AGA KHAN UNIVERSITY EXAMINATION BOARD

HIGHER SECONDARY SCHOOL CERTIFICATE

CLASS XII EXAMINATION

APRIL/ MAY 2018

Biology Paper II

Time: 2 hours 20 minutes Marks: 55

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**

2. RUBRIC. 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 4 Marks)

The given diagrams represent two types of foxes. Fox **X** lives in warm climatic conditions while fox **Y** lives in cold climatic conditions.

Fox X

Fox Y

a. Identify any TWO features of fox **X** adapted to warm climatic conditions. (2 Marks)

_____

_____

_____

_____

b. How do the features identified in part **'a'** adapted to warm climatic conditions? (2 Marks)

_____

_____

_____

_____

_____

_____

Q.2. (Total 4 Marks)

a. The following table shows the approximate concentration of glucose and urea in the renal artery and the renal vein.

	Concentration in the Renal Artery (mg/dL)	Concentration in the Renal Vein (mg/dL)
Glucose	70	70
Urea	20	10

Give reason for

i. equal concentration of glucose in the renal artery and the renal vein. (1 Mark)

ii. less concentration of urea in the renal vein as compared to the renal artery. (1 Mark)

b. Adnan is diagnosed with hyper-secretion of glucocorticoids in his body.

Mention TWO physiological effects of hyper-secretion of glucocorticoids on Adnan's body. (2 Marks)

Q.3. (Total 4 Marks)

a. The given diagrams show two forms of chromatin present in the nucleus of eukaryotes.

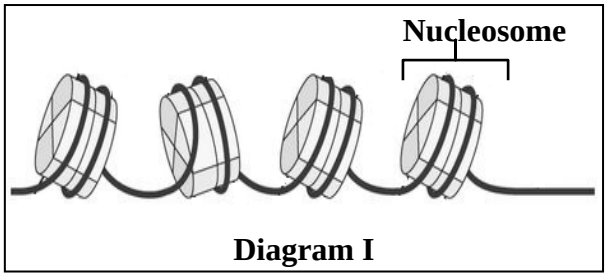


Diagram I

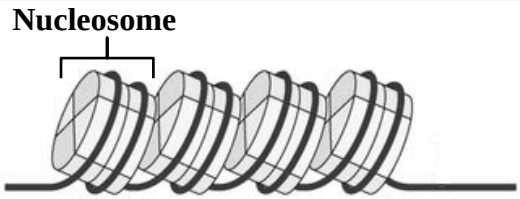


Diagram II

Which form of chromatin is transcriptionally more active (can be expressed) and why? (2 Marks)

b. While travelling from nucleus to the cytoplasm, newly synthesised messenger ribonucleic acid (mRNA) in eukaryotic cell encounters different degrading enzymes.

How is this mRNA modified to protect itself from the degrading enzymes? (2 Marks)

Q.4. (Total 5 Marks)

a. When nervous stimulation at neuromuscular junction stops,

i. what will be the action of tropomyosin molecules? (1 Mark)

