



ཤེས་རིག་རྒྱན་ལག་།
སྤྱི་གསལ་འཕེལ་རིམ་སློབ་འཁྲབ་སྡེ་ཁག་།



MOTITHANG HIGHER SECONDARY SCHOOL
THIMPHU THROMDE

“Every child is **inspired** to learn and **empowered** with **wisdom** to excel in life”

MID TERM EXAMINATIONS, 2019

BIOLOGY

Reading Time: 15 mins

Class: XII

Writing Time: 3 hours

Date:

Full marks: 100

Name:

Invigilators initial

Roll No.**Class:** **Sec:**

Questions	<i>PART I</i>					<i>PART II</i>							
	Q1a	Q1b	Q1c	Q1d	Q1e	Q2	Q3	Q4	Q5	Q6	Q7	Q8	TOTAL
Full Marks	15	5	5	5	10	10	10	10	10	10	10	10	
Award													
Teacher's initial													
Total Marks													

For Teacher's use only

Awarded		
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READ THE FOLLOWING DIRECTIONS CAREFULLY:

1. Do **not** write for the first **15 minutes**. This time is to be spent reading the questions
2. After having read the questions, you will be given **three hours** to answer all questions.
3. This paper comprises of **TWO PARTS**, PART I is compulsory and **SIX** questions should be answered for PART II, out of seven questions.
4. Draw well labelled diagrams wherever necessary. [Use pencil for drawing and labelling]
5. Read the directions to each question carefully and write **all** your answers in the answer sheets provided.
6. Remember to write **quickly but neatly**.

PART I (40 marks) Answer all questions.

Question 1.

(a) For each question, there are four alternatives A, B, C and D. Choose the correct alternative and circle it. Do not circle more than ONE alternative. If there are more than one circled, NO score will be awarded. [15]

1. Prostaglandins within the seminal fluid are thought to:
 - A. cause ovulation
 - B. decrease sperm motility
 - C. stimulate muscular contractions within the uterus
 - D. stimulate the vestibular (Bartholin's) glands to produce mucus.
2. The hormone secreted by the pituitary to start the ovulation process is _____.
 - A. FSH
 - B. Luteinizing hormone
 - C. Oestrogen
 - D. Progesterone
3. Why are C4 plants able to photosynthesize with no apparent photorespiration? .
 - A. They use PEP carboxylase to initially fix CO₂.
 - B. They are adapted to cold, wet climates.
 - C. They conserve water more efficiently
 - D. They do not participate in the Calvin cycle
4. CAM plants keep stomata closed in daytime, thus reducing loss of water. They can do this because they
 - A. Fix CO₂ into organic acids during the night.
 - B. Fix CO₂ into sugars in the bundle-sheath cells.
 - C. Fix CO₂ into pyruvate in the mesophyll cells.
 - D. Use the enzyme phosphofructokinase, which outcompetes rubisco for CO₂.

5. Urea will move freely through a non-living dialysis membrane. Its method of moving through the membrane must therefore be;
 - A. Simple diffusion
 - B. Facilitated diffusion
 - C. Active transport
 - D. Osmosis

6. The ring of waxy material that borders the endodermal cells on four sides is known as the
 - A. Plasmodesmata
 - B. Casparian strips
 - C. Cotyledons
 - D. Pericycle

7. Which of the following cells during gametogenesis is normally diploid?
 - A. Secondary polar body
 - B. Primary polar body
 - C. Spermatid
 - D. Spermatogonia

8. Which of the following repairs nicked DNA formed by phosphodiester bonds between adjacent nucleotides?
 - A. Helicase
 - B. DNA gyrase
 - C. Topoisomerase
 - D. DNA ligase

9. Why is an RNA primer necessary for DNA replication?
 - A. The RNA primer is necessary for the activity of DNA ligase.
 - B. The RNA primer creates the 5' and 3' ends of the strand.
 - C. DNA polymerase can only add nucleotides to RNA molecules.
 - D. DNA polymerase can only add nucleotides to an existing strand.

10. What happens after the DNA polymerase laying down a new DNA strand meets up with the RNA primer of a preceding Okazaki fragment?
 - A. The other strand is then replicated in the 3 to 5' direction.
 - B. The DNA polymerase reverses direction and performs error checking.
 - C. DNA ligase couples the two fragments together.
 - D. The RNA primer is removed and is replaced by DNA.

11. Imagine a life form in which the orientation of the strands in the DNA double helix was parallel rather than antiparallel. This life form uses a DNA polymerase with similar properties to that in normal eukaryotic organisms, thus, we would expect that:
 - A. DNA replication would be much slower than in normal eukaryotes.
 - B. DNA replication would occur in the 3' to 5' direction on one strand and in a 5' to 3' direction on the other.
 - C. DNA replication would only occur toward one end of a replication bubble.
 - D. The DNA polymerase would be unable to carry out error-checking.

