AGA KHAN UNIVERSITY EXAMINATION BOARD

HIGHER SECONDARY SCHOOL CERTIFICATE

CLASS XII

ANNUAL EXAMINATIONS (THEORY) 2023

Biology Paper II

Time: 1 hour 30 minutes Marks: 35

INSTRUCTIONS

Please read the following instructions carefully.

1. Check your name and school information. Sign if it is accurate.

I agree that this is my name and school. **Candidate's Signature**

RUBRIC

2. There are ELEVEN questions. Answer ALL questions. Questions 10 and 11 offer TWO choices. Attempt any ONE choice from each.

3. When answering the questions:

   Read each question carefully.
   Use a black pointer to write your answers. DO NOT write your answers in pencil.
   Use a black pencil for diagrams. DO NOT use coloured pencils.
   DO NOT use staples, paper clips, glue, correcting fluid or ink erasers.
   Complete your answer in the allocated space only. DO NOT write outside the answer box.

4. The marks for the questions are shown in brackets ( ).

Q.1. (Total 3 Marks)

Describe any THREE thermoregulatory adaptations in plants to high temperature.

Q.2. (Total 2 Marks)

Exemplify any ONE joint of the human skeleton for each of the given models of joint movement.

Model of Joint Movement		
Example of Joint in Human Skeleton		

Q.3. (Total 2 Marks)

How does nicotine (a stimulant drug) affect synaptic transmission in humans?

Q.4. (Total 2 Marks)

Consider the given cross in *Drosophila* (Fruit flies).

Phenotypes of Parents	Grey Body, Long Wings	×	Black Body, Short Wings
Genotypes of Parents	GGNN		ggnn
Genotypes of Offspring	GgNn		
Phenotypes of Offspring	All Grey Body, Long Wings		

The resulted offspring (GgNn) were then crossed with flies homozygous for black body and short wings (ggnn). The obtained results are shown in the given table.

GgNn Crosses with ggnn				
	Grey Body and Long Wings	**Black Body and Short Wings**	**Grey Body and Short Wings**	**Black Body and Long Wings**
Number of Offspring	975	963	186	194

a. Why are the parental type offspring [(grey body, long wings) and (black body, short wings)] produced more in number? (1 Mark)

b. Why are the recombinant offspring [(grey body, short wings) and (black body, long wings)] produced less in number? (1 Mark)

Q.5. (Total 2 Marks)

Describe any TWO points of significances of double fertilisation in angiosperms.

Q.6. (Total 2 Marks)

How is the primitive ridge formed during the development of chick's embryo?

Q.7. (Total 2 Marks)

Phenylketonuria is a genetic disease caused by gene mutation.

In the human body, how does this gene mutation cause changes in the metabolism of body cells?

Q.8. (Total 3 Marks)

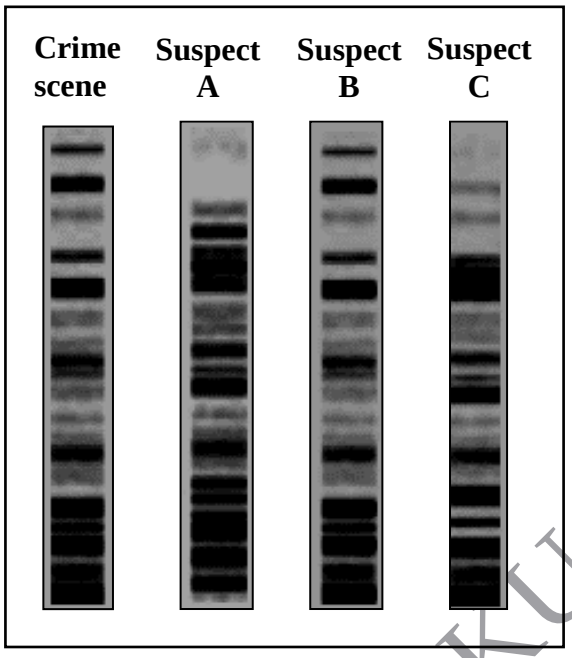
The given table shows the number of chromosomes and the mass of DNA in different nuclei. All the nuclei come from the same animal.

Complete the missing information in the given table.

Nucleus	Number of Chromosomes	Mass of DNA in Each Nucleus/ Arbitrary Units
At Prophase of Mitosis	26	
At Telophase of Mitosis		30
From a Sperm Cell		15

Q.9. (Total 3 Marks)

Given are the DNA fingerprints of a sample of DNA collected from a crime scene which belongs to three suspects, **A**, **B** and **C**.



a. Which feature of the DNA fingerprint would lead to the identification of suspect **B** as being present at the site of the crime? (1 Mark)

_____

_____

b. DNA at crime scenes is often found in very small masses.

Mention the technique that amplifies the DNA to enable their analysis. (1 Mark)

_____

_____

c. Which enzyme is used in the technique mentioned in part b? (1 Mark)

_____

_____

Q.10. (Total 7 Marks)

EITHER

a.

i. Describe any FOUR functions of liver other than bile production and deamination in the human body. (4 Marks)

ii. Identify any THREE substances required to initiate the urea cycle in liver. (3 Marks)

OR

b. Explain the cross-bridge formation between actin and myosin during muscular contraction when a muscle fibre is activated by acetyl choline in the human body. (7 Marks)

Q.11. (Total 7 Marks)

EITHER

a. The given diagram depicts a stressful condition where a dog is running after an officer. After running for 20 minutes, the officer is rescued and hence, he gets out of this stressful condition.

i. Describe the effects of stimulations of sympathetic nervous system on the liver, cardiac muscles, pancreas and adrenal medulla of the officer. (4 Marks)

ii. Describe any THREE roles of parasympathetic nervous system in the relaxed situation when the officer is rescued. (3 Marks)

OR

b. A 28-year-old female delivered a baby boy. On examination, the newborn was slow in crying and suffered from jaundice and haemolytic anaemia. The following box shows the history of the patient.

History of the Patient

- Mother is Rh^- and the father is Rh^+
- Second pregnancy
- Rhogam (Rh antibodies) was NOT administered to the mother after the first delivery

i. Identify the medical condition of the child. (1 Mark)

ii. Explain the cause of the medical condition identified in part 'i' in THREE points.

(3 Marks)

iii. Why would rhogam (Rh antibodies) have been beneficial if it was administered after the first delivery? (3 Marks)

END OF PAPER

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