

AGA KHAN UNIVERSITY EXAMINATION BOARD

SECONDARY SCHOOL CERTIFICATE

CLASS X

ANNUAL EXAMINATIONS (THEORY) 2024

Biology Paper I

Time: 1 hour 10 minutes Marks: 40

INSTRUCTIONS

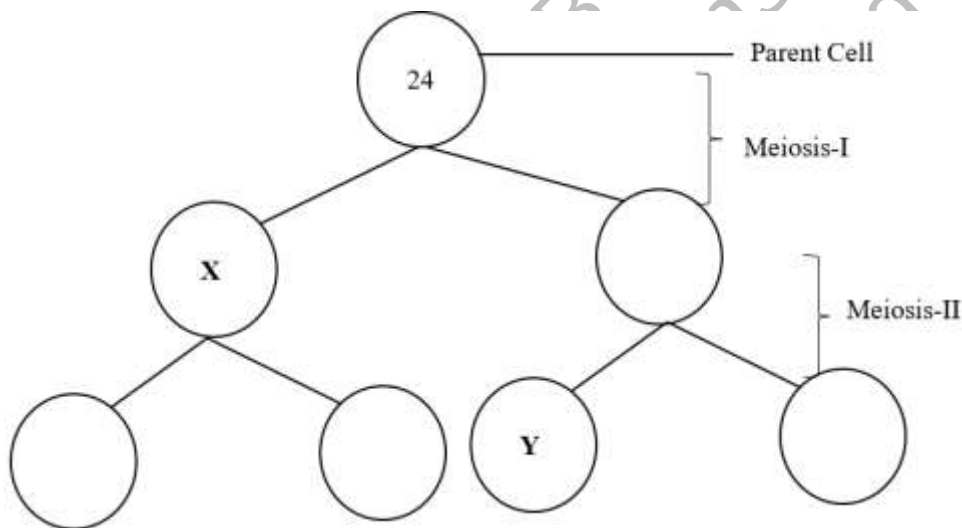
1. Read each question carefully.
2. Answer the questions on the separate answer sheet provided. DO NOT write your answers on the question paper.
3. There are 100 answer numbers on the answer sheet. Use answer numbers 1 to 40 only.
4. In each question, there are four choices A, B, C, D. Choose ONE. On 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) (✓) (D)
	2 (A) (B) (C) (D)
	3 (A) (B) (X) (D)
	4 (A) (B) (ζ) (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 simple calculator if you wish.

1. If sister chromatids fail to separate from each other during anaphase-II of meiosis, then the possible outcome of this situation will be that
 - A. all the daughter cells will receive half number of genes.
 - B. all the daughter cells will receive equal amount of cytoplasm.
 - C. one of the daughter cells will become completely degenerated.
 - D. one of the daughter cells will receive two copies of the same genes.
2. In contrast to prophase-I of meiosis in the animal cell, which of the following events does NOT occur in prophase-I of the plant cell?
 - A. Condensation of chromosomes
 - B. Pairing of homologous chromosomes
 - C. Movement of centrioles towards opposite poles
 - D. Exchange of genetic material between homologous chromosomes
3. The given diagram shows the process of meiosis.



The number of chromosomes in the cells **X** and **Y** is

	X	Y
A	12	12
B	12	6
C	6	6
D	6	12

4. The option that identifies the nature of chromosomes and crossing over between chromatids during meiosis is

	Nature of Chromosomes	Crossing Over Between Chromatids
A	homologous	non-sister
B	homologous	sister
C	non-homologous	non-sister
D	non-homologous	sister

5. Given are the characteristics of a part of the human urinary system.

- Tube-like structure
- Carries urine from kidney to bladder

Based on the given characteristics, the structure is identified as

- A. ureter.
 B. urethra.
 C. collecting duct
 D. proximal convoluted tubule.
6. An individual is diagnosed with malfunctioning of sphincter muscles present in the urinary system.

Which of the following physiological changes will occur in this individual?

- A. Involuntary loss of urine
 B. Appearance of blood cells in urine
 C. Slow rate of glomerular filtrate formation
 D. Inability of proximal convoluted tubule to reabsorb useful materials
7. The similarity between the working of dialysis machine and human kidneys is that both
- A. reabsorb proteins into blood.
 B. remove macromolecules from blood.
 C. maintain the mineral balance in blood.
 D. change oxygenated blood to deoxygenated blood.

8. Which of the following metabolites in urine indicates damaged glomerular membrane in the human nephron?

- A. Urea
 B. Proteins
 C. Glucose
 D. Creatinine

9. The given table shows the distribution of the number of stomata in the leaves of four different plant species (A, B, C and D).