12. A microbody which is commonly found in the cells of germinating oil seeds are

- A. Peroxisome
- B. Glycoxysome
- C. Spherosomes
- D. Lysosomes

13. The tails of the phospholipids of the plasma membrane are composed of.....and are.....

- A. phosphate groups; hydrophobic
- B. fatty acid groups; hydrophilic
- C. phosphate groups; hydrophilic
- D. fatty acid groups; hydrophobic

14. A team of researchers is writing a grant for a microscope to use in their research on the external structures on the dorsal surface of a spider mite. The specific region on the mite's back seems to be the habitat of an even smaller mite. These mites are extremely tiny and only one microscope with very high magnification can be purchased. Based on the information given, which type of microscope would you suggest?

- A. transmission electron microscope
- B. scanning electron microscope
- C. compound light microscope
- D. dissecting microscope

15. You are required to draw blood from a patient and to keep it in a test tube for analysis of blood corpuscles and plasma. You are also provided with the following four types of test tubes. Which of these will you not use for the purpose?

- A. test tube containing calcium bicarbonate
- B. chilled test tube
- C. test tube containing heparin
- D. test tube containing sodium oxalate.

(b) Fill-in-the-blanks with appropriate word/s. [0.5x10=5]

- i. During an..... muscle contraction, a muscle develops contractile force but does not change in length.
- ii. The acidity of the stomach deactivates..... but activates protein digesting enzymes.
- iii. Fats are transported in the lymph and blood in the form of droplets called
- iv. Sciophytes are the plants that requireintensity of light for optimum photosynthesis to take place.
- v. Glycolysis decomposes glucose to two molecules of as its end product.
- vi. The resolution power of a microscope can be determined by usingequation.
- vii. Growth of the primary cell wall by the addition of wall material from within the existing wall is called.....
- viii. Endocrine cells in the pyloric stomach produce the hormone,, which stimulates the secretion of gastric juice from gastric glands.
- ix. Temporary suspension of impulse transmission at the synapse due to repeated transmission of nerve impulses is called
- x. The process by which glucose is formed from non-carbohydrate is called.....

(c) Match each item of Column A with the most appropriate item of Column B. Rewrite the correct pairs by writing the number and the corresponding alphabet in the spaces provided.

[5]

Column A	Column B
i. Myelin sheath	a. prokaryotes
ii. Isobilateral leaf	b. Exogenous origin
iii. Multinucleated cell	c. Oxaloacetic acid
iv. Electron acceptor	d. Bulliform cells
v. Action potential	e. Inner walls of mitochondria
vi. Lateral branches	f. Calvin cycle
vii. mesosomes	g. Schwann cells
viii. RuBP	h. Coenocytes
ix. Electron transport chain	i. Interior of neuron is electro negative
x. C ₄ cycle	j. Cytochrome C
	k. Nodes of ranvier

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(d) Correct the following statement by changing the words given in BOLD. Rewrite ONLY the correct answer. DO NOT copy the whole sentence. [5]

- i. In spermatogenesis, reduction division of chromosome occurs during conversion of primary spermatocytes to SPERMATOOZA.
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- ii. ENDOTHELIAL CELLS have minute spaces called slit pores for filtration of blood into Bowman's capsule.
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- iii. PRIMARY CELL WALL is elastic and capable of expansion.
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- iv. RED muscles soon get fatigued and are present in limbs.
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- v. Rapid spasms in the muscle due to lesser MAGNESIUM IONS in the body fluid cause tetany.
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- vi. TRYPSIN coagulates the milk protein casein.
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- vii. Transfer of electrons over Electron Transport Chain is facilitated by the enzyme OXIDOREDUCTASE.
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- viii. UNIPOLAR neurons occur in the retina of the eye.
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- ix. REACTION CENTRE of a light harvesting unit is formed of several chlorophyll a molecules.
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- x. Crossing over between non-sister chromatids of homologous chromosomes occurs during ZYGOTENE stage.
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(e) I. Give suitable reasons for the following: [3]

a. Flight muscles of birds have red muscle fibres.

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b. Growth of long bones are bidirectional.

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c. Meiosis produces four genetically dissimilar cells.

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II. Define the following terms: [2]

a. Synaptonemal Complex-

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b. Oxidative phosphorylation.

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III. Differentiate between the following pairs. [2]

a. PS I	PS II
b. Leading strand	Lagging strand

IV. Answer the following questions. [3]

- a. Glycolysis can be divided into two parts: the energy investment phase and energy pay off phase. Explain.

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- b. Which are the two most efficient colours for photosynthesis?

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- c. What triggers an action potential? What happens to the membrane to trigger an action potential?

