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 མཉེན་གསུང་འབྲིང་རིམ་སློབ་གྲྭ་གོང་མ།



**MOTITHANG HIGHER SECONDARY SCHOOL
 THIMPHU THROMDE**

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

TRIAL EXAMINATIONS-2020

BIOLOGY
 Class XII

Time-3 hrs. 15minutes
Maximum Marks-100

Name.....class/sec.....

Roll no.....

(The first 15 minutes of the examination are for reading the paper only. Candidates must NOT start writing during this time). Answer all questions in Part I and six questions from Part II.

All workings, including rough work, should be done on the same sheet as, and adjacent to; the rest of the answer. The intended marks for questions are given in brackets [].

Questions	PART I					PART II							
	Q1 A	Q1 B	Q1 C	Q1D	Q1 E	Q2	Q3	Q4	Q5	Q6	Q7	Q8	TOTAL
Full Marks	15	5	5	5	10	10	10	10	10	10	10	10	110
Award													
Teacher's initial													
Total Marks Awarded													

PART I (40 marks) Answer all questions.

Question 1.

For each question, there are four alternatives A, B, C and D. Choose the correct alternative and circle it on the question paper. Do not circle more than ONE alternative. [15]

1. Cell division typically occurs only in the meristematic regions of plants. In which region would cell division not occur?
 - A. shoot apex.
 - B. wood.
 - C. expanding leaf.
 - D. cambium between wood & bark.
2. According to the sliding filament model, binding sites on actin open when _____.
 - A. creatine phosphate levels rise
 - B. ATP levels rise
 - C. acetylcholine levels rise
 - D. calcium ion levels rise
3. The Black-necked Crane (*Grus nigricollis*) is the last discovered of 15 species of cranes in the world. Since 1987, RSPN has been working to protect and rebuild the population of the Black-necked Cranes. The black-necked cranes feed on the particular type of dwarf bamboos that grow in the wetlands of the Phobjika valley. The thick grasslands of wetlands are also grazing grounds for a large number of cattle and horses during the summer months that helps the growth of the tender bamboo shoots on which the cranes feed later during the winter season. There were suggestions that the wetlands be drained and used to grow cash crops such as potatoes, which is also the main crop of the valley. Such an action would have deprived the cranes of their main feeding centres. However, the founder of the Black-necked Conservation Programme prevailed on the Government of Bhutan to drop the proposal to drain the wetlands of the Phobjika Valley to create farms to grow cash rich seed potatoes. The management strategy mentioned above is an example of
 - A. Adaptive management.
 - B. Landscape level conservation.
 - C. Command and control management.
 - D. Integrated natural resource management.
4. Lamarck's theory of evolution fails to explain
 - A. Indian women have been getting their ear pierced for thousands of years but not a single baby with pierced ear is born
 - B. Giraffes have long legs because they have to eat leaves from the tall trees on their habitat
 - C. Deer's have the capacity to escape from agile Enemies because these can run very fast
 - D. High altitude Pines have branches with slope down so that snow fails to collect up on them in winter.
5. According to neo- darwinism variations which are the raw material of evolution occur-
 - A. In an individual and remain restricted to him