The plant species that represents the aquatic plant (hydrophyte) with floating leaves is

Plant Species	Average Number of Stomata on the	
	Upper Surface of Leaf	Lower Surface of Leaf
A	500	0
B	400	400
C	300	600
D	0	300

10. A CT scan of a patient's brain indicates injured hypothalamus.

The function that would be MAINLY affected due to this injury is the

- A. thinking and learning ability.
 - B. maintenance of body temperature.
 - C. retention of memory for a longer period.
 - D. coordination of body parts during movement.
11. During an ear surgery, the auditory ossicles (incus, malleus and stapes) of a patient got damaged.

Which of the following functions of the patient's ear will be affected by this damage?

- A. Auditory receptors will become dysfunctional
 - B. Eustachian tube will detach from the inner ear
 - C. Sound waves will not pass from the ear drum to the inner ear
 - D. Semicircular canals will not be able to keep the body balanced
12. Read the given statement.

'In the human body, anterior pituitary gland controls the activities of other hormone-secreting glands.'

Which of the following examples CORRECTLY exemplifies the given statement?

- A. Estrogen stimulates the release of eggs from the ovary.
- B. Vasopressin stimulates the water reabsorption by kidneys.
- C. Somatotrophin hormone stimulates adrenal glands to release testosterone.
- D. Thyroid stimulating hormone, stimulates the thyroid gland to secrete thyroxine.

13. In the human brain and spinal cord, grey matter lies in the

	Brain	Spinal Cord
A	outer layer	central portion
B	central portion	outer layer
C	outer layer	outer layer
D	central portion	central portion

14. The pupil of a human eye dilates in dim light, when the

	Circular Muscles	Radial Muscles
A	contract	relax
B	relax	contract
C	contract	contract
D	relax	relax

15. The function of nodes of Ranvier in neurons is to

- A. insulate the nerve fibres.
- B. give rise to cytoplasmic processes.
- C. facilitate rapid conduction of nerve impulse.
- D. provide nourishment to the axon and dendrites.

16. In an insect-pollinated flower, the stamen and stigma are

	Stamen	Stigma
A	strong and short	small and sticky
B	slender and long	large feathery
C	pin-shaped	hanging outside
D	found in groups	coloured and scented

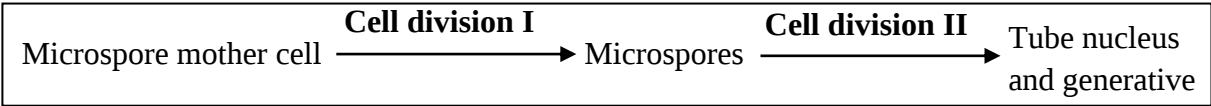
17. In epigeal germination, the cotyledons emerge out of the soil due to the

- I. rapid growth of epicotyl
- II. slower growth of epicotyl
- III. rapid growth of hypocotyl
- IV. slower growth of hypocotyl

- A. I and III.
- B. I and IV.
- C. II and IV.
- D. II and III.

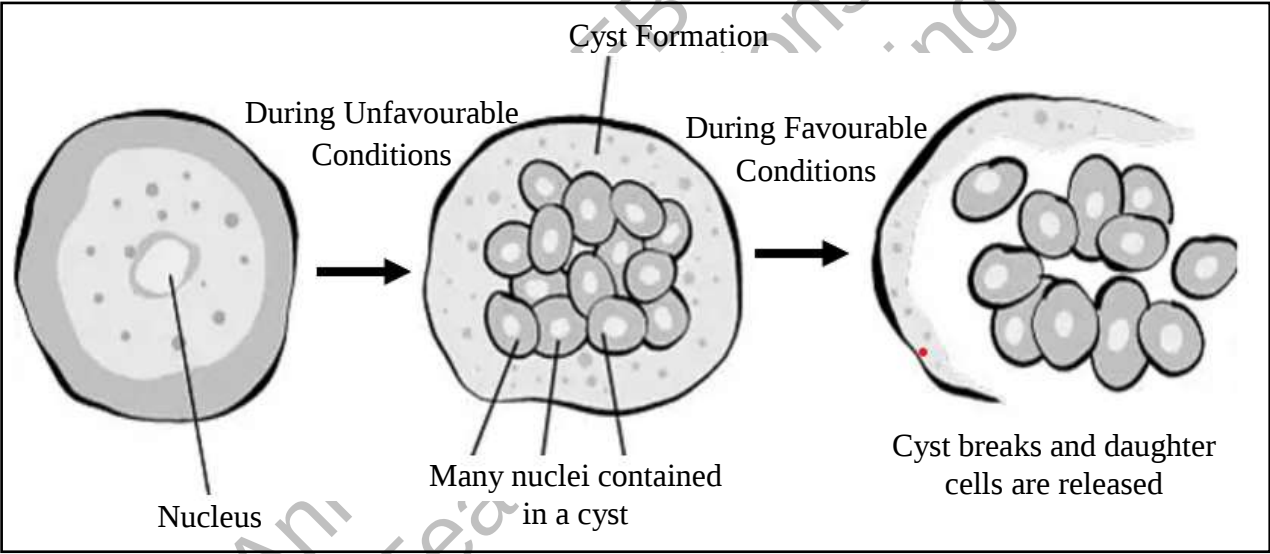
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18. The given sequence of changes takes place in the pollen sac of a flowering plant. The cell divisions **I** and **II** represent



