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09 E I

First Term Test - Grade 13 - 2019

Index No :

Biology I

Two Hours Only

- ❖ Answer all the questions.
- ❖ Write your Index number in the space provided in the answer sheet.
- ❖ When you select the response which you consider to be the best answer to a question mark your response on the answer sheet according to the instructions given in it.

1. Diversity among living organisms can be seen according to different criteria. Which one is not such a criterion?
 1. Size
 2. Growth
 3. Form
 4. Shape
 5. Habitat
2. Which property of water helps water to act as the universal solvent?
 1. High latent heat of evaporation
 2. Being a conical molecule
 3. Polar nature of water
 4. High specific heat capacity
 5. The low viscosity of water
3. Select the correct statement.
 1. All amino acids show amphoteric nature
 2. An amino acid comprises only a carboxyl group, alkyl group, and an amino group
 3. Collagen is a protein at Secondary structure
 4. Microvilli of the small intestinal epithelial cells absorb dipeptides, tripeptides, and amino acids
 5. All amino acids are considered essential amino acids regarding animals
4. Lactic acid fermentation differs from alcohol fermentation as,
 1. It happens in the cytosol
 2. Substrate phosphorylation occurs
 3. Oxidation of NADH
 4. Final electron acceptor being an organic compound
 5. Decarboxylation occurs
5. Which statement is true regarding the extracellular matrix?
 1. Present in both plant and animal cells
 2. Most abundant glycoprotein is collagen
 3. The leakage of fluid between cells
 4. Important in providing shape to the animal cells
 5. Lattice like structure made with microtubules, microfilaments, and glycoproteins

6. Which of the below does not pass from the mother cells to the daughter cells during cell division?
1. Nucleolus
 2. Ribosomes
 3. Chloroplasts
 4. Mitochondria
 5. Golgi apparatus
7. Which one is correct regarding the G2 phase of the cell division?
1. Synthesis of proteins occur only at G2 phase
 2. replication of centrioles occurs this in this phase
 3. It has 4 stages as, G1, S, G2, and G0
 4. DNA winds around histones to produce chromatin
 5. Histones are synthesized in this phase
8. Which one is not a characteristic feature of enzymes?
1. They act as biological catalysts
 2. They increase the activation energy of the reaction
 3. Most enzyme-catalyzed reactions are reversible
 4. Enzymes are substrate specific
 5. They are not expended during the reaction
9. Not an evidence or an opinion to prove that organic molecules can be synthesized abiotically,
1. synthesis of organic molecules during volcanic eruptions
 2. synthesis of organic molecules at alkaline vents
 3. Synthesis of organic molecules by sending an electric spark to reducing gases
 4. synthesis of organic molecules within the protocell
 5. Production of simple organic molecules by reacting the gases of the early atmosphere
10. Which statement - Time period does not match?
1. origin of photosynthetic organisms – Proterozoic eon
 2. an of reptiles and their radiation – Phanerozoic eon
 3. radiation of the pollinating insects – Cenozoic era
 4. origin of eukaryotic cells – Proterozoic eon
 5. Origin of the earth – Hadean eon
11. Not a genus with introns present rarely in their genes,
1. *Nostoc*
 2. *Salmonella*
 3. *Thermococcus*
 4. *Escherichia*
 5. *Anabaena*
12. A character not possessed by an Organism which has silica as a cell wall component
1. Being marine as well as freshwater organisms
 2. The body comprising of two overlapping parts
 3. Being multicellular
 4. Being photosynthetic
 5. Having chrysolaminarin as storage food

13. One of the important characteristics of seed plants is producing seeds. select another important characteristic of seed plants from the given choices.
1. Heteromorphic alternation of generations
 2. Production of ova and eggs
 3. Production of spores within sporangia
 3. Bearing roots
 5. Evolution of leaves
14. A student observed a prepared microscopic slide with the light microscope and could notice septate fungal hyphae and exospores in clusters over specialized hyphae. What could have been the fungus he observed?
1. *Mucor*
 2. *Chytridium*
 3. *Rhizopus*
 4. Shelf fungi
 5. *Penicillium*
15. Which organisms display the following characteristics in the respective order?
- The clitellum, Mantel, Parapodia, Pentaradial symmetry
1. Leech, Slug, *Planaria*, Starfish
 2. Earthworm, *Taenia*, *Nereis*, Sea cucumber
 3. Earthworm, Snail, *Nereis*, Brittle star
 4. *Nereis*, Octopus, Earthworm, Sea urchin
 5. Earthworm, Slug, Leech, *Hydra*
16. A character that is not displayed by a group of vertebrates with most members having external fertilization and a few having internal fertilization can be,
1. Having fins for locomotion
 2. Body covered with scales
 3. Being viviparous
 4. Being Ovoviviparous
 5. Having a swim bladder for controlling buoyancy
17. Common to *Nephrolepis*, *Selaginella*, and *Cycas*,
1. Having monoecious gametophytes
 2. Being heterosporous
 3. Starch being the storage food
 4. Presence of vessel elements in the Xylem
 5. Having autotrophic gametophytes
18. Not acceptable regarding the primary growth of a plant shoot,
1. In primary growth, the height of the stem is increased
 2. Leaves develop from the leaf primordia
 3. Apical meristem produces new cells only towards the stem
 4. As the height increases the circumference of the stem is also increased
 5. New cells produced from the meristems are subjected to differentiation after they are elongated
19. .
- 
- Which statement regarding the given cell type cannot be agreed with?
1. Present in all the plants
 2. Lignified cell walls present
 3. Water travels from one cell to another via pits
 4. Dead cells
 5. Provide mechanical support

20. Which of the following has no relationship with the secondary growth of dicot plants?
1. Happens due to the action of lateral meristems
 2. Cork cambium produces a thick and strong cover towards the outside
 3. The cambium of a woody stem is a single layer of differentiated cells
 4. Vascular cambium is a continuous cylinder of cells
 5. Cork cambium of the root arises from the outermost layer of cells of the pericycle
21. Which is absent in soft-wood?
- | | | |
|---------------------|-------------------------------|--------------------|
| 1. Xylem fibers | 2. Xylem vessels | 3. Xylem tracheids |
| 4. Xylem parenchyma | 5. Cells with lignified walls | |
22. Given below are a few steps of a biological process happening in plants. Select the answer with the steps in the correct order regarding the K⁺ influx.
- a) Turgidity of the guard cells increases
 - b) Water enters into the guard cells from the epidermal cells by osmosis
 - c) Water potential of the guard cells reduce
 - d) Opening of the stoma
- | | | |
|------------------|------------------|------------------|
| 1. a, b, c, d, e | 2. b, d, c, a, e | 3. b, c, d, a, e |
| 4. d, a, c, b, e | 5. d, c, b, a, e | |
23. How do Ψ , Ψ_s , and Ψ_p is changed when a cell at incipient plasmolysis is submerged in water is illustrated in the below graph.
- In which choice the X, Y and Z lines are correctly matched?
- | X | Y | Z |
|-------------|----------|----------|
| 1. Ψ | Ψ_p | Ψ_s |
| 2. Ψ_s | Ψ | Ψ_p |
| 3. Ψ_p | Ψ_s | Ψ |
| 4. Ψ_p | Ψ | Ψ_s |
| 5. Ψ | Ψ_s | Ψ_p |
-

24. Which statement regarding the phloem translocation is not agreeable?
1. 30% of the weight of the phloem sap is sucrose
 2. Tubers act as the source as well as the sink
 3. Translocation of the phloem sap is bidirectional
 4. In some species sugars diffuse from the leaf mesophyll cells to the sieve tube elements via plasmodesmata
 5. Unloading of sugars at the sink is a passive process
25. Which choice indicates the incorrect form in which the plants absorb the relevant nutrient.
- | Element | Form absorbed |
|---------|---|
| 1. Mg | Mg ²⁺ |
| 2. B | B ³⁺ |
| 3. MO | MOO ₄ ²⁻ |
| 4. P | H ₂ PO ₄ ⁻ |
| 5. Cu | Cu ⁺ |

26. Select the correct answer.

1. The mature sporophyte of *Pogonatum* is a photoautotrophic independent plant
2. The female gametophyte of *Selaginella* bears unicellular rhizoids.
3. Nutrition needed for the development of the young sporophyte of *Nephrolepis* is obtained from the female gametophyte
4. The pollen grains of *Cycas* are unicellular and with three nuclei
5. The embryonic sac of the Angiosperms is unicellular while it has eight nuclei

27. Not a response of blue - light receptors,

1. Photomorphogenesis
2. Light-induced opening of stomata
3. Shade avoidance
4. Inhibition of the elongation of the coleoptile
5. Growth of the shoot towards light

28. Consider the events happening in plants due to various stresses.

- a) Rolling of leaves of grasses
- b) Increased amounts of unsaturated lipids in membranes
- c) Formation of the cork and the abscission layer

Which choice contains a, b and c in the correct order?