- B. In gene pool of a population
 C. In all the members of one species
 D. In all the members of all species
6. Cell recognition and adhesion occur due to biochemicals of cell membranes named
 A. proteins
 B. lipids
 C. proteins and lipids
 D. glycoproteins and glycolipids.
7. Trypsin is released by the _____ and acts in the _____ to break down _____.
 A. stomach; duodenum; carbohydrates
 B. liver; stomach; carbohydrates
 C. pancreas; duodenum; proteins
 D. gall bladder; liver; proteins
8. What is the nature of the oogonium and the secondary oocyte? Which process results in the formation of the secondary oocyte?
 A. A diploid oogonium forms a haploid oocyte by the process of mitosis.
 B. A haploid oogonium forms a diploid oocyte by the process of meiosis.
 C. A diploid oogonium forms a haploid oocyte by the process of meiosis.
 D. A haploid oogonium forms a haploid oocyte by the process of meiosis.
9. What do the rising levels of FSH and LH in the follicular phase cause?
 A. The follicles on the surface of the ovary start growing in preparation for ovulation.
 B. The endometrium starts to thicken.
 C. The corpus luteum starts secreting progesterone.
 D. One of the mature follicles bursts, releasing the egg.
10. Galápagos medium ground finches are found on Santa Cruz and San Cristóbal islands, which are separated by about 100 km of ocean. Occasionally, individuals from either island fly to the other island to stay. This can alter the allele frequencies of the population through which of the following mechanisms?
 A. natural selection
 B. genetic drift
 C. gene flow
 D. mutation
11. Which situation would most likely lead to allopatric speciation?
 A. A flood causes the formation of a new lake.
 B. A storm causes several large trees to fall down.
 C. A mutation causes a new trait to develop.
 D. An injury causes an organism to seek out a new food source.
12. A cavity present in vascular bundles of Maize is formed by-
 A. Degeneration of xylem parenchyma
 B. Replacement of phloem parenchyma
 C. Disruption of protoxylem
 D. Dissolution of cells between metaxylem vessels
13. Although the same species may have the same basic structure, variations exist within the same species. Variations among members of a population are referred to as ...

- A. genetic diversity
- B. biotic diversity
- C. species diversity
- D. living diversity

14. The species composition of four different communities is given below.

Species	Community A	Community B	Community C	Community D
P	10	20	28	25
Q	9	6	5	12
R	11	6	7	1
S	10	7	0	2

The community which is the least diverse is

- A. Community A
 - B. Community B
 - C. Community C
 - D. Community D
15. What was the probable role of oxygen gas in the early stages of life's appearance on Earth?
- A. Cellular respiration, which depends on oxygen availability, provided abundant energy to the first life-forms.
 - B. Abundant atmospheric oxygen would have created an ozone layer, which blocked out ultraviolet light and thereby protected the earliest life-forms.
 - C. Oxygen gas tends to disrupt organic molecules, so its absence promoted the formation and stability of complex organic molecules on the early Earth.
 - D. Oxygen promoted the formation of complex organic molecules through physical processes.

B. **Complete the following statements. Write the correct answers in your answer scripts without copying the whole sentence.** [10×0.5 = 5]

- i. The growing of different crops in succession on a piece of land to avoid exhausting the soil and to control weeds, pests, and diseases is
- ii. Argentaffin cells of gastric gland produces a vasoconstrictor called while the gastrin cells produces which stimulates the secretion of HCl.
- iii. acts on Sertoli cells and stimulates them to secrete androgen binding protein and inhibin.
- iv. The curve showing the rate of photosynthesis at different wavelengths of light is called
- v. The process of determining the precise order of nucleotides within a DNA molecule is.....
- vi. The species facing an extremely high risk of extinction in the wild in immediate future are called
- vii. When xylem lies in the Centre and is completely surrounded by phloem is called.....
- viii.are leucoplasts found in rice grains and wheat grains.
- ix. Proteins that facilitate the folding of other proteins are called.....
- x. According to Neo Darwinism, new species develop through mutation with

C. Correct the following statement by changing the BOLD word/words only. Rewrite ONLY the correct answer. DO NOT copy the whole sentence. [5]

- i. For each acetyl CoA that enters the citric acid cycle, **FOUR** carbon dioxide molecules are released in reactions that are coupled with the production of NADH molecules from the reduction of **NAD⁺** molecules.
.....
- ii. Angiotensinogen is a protein produced and secreted by **JUXTAGLOMERULAR CELLS**.
.....
- iii. The **CORI CYCLE** provide ATP and NADPH to the Calvin cycle and the Calvin cycle in turn, returns ADP, Pi, and **NADP⁺**
.....
- iv. Collateral and open type of vascular bundles is unique feature of **DICOT ROOTS**.
.....
- v. Animals whose immature stage develops on or within the insect host, ultimately killing the host are called **PATHOGENS**
.....

