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Provincial Department of Education - NWP

09 E I

Third Term Test - Grade 13 - 2021

*Enu*

Index No : .....

**Biology I**

Two Hours Only

- ◆ Answer all 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) Select the correct statement regarding water.
  1. Provides the biological medium for most organisms
  2. Small non-polar angular molecule
  3. H- bonds between water molecules are highly fragile at liquid state
  4. Hydrogen atoms in water are positively charged
  5. Small insects can walk over the surface of water due to the presence of strong adhesive forces
  
- 2) Which of the following is correct regarding lipids?
  1. Not polymers, but are macromolecules
  2. All of them are composed of glycerol and fatty acids
  3. Vegetable oils are saturated fats
  4. Too much consumption of saturated fat leads to atherosclerosis
  5. A small fraction of them act as circulating signaling molecules within the body
  
- 3) Select the choice in which the part-function relationship with regards to the light microscope is correctly matched.
  1. Coarse focus- to focus the specimen under the low power only
  2. Objective lens - magnifying the specimen
  3. Fine focus - to focus only under high power
  4. High power - to observe more cells
  5. Stage - to keep the microscope stable
  
- 4) Given below are some cellular structures,
 

A- 70's ribosomes	C- Glyoxysomes
B- Lysosomes	D- True flagella/ cilia

Common to both plant and animal cells are,

1. A and B
2. A and D
3. A and D
4. A and C
5. A only

5) Some of the events observed during meiosis are given below,

- a) Arrangement of synaptonemal complexes on the metaphase plate
- b) Pulling the chromatids towards the poles
- c) Creating the nuclear envelope enclosing the chromosomes with chromatids
- d) Crossing over between non-sister chromatids
- e) Deposition of single chromosomes on the metaphase plate

The correct order of the above events is,

1. e, d, b, a, c
2. d, a, c, e, b
3. d, e, b, d, c
4. b, a, c, d, e
5. a, d, c, e, b

6) Select the correct statement regarding enzymes.

1. Enzymes increase the reaction rate by increasing the activation energy
2. Allosteric enzymes are equipped with multiple active sites and the binding of one inhibitor molecule to one of the active sites will cause inhibition of the other active sites also
3. ATP acts as an allosteric activator in catabolic reactions while ADP act as an allosteric inhibitor
4. Substrate specificity of an enzyme is due to the similarity of the shape of the active site to the shape of the substrate
5. According to the induced-fit mechanism, an enzyme changes the shape of the active site to become complimentary with any of the incoming substrates

7) Select the correct statement regarding respiration.

1. Two molecules of CO<sub>2</sub> are released during glycolysis
2. The end product of glycolysis is entered into the mitochondria utilizing ATP
3. The first stable product of the citric acid cycle is a 3 carbon compound
4. Two molecules of FADH<sub>2</sub> are produced per one molecule of glucose during aerobic respiration
5. 26 molecules of ATP are produced per one molecule of glucose during the electron transport chain

- 8) Which one out of the following statements regarding the evolution of biodiversity is correct?
1. RNA acted as enzymes within the protocell, and also RNA had the capability of replication
  2. Lipids in the primordial soup added to the membrane, resulting in the growth of the protocell
  3. The origin of aerobic organisms led to the evolution of photosynthetic organisms
  4. The first land-dwelling organisms were mollusks as snails
  5. Mammals originated after the extinction of dinosaurs

- 9) Some of the characteristics of vascular plants are given below,
- A. Production of seeds
  - B. Presence of tracheid and vessel elements in the xylem
  - C. Seeds being located in carpels
  - D. Being homosporous
  - E. Production of pollen tube

Select the characters found only in angiosperms.

1. A only
  2. A and E only
  3. B and E only
  4. B and C only
  5. C only
- 10) Some characters of the classes of phylum Chordata are given below,
- P – Operculum absent, cartilaginous skeleton present
- Q- Thin wet skin present, nictitating membrane present
- R – Color vision present, Shelled eggs present

Select the choice with appropriate examples,

	P	Q	R
1	Carp	Lizard	Frog
2	Ray	Craw	Crocodile
3	Toad	Shark	Turtle
4	Shark	<i>Ichthyophis</i>	Eagle
5	Bat	Frog	Lizard

- 11) Select the matching pair of fungal phylum – character.

1. Chytridiomycota - cellulose cell wall
2. Zygomycota – Flagellated zoospores

3. **Ascomycota – Asexual ascospores**
4. **Basidiomycota – Sexual exospores**
5. **Zygomycota – Incomplete septa**

**12) Is a character of lateral meristems,**

1. **Their action replaces the epidermis**
2. **Produces tender leaves**
3. **Participates in the regeneration of broken leaves**
4. **Located underneath the epidermis**
5. **Increases the length of the plant body**

**13) Select the correct statement regarding the plant body.**

1. **There is a contrasting pith in the dicot primary root but not in the monocot root**
2. **Although there is a bundle sheath of sclerenchyma encircling the vascular bundles of the primary stem of monocot plants, in the dicot stem there is only a sclerenchyma cap outer to the vascular bundles.**
3. **In both monocot and dicot plants, lateral roots are produced by the cell division in the pericycle.**
4. **In monocots and the dicots, the xylem is located to the inwards and the phloem to the outwards, while the cambium lies sandwiched in between**
5. **The cortex of a dicot stem is thicker than itself in the root**

**14) Select the correct statement receding concept of water potential,**

1. **Water potential increases as the concentration increases**
2. **Plants can't have a negative water potential in any circumstance**
3. **At constant pressure, the solute potential is proportional to the water potential**
4. **A solution in a beaker has a pressure potential similar to the atmospheric pressure**
5. **Water potential increases with the increasing temperature**

**15) Select the correct statement regarding the movement of water within plants.**

1. **Entry of water to the apoplast uses metabolic energy and from there, water travels by passive transport**
2. **Movement of water via symplast stops at the endodermis and resumes at the pericycle**
3. **In the trans-membrane route, water travels across the membranes at the beginning and the end of it only**
4. **Cells of the endodermis release ions from their protoplasts to the cell walls**
5. **Symplast is responsible for the majority of water movement**

**16) Which of the following element absorbed as an anion result in chlorosis in tender leaves as a deficiency symptom?**

1. **S**

2. Fe
3. Mn
4. Mg
5. N

17) Given below are some of the features observed in the life cycles of plants.

P – photosynthetic gametophyte

Q – Being dioecious

R – cilia/ flagella bearing gametes

S – heterospory

Select the correct combination.

1. *Pogonatum* - P, R, S
2. *Nephrolepis* – Q, R, S
3. *Selaginella* – P, Q, R
4. *Cycas* – Q, R, S
5. Shoe Flower plant – Q, R, S

18) Which of the following statement is correct regarding plant hormones?

1. Both Auxins and Gibberellins stimulate elongation of the stem
2. Abscisic acid, as well as ethylene, enhances senescence
3. Auxins promote leaf abscission in drought seasons
4. Auxins and cytokinins enhance apical dominance
5. Gibberellins inhibit seed germination

19) Given below are some statements regarding plant stresses.

- A. Stimulates synthesis and release of abscisic acid
- B. Increased levels of unsaturated phospholipids in the plasma membrane
- C. Increased levels of dissolved sugars in the cytoplasm
- D. Keeping the cytoplasm at a low water potential compared to the soil solution

Which of the above is related to cold stress?

1. A, B
2. B, C
3. C, D
4. A, C
5. B, D

20) Select the correct structure-function relationship regarding the digestive tract.

1. Stomach – conversion of pepsinogen to pepsin by pepsin
2. Duodenum – Secretion of gastrin
3. Duodenum – Mechanical digestion of food
4. Jejunum – Neutralization of chyme
5. Colon – Absorption of triglycerides

21) Select the correct statement regarding the human circulatory system.

1. Deoxygenated blood enters the pulmonary artery
2. The heart wall is comprised of 4 layers
3. Sometimes nerves are also involved in maintaining the basic rhythm of the heart
4. The blood pressure of humans is 80/120 mmHg
5. Rhythmic contractions in the walls of lymphatic vessels also involve in the circulation of lymph

22) Select the correct statement regarding the

1. Hairs present in the trachea filter air
2. Lowering of the larynx and the epiglottis happens as swallowing takes place
3. The inner surface of the alveoli are covered by a fluid called surfactant
4. Diaphragm contracts during exhalation
5. The main center for the control of respiration is located in pons varolii

23) Select the correct statement regarding immunity.

1. Usually, proteins and lipids act as antigens
2. A specific antigen contains only one epitope
3. In cell-mediated immunity, T lymphocytes directly kill antigenic cells
4. Helper T cells produce antibodies
5. Effector cells produced by the lymphocytes live longer; protecting against the relevant pathogens

24) Given below are some statements regarding the formation of urine in humans,

- A. Active secretion of  $K^+$
- B. Passive resorption of water
- C. Passive resorption of  $HCO_3^-$
- D. Active secretion of  $H^+$  into the tubules

Select the events that take place at the distal convoluted tubule.

1. A and B only
2. B and C only

3. A and C only
4. B and D only
5. A B and C only

25) Select the correct statement regarding the human brain.

1. Corpus callosum is composed of white matter
2. Two of the ventricles are located in the forebrain while the mid brain and hindbrain contains one ventricle in each of them
3. The hindbrain contains the cerebellum, Pons varolii, and medulla oblongata
4. Hypothalamus is located above and in front of the thalamus and above and in front of the pituitary
5. The Corpus callosum belongs to the midbrain

26) When a nerve impulse travels across a synapse,

1. The action potential causes the polarization of the presynaptic membrane
2.  $Ca^{2+}$  diffuse into the terminal end causing it to depolarize
3. Vesicles containing neurotransmitters bind with the postsynaptic membrane and releases neurotransmitters into the synaptic cleft
4. Depolarization of the postsynaptic membrane causes it to reach the action potential
5. Some gasses can act as neurotransmitters

27) Select the correct combination of Hormone – target location,

	Hormone	Target location
1	Prolactin releasing hormone	Mammary glands
2	Luteinizing hormone	Testes
3	Oxytocin	Ovaries
4	Cortisol	Adrenal gland
5	Thymosin	Thyroid gland

28) Select the correct statement regarding the development of the zygote and the embryo.

1. Morula which results from the division of the zygote reaches the uterus in 3-4 days after fertilization
2. A blastocyst is formed 10 days after fertilization
3. The umbilical cord is formed by the fusion of the trophoblast of the embryo and the endometrium of the mother
4. Implanted embryo does not send hormones to the mother
5. Implantation takes place 12 days after fertilization

29) Select the correct statement regarding the human skeletal system.