1. Salt stress, Drought stress, Cold stress
2. Drought stress, Cold stress, and biological stress
3. Cold stress, Drought stress, and biological stress
4. Biological stress, Cold stress, Drought stress
5. Drought stress Biological stress, Cold stress

29. Select the incorrect statement regarding the responses of plants towards mechanical stimuli,

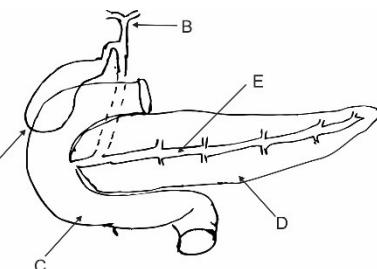
1. Trees growing in windy environments normally have shorter stockier trunks,
2. Thigmonastic moments occur due to the change of turgor in the cells of the pulvinus
3. The winding of *Passiflora* tendrils around a support is an example for thigmotropism
4. Changes happening in plants due to mechanical stress is called photomorphogenesis
5. Retraction of the leaves of *Mimosa pudica* when touched, is an example for thigmonasty

30. Given below are some tissue types and their functions. Select the incorrect combination.

Tissue	Function
1. Fat tissue	Hold organs in place
2. Epithelial tissues	Protection
3. Blood tissue	Transportation
4. Bone tissue	Support
5. Muscle tissue	Movement

31. Select the incorrect statement regarding the illustration.

1. D- act both as an endocrine and exocrine gland
2. B – Brings bile from the liver
3. A – Stores bile
4. All the secretions of D are brought towards C via E
5. Digestion of food is completed in C



32. Which of the following mismatches with the nutritional relationship between bull and crane?

1. It is a symbiotic relationship
2. One organism is benefited
3. The other organism is not affected
4. Such another nutritional relationship can be seen between *Balanus* and Whale
5. Both species are benefited

33. Given below are the components of human saliva and their functions. Select the incorrect choice.

Component	Function
1 Salivary amylase	Breaks polysaccharides into small polysaccharides and disaccharides
2 Mucus	Lubricates food
3 Immunoglobulin	Provide protection against bacteria
4 Buffering agents	Neutralize food
5 Water	Important in taste reception

34. Which one acts as the functional unit of the human liver?

1. Liver lobes
2. Liver lobules
3. Liver cells
4. Liver sinusoids
5. Hepatic macrophages

35. Which one is incorrect regarding the circulatory system?

1. All the invertebrates have open circulatory systems
2. Always a closed circulatory system has only one heart
3. Animals with open circulatory systems do not have respiratory pigments
4. The hemolymph of the animals with open circulatory systems flow back to the heart via capillary venules.
5. In the circulatory systems of vertebrates, blood flow occurs bi-directionally within the vessels.

36. Select the incorrect statement regarding ECG.

1. ECG is helpful in recognizing abnormalities of the cardiac conduction system.
2. There are five main waves in an ECG
3. The p wave is due to the depolarization of atria
4. QRS wave complex indicates the depolarization of ventricles
5. T wave represents the relaxation of atria and ventricles

37. Select the incorrect statement regarding the lymphatic system

1. Spleen and thymus are lymphatic organs
2. Lymph nodes are made with connective tissues and white blood cells
3. Lymph vessels are equipped with valves
4. Composition of lymph is similar to that of blood plasma
5. Lymph is circulated by the rhythmic contractions of walls of lymph vessels and skeletal muscle contractions

38. Select the incorrect statement regarding the ventilation of the lungs.
1. Ventilation occurs by inhalation and exhalation
 2. The volume of the thoracic cavity increases during inhalation
 3. Air is sucked into the atmosphere during exhalation
 4. At rest, the contraction of intercostal muscles and the diaphragm is sufficient to provide proper ventilation
 5. Ventilation is important to maintain a high O₂ concentration and a low CO₂ concentration within the lungs
39. The acquired immunity in humans can be categorized as active and passive. Select the correct statement regarding active immunity.
1. T cells and B cells do not participate
 2. Lasts only a few weeks
 3. Provides instant protection against the pathogen
 4. Builds up due to a natural infection
 5. Some activated T cells and B cells destroy the pathogen
40. One of the functions of human kidneys is the regulation of blood pressure. Which one out of the following does not involve in this process?
1. Renin
 2. Aldosterone
 3. Angiotensinogen
 4. Cortisol
 5. Angiotensin

• Question no. 41-50 has one or more correct answers. Use the table to answer those questions.

1	2	3	4	5
A,B,D correct	A,C,D correct	A,B correct	C,D correct	Any other answer or combination of answers is correct

41. Select the mismatching choice/choices regarding the C4 pathway of photosynthesis
- A. CO₂ reacts with PEP in the stroma of the chloroplasts of the leaf middle cells
 - B. First stable product is oxaloacetate
 - C. Within the cytoplasm of the bundle sheath cells, CO₂ is fixed by RUBISCO
 - D. Oxaloacetate is reduced to malate within the bundle sheath cells
 - E. In C4 plants CO₂ is fixed twice
42. Autoimmune disease/ diseases of humans is/are?
- A. Type I diabetes
 - B. Multiple sclerosis
 - C. AIDS
 - D. Osteo arthritis
 - D. Gastritis
43. Which of the following does not occur during urine formation?
- A. Filtration of blood into the cavity of the bowman's capsule under high pressure
 - B. Selective resorption of the needed materials back into the blood vessels
 - C. Active secretion of H⁺ and NH₃ into the tubules by the epithelium that lines the tubules
 - D. The fluid that leaves the proximal convoluted tubules is much diluted
 - E. K⁺ is actively secreted at distal convoluted tubule