D. Match each item of Column A with the most appropriate item of Column B. Rewrite the correct pairs in the space provided below. [5]

Column A	Column B
<ul style="list-style-type: none"> i. Enterokinase ii. Beta cells iii. Ptyalin iv. Protein coated fat molecules v. primary myofilament vi. Alpha cells vii. secondary myofilament viii. Pepsin ix. Rennin x. Maltase 	<ul style="list-style-type: none"> a. chylomicrons b. Myosin filament c. Activates trypsinogen to trypsin d. Reduces sugar level in the blood e. Splits disaccharides into monosaccharides f. Digest starch in the mouth g. micelles h. Hydrolyse proteins into peptides i. Converts angiotensinogen to angiotensin I j. Hydrolyse casein of milk into paracasein k. Increases sugar level in the blood l. Actin filament

E. Answer the following questions

[1X10=10]

- i. How does DNA replication ensure accuracy?

- ii. How does zona pellucida of ovum prevent polyspermy?

- iii. Describe what happens to an ecosystem when a keystone species is removed?

- iv. Name a cell that is found arrested in diplotene stage for months and years. Comment in few lines how it completes cell cycle?

- v. A farmer adds *Azotobacter* culture to soil before sowing maize. Which mineral element is being replenished?

- vi. While eating pear it is usually seen that some stone like structures get entangled in the teeth. What are these stone like structures?

- vii. "Migration may enhance or blur the effects of selection". Comment.

- viii. Why is there no breakage of continuity of water column in xylem vessels even in presence of air bubbles?

- ix. What type of epithelium is found in the mucous membrane of the ureter and urinary bladder?
- x. What is the purpose of bacteria in the gut?

Part B (60 marks)
Answer any six questions

Question 2

- (a) How would the digestion and absorption of food be affected if bile duct is completely blocked? [1]
- (b) Placenta is formed from two different individuals in humans. It is naturally adapted that the blood of the two individuals do not mix in the placenta. Give reasons to support the statement. [2]
- (c) The pH of the medium and the action of enzymes are involved in the process of digestion. Considering this statement, explain the digestion of carbohydrates in the mouth. [2]

(d) Explain with an example how extinction of one species may lead to loss of another species. [2]

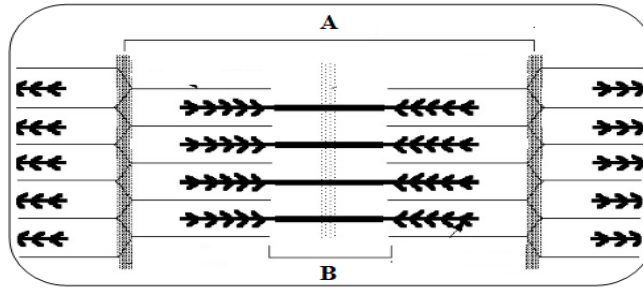
(e) A cotyledon of a seed is usually white in colour but as it emerges from the soil it turns green. Explain. [1]

(f) How does the mRNA copy differ from the DNA template from which it is made? [2]

Question 3

(a) Discuss the purpose behind investing 2 ATP's in the glycolytic pathway, when apparently, the purpose of the pathway is to produce ATP. [2]

(b) Study the diagram below and answer the questions:



(i) Label the parts A and B [1]

(ii) During contraction of the above structure, which parts disappear? [1]

(iii) How isotonic muscle contraction is different from isometric muscle contraction? [1]

(c). The National Gene Bank in Bhutan for Plant Genetic Resources (NGB-PGR) was established in early 2004 with the key objective to conserve crop varieties, especially the traditional varieties, lest they became extinct in their natural environments. What role can it play in maintaining the traditional varieties? [2]