1. The zygomatic arch is formed by the union of part of the temporal bone and part of the maxilla
2. Ethmoid bone, lachrymal bone, and nasal bone together makes the floor eye orbit
3. Sphenoid bone, Ethmoid bone, maxilla, and the nasal bone contain sinuses
4. The Coronoid process of the mandible articulates with the temporal bone
5. Occipital condyles articulate with the atlas to create a hinge joint

30) Select the correct statement,

1. Widow's peak is a human Mendelian character determined by a recessive allele
2. Both homozygous and heterozygous genotypes in incomplete dominance display similar phenotypes
3. ABO blood grouping in humans is an example of polygenic inheritance
4. Linked genes are located close to each other on the same chromosome
5. Hardy Weinberg equilibrium is valid when random mating does not take place

31) Which statement is correct regarding mutations,

1. X-ray and Infrared are examples of mutagenic physical agents
2. Substitution of a pair of nucleotides of an exon of a gene may cause no change in the amino acid sequence
3. The effect of a mutation is always damaging or neutral
4. Missense mutations cause premature termination of protein synthesis
5. If insertion does not take place close to the start or stop codon, the polypeptide may become nonfunctional

32) In DNA Isolation,

1. In the first step of DNA Isolation from bacteria, bacterial cell walls are digested using lipase
2. DNase is added in the second step
3. SDS prevents the action of enzymes on released DNA
4. DNA is dissolved in cold ethanol
5. Full length of DNA can't be isolated from eukaryotic cells

33) Select the correct combination,

- | Eco-system                        | Plant   |
|-----------------------------------|---------|
| 1. Savanna -                      | Nelli   |
| 2. Marshes -                      | Kadol   |
| 3. Low land rain forests -        | Keena   |
| 4. Tropical montane forests -     | Heressa |
| 5. Dry mixed ever green forests - | Aralu   |



34) Select the answer with the correct example that matches the given threat level according to the IUCN classification.

Threat level	Example
1. Extinct	<i>Crudia zeylanica</i>
2. Critically endangered	Elephant
3. Extinct in the wild	DO- Do
4. Endemic to Sri Lanka	<i>Garcinia zeylanica</i>
5. Flagship species of Sri Lanka	Lion

35) Which of the below given, contribute most to increased global temperature?

1. NO<sub>2</sub>
2. CFC
3. Black carbon
4. IR
5. SO<sub>2</sub>

36) Select the correct statement regarding sterilization.

1. Exposing for 1 hour to steam of 121°C at 15 lbs/inch is sufficient to kill all microbes and their spores
2. During incineration, microorganisms are burnt to ash
3. Glassware can be sterilized by keeping at 170 °C for 15min in a dry air oven
4. Microbes are absent in pasteurized milk
5. Membrane filters have slits ranging from 0.01mm – 0.45mm

37) Names of a few pathogens have been given below,

- A. Rubella virus
- B. *Neisseria meningitidis*
- C. *Clostridium tetani*
- D. Hepatitis A virus

Organisms that damage the nervous system are,

1. A and B
2. A and C
3. A and D
4. B and C
5. B and D

38) Microorganisms are used in various industries. One such correct example is,

Industry	Microorganism
1. Production of vitamins	<i>Streptococcus</i>
2. Extraction of metals	<i>Pseudomonas</i>
3. Single cell proteins	<i>Gluconobacter</i>
4. Alcoholic beverages	<i>Aspergillus niger</i>
5. Production of vinegar	<i>Saccharomyces cerevisiae</i>

39) One of the primary treatment steps in the purification of water is,

1. Collection and removal of sludge
2. Vigorous mechanical aeration
3. Allowing wastewater to trickle through a rocky material
4. Sedimentation by adding alum
5. Disinfection by adding chlorine /ozone

40) Select the daily activities that should be followed in maintaining a home aquarium

1. Stirring up the bottom medium gently
2. Siphoning out the scraped algae and debris
3. Replacing half of the water
4. Scraping out of algae from the glass surface
5. Paying attention to the health condition of the fishes

Use the following table to select the answers for the question from 41 to 50.

1	2	3	4	5
A, B, and D	A, C, and D	A and B	C and D	Any other answer
correct	correct	correct	correct	or a combination correct

41) Some biochemical reactions taking place inside cells are given below. Select the reactions relevant to cellular respiration.

- A.  $\text{Pyruvate} + \text{CoA} + \text{NAD}^+ \longrightarrow \text{Acetyl CoA} + \text{CO}_2 + \text{NADH}$
- B.  $\text{Glucose} + 2\text{ADP} + 2\text{NAD}^+ \longrightarrow \text{Pyruvate} + 2\text{ATP} + 2\text{NADH}$
- C.  $\text{RuBP} + \text{CO}_2 \longrightarrow 2\text{x3PGA}$
- D.  $\text{Oxaloacetate} + \text{Acetyl CoA} \longrightarrow \text{Citrate} + \text{CoA}$
- E.  $\text{Phosphoenolpyruvate} + \text{HCO}_3^- \longrightarrow \text{Oxaloacetate}$

42) Select the matching statements

- A. Carbohydrates – Spares proteins
- B. Proteins – Used in the synthesis of some hormones
- C. Lipids - Used in the synthesis of some hormones
- D. Mg – Component of hemoglobin
- E. Vit B – Act as an antioxidant

43) Select the correct statement/s regarding circulatory systems.

- A. In grasshoppers, dorsally blood flows towards the anterior direction while ventrally blood flows towards the posterior direction.
- B. The first closed circulatory systems appear in nematodes
- C. In single circulation, the heart bears two chambers
- D. Most reptiles have three-chambered hearts
- E. Birds have three-chambered hearts

44) Select the correct statement/s regarding immunity.

- A. Both innate immunity and acquired immunity can be seen in all animals.
- B. Various chemicals present in mucus membranes act as chemical barriers.
- C. Lysozyme can destroy the cell walls of some bacteria.
- D. Natural killer cells are a component of innate immunity.
- E. Interferons are secreted by cells infected by bacteria and kill bacteria.

45) Not a function of the medulla oblongata,

- A. Thermoregulation
- B. Connecting the central nervous system with sensory and motor neurons
- C. Coordination in running
- D. Controlling coughing and sneezing
- E. Maintaining balance and posture

46) Select the correct combination/s of structure and function.

- | Structure           | Function                      |
|---------------------|-------------------------------|
| A. Sertoli cells    | Secretion of inhibin          |
| B. Leydig cells     | Secretion of androgens        |
| C. Epididymis       | Helps in maturation of sperms |
| D. Seminal vesicles | Storage of sperms             |

47) Uses of DNA sequencing,

- A. Paternity testing
- B. Identifying criminals
- C. Diagnosis of cancers
- D. Figuring evolutionary relationships
- E. Identifying allergens

48) In a non-evolving population,

- A. Mutations do not occur
- B. Selective mating should happen
- C. Immigrations and emigrations should not happen
- D. Natural selection does not take place
- E. Population size should be small

49) Select the correct statement,

- A. Cycas of Sri Lanka is conserved under the convention on biological diversity
- B. Sustainable utilization of the components of biological diversity is done under Ramsar convention
- C. Trans-boundary movement of hospital waste is controlled under the Basel convention
- D. Strict natural reserves and jungle corridors are conducted under Fauna and flora protection ordinance
- E. Reduction of emission greenhouse gases to match the targets is done under the Montreal protocol

50) Select the correct statements regarding microorganisms.

- A. In chemoautotrophic bacteria the source of carbon is inorganic
- B. Cyanobacteria are photoautotrophic organisms
- C. All fungi are saprotrophs
- D. Most mycoplasmas are parasitic on humans and other animals
- E. In mycoplasmas, the cell walls are composed of proteins and polysaccharides



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Third Term Test - Grade 13 - 2021

Index No : .....

Biology II

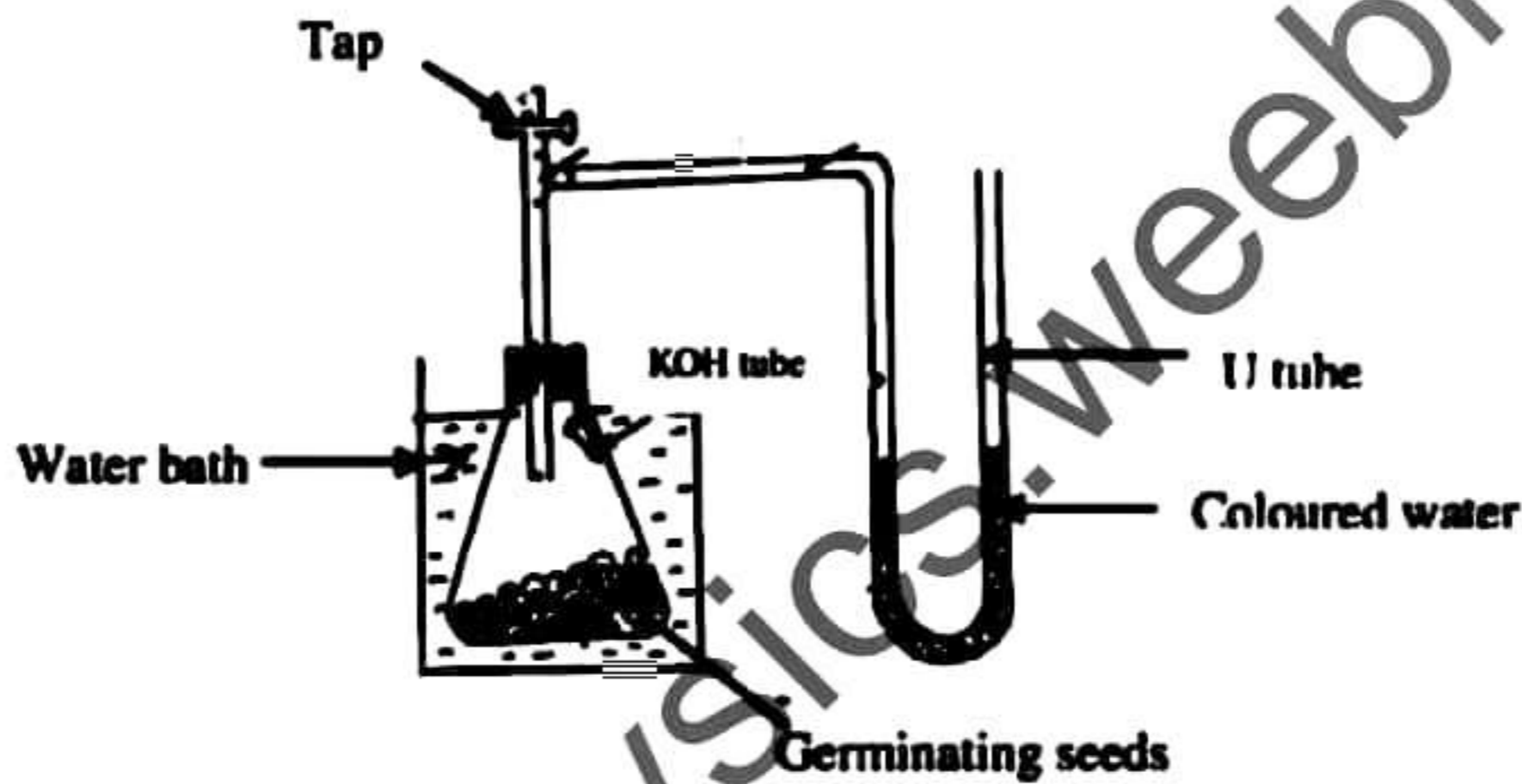
Three Hours Only

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.