44. Which statement/s regarding inflammatory responses can be agreed with?
- A. They are external innate defense mechanisms
 - B. Histamine is a messenger molecule involved in this case
 - C. Mast cells present at the injured connective tissue secretes histamine
 - D. Only reddening and Swelling are symptoms of inflammation
 - E. Prevents the spreading of the infection to the other tissues
45. Which of the following is/are a disease/s of the nervous system?
- A. Parkinson
 - B. Schizophrenia
 - C. Stroke
 - D. CKD
 - E. Gastritis
46. Which statement/s is/ are correct about the functionality of the brain?
- A. The cerebellum coordinates the involuntary muscle movements
 - B. Transfers information between PNS and the midbrain and forebrain
 - C. Regulates thirst and water balance
 - D. Motor areas of the cerebrum are responsible for directing skeletal muscle movements
 - E. Midbrain receives and integrates sensory information and sends it to particular regions of the cerebral cortex
47. Which statement/statements regarding pituitary hormones cannot be agreed with?
- A. All hormones released by the pituitary are synthesized within the pituitary itself
 - B. All are trophic hormones
 - C. Prolactin is secreted by the pituitary
 - D. Pituitary synthesizes and secretes growth hormone which acts on all the body cells
 - E. The pituitary is located in the forebrain just below the hypothalamus
48. Select the correct statement/s regarding the Calvin cycle.
- A. Happens both in C3 and C4 plants
 - B. Happens in the stroma of the chloroplasts
 - C. It needs Rubisco and PEP carboxylase enzymes
 - D. The first stable product is 3- phosphoglycerate
 - E. The cycle has to run 6 times to produce a single G3P molecule as the net production
49. Select the mismatching statement regarding animal phyla
- A. Polymorphism – Annelida
 - B. Flame bulbs – Platyhelminthes
 - C. Muscular foot for locomotion - Mollusca
 - D. Deuterostomes - Arthropoda
 - F. Post anal muscular tail – Reptilia
50. Select the mismatching combination/s.
- A. Intercalated disk – Nervous tissue
 - B. Osteons – cartilages
 - C. Presence of cilia on the free surface – epithelium of the trachea
 - C. Mast cells – Blood tissue
 - D. Sarcomeres – Cardiac muscle cells



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Provincial Department of Education - NWP

09 E I

First Term Test - Grade 13 - 2019

Index No :

Biology II

Three Hours Only

Impotent

Part A - Structured Essay. Answer all questions on the paper itself.

Part B - Essay, Answer four questions only. Give clearly labeled diagrams where necessary.

Part A (Structured Essay)

- 01). A). i. Define cellular respiration.

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.....

(1 Mark)

- ii. The major respiratory substrate of aerobic respiration occurred in the cell is glucose. Write the chemical equation of aerobic respiration of glucose.

.....
.....

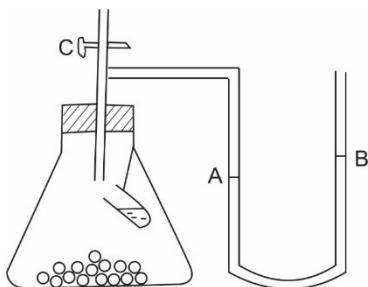
(1 Mark)

- iii. State the steps of aerobic respiration in eukaryotic cell and state the places where they occurred.

.....
.....
.....

(1 Mark)

- iv. A setup used in laboratory for measuring the rate of respiration of green gram seed is given below. Answer the questions regarding the apparatus given below.



a. Why do green gram seeds soaked in water of about 8 hours time duration?

.....
.....

(1 Mark)

b. What will be the level of liquid column of A arm relatively to its initial level when taking readings?

.....

(1 Mark)

c. Calculate the rate of respiration of green gram seeds, If the difference of the level of liquid column in A arm at 20 minutes is 5cm.

.....
.....

(1 Mark)

d. How do you plan a control experiment for the experiment done above?

.....
.....
.....

(1 Mark)

v. State 5 differences between aerobic and anaerobic respiration.

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.....
.....
.....
.....

(5 Marks)

B). i. What is respiratory cycle ?

.....
.....

(1 Mark)

ii. Define tidal volume and write the value of this volume in a normal healthy adult person.

.....
.....

(2 Marks)

iii. What is meant by vital capacity? State normal range of that value of a male.

.....
.....

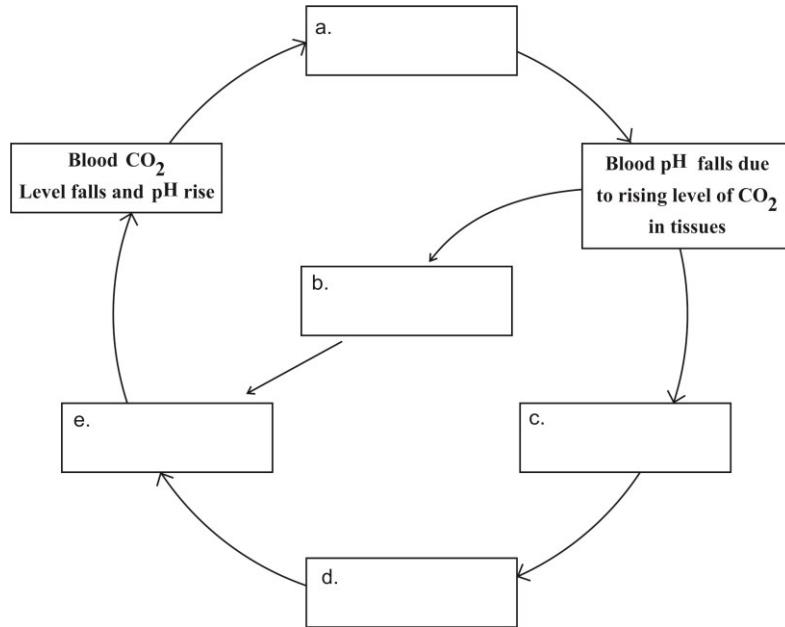
(2 Marks)

- iv. Define the anatomical dead space ? State the typical value of it.

.....
.....
.....

(2 Marks)

- v. A flow chart of homeostatic control of mechanism of inhalation and exhalation is given below. Complete the chart by stating the relevant process / State, in the empty cages.



a
.....
.....

b
.....
.....

c
.....
.....

d
.....
.....

e
.....
.....

(9 Marks)

- C). i. What is a cardiac cycle? State the time to complete one cardiac cycle.

.....
.....

(9 Marks)

- ii. State the steps of cardiac cycle in sequence.

.....

(1 Mark)

- iii. An ECG of a healthy adult person is depicted below.



a. Point out P, QRS and T waves on the diagram. (1 Mark)

b. Write the main events occurred in the heart by each of the waves stated above.

P

QRS.....

T

(3 Marks)

- iv. a. What is blood pressure ?

.....

.....

(1 Mark)

b. What is the name of the equipment used for measuring blood pressure in arteries ?

.....

(1 Mark)

c. State 6 factors that can be changed blood pressure in a person.

.....

.....

.....

.....

.....

(3 Marks)

$$40 \times 2.5 = 100$$

- 02). A). i. Name two bio polymers consisting of Nitrogen.

.....

(2 Marks)

- ii. Draw each of monomers of molecules you stated above. (I)

(1 Mark)

iii. Complete the given table regarding the protein.

Type of protein	Example	Function
1.	Hemoglobin	.....
2. ....	.....	storage food in milk
3. Defensive	..........	..........
4.	Keratin	.....

(8 Marks)

iv. Write steps in a simple test for identifying protein in the school laboratory.

.....
.....
.....
.....

(3 Marks)

B) i. State animal phyla that exhibit below structure /events.

- a radula
- b first animal phyla shows cephalization
- c Pseudocoelom
- d All are marine phyla
- e incomplete digestive tract without an anus

(5 Marks)

ii. State classes of the phylum chordata and give examples for each of the classes.

Class	Example
-------	---------

- a
- b
- c
- d
- e
- f

(6 Marks)

iii. The one of the class you stated above have many adaptation for flying. State 6 adaptation of them for flying.

.....
.....
.....
.....
.....
.....

(6 Marks)

iv. What are nematocysts ?

..... (1 Mark)

- C) Results of an experiment done by a student for finding water potential in potatoes tuber strips are given below.

Molarity of the sucrose solution (M)	Initial length of potato tuber (mm)	Final length of potato tuber (mm)	.....
distilled water	5.3	5.6	.....
0.1	4.9	5.1	.....
0.20	4.9	5.0	.....
0.30	5.0	5.1	.....
0.40	4.8	4.8	.....
0.50	5.1	5.0	.....

- i. What is the other information that should be obtained with the help of table for finding water potential in the tissue ?