(d) With the help of suitable diagram explain the structure and organization of shoot apical meristem as explained by Tunica Corpus theory. [2]

Question 4

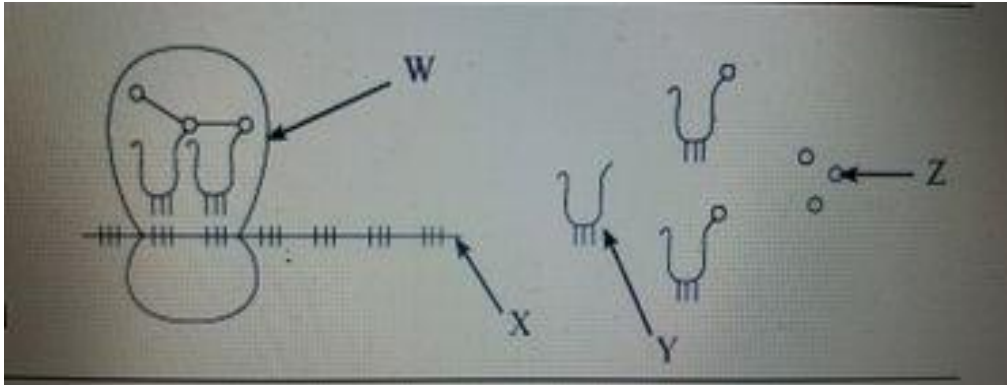
(a) The zygote divides only after the division of the primary endosperm cell. Give reasons in support of the statement. [2]

(b) Why can transcription and translation be simultaneous in prokaryotes but not in eukaryotes? [1]

(c) Integrated pest management has been successful in avoiding the use of chemical pesticides to a certain extent. Do you agree? Justify your answer. [1]

(d) The diagram below a part of the process of protein synthesis.

[4]



i. Identify the following labelled structures.

W- Y-

X- Z-

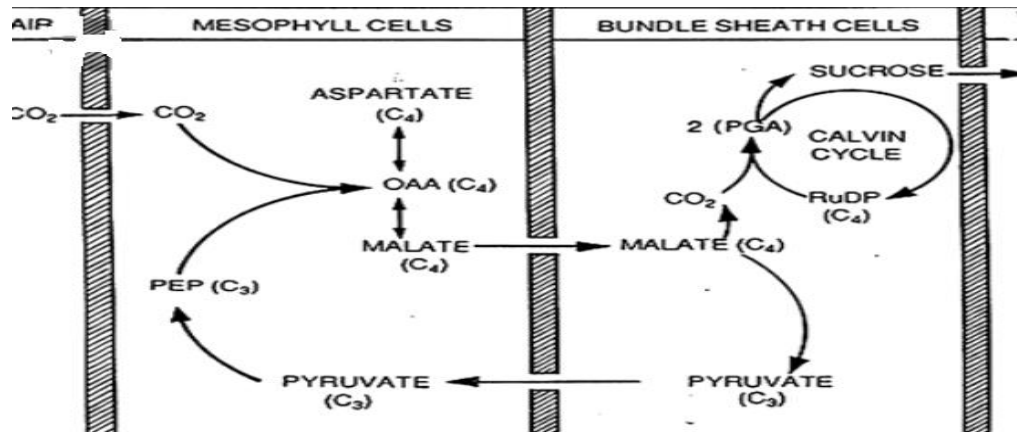
ii. Name the part of protein synthesis represented by the diagram.

iii. Where in the cell is X synthesized?