- 1. (A) (i) Following diagram shows an apparatus used to determine rate of respiration using germinating green gram seeds.



- I. Identify the above instrument

.....  
 .....

- II. Seeds soaked in water for 8 hours in the experiment of determining rate of respirations, state the reason for this.

.....  
 .....

- III. Indicate the sequence of actions to be taken to obtain the reading using the above instrument set to find the volume of oxygen absorbed to determine the rate of respiration.

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**IV. State the reason to use following materials and methods in this experiments.**

**(a) Water bath :**

.....

**(b) Using color water in u-tube :**

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**V. (a) What is meant by galls ?**

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.....  
.....

**(c) What is the reason to produce undifferentiated mass of cells by plants ?**

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.....

**(B) I. State an organism or group of organism which shows following characteristics**

**a. Unicellular and having glass like cell walls**

.....

**b. presence of pellicle and chloroplast**

.....

**c. Both gametophyte and sporophyte are independent and autotrophic**

.....

**d. Presence of open seeds and reticulate veins in leaves**

.....

**e. presence of fins and cloaca**

.....

**II. What are the respiratory surfaces of following animals of kingdom Animalia?**

**a).Liver fluke .....**

**b).Shrimp :.....**

**c). Frog : .....**

**III. State the method which take place gaseous exchange through respiratory surfaces.**

.....

IV. (a) What is the common part belong to both respiratory system and food digestive system of human ?

.....  
(b) During Swallowing of food how it stop the entering of food in to trachea  
.....  
.....  
.....

V (a) Why does ventilation of human lungs consider as a negative pressure breathing ?

.....  
.....

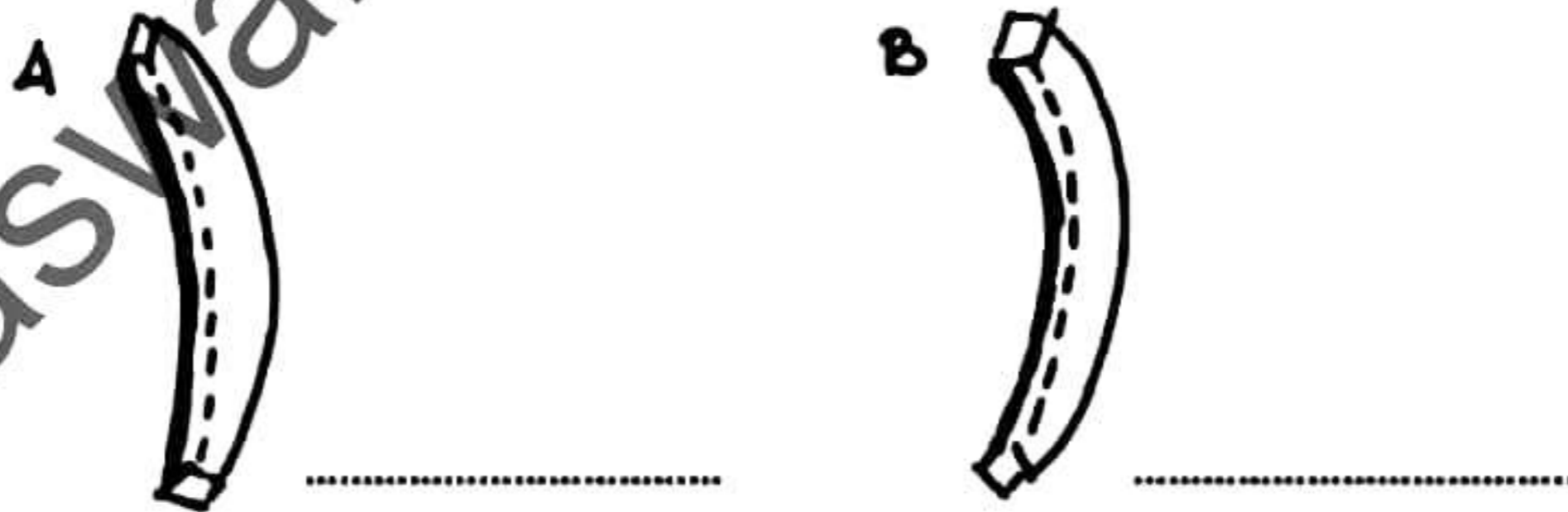
(b) State an important of functional residual capacity

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

(C) I Introduce water potential concept

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.....

II. (a) Following diagram shows the initial curvatures of two stripes of *Alcasia* leaf petioles. From these stripes A put in a hypertonic solution and B put in a hypotonic solution for 30 minutes. Draw the final curvature of each stripe in front of the each diagram.



(b) What is the reason for changing the curvature of B stripe

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.....

**III. (a) What is ascent of sap?**

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

**(b) What is the method of water movement in ascent of sap?**

.....

**IV. What is the accepted hypothesis use to explain ascent of sap?**

.....

**V. What are the important concepts in ascent of sap according to the above mentioned Hypothesis?**

.....  
.....

**2. (A) I. The largest organ in human body is skin. Name the main types of tissues in it.**

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.....  
.....

**II. What is the type of immunity given by skin?**

.....

**III. Write the 2 ways of giving above immunity by epidermis of skin**

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

**IV. (a) Name three types of cells in dermis of skin**

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

**(b) What is the adaptation skin to protect from U V rays?**

.....

**V. (a) some cells in the dermis are important in immunization. What is the type of immunization doing by those cells.**

.....  
.....

**(b) State the defense mechanisms given by those cell separately.**

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



**(B) I. Name the part of the brain which locate human body's temperature control center.**

.....

**II. When a person is in a hot surrounding, how it is detected.**

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

**III. Write a heat gain mechanism to increase the body temperature until the preset point when a person is in a cold surrounding**

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.....

**IV. Write two other regulatory processes done by the part of the brain which is locate the body's temperature control Centre.**

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.....  
.....

**V. (a) what is meant by positive feedback mechanism**

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

**(b) Write two examples for the positive feedback mechanism of human body**

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

**(C) I. What are the factors determine excretory product on substrate?**

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

**II. What is the main excretory product of following animals?**

- a) Tadpole : .....
- b) Terrestrial snail : .....
- c) Shark : .....
- d) crow : .....

**III. What is the difference between CKD and CKDU**

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.....

**IV .Human skull is given in the following diagram. Answer following questions regarding it.**



**(a) What is cranial capacity?**

.....

**(b) In the above diagram label and show the cranial and facial bones which contain processes using arrows**

.....

**V. what are sutures; State the important of it.**

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

3. A Flowers of a certain plant species are purple, white and pink due to interaction of two genes. P allele is responsible for the formation of purple flowers and R allele is responsible for pink flowers. Presence of both P and R allele responsible for white. P and r alleles are recessive for p and r alleles

I. Write the phenotype that produce by following genotypes.

<u>Genotype</u>	<u>Phenotype</u>
(a) PPrr	.....
(b) PpRr	.....
(c) RRpp	.....
(d) rpp	.....

II. What is the frequency of progeny bear white flowers by the cross between (b) and (d)?

.....

III. a) What is meant by polygenic inheritance?

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

b) Write three human characters that occur by polygenic inheritance.

.....  
 .....

IV. How do you explain the distribution of data for a polygenic character in a population.

.....

V. a) Explain the reason for, hemophilia can be seen more in males than the females.

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

b) Name the product that produce to treat hemophilia patients by the use of genetically modified organisms.

.....

I. What is meant by DNA packaging?

.....

II. Write the sequential levels that follow the process of packaging of DNA in Eukaryotic cells.

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**III. Mention the term "Genome Library"**

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

**IV. a). Which molecules are isolated from tissues in the formation of C DNA libraries?**

.....

**b). Mention the role of following enzymes in the formation of C.DNA.**

**I. Reverse transcriptase :**

.....

**II. DNA polymerase :**

.....

**V. Name the vector that use in gene transformation by using *Agrobacterium***

.....

**C. I. Molecules are included in the Domain Bacteria. Write a specific character of Molecules.**

.....

**II. a) Name two types of Molecules**

.....  
.....

**b) Write a physiological similarity of the above mentioned two types.**

.....  
.....

**III. What is the step of method of sterilization?**

.....  
.....

**IV. Name the sterilization method of followings.**

**a) Inoculation loops :** .....

**b) Bottled milk :** .....

**c) Plant nurseries :** .....

**d) Antibiotics :** .....

**e) Mattresses in hospitals:**.....

V. a) Write two specific characteristics of pathogenic micro-organisms

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

b) Name the micro biological technology that use in environment management.