..... (1 Mark)

- ii. Draw a suitable graph in the space given below for finding water potential of the potato tissue, by using data given in the table. (3 Marks)

- iii. Calculate the water potential of the potato tissues used, with the help of the table of water potential of sucrose solutions given below.

..... (1 Mark)

- iv. State 2 reasons of using *Tradescantia (Rhoeo)* lower epidermal tissues in experiments of determining water potential.

.....
.....
.....
.....

(2 Marks)

- v. What is the conclusion of that experiment ?

.....
.....

(1 Mark)

Concentration of sucrose solution	Solute potential Kpa
0.1	-260
0.20	-540
0.25	-650
0.30	-820
0.35	-970
0.40	-1120
0.45	-1280
0.50	-1450

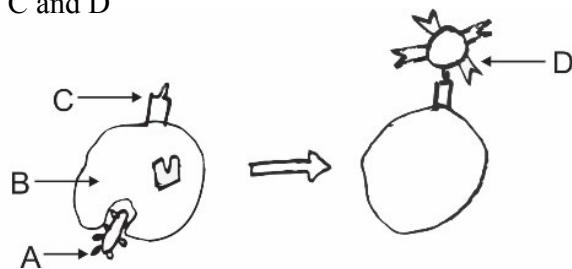
(40x2.5 = 100)

- 03). A). i. What is meant by adaptive immunity?

.....
.....
.....
.....

(1 Mark)

- ii. A cell mediated immune response has been depicted in the diagram given below. Identify and name A, B, C and D



A -

B -

C -

D - (4 Marks)

iii. What are the effector types of cell named as D ? State the functions of them.

Types of cell	Function
.....
.....
.....

(4 Marks)

iv. a) What is meant by active immunity ?

.....
.....
.....
.....

(3 Marks)

b) State types of active immunity and write an example for each of them separately.

Type	Example
.....
.....
.....

(3 Marks)

B) i. What is meant by osmoregulation ?

.....
.....

(1 Mark)

ii. a. What is excretion?

.....

(1 Mark)

b. What is the functional unite of kidney?

.....

(1 Mark)

iii. Some of the excretory structures in animal kingdom are given below. State an animal phylum that exhibit the structures given.

Structure	Animal phylum
Nephridia
Malpighian tubules
Antennal glands
Kidney
Flame cell

(8 Marks)

iv. State parts in human urinary system and state a main function for each of the parts stated.

Part	Main function
(i)
(ii)
(iii)
(iv)

(8 Marks)

C) i Explain briefly the way of organization of nervous system in Annelids.

.....
.....
.....

(3 Marks)

ii. a) What is cerebrospinal fluid ?

.....
.....
.....

(2 Marks)

b) State four functions of the cerebrospinal fluid.

.....
.....
.....

(4 Marks)

iii. a) What is meant by peripheral nervous system?.

.....
.....
.....

(4 Marks)

b) What are the parts belong to peripheral nervous system?

.....
.....
.....

(3 Marks)

iv. What are the main components of autonomous nervous system?

.....
.....

(2 Marks)

- v. State main 3 structural differences of the main two parts you stated (iv) above.

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.....

(3 Marks)

$$40 \times 2.5 = 100$$

- 04). A) i. Active and passive transportation are the two methods of conducting water in a plant. Name the methods of passive transportation of water in a plant.

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.....
.....
.....
.....

(5 Marks)

- ii. What is the method of long distance transportation out of them?

.....
.....

(1 Mark)

- iii. a) What is meant by water potential concept ?

.....
.....
.....

(1 Mark)

- b) Write the equation of water potential.

.....
.....

(1 Mark)

- iv. State three methods of radial transportation of water which occurred in a plant.

.....
.....
.....

(3 Marks)

- v. a) What is a stomata ?

.....
.....
.....

(1 Mark)

b) State 5 factors affect on the rate of transpiration.

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.....
.....
.....
.....

(5 Marks)

B) i. Name six plant growth factors found in plants.

.....
.....
.....

(3 Marks)

ii. a) What is meant by stresses found in plant ?

.....
.....
.....

(1 Mark)

b) Name abiotic stresses found in plants.

.....
.....
.....

(1 Mark)

iii. Name the arteries that provide blood for the liver.

.....
.....

(2 Marks)

iv. State 4 functions of the liver other than related to food digestion.

.....
.....
.....
.....

(4 Marks)

C) i. State the steps in holozoic mode of nutrition.

.....
.....
.....

(5 Marks)

ii. State three groups of symbiosis shown by animals and write examples for each of them.

(3 Marks)

Groups	Examples
.....
.....
.....

(3 Marks)

iii. Explain structure and location of human stomach.

.....
.....

(1 Mark)

iv. What is chyme ?

.....
.....

(1 Mark)

v. State 5 functions of stomach.

.....
.....
.....
.....
.....

(5 Marks)

$$40 \times 2.5 = 100$$

First Term Test – 2019
Biology – Grade 13 Part II
Part B (Essay)

❖ **Answer four questions only.**

- 05). i. Explain gross structure of the chloroplast.
ii. Explain the way of production of ATP and NADPH in photosynthesis
- 06). i. State what is meant by alternation of generation regarding plants.
ii. Briefly describe the basic characteristic features of the life cycle of *Pogonatum*
iii. Write differences between the life cycle of *Pogonatum* and the life cycle of *Nephrolepis*.
- 07). i. Describe the mechanism of ventilation of lungs in man.
ii. Explain how breathing of man is homeostatically controlled?
- 08). i. Explain the structure and functions of parts derived from the hind brain of the fetus.
ii. Explain transmission of a nerve impulse through a synapse.
- 09). i. State the location of the human kidney.
ii. Explain the gross structures of the human kidney.
iii. Explain the affect of hormones on function of the kidney.
- 10). Write short notes on
i. Seed dormancy.
ii. Hypertension.
iii. Humoral immune responses

First Term Test - 2019

Biology Answer Sheet - Grade 13

Part I

(1) O ₂	(11) 3	(21) 2	(31) 4	(41) 2
(2) O ₃	(12) 3	(22) 3	(32) 5	(42) 3
(3) 4	(13) 2	(23) 4	(33) 4	(43) 4
(4) 5	(14) 5	(24) 3	(34) 2	(44) 5
(5) 2	(15) 3	(25) 2	(35) 4	(45) 3
(6) 1	(16) 4	(26) 3	(36) 5	(46) 2
(7) 2	(17) 3	(27) 3	(37) 4	(47) 3
(8) 2	(18) 4	(28) 2	(38) 3	(48) 1
(9) 4	(19) 1	(29) 4	(39) 5	(49) 5
(10) 1	(20) 3	(30) 1	(40) 4	(50) 1

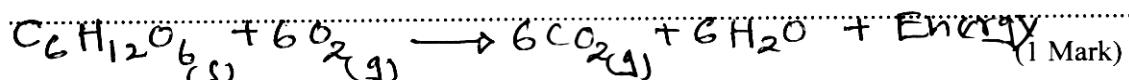
Part II

Part A (Structured Essay)

01. A). i. Define cellular respiration.

The process by which chemical energy in organic molecules such as carbohydrates is released by stepwise oxidative process, catalysed by enzymes and available in living cells in form of ATP (1 Mark)

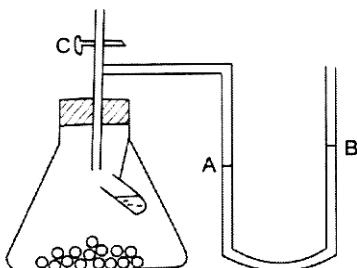
- ii. The major respiratory substrate of aerobic respiration occurred in the cell is glucose. Write the chemical equation of aerobic respiration of glucose.



- iii. State the steps of aerobic respiration in eukaryotic cell and state the places where they occurred.