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PART II (60 marks)
Answer any six questions

Question 2

(a) What are the two key features of meiosis that contribute to genetic variations? [2]

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(b) When meiosis occur in females, the cytoplasm is not divided equally among the resulting four cells. Explain why. [2]

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(c) Menstrual cycles are absent during pregnancy. Why? [1]

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(d) What is the significance of stepwise release of energy in respiration? [1]

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(e) Name indicating their functions, four additional enzymes, other than DNA polymerase that are involved in the replication of DNA. [4]

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Question 3

(a) Corpus luteum in pregnancy has a long life. However, if fertilization does not take place it remains active only for 10-12 days. Why? [2]

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(b) Placenta has endocrine function. Does it have other functions? Explain. [2]

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(c) What are the events taking place in the ovary and uterus during follicular phase of the menstrual cycle. [2]

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(d) Briefly describe the relationship between the nucleus and ribosomes. Your answer should include the following key terms: mRNA, tRNA, and protein synthesis. [3]

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(e) A friend complains that he is always thirsty, and is producing large quantities of very dilute urine. How would you explain these symptoms? [1]

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Question 4

(a) How do cells capture the energy released by cellular respiration? [1]

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(b) Explain the mechanism of absorption of the following food substrates: [3]

- (i) Carbohydrates (ii) Amino acids (iii) Fats

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(c) Describe the steps involved in cell fractionation? [2]

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(d) The genetic code is often described as being redundant but not ambiguous. Briefly explain what this means. [2]

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(e) List the key steps of initiation in translation [2]

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Question 5

(a) Why do the endodermal cells of dicot roots possess casparian strips in their radial and transverse walls? [2]

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(b) During muscle contraction a change in position of the myosin head causes the actin filaments to move.

i. Describe the part played by each of the following in muscle contraction. [2]

- a. calcium ions
- b. ATP

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ii. Explain why muscle fibers contract, but do not lengthen? [1]

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c. Calcium ions enter neurons through presynaptic membranes when action potentials arrive.

i. Explain how these ions enter the neurons. [1]

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ii. Describe the events that follow the entry of these ions until the depolarization of the post synaptic membrane. [2]

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d. What structural differences do you find in a sunflower and a maize stem on the basis of their vascular bundles? [2]

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Question 6

(a) Explain how the products of light dependent reactions are necessary to drive Calvin cycle. [3]

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(b) Why Krebs cycle is also called the ‘final common pathway’ of the breaking down of organic compounds? [2]

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(c) Explain the process of urea formation from ammonia in the human liver cells. [3]

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(d) Write a brief report on the dangers associated with cocaine use and the mechanism by which it produces its effect. [2]

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Question 7

(a) Explain ultrafiltration occurring in the Malpighian corpuscle of the nephron along with diagrammatic representation [3]

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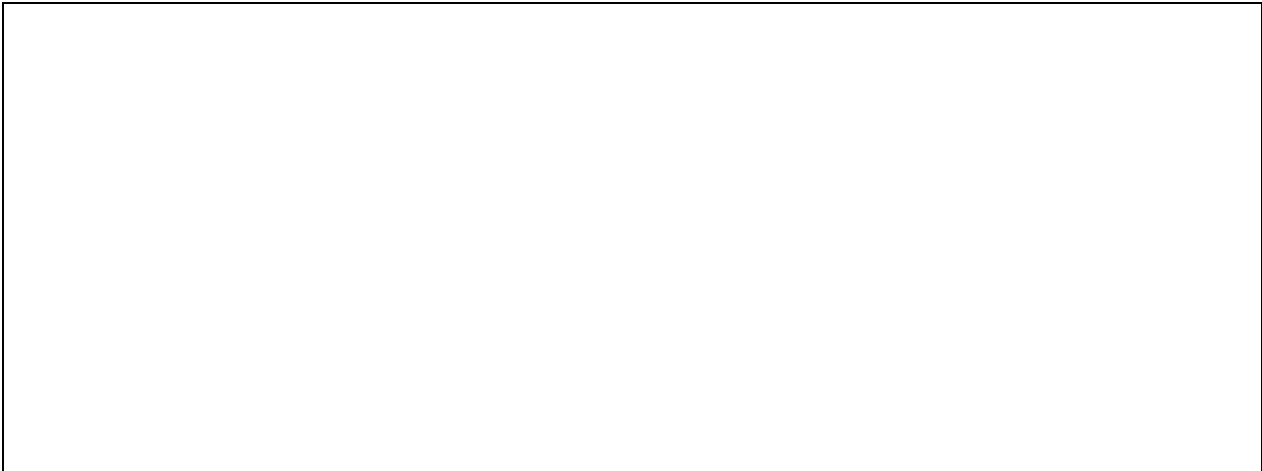
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(b) The epithelial cells lining the stomach of vertebrates are protected from damage by HCl. Explain the role of stomach in the digestion of various food materials [2]

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(c) Give an account of the acrosomal reaction that occurs when the human sperm reaches the secondary oocyte. Why human ovum can only be fertilized by human sperm? [3]

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(d) What is Shine Dalgarno sequence? What is its function? [2]

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Question 8

(a) Give an account of Krebs’s cycle. How many molecules of NADH+H⁺ are produced in a single turn of Krebs’s cycle? [3]

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(b) Nephrons are the structural and functional unit of the kidney. In which portion of the nephron, most of NaCl and water is reabsorbed from the filtrate? How does the osmolality of the filtrate remaining in this part differ from the blood plasma? [2]

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(c) Students sometimes wrongly suggest that food falls down into the stomach under the effect of gravity. Suggest one piece of evidence which would oppose this idea. [1]

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(d) What is the advantage of having two pigment systems in the chloroplast. [2]

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(e) Cholesterol is extremely important biomolecules in the cell membrane. Explain [2]

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