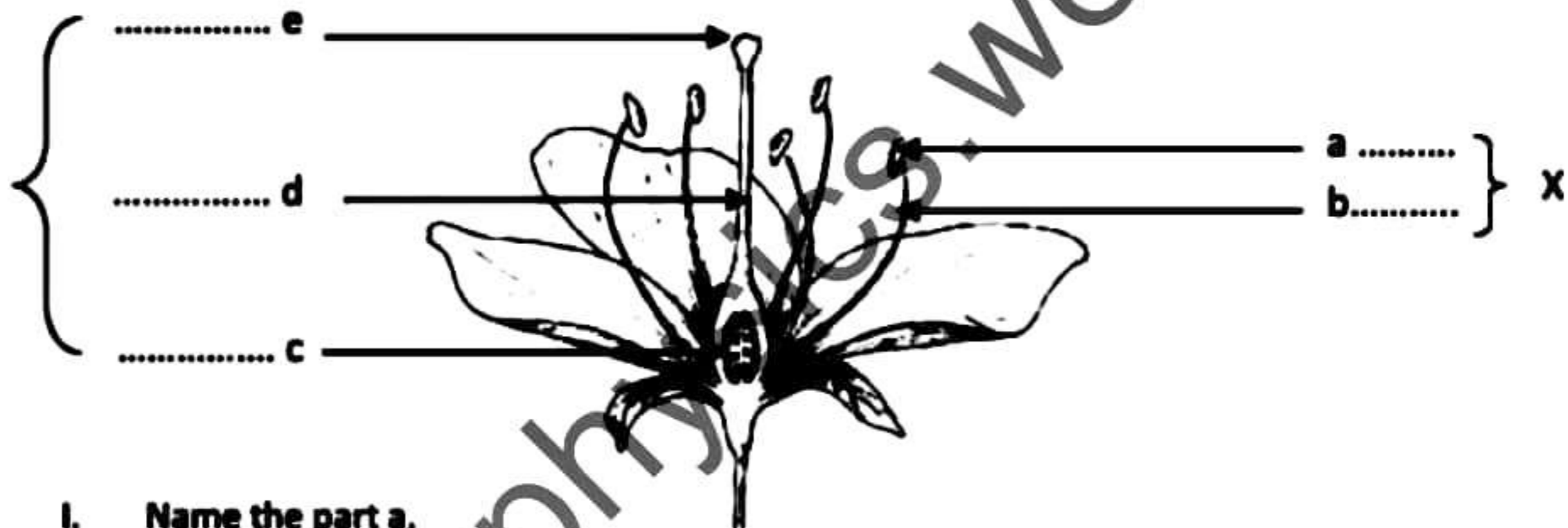
.....

VI. What is the step that contribute symbiotic micro-organisms among the steps of natural nitrogen cycle?

.....  
.....

(40x2.5)

4. A. Given below is a diagram with the parts of a typical flower of Anthophyta.



I. Name the part a,

a - .....  
b - .....  
c - .....  
d - .....  
e - .....

II. Identify X and Y

X - .....  
Y - .....

III. What are the structures of *cycas* those related to X and Y?

X - .....  
Y - .....

IV. a) What is a future fate of 'C' after the fertilization?

.....

b) What is meant by parthenocarpy?

.....

.....

- V. Write an examples for natural and artificial parthenocarpy  
Natural - .....  
Artificial - .....

**B.**

- I. What is meant by biological resources?  
.....  
.....  
.....

- II. Given below are the several values of biodiversity. Name the main fields that consists of the following values.

- a. Carbon dioxide fixation through photosynthesis - .....  
b. Sacred places - .....  
c. Photography - .....

- III. Name a medical plant that threats due to overexploitation and name an animal who export for medical purpose.

- a. Plant - .....  
b. Animal - .....

- IV. Formation of national parks under the processes of conservation of biodiversity.

- a. How, this type of conservation methods are known,  
.....  
.....  
.....  
.....  
.....  
.....  
.....
- b. What are the main facts should be taken to ensure the conservation process that you mentioned above?  
.....  
.....  
.....  
.....  
.....  
.....  
.....

- V. a) What are the main factor that affect for desertification?  
.....  
.....

- b) What are the International conventions / protocol has to be taken related for following necessities?

- I. United nations frame work convention on climatic changes  
.....  
.....

- II. Wise use of wetland and their resources  
.....  
.....

**C.**

- I. What is meant by protected cultivation of crop/ protected agriculture?  
.....  
.....

II. Write two advantages of a protected cultivation.

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

III. a) What is meant by tissue culture?

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

b) What is the main concept that based on the tissue culture?

.....

IV. Write two incidences where nano cells are used in medical and biological field

.....  
.....

V. a) Write two cytological characters of stem cells.

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

b) What is the source which obtain embryonic stem cells?

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

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**Third Term Test - 2021**  
**Grade 13 - Biology - II**  
**Part B - Essay**

◆ Answer four questions only.

05.

- I. Explain the fine structure of a typical chloroplast.
- II. Describe the importance of  $C_4$  pathway of photosynthesis and explain the structural adaptations of those plants.

06.

- I. Explain the responses of plants for abiotic stresses.
- II. Briefly describe the terrestrial adaptations of *Nepenthes*.

07.

- I. Name the main parts of human brain those are developed from embryonic forebrain and explain the structure of largest part among those.
- II. Briefly describe the mechanism of hearing of human ear.

08. Explain the process of DNA replication in eukaryotic cell.

09.

- I. Briefly describe the using of microbial metabolic end products in industries.
- II. What are the advantages of using microbial processes over chemical processes?
- III. Briefly describe the immunization vaccines in controlling microbial diseases.

10. Write short notes on,

- I. Human sex determination
- II. Desertification
- III. General characteristics of species that could be cultured in a aquarium.





Common to both plant and animal cells are,

1. A and B
- ② A and D
3. A and D
4. A and C
5. A only

5) Some of the events observed during meiosis are given below,

- a) Arrangement of synaptonemal complexes on the metaphase plate
- b) Pulling the chromatids towards the poles
- c) Creating the nuclear envelope enclosing the chromosomes with chromatids
- d) Crossing over between non-sister chromatids
- e) Deposition of single chromosomes on the metaphase plate

The correct order of the above events is,

1. e, d, b, a, c
- ② d, a, c, e, b
3. d, e, b, d, c
4. b, a, c, d, e
5. a, d, c, e, b

6) Select the correct statement regarding enzymes.

1. Enzymes increase the reaction rate by increasing the activation energy
- ② Allosteric enzymes are equipped with multiple active sites and the binding of one inhibitor molecule to one of the active sites will cause inhibition of the other active sites also
3. ATP acts as an allosteric activator in catabolic reactions while ADP act as an allosteric inhibitor
4. Substrate specificity of an enzyme is due to the similarity of the shape of the active site to the shape of the substrate
5. According to the Induced-fit mechanism, an enzyme changes the shape of the active site to become complementary with any of the incoming substrates

7) Select the correct statement regarding respiration.

1. Two molecules of CO<sub>2</sub> are released during glycolysis
2. The end product of glycolysis is entered into the mitochondria utilizing ATP
3. The first stable product of the citric acid cycle is a 3 carbon compound
- ④ Two molecules of FADH<sub>2</sub> are produced per one molecule of glucose during aerobic respiration
5. 26 molecules of ATP are produced per one molecule of glucose during the electron transport chain

8) Which one out of the following statements regarding the evolution of biodiversity is correct?

- ① RNA acted as enzymes within the protocell, and also RNA had the capability of replication
2. Lipids in the primordial soup added to the membrane, resulting in the growth of the protocell
3. The origin of aerobic organisms led to the evolution of photosynthetic organisms
4. The first land-dwelling organisms were mollusks as snails
5. Mammals originated after the extinction of dinosaurs

9) Some of the characteristics of vascular plants are given below,

- A. Production of seeds
- B. Presence of tracheid and vessel elements in the xylem
- C. Seeds being located in carpels
- D. Being homosporous
- E. Production of pollen tube

Select the characters found only in angiosperms.

1. A only
2. A and E only
3. B and E only
4. B and C only
- ⑤ C only

10) Some characters of the classes of phylum Chordata are given below,

P – Operculum absent, cartilaginous skeleton present

Q- Thin wet skin present, nictitating membrane present

R – Color vision present, Shelled eggs present

Select the choice with appropriate examples,

	P	Q	R
1	Carp	Lizard	Frog
2	Ray	Craw	Crocodile
3	Toad	Shark	Turtle
④	Shark	<i>Ichthyophis</i>	Eagle
5	Bat	Frog	Lizard

11) Select the matching pair of fungal phylum – character.

1. Chytridiomycota - cellulose cell wall
2. Zygomycota – Flagellated zoospores

3. Ascomycota – Asexual ascospores
- ④ Basidiomycota – Sexual exospores
5. Zygomycota – Incomplete septa

12) Is a character of lateral meristems,

- ① Their action replaces the epidermis
2. Produces tender leaves
3. Participates in the regeneration of broken leaves
4. Located underneath the epidermis
5. Increases the length of the plant body

13) Select the correct statement regarding the plant body.

1. There is a contrasting pith in the dicot primary root but not in the monocot root
- ② Although there is a bundle sheath of sclerenchyma encircling the vascular bundles of the primary stem of monocot plants, in the dicot stem there is only a sclerenchyma cap over to the vascular bundles.
3. In both monocot and dicot plants, lateral roots are produced by the cell division in the pericycle.
4. In monocots and the dicots, the xylem is located to the inwards and the phloem to the outwards, while the cambium lies sandwiched in between
5. The cortex of a dicot stem is thicker than itself in the root

14) Select the correct statement receding concept of water potential,

1. Water potential increases as the concentration increases
2. Plants can't have a negative water potential in any circumstance
3. At constant pressure, the solute potential is proportional to the water potential
4. A solution in a beaker has a pressure potential similar to the atmospheric pressure
- ⑤ Water potential increases with the increasing temperature

15) Select the correct statement regarding the movement of water within plants.

1. Entry of water to the apoplast uses metabolic energy and from there, water travels by passive transport
2. Movement of water via symplast stops at the endodermis and resumes at the pericycle
3. In the trans-membrane route, water travels across the membranes at the beginning and the end of it only
4. Cells of the endodermis release ions from their protoplasts to the cell walls
- ⑤ Symplast is responsible for the majority of water movement

16) Which of the following element absorbed as an anion result in chlorosis in tender leaves as a deficiency symptom?

- ① S

2. Fe
3. Mn
- ④ Mg
5. N

17) Given below are some of the features observed in the life cycles of plants.

P – photosynthetic gametophyte

Q – Being dioecious

R – cilia/ flagella bearing gametes

S – heterospory

Select the correct combination.

1. *Pogonatum* - P, R, S
2. *Nephrolepis* – Q, R, S
3. *Selaginella* – P, Q, R
- ④ *Cycas* – Q, R, S
5. Shoe Flower plant – Q, R, S

18) Which of the following statement is correct regarding plant hormones?

1. Both Auxins and Gibberellins stimulate elongation of the stem
- ② Abscisic acid, as well as ethylene, enhances senescence
3. Auxins promote leaf abscission in drought seasons
4. Auxins and cytokinins enhance apical dominance
5. Gibberellins inhibit seed germination

19) Given below are some statements regarding plant stresses.

- A. Stimulates synthesis and release of abscisic acid
- B. Increased levels of unsaturated phospholipids in the plasma membrane
- C. Increased levels of dissolved sugars in the cytoplasm
- D. Keeping the cytoplasm at a low water potential compared to the soil solution

Which of the above is related to cold stress?