- Glycolysis - Cytosole
- Kreb's cycle / Oxidation of pyruvate and Citric acid cycle - Mitochondrial matrix
- Electron transport chain / inner membrane oxidative phosphorylation of mitochondria

- iv. A setup used in laboratory for measuring the rate of respiration of green gram seed is given below. Answer the questions regarding the apparatus given below.



- a. Why do green gram seeds soaked in water of about 8 hours time duration?
Increasing metabolic activity / speed of respiration in green gram seeds
(1 Mark)

- b. What will be the level of liquid column of A arm relatively to its initial level when taking readings?
Rises up.
(1 Mark)

- c. Calculate the rate of respiration of green gram seeds, If the difference of the level of liquid column in A arm at 20 minutes is 5cm.

$$\text{Rate of respiration} = \frac{\text{absorbed Volume of } O_2}{\text{Time taken}}$$

$$= \frac{5 \text{ cm}^3}{20 \text{ min}} \quad \text{Time taken}$$

(1 Mark)

- d. How do you plan a control experiment for the experiment done above?
Re arrange the apparatus as the figure given above by removing the KOH tube.
(1 Mark)

- v. State 5 differences between aerobic and anaerobic respiration.

Aerobic	anaerobic
use oxygen	do not use oxygen
end product is CO_2 / H_2O	end products CO_2 , ethyl alcohol
Number of ATP molecules per one glucose molecule is 30/32	2 ATP
Terminal electron acceptor is O_2	Final electron acceptor (5 Marks) or pyruate or Acetaldehyde

B). i. What is respiratory cycle?
Inhalation and exhalation during a single breath.
(5 marks)

ii. Define tidal volume and write the value of this volume in a normal healthy adult person.
The volume of air inhaled and exhaled with each breath during normal breathing. • 500ml
(1 mark)

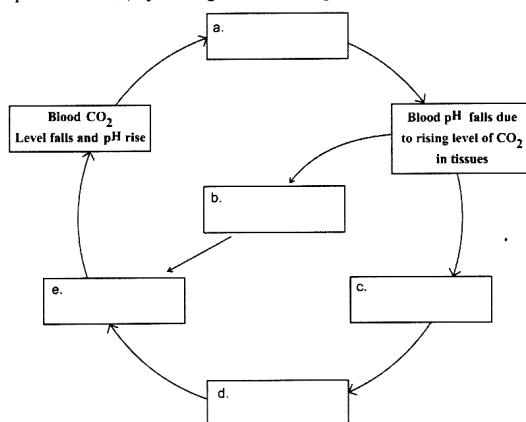
iii. What is meant by vital capacity? State normal range of that value of a male.
The maximum volume of air which can be inhaled and exhaled. • 4800ml
(1 mark)

• relates to the gas exchange in the alveoli.

• 1500ml.

(01 Marks)

- v. A flow chart of homeostatic control of mechanism of inhalation and exhalation is given below. Complete the chart by stating the relevant process / State, in the empty cages.



- a. Normal blood pH level is about 7.4
- b. Modulla detects decrease of pH of cerebrospinal fluid
- c. Sensors in major blood vessels detect decrease in blood pH
- d. Modulla receives signals from major blood vessels
- e. Signals from modulla to rib muscles and diaphragm increase rate and depth of ventilation.

(10 Marks)

- C). i. What is a cardiac cycle? State the time to complete one cardiac cycle.

• Sequences of events that take place in a complete heart beat. • O.S. (1 Marks)

- ii. State the steps of cardiac cycle in sequence.

• Atrial systole
• Ventricular Systole
• Complete cardiac diastole. (3 Mark)

- iii. An ECG of a healthy adult person is depicted below.



- a. Point out P, QRS and T waves on the diagram. (2 Mark)
- b. Write the main events occurred in the heart by each of the waves stated above.
 - P Impulse from the SA node sweeps over the atria / atrial depolarization
 - QRS rapid spread of impulse from the AV node throughout the ventricles / ventricular depolarization
 - T Relaxation of the ventricular muscles / ventricular repolarization

(3 Marks)

- iv. a. What is blood pressure?

The force that the blood exerts on the walls of blood vessels as it travels

(1 Mark)

- b. What is the name of the equipment used for measuring blood pressure in arteries?

Sphygmomanometer

(1 Mark)

- c. State 6 factors that can be changed blood pressure in a person.

- Time of day
- stress / emotional stress
- the posture
- gender
- age
- activity
- Exercise

(6 Marks)

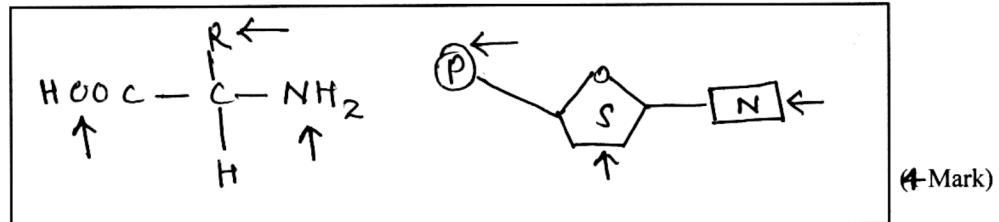
$$40 \times 2.5 = 100$$

02). A). i. Name two bio polymers consisting of Nitrogen.

- Protein
- Nucleic acid

(2 Marks)

ii. Draw each of monomers of molecules you stated above. (I)



(4 Marks)

4 Drawing - 2
labelling - 2
4 Marks

iii. Complete the given table regarding the protein.

Type of protein	Example	Function
1. Transport	Hemoglobin	Transport O_2 and CO_2
2. Storage	Caesin	storage food in milk
3. Defensive	Imuno globins	eliminate foreign bodies
4. Structural	Keratin	prevent desication

(8 Marks)

iv. Write steps in a simple test for identifying protein in the school laboratory.

.....
.....
For relevant test.

(3 Marks)

B) i. State animal phyla that exhibit below structure /events.

- radula Mollusca
- first animal phyla shows cephalization Annelida
- Pseudocoelom Nemata
- All are marine phyla Echinodermata
- incomplete digestive tract without an anus Platyhelminthes

(5 Marks)

ii. State classes of the phylum chordata and give examples for each of the classes.

Class	Example
a. Chondrichthyes	Skates / shark
b. Osteichthyes	Carp / tuna etc
c. Reptilia	Iguanas / snakes / turtles etc
d. Aves	Crow / Parrot / Eagle etc
e. Amphibia	Toad / frog / Ichthyophis
f. Mammalia	Bat / whales / cows etc

(6 Marks)

iii. The one of the class you stated above have many adaptation for flying. State 6 adaptation of them for flying.

- Having wings
- Having a light body
- Possession of bones with air cavities
- High metabolism
- restrictions in body size

(6 Marks)

- iv. What are nematocysts ?

A type of cell in cnidaria with a stinging thread which used for protection and crip (1 Mark)

- C) Results of an experiment done by a student for finding water potential in potatoe tuber strips are given below.

Molarity of the sucrose solution (M)	Initial length of potato tuber (mm)	Final length of potato tuber (mm)	Difference of length in a tissue
distilled water	5.3	5.6	0.3
0.1	4.9	5.1	0.2
0.20	4.9	5.0	0.1
0.30	5.0	5.1	0.1
0.40	4.8	4.8	0
0.50	5.1	5.0	-0.1

- i. What is the other information that should be obtained with the help of table for finding water potential in the tissue ?

Difference of length in the potato tuber strip tissue. (1 Mark)

- ii. Draw a suitable graph in the space given below for finding water potential of the potato tissue, by using data given in the table.

- Finding difference of length - 6
- Naming axis - 1
- Correct graph - 1
- Labelling the graph - 1
- Stating the 0.4 state. - 1

Total mark 10

- iii. Calculate the water potential of the potato tissues used, with the help of the table of water potential of sucrose solutions given below.

