diagram shows a *Marchantia* (liverwort) thallus.



The option which matches structure X with its function is

	X	Function
A	rhizoids	aid in water absorption
B	gemma cup	produce eggs and sperms
C	rhizoids	anchor the thallus
D	gemma cup	involve in vegetative reproduction

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34. In flowering plants, four megaspores are produced within the megasporangium but only one of the megaspores is developed into a healthy female gametophyte while the remaining three are aborted.

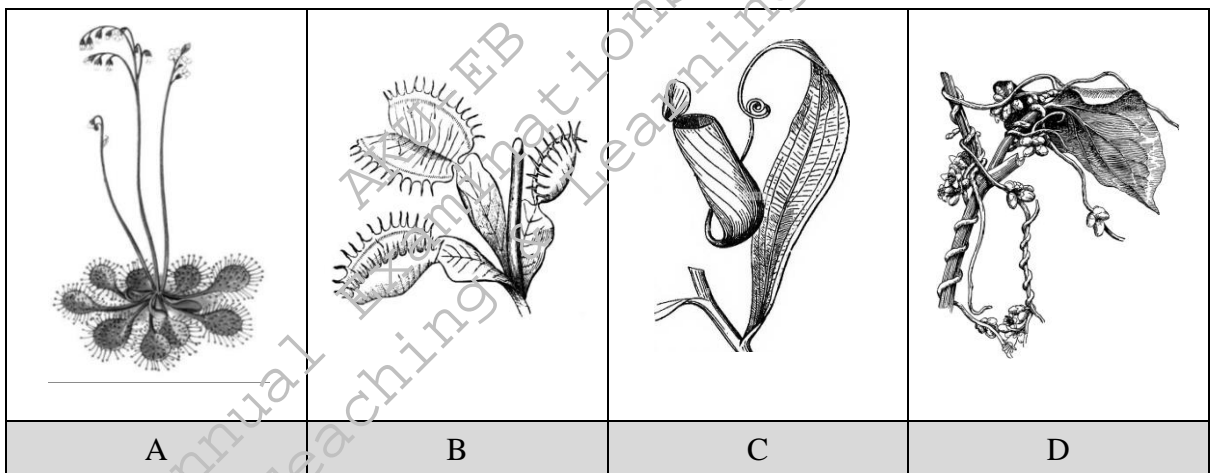
The MAIN reason to adopt this strategy by the plants is to

- A. increase the chances of variations in the four megaspores.
 - B. ensure the maximum protection for the developing megaspores.
 - C. decrease the competition for space and food among the four megaspores.
 - D. make the gametophyte suitable to catch maximum number of pollen grains.
35. In cellular respiration, the reaction that does NOT occur during the formation of acetyl CoA is
- A. decarboxylation.
 - B. reduction of NAD^+ .
 - C. formation of ATP.
 - D. formation of acetyl group.
36. In thylakoid membrane, the reaction centre of the photosystem contains molecules of
- A. carotenoids.
 - B. primary electron acceptor.
 - C. chlorophyll a and chlorophyll b.
 - D. primary electron acceptor and chlorophyll a.
37. In the inner mitochondrial membrane, all of the following oxidation reduction substances take part in respiratory chain EXCEPT
- A. acetyl CoA.
 - B. coenzyme Q.
 - C. molecular oxygen.
 - D. cytochrome enzymes
38. In the Calvin cycle during CO_2 fixation, CO_2 reacts with ribulose biphosphate (RuBP), forming two molecules of three-carbon compound that is
- A. phosphoglycerate (PGA).
 - B. phosphoenolpyruvate (PEP).
 - C. glyceraldehyde-3-phosphate (G3P).
 - D. dihydroxyacetone phosphate (DHAP).
39. Which of the following animals has a digestive tract with single opening that serves as both mouth and anus?
- A. Planaria
 - B. Cockroach
 - C. Earthworm
 - D. Roundworm

40. In the human digestive system, appendix is a finger-like projection that arises from a part of large intestine.

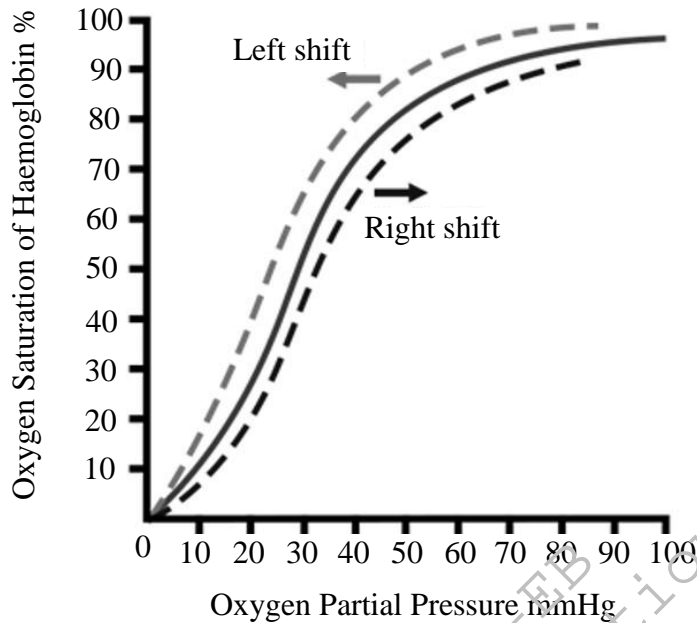
This part of large intestine is identified as