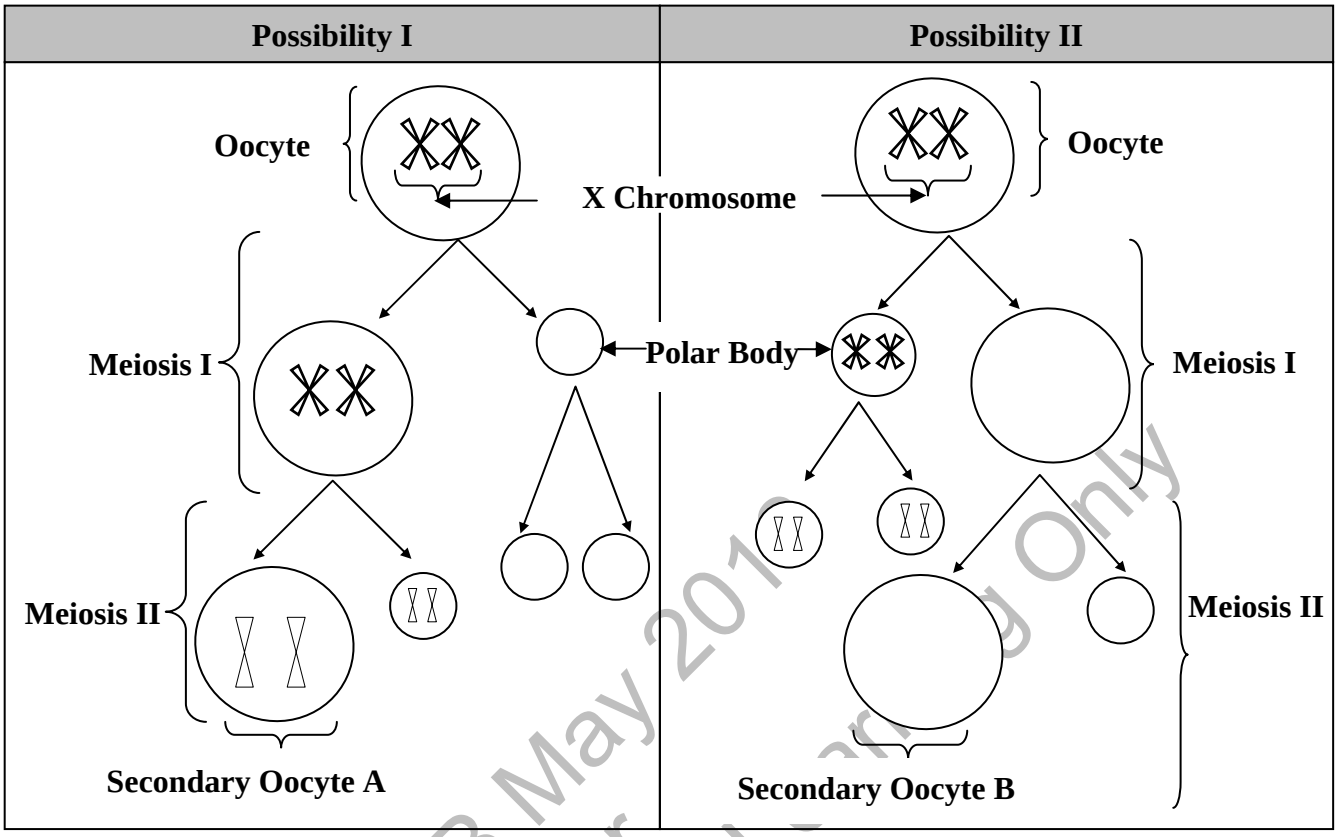
ii. what will be the result of action of tropomyosin molecules on the myosin heads? (1 Mark)

iii. which organelle will store calcium ions? (1 Mark)

b. Which part of a plant contains intercalary meristematic tissues? What is the function of intercalary meristematic tissues? (2 Marks)

Q.5. (Total 5 Marks)

The given diagram illustrates two possibilities of non-disjunction in oogenesis.



a. What would be the distribution of X chromosomes at meiosis I, if meiosis I takes place normally? (2 Marks)

b. Which types of syndrome will appear in the offspring if a sperm having

i. Y chromosome fertilises secondary oocyte **A** (1 Mark)

ii. X chromosome fertilises secondary oocyte **B**? (1 Mark)

c. What will be the gender of the offspring produced as a result of the fusion of a sperm having X chromosome with the secondary oocyte **B**? (1 Mark)

Q.6. (Total 5 Marks)

a. The given dihybrid cross of pea plant shows the appearance of 50 percent of parental type and 50 percent recombinant type offspring.