1. A, B
- ② B, C
3. C, D
4. A, C
5. B, D

20) Select the correct structure-function relationship regarding the digestive tract.

- ① Stomach – conversion of pepsinogen to pepsin by pepsin
2. Duodenum = Secretion of gastrin
3. Duodenum – Mechanical digestion of food
4. Jejunum – Neutralization of chyme
5. Colon – Absorption of triglycerides

21) Select the correct statement regarding the human circulatory system.

- ① Deoxygenated blood enters the pulmonary artery
2. The heart wall is comprised of 4 layers
3. Sometimes nerves are also involved in maintaining the basic rhythm of the heart
4. The blood pressure of humans is 80/120 mmHg
- ⑤ Rhythmic contractions in the walls of lymphatic vessels also involve in the circulation of lymph

22) Select the correct statement regarding the

1. Hairs present in the trachea filter air
2. Lowering of the larynx and the epiglottis happens as swallowing takes place
- ③ The inner surface of the alveoli are covered by a fluid called surfactant
4. Diaphragm contracts during exhalation
5. The main center for the control of respiration is located in pons varoli

23) Select the correct statement regarding immunity.

1. Usually, proteins and lipids act as antigens
2. A specific antigen contains only one epitope
- ③ In cell-mediated immunity, T lymphocytes directly kill antigenic cells
4. Helper T cells produce antibodies
5. Effector cells produced by the lymphocytes live longer; protecting against the relevant pathogens

24) Given below are some statements regarding the formation of urine in humans,

- A. Active secretion of  $K^+$
- B. Passive resorption of water
- C. Passive resorption of  $HCO_3^-$
- D. Active secretion of  $H^+$  into the tubules

Select the events that take place at the distal convoluted tubule.

1. A and B only
2. B and C only

- ③ A and C only
- 4. B and D only
- 5. A B and C only

25) Select the correct statement regarding the human brain.

- 1. Corpus callosum is composed of white matter
- 2. Two of the ventricles are located in the forebrain while the mid brain and hindbrain contains one ventricle in each of them
- ③ The hindbrain contains the cerebellum, Pons varolii, and medulla oblongata
- 4. Hypothalamus is located above and in front of the thalamus and above and in front of the pituitary
- 5. The Corpus callosum belongs to the midbrain

26) When a nerve impulse travels across a synapse,

- 1. The action potential causes the polarization of the presynaptic membrane
- 2.  $Ca^{2+}$  diffuse into the terminal end causing it to depolarize
- 3. Vesicles containing neurotransmitters bind with the postsynaptic membrane and releases neurotransmitters into the synaptic cleft
- 4. Depolarization of the postsynaptic membrane causes it to reach the action potential
- ⑤ Some gasses can act as neurotransmitters

27) Select the correct combination of Hormone – target location,

	Hormone	Target location
1	Prolactin releasing hormone	Mammary glands
②	Luteinizing hormone	Testes
3	Oxytocin	Ovaries
4	Cortisol	Adrenal gland
5	Thymosin	Thyroid gland

28) Select the correct statement regarding the development of the zygote and the embryo.

- ① Morula which results from the division of the zygote reaches the uterus in 3-4 days after fertilization
- 2. A blastocyst is formed 10 days after fertilization
- 3. The umbilical cord is formed by the fusion of the trophoblast of the embryo and the endometrium of the mother
- 4. Implanted embryo does not send hormones to the mother
- 5. Implantation takes place 12 days after fertilization

29) Select the correct statement regarding the human skeletal system.

1. The zygomatic arch is formed by the union of part of the temporal bone and part of the maxilla
2. Ethmoid bone, lachrymal bone, and nasal bone together makes the floor eye orbit
3. Sphenoid bone, Ethmoid bone, maxilla, and the nasal bone contain sinuses
4. The Coronoid process of the mandible articulates with the temporal bone
5. Occipital condyles articulate with the atlas to create a hinge joint

30) Select the correct statement,

1. Widow's peak is a human Mendelian character determined by a recessive allele
2. Both homozygous and heterozygous genotypes in incomplete dominance display similar phenotypes
3. ABO blood grouping in humans is an example of polygenic inheritance
4. Linked genes are located close to each other on the same chromosome
5. Hardy Weinberg equilibrium is valid when random mating does not take place

31) Which statement is correct regarding mutations,

1. X-ray and Infrared are examples of mutagenic physical agents
2. Substitution of a pair of nucleotides of an exon of a gene may cause no change in the amino acid sequence
3. The effect of a mutation is always damaging or neutral
4. Missense mutations cause premature termination of protein synthesis
5. If insertion does not take place close to the start or stop codon, the polypeptide may become nonfunctional

32) In DNA Isolation,

1. In the first step of DNA Isolation from bacteria, bacterial cell walls are digested using lipase
2. DNase is added in the second step
3. SDS prevents the action of enzymes on released DNA
4. DNA is dissolved in cold ethanol
5. Full length of DNA can't be isolated from eukaryotic cells

33) Select the correct combination,

- | Eco-system                        | Plant   |
|-----------------------------------|---------|
| 1. Savanna -                      | Nelli   |
| 2. Marshes -                      | Kadol   |
| 3. Low land rain forests -        | Keena   |
| 4. Tropical montane forests -     | Heressa |
| 5. Dry mixed ever green forests - | Aralu   |



34) Select the answer with the correct example that matches the given threat level according to the IUCN classification.

Threat level	Example
1. Extinct	<i>Crudia zeylanica</i>
2. Critically endangered	Elephant
3. Extinct in the wild	DO- Do
<input checked="" type="radio"/> 4. Endemic to Sri Lanka	<i>Garcinia zeylanica</i>
5. Flagship species of Sri Lanka	Lion

35) Which of the below given, contribute most to increased global temperature?

1. NO<sub>2</sub>
2. CFC
3. Black carbon
4. IR
5. SO<sub>2</sub>

36) Select the correct statement regarding sterilization.

1. Exposing for 1 hour to steam of 121°C at 15 lbs/inch is sufficient to kill all microbes and their spores
2. During incineration, microorganisms are burnt to ash
3. Glassware can be sterilized by keeping at 170 °C for 15min in a dry air oven
4. Microbes are absent in pasteurized milk
5. Membrane filters have slits ranging from 0.01mm – 0.45mm

37) Names of a few pathogens have been given below,

- A. Rubella virus
- B. *Neisseria meningitidis*
- C. *Clostridium tetani*
- D. Hepatitis A virus

Organisms that damage the nervous system are,

1. A and B
2. A and C
3. A and D
4. B and C
5. B and D

38) Microorganisms are used in various industries. One such correct example is,

Industry	Microorganism
1. Production of vitamins	<i>Streptococcus</i>
2. Extraction of metals	<i>Pseudomonas</i>
3. Single cell proteins	<i>Gluconobacter</i>
4. Alcoholic beverages	<i>Aspergillus niger</i>
⑤ Production of vinegar	<i>Saccharomyces cerevisiae</i>

39) One of the primary treatment steps in the purification of water is,

- ① Collection and removal of sludge
2. Vigorous mechanical aeration
3. Allowing wastewater to trickle through a rocky material
4. Sedimentation by adding alum
5. Disinfection by adding chlorine /ozone

40) Select the daily activities that should be followed in maintaining a home aquarium

1. Stirring up the bottom medium gently
2. Siphoning out the scraped algae and debris
3. Replacing half of the water
4. Scraping out of algae from the glass surface
- ⑤ Paying attention to the health condition of the fishes

Use the following table to select the answers for the question from 41 to 50.

1	2	3	4	5
A, B, and D	A, C, and D	A and B	C and D	Any other answer
correct	correct	correct	correct	or a combination correct

41) Some biochemical reactions taking place inside cells are given below. Select the reactions relevant to cellular respiration.

- A.  $\text{Pyruvate} + \text{CoA} + \text{NAD}^+ \longrightarrow \text{Acetyl CoA} + \text{CO}_2 + \text{NADH}$
- B.  $\text{Glucose} + 2\text{ADP} + 2\text{NAD}^+ \longrightarrow \text{Pyruvate} + 2\text{ATP} + 2\text{NADH}$
- ① C.  $\text{RuBP} + \text{CO}_2 \longrightarrow 2\text{x3PGA}$
- D.  $\text{Oxaloacetate} + \text{Acetyl CoA} \longrightarrow \text{Citrate} + \text{CoA}$
- E.  $\text{Phosphoenolpyruvate} + \text{HCO}_3^- \longrightarrow \text{Oxaloacetate}$

42) Select the matching statements

- A. Carbohydrates – Spares proteins
- B. Proteins – Used in the synthesis of some hormones
- 5. C. Lipids - Used in the synthesis of some hormones
- D. Mg – Component of hemoglobin
- E. Vit B – Act as an antioxidant

43) Select the correct statement/s regarding circulatory systems.

- A. In grasshoppers, dorsally blood flows towards the anterior direction while ventrally blood flows towards the posterior direction.
- B. The first closed circulatory systems appear in nematodes
- 2. C. In single circulation, the heart bears two chambers
- D. Most reptiles have three-chambered hearts
- E. Birds have three-chambered hearts

44) Select the correct statement/s regarding immunity.

- A. Both innate immunity and acquired immunity can be seen in all animals.
- B. Various chemicals present in mucus membranes act as chemical barriers.
- 4. C. Lysozyme can destroy the cell walls of some bacteria.
- D. Natural killer cells are a component of innate immunity.
- E. Interferons are secreted by cells infected by bacteria and kill bacteria.

45) Not a function of the medulla oblongata,

- A. Thermoregulation
- B. Connecting the central nervous system with sensory and motor neurons
- 3. C. Coordination in running
- D. Controlling coughing and sneezing
- E. Maintaining balance and posture

46) Select the correct combination/s of structure and function.

- | Structure           | Function                      |
|---------------------|-------------------------------|
| A. Sertoli cells    | Secretion of inhibin          |
| B. Leydig cells     | Secretion of androgens        |
| 5. C. Epididymis    | Helps in maturation of sperms |
| D. Seminal vesicles | Storage of sperms             |

47) Uses of DNA sequencing,

- A. Paternity testing
- B. Identifying criminals
- ② C. Diagnosis of cancers
- D. Figuring evolutionary relationships
- E. Identifying allergens

48) In a non-evolving population,

- A. Mutations do not occur
- B. Selective mating should happen
- ② C. Immigrations and emigrations should not happen
- D. Natural selection does not take place
- E. Population size should be small

49) Select the correct statement,

- A. Cycas of Sri Lanka is conserved under the convention on biological diversity
- B. Sustainable utilization of the components of biological diversity is done under Ramsar convention
- ③ C. Trans-boundary movement of hospital waste is controlled under the Basel convention
- D. Strict natural reserves and jungle corridors are conducted under Fauna and flora protection ordinance
- E. Reduction of emission greenhouse gases to match the targets is done under the Montreal protocol

50) Select the correct statements regarding microorganisms.