	Cell Division I	Cell Division II
A	mitosis	mitosis
B	mitosis	meiosis
C	meiosis	mitosis
D	meiosis	meiosis

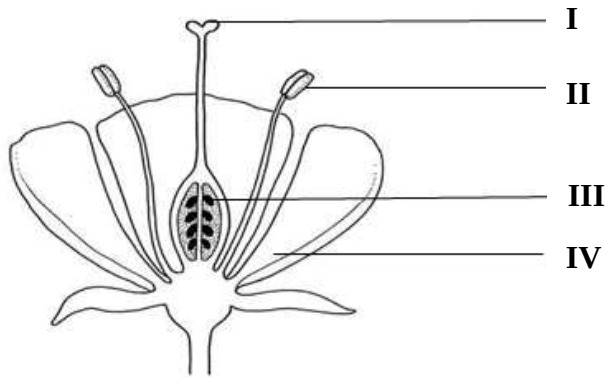
19. The given diagram shows a type of asexual reproduction.



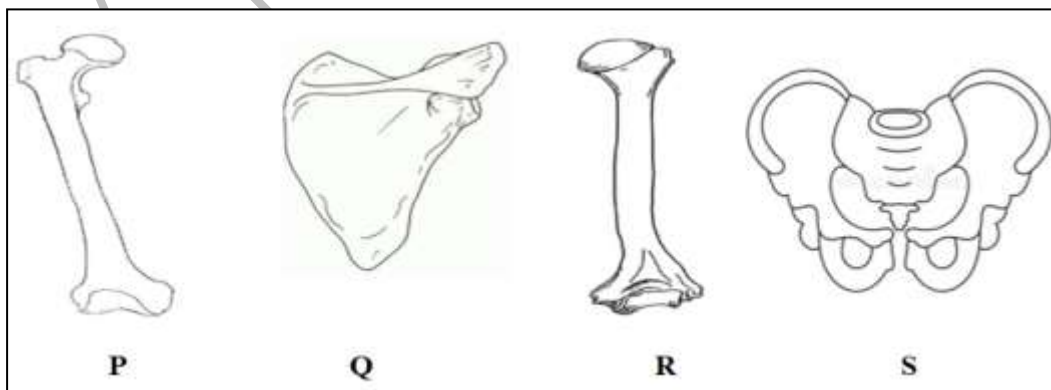
The organism that undergoes this type of reproduction is

- A. yeast.
- B. bacteria.
- C. amoeba.
- D. plasmodium.

20. In pollination, pollens transfer from the labelled parts



- A. II to I.
B. I to III.
C. II to IV.
D. III to IV.
21. A person is taken to emergency due to a dislocated shoulder. The dislocated part would be
- A. ulna.
B. femur.
C. radius.
D. humerus.
22. Support and movement in epiglottis, larynx and trachea are brought about by the
- A. cartilage.
B. ligament.
C. spongy bone.
D. compact bone.
23. The given diagrams represent different bones of human skeleton.