- A. colon.
 - B. ileum.
 - C. rectum.
 - D. caecum.
41. In the human liver, the action which forms bile pigments is the
- A. metabolism of cholesterol.
 - B. degradation of fat-soluble vitamins.
 - C. destruction of white blood cells and platelets.
 - D. breakdown of heme from destroyed red blood cells.
42. Which of the following heterotrophic plants has parasitic mode of nutrition?



43. Skin is kept moist by the secretion of epidermal mucous gland cells and coelomic fluid.
- The given characteristic feature is a common respiratory adaptation in
- A. crab.
 - B. hydra.
 - C. cockroach.
 - D. earthworm.
44. In the human breathing system, the muscles that contract to force the air out of the lungs during exhalation are
- A. muscles of diaphragm.
 - B. internal intercostal muscles.
 - C. external intercostal muscles.
 - D. smooth muscles in tracheal wall.

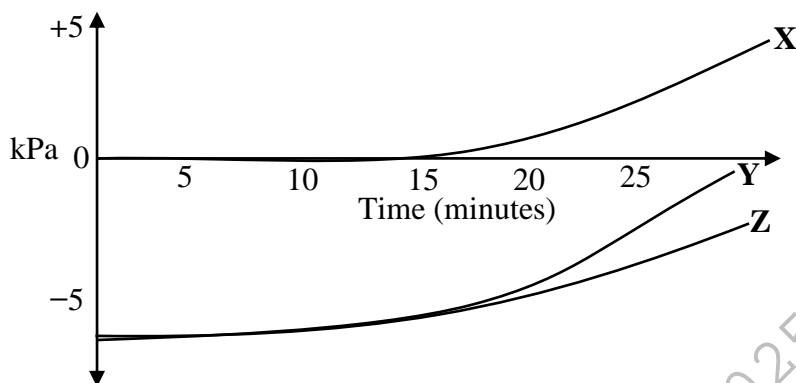
45. With an increase in blood carbon dioxide concentration, the given oxygen dissociation curve shifts to the right side.



Which of the following statements CORRECTLY describes this effect?

- A. Carbon dioxide dissolves in water more rapidly than oxygen and displaces it.
B. Ventilation rate is decreased when the carbon dioxide concentration increases.
C. Increased concentration of H^+ decreases the haemoglobin's affinity for oxygen.
D. Rate of diffusion of carbon dioxide between the alveoli and the blood is more rapid.
46. During daytime in higher plants, the LEAST effective force that pulls up the sap in xylem vessels is
- A. root pressure.
B. transpiration pull.
C. tension between water molecules.
D. cohesion between water molecules.
47. In humans, oedema occurs when the lymphatic system is unable to
- A. produce macrophages.
B. transport dietary lipids.
C. carryout immune responses.
D. drain excess interstitial fluid.

48. The given diagram depicts the pressure potential (Ψ_P), solute potential (Ψ_S) and water potential (Ψ_w) of a plasmolysed plant cell when it is placed in fresh water. After 15 minutes, the potentials (Ψ_P , Ψ_S and Ψ_w) of the solution change.



Based on the information provided, curves X, Y and Z depicts

	X	Y	Z
A	Ψ_w	Ψ_P	Ψ_S
B	Ψ_P	Ψ_S	Ψ_w
C	Ψ_S	Ψ_w	Ψ_P
D	Ψ_P	Ψ_w	Ψ_S

49. In the given table, the option that CORRECTLY differentiates between T-lymphocytes and B-lymphocytes is

	Characteristic	T-Lymphocyte	B-Lymphocyte
A	Types of Active Cells	plasma cells	cytotoxic and helper cells
B	Secretory Product	cytokines	antibodies
C	Site of Maturation	bone marrow	thymus gland
D	Formation of Memory Cells	memory cells are formed	memory cells are not formed

50. Breastfeeding provides neonates (newborns) with natural passive immunity.

The protection offered by this immunisation is usually short-lived, lasting only a few weeks because

- A. the immunity provided is not inherited.
- B. the macrophages are not in their active state.
- C. memory cells are not produced in the baby's body.
- D. the antibodies only act efficiently in the mother's body.

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