- A. In chemoautotrophic bacteria the source of carbon is inorganic
- B. Cyanobacteria are photoautotrophic organisms
- ① C. All fungi are saprotrophs
- D. Most mycoplasmas are parasitic on humans and other animals
- E. In mycoplasmas, the cell walls are composed of proteins and polysaccharides

# Biology

(1)

Grade 13 - Part II - 2021A/L  
structured essay - A Part.

① (A)(i) Following diagram shows an apparatus used to determine rate of respiration using germinating green gram seeds.



I Identify above instrument  
Respirometer.

II seeds soaked in water for 8 hours in the experiment of determining rate of respiration. state the reason for this.

To increase rate of respiration by activation of enzymes.

III Indicate the sequence of actions to be taken to obtain the readings using the above instrument set up to find the volume of oxygen.

1. Insert certain weight of germinating seeds to a flask.
2. Insert a ignition tube with KOH in to the flask
3. Make the apparatus as airtight, using vasline
4. Open the tap, and level the liquid columns and note the initial positions of water columns.
5. Observe and record changes in the water column after 2 hours/ certain time period.
6. Changes in water columns &  $O_2$  volume absorbed within a certain time period.

IV) State the reason to use following materials and methods in this experiment

a) water bath - To maintain a equal temperature

b) using colour water in u-tube - to observe changes in the water column clearly.

V) a) What is meant by galls.

- Bumps and growths that develop on different parts of plants
- after being invaded by some very unique organisms.

b) What is the reason to produce undifferentiated mass of cells by plants.

- when lost balance
- between auxin and cytokinins which is control plant cell division

(B) I State a organism or group of organism which shows following characteristics.

a) unicellular and having glass like cell walls

Diatom

b) presence of pellicle and large chloroplast.

Euglena

c) Both gametophyte and sporophyte are independent and autotrophic

Nephrrolepis

d) presence of open seeds and reticulate veins in leaves Ginkgo

e) presence of fins and cloaca. shark / skate

II What are the respiratory surfaces of following animals of animal kingdom, animalia.

a) Liver fluke - body surface.

b) - internal gills.

c) Frog - skin.

III State the method which take place gaseous exchange through respiratory surfaces diffusion.

Q10) What is the common part belong to both respiratory system and food digestive system of human.

pharynx

b) During swallowing of food has it stop the entering of food in to respiratory

• During swallowing of food the larynx move upward

• close the opening of the larynx by epiglottis

(v) (a) Why does ventilation of human

lungs consider as a negative pressure breathing.

Air is pulled rather than pushed into lungs.

(b) State an important of functional residual capacity.

• Continuous exchange of gas in the alveoli

• Prevent the collapse of the alveoli during expiration.

(c) I Introduce water potential concept. The physical property that predict the direction in which water will flow governed by solute concentration and applied pressure.

II Following diagram shows the initial curvature of ~~the~~ Alocasia leaf of two stripes of Alocasia leaf petioles. From

these stripes A put in a hypertonic solution and B put in a hypotonic solution for 20 minutes.



Draw the final curvature of each stripe in front of <sup>each</sup> the <sup>each</sup> diagram.



- (b) What is the reason for changing the curvature of B stripe.
- Water potential of external solution is higher than tissue cells.
  - Inner side cells of tissue stripes do, endosmosis.
  - So cells opposite side to the green peel get turgid and elongate.

III (a) What is '... ascent of sap?'  
 Water and minerals which enter to vascular cylinders are transported to upper parts of the plant.

(b) What is method of water movement in ascent of sap.

Bulk Flow

(v) What is the accepted hypothesis use to explain ascent of sap.

cohesion-tension hypothesis

(V) What are the important concepts in ascent of sap according to the above mentioned hypothesis.

- Transpiration pull
- Adhesion and cohesion forces of water
- Water potential gradient between the soil solution and atmosphere through the plant body

(2) (A) I The largest organ in the human body is skin. Name the main types of tissues in it

- Epithelial tissues
- Nervous tissues
- Connective tissues
- Muscle tissues.

II What is the type of immunity given by skin.

- External defenses in innate immunity.

III : Write 2 ways of giving above immunity by epidermis of skin

- closely packed keratinized cell layer
- periodic shedding of epidermal cells.
- Lysozyme present in sweat destroy cell walls of some bacteria
- Secretion of sebaceous gland

IV (a) Name 3 types of cells in dermis of skin.

- fibroblasts
- macrophages
- mast cells

(b) What is the adaptation of skin to protect from U.V. rays.

(V)(a) Some cells in the dermis are important in immunisation. What is the type of immunization done by those cells.

- Internal defenses in innate immunity.

(b) State the defense mechanisms of given by those cell separately.

- macrophages cells - phagocytosis / produce cytokines in ~~the~~ inflammatory response.
- mast cells - release histamin important for inflammatory response.

(B) (i) Name ~~the~~ the part of the brain which locate human body's temperature ~~regul~~ control center.

Hypothalamus.

(ii) When a person is in a hot surrounding, how it is detected

- \* by stimulating ~~to~~ warm receptors in the skin.

- \* by stimulating ~~organ~~ of ruffini and free nerve endings.

(iii) Write a heat gain mechanism to increase the body temperature until the ~~pres~~et point, when a person is in a cold surrounding.

- Reduce heat loss by constricting peripheral blood vessels of skin

IV Write two other regulatory processes done by the part of the brain which is locate the body's temperature

control centre.

- Regulate thirst and water balance
- Regulate appetite / regulate sleep and wake cycles / control of autonomic nervous system.

V a) ~~an~~ what is meant by positive feedback mechanism.

- Output or end product of a process speeds up relevant process.
- amplifying the change.

b) Write ~~two~~ examples for the positive feedback mechanism of human body

- releasing milk from the mammary glands / milk ejection.
- child birth / contractions of uterus in child birth.

(C) 2 What are the factors determine excretory product on substrate.

• chemical structure and composition of substrate.

• Availability of enzymes.

• Oxygen availability.

• habitat in which they live.

II What is the main excretory product of following animals. (5)

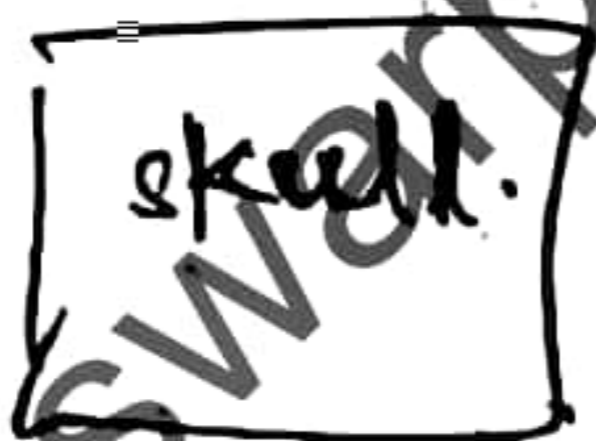
- a) Tadpole - Nitrogen / Ammonia
- b) terrestrial snail - Uric acid
- c) Shark - urea
- d) crow - Uric acid

III What is the difference between CKD and CKDU.

• CKD is gradual loss of kidney function over time and many reasons are affected to it.

• CKDU is gradual loss of kidney function over time and root cause has not been ~~identifi~~ definitively identified

IV Human skull is given in the following diagram. Answer following questions regarding it.



a) What is the cranial capacity.  
• 1.5L / 1500cm<sup>3</sup>

b) Name labels using an arrow

In the above diagram, label & show the cranial and facial bones which contain processes using an arrow.

• cranial - temporal bone

• facial bones - zygomatic

V What are sutures. state the importance of it.

- Immovable joints - present between the skull bones
- provide more protection.

### Essay questions

8 Explain the process of DNA replication in eukaryotic cell.

9 a Briefly describe the using of microbial metabolic ~~end product~~ products in industries.

b What are the advantages of using microbial processes over chemical processes.

c Briefly describe the immunization - vaccines in controlling microbial diseases.

10 Write short notes on  
a) Human sex ~~image~~ determination  
b) Desertification.  
c) General characteristics of species that could be cultured in a. aquarium.

# Biology - Grade 13

final term test - 2021

## Biology - II

### Part A - Structured Essay

- ③ A. Flowers of a certain plant species are purple, white and pink. Due to interaction of two genes P allele is responsible for the formation of purple flowers and R allele is responsible for pink flowers. Presence of both P and R alleles responsible for white flowers. p and r alleles are recessive for P and R alleles.

I Write the phenotype that produce by following genotypes.

	<u>Genotype</u>	<u>Phenotype</u>
a)	PPrr	• Purple flowers.
b)	PpRr	• White flowers.
c)	RRpp	• Pink flowers.
d)	rppp	• White flowers.

II What is the frequency of offspring progeny bear white flowers by the cross between (b) and (d) ?

• 50%

III a) What is meant by polygenic inheritance?  
• Inheritance of a ~~primary~~ phenotype such as quantitative characters which results from a cumulative expression of two or more genes.

b) Write three human characters that occur by polygenic inheritance.

- skin colour
- height
- intelligence quotient

IV do you explain the How a distribution of data for a polygenic character in a population.

- by normal distribution curve.

V a) Explain the reason for Haemophilia can be seen <sup>more in</sup> among males than the females.

- It causes due to a linked recessive allele on X sex chromosome.

• It should be homozygous recessive condition to occur this disorder due to female bear XX condition.

• males bear only one X chromosome therefore they easily expressed this disorder.

b) Name the product that produce to treat Haemophilia patients by the use of genetically modified organisms.

- factor VIII use to coagulate blood.



B. I What is meant by DNA packaging?

- Consisting of DNA in Nucleus or Nucleotide

II Write the sequential levels that follow the process of packaging of DNA in Eukaryotic cells.

- The double helix winds around a complex of eight histone molecules / formation of nucleosomes.

- nucleosomes twist and packed in a spiral fashion / formation of chromatin fibre.

- forms loops / looped domains, attached to a protein scaffold.

- the looped domains coil, fold & further compact / form mitotic chromosomes.

III Mention the term 'Genome Library'.

- a collection of microbial cultures
- each propagating a different fragments of a total ~~DNA~~ genomic DNA.