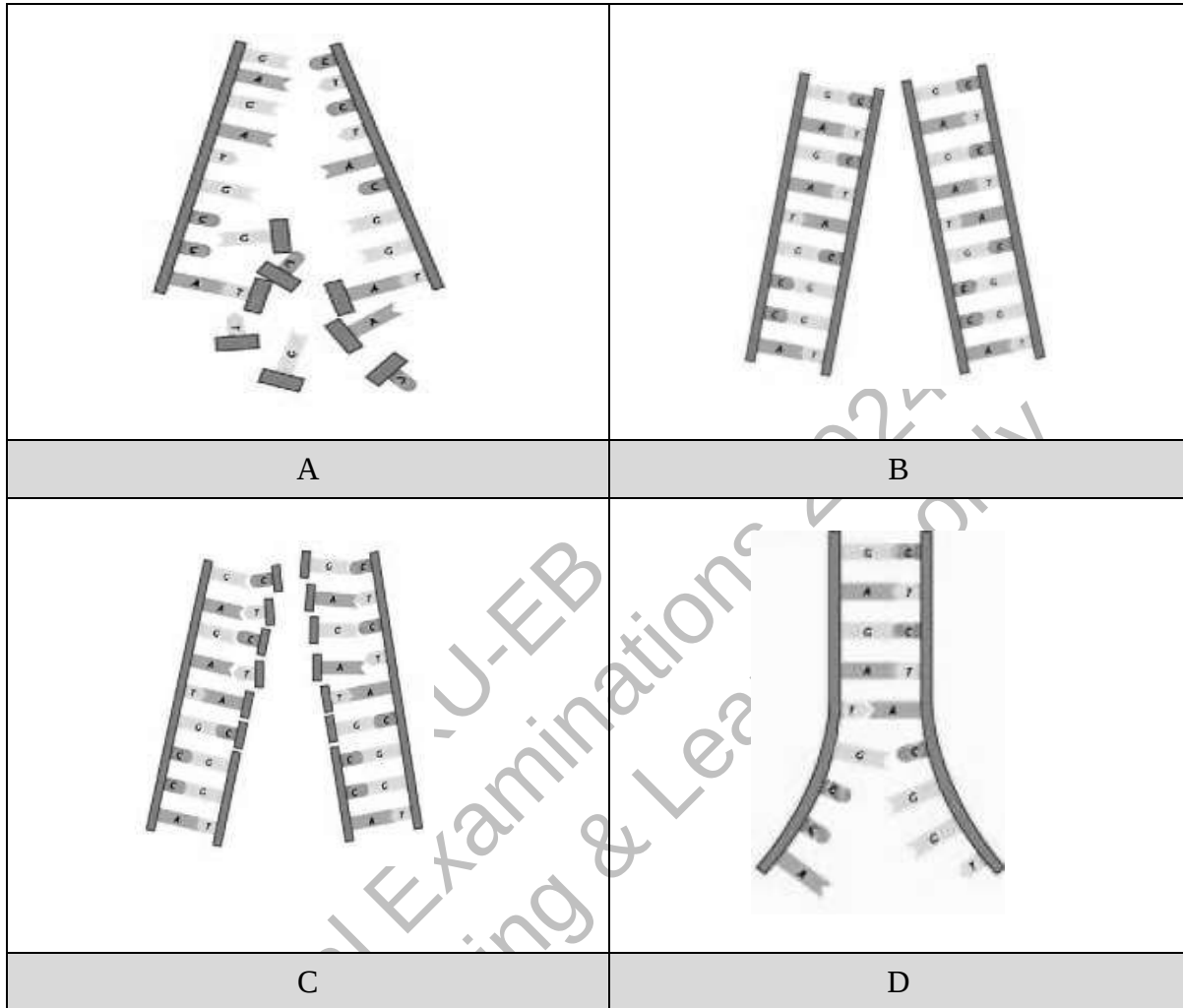


The bones which form ball and socket joint with pelvic girdle and femur are labelled as

- A. P and S.
B. Q and S.
C. P and R.
D. Q and R.

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24. The image that depicts the step of uncoiling during DNA replication is



25. The cellular structure that contains DNA, histones, nucleosomes, and other proteins is

- A. gene.
- B. nucleotide.
- C. chromosome.
- D. mitotic apparatus.

26. In a dihybrid cross, $RrYy \times RrYy$, the fraction of offspring that are expected to be heterozygous for both traits is

- A. $1/16$
- B. $2/16$
- C. $3/16$
- D. $4/16$

27. The given table shows the result obtained in an experiment of breeding cattle with unknown genotype for their coat colour.

(**Note:** The allele for black hair coat colour is completely dominant over the allele for red hair coat colour and these are represented as **B** and **b**, respectively.)

Cross	Parents		Offspring	
	Cow	Bull	% of Black Hair Coat Colour	% of Red Hair Coat Colour
I	Black	Red	50	50
II	Black	Black	75	25
III	Black	Red	100	0

If the parental black cow from cross **III** is bred with the parental black bull from cross **II**, then which of the following would be TRUE for the genotypes of their offspring?

	Heterozygous Offspring	Homozygous Offspring
A	0	100
B	25	75
C	50	50
D	75	25

28. In pea plants, the allele (L) for long stem is dominant over the allele (l) for short stem. Similarly, the allele (P) for the purple flower colour is dominant over the allele (p) for white flower colour.