(e) How does study of early development of embryo support common ancestry of animals. [2]

Question 5

(a) The diagram below shows fixation of carbon dioxide in plants. Study the diagram and answer the questions



(i) What special anatomical features should be present in the leaves of these plants to make them able to perform this type of CO₂ fixation? [1]

(ii) What is the advantage of performing this type of CO₂ fixation? [1]

(iii) Comment on the energy expenditure of this type of pathway compared to the other type of CO₂ fixing pathway? [1]

(b) Describe double fertilization and the structural changes which occur after fertilization, leading to the development of the embryo within the seed. [2]

(c) According to the 2017 National Survey on Drug Use and Health, more than 220 million people across the U.S. reported drinking alcohol in their lifetime.

i. How does alcohol affect the nervous system? State three points. [1.5]

ii. How does alcohol affect youth development? [1.5]

(d) What is the function of the 5' cap and 3' poly A tail on an mRNA? [2]

Question 6

(a) Sensory fibers, or pathways, are referred to as “afferent.” Motor fibers, or pathways, are referred to as “efferent.” What can you infer about the meaning of these two terms (afferent and efferent) in a structural or anatomical context? [2]

(b) What does it mean for an action potential to be an “all or none” event? [1]

(c) Using Simpsons index find out which community is more diverse? Mention one advantage of Simpson method. [1+1]

(a) Species	(b) Community X	(c) Community Y
(d) A	(e) 4	(f) 8
(g) B	(h) 4	(i) 2
(j) C	(k) 7	(l) 6
(m) D	(n) 5	(o) 4
(p) Total	(q) 20	(r) 20

(d) According to the theory of evolution, all living organisms have evolved from the same ancestors.

i. Give two examples of the vestigial organs in man to support the above statement. [1]

ii. State Dollo's law.

[1]

(e) With the help of diagrams, show the three types of entry of pollen tube into the ovule. [3]

Question 7

(a) Production of human insulin in bacteria is an example of the universality of the genetic code. Explain what is meant by universality of the genetic code. [1]

(b) *Archaeopteryx*, found in 1861, was long thought to be the first bird. Then it was recognized as something closer to a dinosaur with feathers. Later it was known to be a missing link. [2]

i. Explain what is meant by missing link.

ii. State an example of such missing links other than *Archaeopteryx*.

(c) 'A rich biodiversity is highly beneficial to agricultural communities. Support the statement by mentioning FOUR benefits. [2]

(d) How is protein made from mRNA? What raw materials must be present for this process to occur? [2]

(e) Arrange the following steps of the urinary process in order: [1]

- i. Blood passes through a bundle of capillaries called the glomerulus which filters out a liquid called filtrate consisting of water, glucose, amino acids, salts, and urea.
- ii. Substances such as ammonia, creatinine, hydrogen ions, potassium ions, and some drugs are actively secreted from the blood into the peritubular capillaries.
- iii. Water is reabsorbed back into the blood as needed to maintain fluid balance.
- iv. Peritubular capillaries reabsorb useful substances from the filtrate.
- v. Concentrated urine forms and travels from the kidneys to the urinary bladder.

(f) What are the major structures comprising the filtration membrane? [1]

Question 8

(a) Meiosis is a type of cell division which occurs in the gametes, it contributes to genetic diversity.

i. Name and discuss the two specific events that occur during meiosis that leads to genetic diversity. Identify when each of these occurs. [1]

ii. What must occur during interphase for meiosis to be successful? [1]

(b) Bhutan has set aside a sizeable portion of the country as protected areas. With the inauguration of the Wangchuck Centennial Park in December 2008, the country's protected areas system is now covering altogether an area of 16,398 km² or 42.7 percent of the country's total area. This puts Bhutan well at the top of the list of countries in the world with the highest

proportion of area under protected status. What are the benefits of biodiversity conservation and how is it conserved by *in situ* conservation. [2]

(c) i. Why are STRs, or short tandem repeats, useful for a DNA profile? [1]

ii. DNA is obtained from a small sample of blood from an individual; what must happen to this sample before electrophoresis can be carried out? [2]

(d) The primary endosperm nucleus of angiosperms is triploid. Why? [1]

(e) Compare spermatogenesis and oogenesis as to timing of the processes and the number and type of cells finally produced. [2]