IV a) Which molecules are <sup>isolated</sup> ~~extracted~~ from tissues in the formation of cDNA libraries? 2

- mRNA

b) Mention the ~~both~~ role of following enzymes in the formation of cDNA library

(i) Reverse transcriptase - • to reverse transcribe / DNA strand complementary to the mRNA.

(ii) DNA polymerase - • to obtain double stranded cDNA.

V Name the vector that use to insert in gene transformation of by using Agrobacterium.  
• Ti plasmid / tumour inducing plasmid.

C: I Molecules are included in the Domain Bacteria. Write a specific character of Molecules.  
• lack cell wall.

II a) Name two types of Molecules.

- Mycoplasma
- Phytoplasma

b) Write a physiological similarity of the above mentioned two types.  
• aerobic and facultative anaerobic

III What is the aim of <sup>method</sup> ~~process~~ of sterilization?  
• removal or destruction of all forms of microbial life including endospores.

IV Name the sterilization methods of followings.

a) inoculation loops - • heating them on the flame until

- b) Bottled milk - • heating to high temperature / UHT
- e) Plant nurseries - • UV Radiation
- d) Antibiotics - • filtration / membrane filters
- e) Mattresses in hospitals - • Use Ethylene Oxide

V a) Write two specific characteristics of pathogenic micro-organisms.

any 2

- Having optimal growth conditions that corresponds to the body conditions of the host.
- Having structures to adhere to the host cells & protect against host's defense mechanisms.
- Produce toxins.
- Having enzymes for invasiveness.
- Having enzymes to alter the host's metabolic processes.

b) Name the micro-biological technology that use in ~~environmental~~ environment management.

- Bioremediation

vi What is the step that contribute symbiotic micro-organisms among the steps of natural Nitrogen cycle?

- fixation of Atmospheric Nitrogen / bio - Nitrogen fixation

Marks →

40 x 2.5 →

100

4) A. Given below is a diagram with the parts of a typical flower of Anthophyta.

diagram

I Name the parts a, b, c, d and e of the above diagram.

- a - Anther
- b - filament
- c - ovary
- d - style
- e - stigma

II Identify: X and Y

- X - Stamens
- Y - carpel

III What are the structures of Cycas those related to X and Y?

- X - Microsporophylls
- Y - Megasporophylls

IV a) What is a future fate of 'c' after the fertilization?

It becomes a fruit.

b) What is meant by parthenocarpy?

Ovary is developed into a fruit without fertilization.

V Write an example for ~~each~~ natural and artificial parthenocarpy.

Natural - Banana.

Artificial - grapes / Orange.

B. I What is meant by Biological resources?  
• Genes, species and ecosystems of:

II Given below are the several values of biodiversity. Name the main fields that consists of the following values.

- Carbon dioxide fixation through photosynthesis - Environmental service value.
- Sacred places - Religious value.
- Photography - Recreational value.

III Name a medical plant that threats due to overexploitation and name an animal who export for medical purposes.

- Plant - Kotalahimbudu / Salacia reticulata
- Animal - Sea cucumber.

IV formation of National parks under the processes of conservation of biodiversity.

a) How, this type of conservation methods are known, as In-situ conservation.

b) What are the main facts should be taken to ensure the conservation of process that you mentioned above?

- a large 'enough' population.
- adequate, appropriate habitat space.
- the space is protected by its reproduction facilitated.
- in its natural habitat.

Q a) What are the main factors that affect for desertification?

- Deforestation.

b) What are the International Conventions/ Protocol has to be taken related for following mesoactivities?

- (i) United Nations Framework Convention on Climate Change - Kyoto protocol.
- (ii) Wise use of wetland and their resources - Ramsar Convention.

C. I. What is meant by protected cultivation of crop / Protected agriculture?

- growing crops under controlled environmental condition.

II. Write two advantages of a protected cultivation.

- Protect plants from adverse climatic conditions.
- to achieve maximum yield and best quality.

- iii a) What is meant by tissue culture ?
- ability to establish plant tissue / cell / callus / protoplast, plant organs / embryos / shoots / roots.
  - in-vitro culture.
  - in special media / culture media.

- b) What is the main concept that based on the tissue culture ?
- totipotent.

iv Write two incidences where nano cells were used in medical and biological field :

- treatment of cancer.
- in bio imaging.

v a) Write two cytological characters of stem cells.

- divide by mitosis without a limit.
- capable of terminally differentiation into other cell type / divide at a relatively low rate (not rapidly)

b) What is the sources which obtain embryonic stem cells ?

- Inner cell mass of blastocyst.

Marks -

40 point x 2.5

100

Biology - Grade 13.

final term test - 2021

Time - two hours.

Part B - Essay.

Write four questions only.

- ⑤ I Explain the fine structure of a typical Chloroplast.  
II Describe the importance of  $C_4$  pathway of photosynthesis and explain the structural adaptations of those plants.
- ⑥ I Explain the responses of plants for abiotic stresses.  
II Briefly describe the terrestrial adaptations of Nepenthes.
- ⑦ I. Name the main parts of human brain those are developed from embryonic forebrain and explain the structure of largest part of among those.  
II Briefly describe the mechanism of hearing of human ear.



Essay

3rd term 2021

- 5) I
1. a biconvex lens shaped organelle.
  2. surrounded by two membranes / double membranes
  3. inner & outer membranes are smooth structure.
  4. they are separated by a very narrow intermembrane space.
  5. inside the chloroplast, there is another membrane system.
  6. they are thylakoids. (flattened & interconnected sacs)
  7. thylakoids contains complexes called thylakoids.
  8. which are made by photosynthetic pigments.
  9. thylakoids stacked to form granum.
  10. grana are interconnected by inter granal lamellae.
  11. the fluid outside the thylakoid is stroma.
  12. it contains circular DNA.
  13. 70 S ribosomes.
  14. many enzymes.
  15. starch granules &
  16. lipid droplets.

diagram of chloroplast.

(in resource book)

II

1. Helps plant to improve the efficiency of  $\text{CO}_2$  fixation at lower  $\text{CO}_2$  concentrations
2. by preventing the gateways for photorespiration by spatially separating Rubisco.
3. In hot-dry climate, it is essential to the stomata to close to prevent water loss through transpiration.
4. This reduces  $\text{CO}_2$  intake of particular plants.
5. therefore, plants in tropical zones or hot climate may suffer from  $\text{CO}_2$  deficiency.
6. At lower  $\text{CO}_2$  concentration,  $\text{C}_4$  mechanism increase the efficiency of photosynthesis by concentrating  $\text{CO}_2$  in the bundle sheath cells.
7.  $\text{C}_4$  plants exhibit better water-use efficiency than  $\text{C}_3$  plants.
8. because of the  $\text{CO}_2$  concentration mechanism, they can acquire enough  $\text{CO}_2$ .
9. even when keeping their stomata more closed
10. then water loss by transpiration is reduced.
11. Rubisco can operate under high  $\text{CO}_2$  concentration in the bundle-sheath cell.
12.  $\text{CO}_2$  works more efficiently <sup>in  $\text{C}_4$</sup>  than  $\text{C}_3$  plant.
13. therefore  $\text{C}_4$  plants need less Rubisco enzyme
14. it leads to better Nitrogen-use efficiency of  $\text{C}_4$ .
15. bundle-sheath cells are enlarged in  $\text{C}_4$  species.
16. and its contents has higher organelle content.
17. Close contact between mesophyll and bundle sheath cells are tightly interconnected to each other by plasmodesmata and.
18. Presence of high number of plasmodesmata
19. Presence of Kranz-Anatomy / bundle sheath cells enclosed the vascular bundles of air

21. Bundle sheath chloroplasts possess a very few, less differentiated grana or grana are absent.

22. then PSI in the bundle sheath cells are depleted in order to lower oxygen production in these cells.

23. PEP carboxylase in mesophyll cells reacts with  $\text{HCO}_3^-$  rather than with  $\text{CO}_2$ . therefore there is a 50-fold higher concentration of  $\text{HCO}_3^-$  than  $\text{CO}_2$  in solution in the cytosol. PEP carboxylase has no affinity for  $\text{O}_2$ .  $\text{CO}_2$  fixation occurs twice.



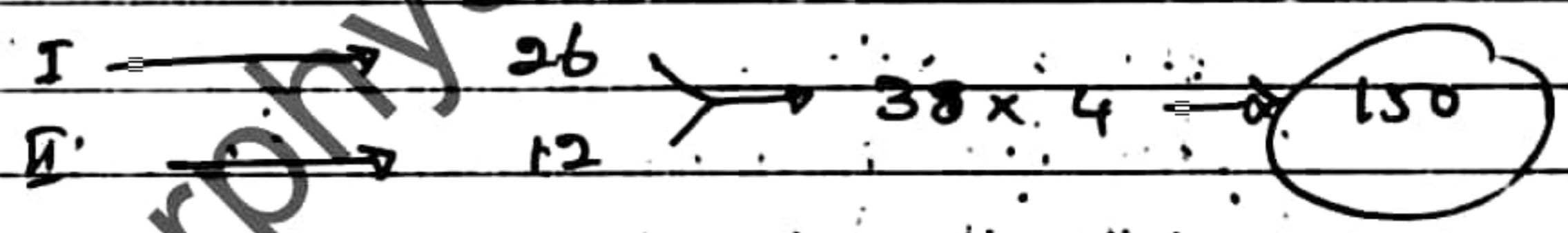
150

6) Abiotic stresses may cause adverse effects on plants for their survival, growth & reproduction

- Common abiotic stresses are,  
Drought stress.
- Cold stress and.
- Salt stress
- Plant may wilt when water loss by transpiration exceeds water absorption.
- Prolonged drought may even kill a plants.  
plants have control systems / to cope with the drought / water deficit condition
- Water deficit stimulates increased synthesis of and release of abscisic acid / ABA.
- Which acts on guard cell membrane, closing stomata to reduce transpiration.
- in some the leaves roll and reduces the...

- [ ]
10. Plants shed their leaves during seasonal drought
  11. In cold stress, when cell membrane cool below below a critical temperature it loses its fluidity.
  12. due to the lipids become locked into crystalline structure.
  13. then blocks the transport across the membrane.
  14. altering the lipid composition of the membrane.
  15. increase the proportion of unsaturated fatty acids & keeps the membranes more fluid at low temperature.
  16. freezing is another cold stress.
  17. Water in the cell wall and intercellular spaces freezes before freezing the solute-rich water in the cytosol.
  18. before the onset of winter, (the cells of frost tolerant) increases cytoplasmic levels of specific solutes / sugars and
  19. help to reduce the loss of water from the cell preventing dehydration.
  20. In salt stress, an excess of salts / high salinity in soil lowers the water potential of soil.
  21. it leads to reduction of water uptake by roots.
  22. too high salinity in soil is toxic to plants.
  23. many plants can respond to moderate soil salinity by
  24. producing solutes that are well tolerated at high concentrations.
  25. A few plants that are salt tolerant / halophytes have developed salt glands.