Parents:	Round Yellow	×	Wrinkled Green	
	RrYy	×	rryy	
Gametes:	RY, Ry, rY, ry	×	ry	
Filial Generation:	RrYy Round Yellow	Rryy Round Green	rrYy Wrinkled Yellow	rryy Wrinkled Green

i. State the Mendel's law which supports the appearance of recombinant type offspring. (1 Mark)

ii. Describe the application of the stated Mendel's law in the given situation. (2 Marks)

b. Red coat colour in cattle is codominant with white coat colour. As a result of cross between these two different coloured cattle, all offspring produced have roan colour.

Determine the genotypes of offspring that will be produced as a result of cross between two roan coat coloured cattle. (2 Marks)

Q.7. (Total 5 Marks)

a.

- Retrovirus
- RNA version of cloned normal gene
- Culture of stem cells from bone marrow having defective gene

Using the given information, outline the process of gene therapy. (3 Marks)

b.

i. What is the genetic basis of cystic fibrosis? (1 Mark)

ii. How are respiratory passages affected in a patient suffering from cystic fibrosis? (1 Mark)

Q.8. (Total 4 Marks)

With reference to Darwin's theory of evolution, describe the following:

a. descent with modification (2 Marks)

b. natural selection (2 Marks)

Q.9. (Total 4 Marks)

a. Name the coniferous forests that are located at:

i. high altitude (1 Mark)

_____

ii. high latitude (1 Mark)

_____

b. How is flora of the coniferous forests adapted to the longer and colder winters? (1 Mark)

_____

_____

c. Name any TWO regions where coniferous forests are located in Pakistan. (1 Mark)

_____

_____

Q.10. (Total 7 Marks)

EITHER

a.

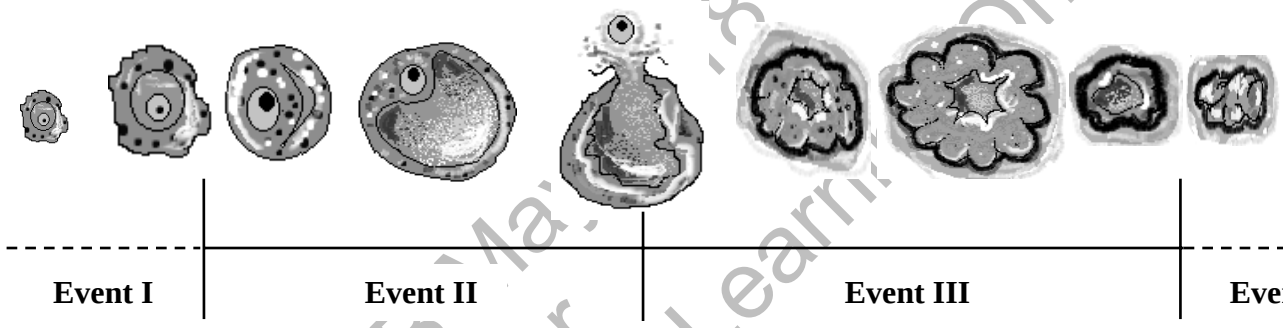
i. What is the site of formation of antidiuretic hormone (ADH)? (1 Mark)

ii. Describe any ONE function and any ONE disorder caused by the hypo-secretion of: (6 Marks)

- Somatotrophin hormone (STH)
- Gonadotrophic hormone
- Antidiuretic hormone

OR

b. The given diagram shows events of the ovarian cycle in human female.



i. Which phase of uterine cycle occurs simultaneously with each event of the ovarian cycle mentioned above? (3 Marks)

Ovarian Cycle	Uterine Cycle
Event I	
Event II	
Event III	

ii. Describe the hormonal effect of events **I** and **III** of ovarian cycle on the thickness of the endometrium. (4 Marks)

Q.11. (Total 8 Marks)

EITHER

a. Describe any TWO examples of positive ecological interaction and any TWO examples of negative ecological interaction in an ecosystem. (8 Marks)

OR

b.

i. Describe the phenomena of greenhouse effect and acid rain considering methane and sulphur dioxide as their main sources respectively. (4 Marks)

ii. Mention any TWO effects of global warming and any TWO effects of acid rain. (4 Marks)

END OF PAPER

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