-1120 KPa.....

..... (1 Mark)

- iv. State 2 reasons of using *Tradescantia (Rhoeo)* lower epidermal tissues in experiments of determining water potential.

- Having anthocyanin pigments in the vacule
- Easy to observe plasmolyzed cells

..... (2 Marks)

- v. What is the conclusion of that experiment ?

Water potential in the tissue with 50% plasmolyzed cells is equal to water potential in solution. (1 Mark)

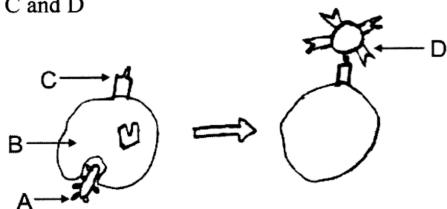
Concentration of sucrose solution	Solute potential Kpa
0.1	-260
0.20	-540
0.25	-650
0.30	-820
0.35	-970
0.40	-1120
0.45	-1280
0.50	-1450

$$50 \times 2 = 100.$$

03. A). i. What is meant by adaptive immunity?

The ability of body to defend itself against invading foreign agent through specific defense response mediated by diverse T lymphocytes and B lymphocytes. (1 Mark)

ii. A cell mediated immune response has been depicted in the diagram given below. Identify and name A, B, C and D



- A - Pathogen / piece of an antigen
- B - Antigen presenting cell / Macrophages / dendrite cell / B cell
- C - MHC
- D - Antigen receptor. (4 Marks)

iii. What are the effector types of cell named as D ? State the functions of them.

Types of cell	Function
T cell	Cell mediated immune response
B cell	Humoral / antibody mediated immune response
	immune response

(4 Marks)

iv. a) What is meant by active immunity?

long lasting immunity mediated by the action of B lymphocytes and T lymphocytes in the body and resulting B and T memory cells specific for a pathogen. (3 Marks)

b) State types of active immunity and write an example for each of them separately.

Type	Example
Naturally acquired	Chicken pox
Artificially acquired	Polio

(4 Marks)

B) i. What is meant by osmoregulation?

a. A process by which organisms control solute concentrations and water balance within the body. (1 Mark)

ii. a. What is excretion?

The removal of the nitrogenous metabolites and other metabolic waste products from the body. (1 Mark)

b. What is the functional unit of kidney?

Nephron. (1 Mark)

iii. Some of the excretory structures in animal kingdom are given below. State an animal phylum that exhibit the structures given.

Structure	Animal phylum
Nephridia	Annelida
Malpighian tubules	Arthropoda
Antennal glands	Arthropoda
Kidney	Chordata
Flame cell	Platyhelminthes

(5 Marks)

iv. State parts in human urinary system and state a main function for each of the parts stated.

Part	Main function
(i) Kidney	produce urine to excrete waste products while maintaining osmotic balance
(ii) Ureters	Receives urine from kidney and send it to bladder
(iii) Bladder	Provide the passage through which urine stored in the bladder leaves the body
(iv) Urinary bladder	Temporary storage of the urine.

C) i. Explain briefly the way of organization of nervous system in Annelids.

- have a somewhat complicated brains
- double ventral nerve cord with ganglia
- Ganglia are segmentally arranged

(3 Marks)

ii. a) What is cerebrospinal fluid?

- The fluid which secretes from choroid plexus
- and contain / present in Cerebral ventricles and Central canal in Spinal cord.

(2 Marks)

b) State four functions of the cerebrospinal fluid.

- helps to maintain uniform pressure within the CNS
- absorbing shock between the brain and skull
- help to circulate nutrients and hormones
- removing waste products.

(4 Marks)

iii. a) What is meant by peripheral nervous system?

The nervous system which transmit impulses to and from CNS regulating both an animal's movement and its internal environment.

(4 Marks)

b) What are the parts belong to peripheral nervous system?

Cranial nerves, Spinal nerves, autonomic nerves / ganglia

(3 Marks)

- iv. What are the main components of autonomous nervous system?

Sympathetic division
Parasympathetic division

(2 Marks)

- v. State main 3 structural differences of the main two parts you stated (iv) above.

Sympathetic	Parasympathetic
Pre-ganglion fibre is short	Pre-ganglion fibre is long
Ganglia arranged close and parallel to the spinal cord	Ganglia on the effectors
Nerves start from at the base of the brain and the spinal cord	Nerves starts only from the spinal cord.

$$10 \times 2 = 10$$

- 04). A) i. Active and passive transportation are the two methods of conducting water in a plant. Name the methods of passive transportation of water in a plant.

diffusion, facilitated diffusion
osmosis, imbibition, bulk flow

(5 Marks)

- ii. What is the method of long distance transportation out of them?

Bulk flow

(1 Mark)

- iii. a) What is meant by water potential concept?

The physical property that predicts the direction in which water will flow governed by solute concentration and applied pressure

(1 Mark)

- b) Write the equation of water potential.

$$\Psi = \Psi_s + \Psi_p \quad \Psi = \text{water potential} \quad \Psi_p = \text{pressure potential}$$
$$\Psi_s = \text{solute potential}$$

(1 Mark)

- iv. State three methods of radial transportation of water which occurred in a plant.

Aeroplasm route
Symplasm route
transmembrane route

(3 Marks)

- v. a) What is a stomata?

Stomata are pores surrounded by guard cells in the epidermis of the leaves and stems of plants which can open and close

(1 Mark)

- b) State 5 factors affect on the rate of transpiration.

- Light intensity
- Temperature
- Humidity
- Wind speed
- Concentration of CO_2

(5 Marks)

- B) i. Name six plant growth factors found in plants.

- auxins
- gibberellin
- cytokinin
- Abscisic acid
- Ethylene
- Jasmonic acid (Tasnornic acid)

(6 Marks)

- ii. a) What is meant by stresses found in plant?

• Certain factors in the environment may have a potentially adverse effect on a plant's survival, growth and reproduction.

(1 Mark)

- b) Name abiotic stresses found in plants.

- Drought stress
- Cold stress
- Salt stress

(3 Mark)

- iii. Name the arteries that provide blood for the liver.

- Hepatic artery
- Hepatic portal veins

(2 Marks)

- iv. State 4 functions of the liver other than related to food digestion.

- metabolism of carbohydrates
- metabolism of fat and proteins
- detoxification of drugs and toxic substances
- defense against microbes
- production of heat

(4 Marks)

- C) i. State the steps in holozoic mode of nutrition.

- Ingestion
- digestion
- absorption
- assimilation
- Elimination/egestion

(5 Marks)

- ii. State three groups of symbiosis shown by animals and write examples for each of them.

Groups	Examples
• Mutualism	• Ruminants, Termites
• Parasitism	• Tape worm/louse and humans
• Commensalism	• Barnacles attached to whales

(6 Marks)

- iii. Explain structure and location of human stomach.

- A "J" shaped dilated sac in the abdominal cavity

(1 Mark)

- iv. What is chyme?

- Partially digested semisolid acidic food mass in the stomach

(1 Mark)

v. State 5 functions of stomach.