1. Sporophyte is dominant.
2. Plant body is differentiated into stem, roots and leaves.
3. Cuticle is found in arial parts.
4. Stomata are developed on arial parts.
5. Xylems and phloems are developed in vascular tissue.
6. have fiddlehead young leaves.
7. stolons arise from the rhizome / asexual reproduction by stolons.
8. sori / sporangia are covered by indusium
9. numerous spores / sporangia are produced. (underside of the leaves, leaflets)
10. spores are dispersed by wind.
11. fix the plant to the soil by well developed root system.
12. Present large / compound leaves.



Q7

1. Cerebrum
2. Thalamus
3. Hypothalamus and
4. diencephalon
5. cerebrum is the largest part.
6. divide by a deep cleft into right and left cerebral hemispheres. (two parts)
7. two cerebral hemispheres are connected by
8. corpus callosum.
9. superficial part of the cerebrum is composed of nerve cell bodies.
10. It is cerebral cortex (with gray matter)

12. called white matter / medulla

13. cerebral cortex shows many infoldings

14. Each cerebral hemisphere is divided into four lobes.

15. frontal lobe.

16. temporal lobe.

17. Parietal lobe.

18. Occipital lobe.

19. thalamus is situated within the cerebral hemispheres just below the corpus callosum.

II

1. Outer ear collects and concentrates the sound waves ↓

2. direct them along the auditory canal towards the tympanic membrane. then,

3. tympanic membrane to vibrate.

4. these vibrations are transmitted and amplified the middle ear.

5. by the movements of three jointed ear ossicles.

6. <sup>transmit</sup> towards the inner ear.

7. ear ossicles transmit the vibrations to the oval window which is located on the membrane of the cochlear surface.

8. Pressure waves are created in the perilymph inside the cochlea.

9. Then pressure waves enter the vestibular canal.

10. they push down on the cochlea duct and the basilar membrane.

11. as a result, the basilar membrane and attached hair cells vibrate up and down.

12. bending of hair projecting from the hair cell ~~cell~~ against the fix tectorial membrane.

auditory hair cells: and

- 15. generating the ~~reverse~~ nerve impulses.
- 16. nerve impulses are passed to the auditory area of the brain. (temporal lobe of the cerebrum)
- 17. for sound perception.
- 18. After the sound perception, the fluid wave is finally dissipated into.
- 19. the middle ear by vibration of the membrane of the round window.

$$\begin{array}{r}
 I \longrightarrow 19 \\
 II \longrightarrow 19 \\
 \hline
 38 \times 4 \longrightarrow 150
 \end{array}$$

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## Essay questions

⑧ Explain the process of DNA replication of eukaryotic cell.

1. This is the process which copies a double stranded DNA molecule to produce two identical copies.
2. The entire replication process is controlled and coordinated by a number of enzymes and other proteins.
3. DNA is synthesized on the existing DNA strands of the double helix of the DNA molecule.
4. Newly synthesized DNA double helix contains one parent DNA strand and a new complementary strand.
5. First tightly packed DNA has to relax.
6. This is done by helicase enzyme.
7. With the expense of energy as ATP
8. unwind the double helix and separate the two strands of a DNA molecule.
9. The separation of the double helix occurs at the 'origin of replication'.
10. The separation occurs by breaking hydrogen bonds between the base pairs of the two strands.
11. 'origin of replication' or 'ori' is a specific sequence of DNA to which proteins that initiate DNA replication bind.



12. Starting from "ori", the entire circular DNA is replicated in both directions.
13. Enzyme synthesizing the new DNA strand can move only in one direction 5' to 3'.
14. Synthesize a new DNA strand on a template, complementary deoxyribonucleotides
15. should be added one after the other in correct sequence.
16. This is done by DNA polymerase.
17. To initiate polymerization a primer is used.
18. Primase is a type of RNA polymerase.
19. One polynucleotide strand synthesized continuously..
20. Other strand synthesized as small fragments.
21. Continuous strand is called leading strand.
22. Strand synthesized as fragments is called lagging strand.
23. Small fragments of lagging strand are called Okazaki fragments.
24. Topoisomerase enzyme work ahead of the direction of DNA synthesis.
25. It introduce breaks on one or both strands of DNA.
26. Twist the molecule to relieve the strain.
27. Single strand binding proteins.
28. molecules bind to exposed single stranded

29. When a wrong nucleotide is added to the growing chain of DNA, this mismatch is identified by DNA polymerase
30. It stops adding next nucleotide. and remove the incorrect nucleotide by exonuclease activity and
31. continues again its polymerase activity.
32. It is called proofreading activity of DNA polymerase.
33. Another type of DNA polymerase identifies DNA-RNA hybrid.
34. Remove ribonucleotides and replaces those with deoxyribonucleotides.
35. and replace the RNA primer with DNA.
36. DNA ligase :: enzyme
37. join the newly synthesized adjacent fragments
38. making a complete strand by the formation of a phosphodiester bond.

$$38 \times 4 = 150$$

9) Briefly describe the using of microbial metabolic end products in industries.

1. Alcohol and alcoholic beverages.

2. Yeast / Saccharomyces cerevisiae . ferment sugars

3 into ethanol and it used as a alcoholic beverage.

4. eg: beer / wine / toddy / sake

5. Production of vinegar. - there are 2 steps.

6. In 1<sup>st</sup> step sugars in malted grains / sap of palms / sugarcane and fruit juices

7. fermented by Saccharomyces cerevisiae into ethanol.

8. Second step is acetic acid fermentation

9. Ethanol under goes incomplete oxidation and converted to acetic acid.

10. Involves Acetobacter sp and Gluconobacter sp.

11. Dairy products are made by fermentation of milk.

12. eg: Sugar lactose in milk fermented into lactic acid.

13. Curd and Yoghurt is produced by

14. A mix population of Lactobacillus bulgaricus and Lactococcus lactis

15. and Streptococcus thermophilus

16. Streptococcus sp. and Penicillium are used in production of cheese.

- 18 To produce organic acids,
- 19 Fermentation substrates such as beet  
or cane molasses and
- 20 organisms such as Aspergillus niger are used.
- 21 Produce antibiotics by microbial fermentation
- 22 Tetracycline  $\Rightarrow$  Saccharomyces aureofaciens.
- 23 Penicillin  $\rightarrow$  Penicillium chrysogenum/  
Streptomycin  $\rightarrow$  Streptomyces griseus

- (b) What are the advantages of using microbial processes over chemical processes
1. Simple nutritional requirements are sufficient for their growth.
  2. They are able to convert a wide range of materials.
  3. They are able to convert cheap raw materials into industrially important products.
  4. Due to higher growth rate, they can convert the raw materials into products within a short period of time.
  5. Their growth conditions can be controlled to obtain desired end products.
  6. Reactions can be carried out at low temperatures, energy and pressures compared to the conventional industrial methods.
  7. They give higher yield with higher specificity.

(c) Briefly describe the immunization vaccines in controlling microbial diseases?

\* there are 3 types of vaccines.

1. Live attenuated vaccines.

2. contain live pathogens which were deliberately weakened for its pathogenicity.

3. provide lifelong immunity

4. eg: Measles / Mumps / Rubella (MMR)  
chicken pox.

5. Inactivated vaccines.

6. Pathogenic microorganism is inactivated or killed in the vaccine.

7. eg: rabies / Influenza / Polio / bacterial disease like cholera.

8. Subunit vaccines.

9. These vaccines contain only the antigenic fragments of a pathogen that can induce immunity.

10. contain inactivated toxins.

eg: Hepatitis B vaccines /  
Diphtheria / Tetanus.

$$\frac{a}{b} = 20$$

$$\frac{b}{c} = 8$$

$$\frac{c}{d} = \frac{10}{20 \times 11} = 150$$

⑩ Write short notes on

(a) Human sex determination.

1. Sex is determined by the expression of sex chromosomes.
2. Sex chromosome expressing male traits are named Y chromosome
3. Other chromosome is X
4. On the occurrence of gametogenesis in females, meiosis yields haploid eggs carrying 100% X chromosomes
5. in males, half the number of the haploid sperms produced, carry X chromosome
6. and the remaining half Y chromosomes.
7. During the fertilization of male and female gametes, the occasions where both egg and sperm carry X chromosomes results in a female zygote
8. An occasion where an egg fuses with a sperm carrying Y chromosome results in a male zygote.

## (b) Desertification.

1. Desertification means process of land degradation.
2. In arid, semi-arid and sub-humid areas
3. resulting from various factors including climatic variations &
4. human activities
5. deforestation is another main factor in desertification
6. over-exploitation of water and soil
7. uncontrolled mining
8. excessive use of agro-chemical products
9. poor land management practices also caused to desertification.
10. decrease ecosystems services and
11. reduced bio-diversity
12. decreasing of the vegetation cover induce water scarcity.
13. destroys habitats of animal and plant species
14. reduces agricultural activities mainly the growth of crop species.
15. It affect to the food security of the people and animals.
16. presents a serious impact on the human well-being and health of the people living in the areas affected by droughts and land degradation
17. Carbon storage capacity of plants and soils will also reduced in the long run.

(c) General characteristics of species that could be cultured in a aquarium.

1. Selected species should withstand the climate of the region in which it is cultured.
2. It should grow well in prevailing physical and chemical parameters of water in the area.
3. It should be easy to breed - sufficient number of fertilized eggs could be obtained.
4. Techniques of incubation of fertilized eggs and rearing techniques of hatchlings should be available.
5. eggs, larvae, fry, fingerlings, juveniles and adults of the species are easy to handle.
6. Food and feeding habits of each developmental stage of the species should be known.
7. It should not reproduce in grow-out ponds/tanks.
8. If it reaches sexual maturation relatively late; it is advantageous.
9. It should accept formulated food and grow well.
10. It should be an efficient converter of economical feedstuffs.
11. If it is accidentally released to natural water bodies, there should not.



12. It should tolerate high population density & grow well
13. Having resistance to common diseases in advantageous.
14. It should satisfy consumers by the taste, nutritive value, texture of flesh / i.e. appearance / body colour / colour patterns

a-8

b-17

c-14

39

any 38/39 x 4

150

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