Long Purple	Long White	Short Purple	Short White
9	3	3	1

The genetic cross that is expected to produce phenotypic ratio as given in the table is

- A. LIPP x llpp
- B. LLPP x LlPp
- C. LlPp x LlPp
- D. LLpp x llPP

29. In pea plants, the allele for yellow seed colour (Y) is dominant over the allele for green seed colour (y).

The option that CORRECTLY represents the genotype and phenotype of a heterozygous offspring is

	Genotype	Phenotype
A	Yy	yellow
B	yy	green
C	yy	yellow
D	Yy	green

30. The following table shows the relative biomass of organisms (X, Y and Z).

	Relative Biomass in Gigatons (GT) of Carbon (C)
X	450
Y	1
Z	0.002

Based on the given biomass, the organisms X, Y and Z can be

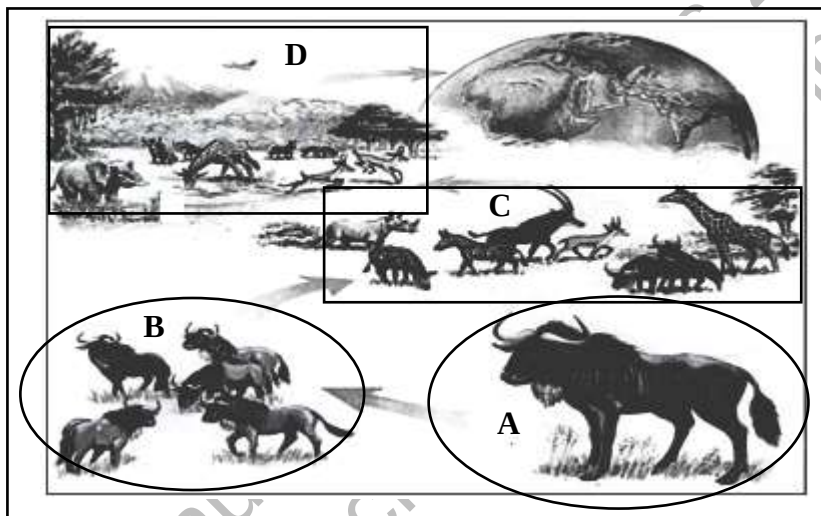
	X	Y	Z
A	wild bird	plant	insect
B	insect	plant	wild bird
C	plant	wild bird	insect
D	plant	insect	wild bird

31. Giraffe and koala live in the same forest and feed on grass.

The ecological interaction between giraffe and koala is

- A. predation.
- B. parasitism.
- C. competition.
- D. commensalism

32. All of the following actions lead to water pollution EXCEPT
- A. flushing harmful chemicals in the toilets.
 - B. disposing extra oil from cooking into kitchen sink.
 - C. making composting piles of vegetables and scrapes.
 - D. using pesticides in water bodies to kill harmful organisms.
33. Based on the mode of nutrition; the primary consumers in a food web are
- A. detritivores.
 - B. heterotrophs.
 - C. photosynthetic autotrophs.
 - D. chemosynthetic autotrophs.
34. In the given diagram of biological level of organisation, the population level is labelled as



35. Cavities that appear in dough during bread making is due to the
- A. production of oxygen.
 - B. evaporation of alcohol.
 - C. release of carbon dioxide.
 - D. liberation of water vapours.
36. Genetic engineering is NOT applied for the
- A. treatment of genetic diseases.
 - B. production of insulin in diabetes.
 - C. treatment of cancer by radiations.
 - D. production of insect resistant plants.
37. The BEST sources of single cell proteins are
- A. fish and fungi.
 - B. poultry and fish.
 - C. fungi and bacteria.
 - D. bacteria and poultry.

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38. Penicillin is a drug obtained from a/ an

- A. plant.
- B. animal.
- C. fungus.
- D. bacterium.

39. Which of the following options CORRECTLY identifies the mode of action of painkillers?

	Conduction of Nerve Impulse	Sensory Perception
A	Blocked	Alters
B	Unblocked	Alters
C	Blocked	Not changed
D	Unblocked	Not changed

40. A person is addicted to heroin and establishes tolerance to it.

Which of the following statements describes 'tolerance' in the given situation?

- A. The addicted person's liver is unable to detoxify the drug.
- B. The addicted person is on higher risk to develop lung cancer.
- C. The addicted person needs to take more of the drug to achieve same effect.
- D. The addicted person experience withdrawal symptoms upon quitting the drug.

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