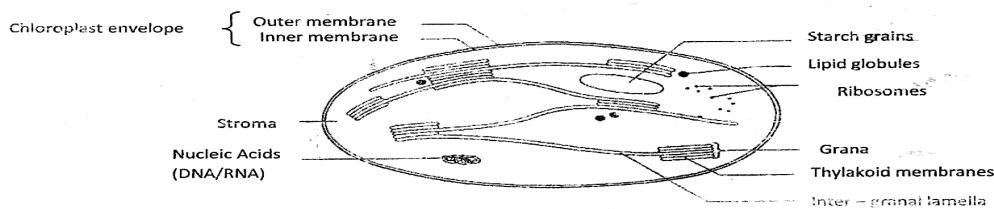
- Act as a temporary reservoir (for food due to high convolution and very elastic wall)
- Mechanical digestion of food (by churning action of muscular contraction)
- Produce gastric juice which starts the chemical digestion of proteins to polypeptide by pepsin
- Absorption of water, alcohol and some drugs
- HCl kills microorganisms
- Secretion of gastrin hormone

Any 5 = 5 marks

$$50 \times 2 = 100.$$

Paper II

- ① (a) Explain gross structure of the chloroplast.
- (b) Explain the way of production of ATP, and NADPH in photosynthesis.
- (a)
1. Double membrane
 2. biconvex lens shaped organelle.
 3. The outer and inner membranes are smooth.
 4. Those membranes separated by a very narrow inter membrane space.
 5. Inside chloroplast, another membrane system present
 6. This membranes produces flattened and interconnected sacs called thylakoids.
 7. The thylakoids contain photosystems
 8. Which are made up of photosynthetic pigment
 9. Thylakoids stacked together
 10. to form grana.
 11. Which are interconnected by intergranal lamellae.
 12. The fluid outside the thylakoid is stroma.
 13. Stroma contain circular DNA.
 14. 70 S ribosomes
 15. Many enzymes
 16. Starch granules
 17. lipid droplets.



Fully labelled (8-10) correct diagram - 08 marks
 partially labelled (<8) diagrams - 03 marks
 unlabelled diagram - 00 marks

(b) Explain the way of production of ATP and NADPH in photosynthesis.

1. Chlorophyll molecules, other organic molecules and proteins are organized into complexes in the thylakoid membrane of chloroplast.
2. A reaction centre and light harvesting complexes are present in a photosystem.
3. PS I and PS II are two types of photosystems in the thylakoid membrane.
4. The reaction centre Complexes contains a primary electron acceptor.
5. The Chlorophyll "a" molecule in the PS II reaction centre is named as P680 and absorb light - having a wavelength of 680nm (effectively).
6. The chlorophyll "a" molecule in the reaction centre of PS I is named as P700 and absorb light having a wavelength of 700 nm.
7. Pigment molecules in light harvesting Complex in PS I and PS II absorb photons of light and energy is transferred to reaction centre.
8. Striking of photons of light on the pigments results in the excitation of electron from photosystem II, to the higher energy state.
9. These electrons will be accepted by the primary electron acceptor of photosystem II.
10. Splitting of water takes place as a result of an enzyme catalyzed reaction.
11. yields O_2 , H^+ and electrons.
12. Electron released (as a result of hydrolysis) neutralize excited photosystem II (P680)
13. Striking of photons of light on the pigments results in the excitation of electrons from PS I (P700) to the higher energy state.
14. Excited electrons accepted by a primary electron acceptor of PS I

15. Excited electrons of PS II at primary electron acceptor of PS II pass through an electron transport chain to PS I and neutralize the excited PS I.

16. The energy released due to the passage of electrons from higher energy state to lower energy results in the synthesis of ATP. This is known as photophosphorylation.

17. Excited electrons of PS I at primary electron acceptor of PS I pass through an electron transport chain and reduce NADP and yield NADPH

18. The reduction of NADP is catalyzed by an enzyme called NADP reductase.

19. Flow of electrons in one direction through the photo systems and other molecular components in the

thylakoids is called linear electron flow.

20. Cyclic electron flow occurs in PS I.

21. Here some photoexcited electrons uses alternative cyclic pathway.

22. This produces ATP, but not NADPH and oxygen are released.

Any 20 pts

$$16 + 20 = 36$$

$$36 \times 4 = 144 \text{ marks}$$

Diagram 6 marks

Total 150 marks.

⑥ (i) State what is meant by alternation of generation regarding plants.

(ii) Briefly describe the basic characteristic features of the life cycle of Pogonatum.

(iii) Write differences between the life cycle of Pogonatum and the life cycle of Nephrolepis.

- (i)
1. A certain life cycle
 2. the presence of haploid gametophytic generation
 3. diploid sporophytic generation
 4. alternatively
 5. Gametophytes produce gametes
 6. by mitosis
 7. Gametes are fertilized / fused
 8. Diploid zygote form
 9. Zygote undergo mitosis and
 10. form the embryo
 11. embryo develops into the diploid sporophyte.
 12. sporophyte produces haploid spores
 13. by meiosis.
 14. Spores grow and develops into haploid gametophyte

- (ii)
1. Exhibit heteromorphic alternation of generation.
 - 2. Gametophyte is dominant plant.

3. and is dioecious Unisexual
4. Gametophyte is independent
5. and photosynthetic
6. Mature male gametophytes produce antheridia
7. Several sperms are produced within them.
8. Mature female gametophyte produce Archegonia.
9. A single egg is produced within them.
10. (Flagellated, motile) sperms swims through external water
11. as responses for chemical attractions
12. and entering the archegonium and fuses the ovum
13. resulting diploid zygote.
14. Zygote undergo mitosis
15. and develops into the embryo.
16. The embryo is retained within the archegonium
17. develops into the (diploid) sporophyte.
18. Obtaining nutrients from the gametophyte.

19. The sporophyte remains attached to the gametophyte.
20. The sporophyte consists of a foot, seta and a capsule (sporangium)
21. Nutrients and water from the gametophyte are absorbed by the foot.
22. The spore mother cells in the capsule undergo meiosis
23. and produce haploid spores.
24. Spores are homospores/homosporous
25. If spores are deposited on a favourable substrate, they germinate.
26. and grow into a green, branched filament called protonema.
27. Protonema produces buds
28. that grow into gametophytes

(iii)

- 1. Gametophyte is dominant in Pogonatum while sporophyte is dominant in Nephrolepis
- 2. Gametophyte in Pogonatum is differentiated into "stem", "leaves" and rhizoids but gametophyte of Nephrolepis is dorsoventrally flattened, heart shaped thallus.
- 3. Gametophyte of Pogonatum is dioecious/unisexual while gametophyte of Nephrolepis is monoecious/bisexual
- 4. Pogonatum produces biflagellated sperms but Nephrolepis produce polyflagellated sperms.
- 5. Sporophyte of Pogonatum remain attached to the gametophyte and depend on gametophyte. Sporophyte of Nephrolepis is independent and photosynthetic.
- 6. Sporophyte of Pogonatum consists of a foot, seta and a capsule while sporophyte of Nephrolepis differentiate into roots, stems and leaves.
- 7. No rhizome/underground stem in Pogonatum but a rhizome/underground stem is in Nephrolepis.

$$14 + 28 + 7 = 50$$

$$50 \times 3 = 150 \text{ marks}$$

- (a) (i) Describe the mechanism of Ventilation of lungs in man.
1. Entering of air into the lungs are referred to as inhalation
 2. and removing of air out of the lungs is referred to as exhalation.
 3. Inhalation and exhalation occurs alternatively
 4. Inhalation is an active process.
 5. Negative pressure breathing occurs in inhalation
 6. contraction of rib muscles/ intercostal muscles and diaphragms occur in inhalation.
 7. leads to expansion of thoracic cavity / increase the in the volume of thoracic cavity.
 8. This allows visceral and parietal pleura (surrounding the lungs) slide smoothly past each other.
 9. increasing the lung volumes.
 10. As a result the pressure within the lungs decreases (in relation to the outside air)
 11. creating a negative pressure gradient between between the atmosphere and lungs.
 12. then air flows from (higher pressure) the atmosphere to (the lower pressure) in the lungs
 13. Exhalation is a passive process
 14. The rib muscles / intercostal muscles and diaphragm relax.
 15. reducing the volume of thoracic cavity
 16. then volume of lung reduces.
-
17. As a result, the pressure inside the lungs increases. in relation to the air outside.
 18. hence air flows out of the lungs / forcing air out of the lungs.
 19. When activity increases in body, deep breathing occurs
 20. additional muscle are involved to further increase the volume of thoracic cavity.
- (b). Explain how breathing of man is homeostatically controlled.
1. Breathing is regulated by involuntary mechanism
 2. The main breathing centre is medulla oblongata
 3. A negative - feed back mechanisms is involved in regulating breathing

4. Sensors in the lung detect stretching of the lung tissues during inhalation.
5. These sensors send nerve impulses to the medulla.
6. Then further inhalation is inhibited.
7. And this prevent the lungs from over expanding.
8. Sensors in the medulla and
9. Chemical sensors in major blood vessels and aorta can detect changes of pH in blood.
10. When CO_2 concentration in blood increases, pH decreases.
11. Hence (the control circuits) in medulla increases the rate of breathing / speed.
12. and depth of breathing
13. Until the excess CO_2 is removed
14. Exhalation take place.
15. pH of the blood comes to its normal value of 7.4
16. Oxygen sensor chemical receptors are found in aorta
17. and the carotid arteries.
18. When O_2 concentration (in blood) becomes very low oxygen sensors / receptors
19. Send impulses to medulla oblongata to increase the breathing rate.
20. The regulation of breathing is also modulated by additional neural circuits in the pons (varolli)

$$20 + 20 = 40 \text{ pts}$$

Any 38 = 152 marks

Maximum 150 marks.

Q8 (i) Explain the structure and functions of parts derived from the hind brain of the "embryo"

From hind brain of embryo

1. Cerebellum
 2. pons varolii
 3. medulla oblongata gives rise.
- Cerebellum
4. Made up of two hemispheres.
 5. Coordinates voluntary muscular movements.
 6. Maintains posture and balance.
 7. Helps in learning / remembering motor skills

Pons Varolii:

8. Contains nerve fibres
9. Form a bridge between the two hemispheres of the cerebellum by nerve fibres.
10. Contains nerve fibre passing between
11. Higher levels of brain and spinal cord.
12. Another groups of nerve cell bodies
13. form respiration regulatory centres

14. Some nerve cells bodies act as relay stations
15. Transfers information between PNS and the mid brain and forebrain.
16. Coordinates large scale body movements such as climbing and running.
17. Together with the medulla oblongata help regulate respiration.

Medulla oblongata.

18. Lowest part of the brain stem.
19. Extends from the pons above / continuous with spinal cord below
20. It consists of cardiovascular centre
21. respiratory centre.
22. reflex centre.
23. Transfers information between PNS and the hind brain and the fore brain
24. Controls several autonomic, homeostatic functions including breathing, heart and blood vessels activities
25. Controls involuntary reflexes such as vomiting, swallowing, coughing, sneezing through reflex centres.

(b) Explain transmission of a nerve impulse through a synapse.

1. An action potential at an axon terminal
2. depolarizes the plasma membrane of presynaptic cell.
3. Depolarization at the presynaptic terminal
4. causes Ca^{2+} to diffuse into the terminals
5. The rise in Ca^{2+} causes
6. binding of synaptic vesicles containing neurotransmitters to the presynaptic membrane.
7. This results in the release of the neurotransmitter into the synaptic cleft.
8. Neurotransmitter diffuse across the synaptic cleft
9. Neurotransmitter bind with specific receptors and
10. activates them.
11. Then depolarization takes place in the postsynaptic membrane and it reaches the action potential.
12. Next the signal is terminated either
13. by enzymatic hydrolysis of neurotransmitter
14. Recapture of neurotransmitter into the presynaptic terminals.

$$25 + 14 = 39$$

Any 38 x 4 = 152 marks
Maximum marks 150.

Q9(i) State the location of the human kidney.

1. on the posterior abdominal
2. one on either side of the vertebral column
3. behind the peritoneum
4. and below the diaphragm.
5. Right kidney is slightly lower than the left.

(ii) Explain the gross structure of the human kidney.

1. Kidney is bean shaped organ.
2. held in position by a mass of fat and
3. are surrounded by a fibrous connective tissue.

4. (In the longitudinal section of the kidney)
three areas of tissues can be seen to the naked eye

5. outer fibrous capsule
6. renal cortex
7. inner renal medulla.
8. Cortex and medulla ^{are} supplied with blood vessels
9. and tightly packed with excretory tubules
10. Renal cortex granulated due to presence of glomeruli
11. Medulla is composed of renal pyramids
12. hence medulla has striated appearance.
13. Apices of pyramids projects into the renal pelvis
14. through renal papillae.

(iii) Explain the effect of hormones on functions of the kidney.

1. Decreasing of blood water content, increases the blood osmotic pressure
2. Osmoreceptors in hypothalamus stimulates
3. Then stimulates posterior pituitary gland
4. and increased secretion of ADH.
5. ADH affect on distal convoluted tubule
6. and collecting duct of kidney
7. and increased reabsorption of water
8. hence blood osmotic pressure returns to normal
9. here concentrated urine is formed.
10. then the stimulation of hypothalamus is...

11. This will be a negative feedback mechanism.
12. When the salt concentration in blood reduces
13. Normal blood pressure and volume reduces
14. Sensors in Juxta glomerular apparatus (JGA) detect it.
15. Release renin by JGA.
16. Then renin stimulates releasing of angiotensinogen from liver.
17. Later it converts to angiotensin I
18. and next into angiotensin II by angiotensin-converting enzyme.
19. Angiotensin II stimulates adrenal gland
20. to release aldosterone.

21. In distal convoluted tubule and collecting duct, more Na+ and water are reabsorbed
22. Then blood volume becomes normal.

Any 36 x 4 = 144 marks
 diagram = 6 marks
 Total 150 marks.

(i) Write short notes on

(i) seed dormancy.

1. After being dispersed, if environmental conditions are favourable, a seed may germinate to form a seedling.
2. Inhibition of embryo within the seed at one stage of maturation takes place.
3. Natural prevention of germination of seed is called seed dormancy.
4. Many reasons of seed dormancy are available.
5. Presence of inhibitors
6. Presence of thick/strong seed coats
7. Presence of seed coat impervious to water
8. After breaking seed dormancy, when water, oxygen and suitable temperature are provided seed starts to germinate.
9. There are advantages of seed dormancy
10. Help to survive during unfavourable conditions
11. Give better chance for growth, development and survival during dispersion.
12. Maintaining survival of a species.

(ii) Hypertension.

Any 10 pts.

1. Sustained elevated blood pressure above normal limits is called hypertension.
2. Hypertension causes consequences
3. Causes damage for kidney
4. Causes complication/disorders in adrenal gland.

5. causing heart attacks
6. Stroke / caused by Cerebral haemorrhage
7. damaged blood vessels / arteries / arterioles / capillaries
8. lead to death
9. Risk factors for hypertension are available
10. obesity
11. Diabetes mellitus
12. Family history
13. Smoking
14. A sedentary life style
15. High intake of salt
16. High intake of alcohol
17. Stress
18. Deposition of low density lipoprotein / LDL on artery wall.

Any = 15 pp.

(iii) Humoral immune responses.

1. specifically sensitized B lymphocytes are involved here.
2. B lymphocytes attach to a particular antigen
3. and undergo proliferation
4. (eventually) differentiate into plasma cells
5. Plasma cells secrete (circulating) antibodies
6. These antibodies are proteins / immunoglobulin
7. antibodies neutralize ;
8. and inactivate.
9. specific toxins
10. pathogens
11. are in blood and lymph.
12. In addition memory B cells are formed
13. When subsequent encounter of same
14. Same antigen.
15. stronger and more rapid response given.
16. this immune response works mainly against antigens present in body fluids.
17. and extracellular pathogens that multiply in the body fluids.

Any = 16 pp.

$10 + 15 + 16 = 41$ pp

Any $38 \times 4 = 152$ marks

Maximum 150 marks.