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Third Term Test - Grade 13 - 2026

9

E

I

Index No:

BIOLOGY - I**02 Hours****Instructions:**

- Answer all questions
- In each of the question 01 to 50, pick one of the alternative on from (1), (2), (3), (4), (5) which is correct or most appropriate and mark your response on the answer sheet.

(01) Which of the following statements regarding water is correct?

- A - Act as a reactant in biochemical reactions.
 B - Density of water increases as temperature decreases.
 C - Prevent over heating of surface of plant body due to high light.
 D - Water act as an electron donor.

- (1) A and B only (2) A and C only (3) A, C and D only
 (4) C and D only (5) B, C and D only

(02) Which of the following statements given in the table regarding main compound found in living matter is correct ?

	Cabohydrate	Protein	Lipids
(1)	Macromolecules	Macromolecules	Not macromolecules
(2)	Elements are C,H,O	Elements are C,H,O,N	Present C,H,O
(3)	Water soluble	Water insoluble	Water insoluble
(4)	Components of structure and storage	Storage component but not structural	Structural and storage component
(5)	The most abundant organic compound on the earth	Have four strctural level	Variable group of compound

(03) Which of the following is incorrect regarding biochemical molecule act as hereditary materials in all living organisms ?

- (1) Store genetic information by sequence of codon
 (2) Directly involve in polypeptide synthesis
 (3) Have antiparallel and similar back bones for every molecule
 (4) Double helical structure and bears twenty nitrogenous bases in a complete turn.
 (5) Has an ability to self replicate very accurately

(04) Which of the following magnification of eye piece lens and objective lens combination is correct regarding observing high number of cells in *Tradescantia* peel in visual field in compound light microscope?

- (1) 5×40 (2) 5×45 (3) 5×100
 (4) 5×10 (5) 5×20

(01)

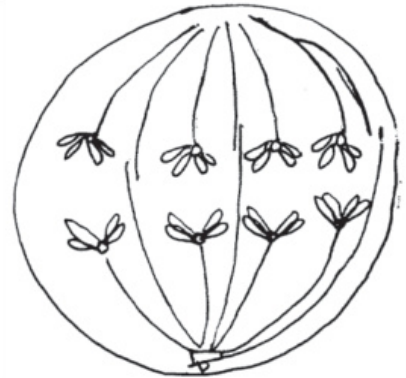


(05) Which of the following combination is correct regarding statements proposed for structural components in a living cells?

- (1) Cell wall - Extracellular structure always possesses cellulose composition.
- (2) Smooth ER - Synthesize phospholipids, doesn't act as membrane factory.
- (3) Central vacuole - large fluid filled cavity found all cells.
- (4) Cytoskeleton - Static structure build up with protein and microtubule
- (5) Mitochondrion - Only involve in cellular respiration.

(06) Which of the following statements is / are incorrect regarding the phase of cell division given in the diagram?

- A - Segregation of dominant and recessive alleles
- B - Have four sets of homologous chromosomes
- C - Human liver cells have such stage
- D - Kinetochore microtubules shorten and microtubules which connect two poles are lengthen
- E - Two genetically non identical nuclei are produced immediately after this phase.



- (1) B and C
- (2) A and B
- (3) A, B and C only
- (4) B, C and D only
- (5) B and E only

(07) Which of the following statments regarding process of photosynthesis is correct ?

- (1) Only globe importance is fulfil energy requirement of living organims.
- (2) Sugar is produced by reduction of CO_2 by hydrogen in water using light energy.
- (3) Two path ways of photosynthesis present acording to first product during corboxylation
- (4) Chlorophyll pigment directly involve in light reaction in photosynthesis.
- (5) Spliting of water occurs at all photosystems in light reaction of photosynthesis.

(08) Which of the following statements regarding theories of evolution is/are incorrect ?

- A Long muscular neck of the giraffe had evolved over many generations as giraffe stretch their necks.
- B Over production and Natural selections are the observations in Darwin's theory
- C Only Darwinian theory and the knowledge of Mendelian genetics developed in Neo-Darwinism

- (1) A only
- (2) B only
- (3) C only
- (4) A and B only
- (5) A, B and C only

(09) The statement not incompatiable with domain which include methenogenic bacteria is?

- (1) Unicellular prokaryotic.
- (2) Size - Most are $0.5 \mu\text{m}$ - $5 \mu\text{m}$
- (3) No peptidoglycan
- (4) Live only in extreme environment
- (5) Some hydrocarbons are branched in membrane lipids.

(10) Which of the following combinations is correct regarding characteristic shown by each Phylum?

features	clan
1 Possesses, xylem vessels, produce seed.	(a) Lyocophyta
2 No xylem vessels produce seeds,	(b) Pterophyta
3 Heteroporous, arranged heterophylls as pairs.	(c) Bryophyta
4 Highly dissected leaf blade, homosporous.	(d) Gnetophyta
5 No true leaves, homesporous.	(e) Cycadophyta

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

(11) Which of the following is common to both kingdom Protista and fungi ?

- (1) Mode of the nutrition
 (2) Cell wall components
 (3) Storage food
 (4) Having unicellular and multicellular type
 (5) Having contractile vacuole

(12) Which of the following is not an adaptation of a plant for capturing light?

- (1) Possession of vertically arranged leaves
 (2) Elongation of plant stem
 (3) Having various branching pattern
 (4) Arrangement of leaves on the plant stem
 (5) Possession of broad leaves in plant in tropical rain forest.

(13) A Several type of cells in vascular tissues in plants are given below.



A



B



C



D

Which of the following statements is correct regarding combination of structure and functions?

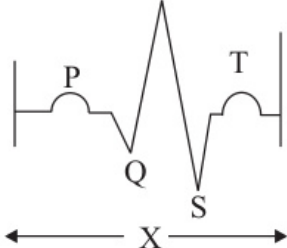
- (1) All of these cell types are important in transportation and support
 (2) Free movement of water take place from B to D through sieve plates
 (3) All vascular plants contains C Involve in transportation of organic nutrient
 (4) B is too short and broad than D processes thin cell wall. Important for transportation and support.
 (5) A, B and D belong to vascular tissue system and are lignified, dead cells.

- (14) The data taken from an experiment that do in the school laboratory to find water potential of lower epidermal peel of *Rhoeo* are given below.

Molarity of sucrose solution mol dm^{-3} (M)	0.1	0.2	0.3	0.4	0.5	0.6
Solute potential KPa	-260	-540	-820	-1120	-1450	-1800
Percentage (%)	3	15	50	80	85	100

Which of the following statement is incorrect regarding above data?

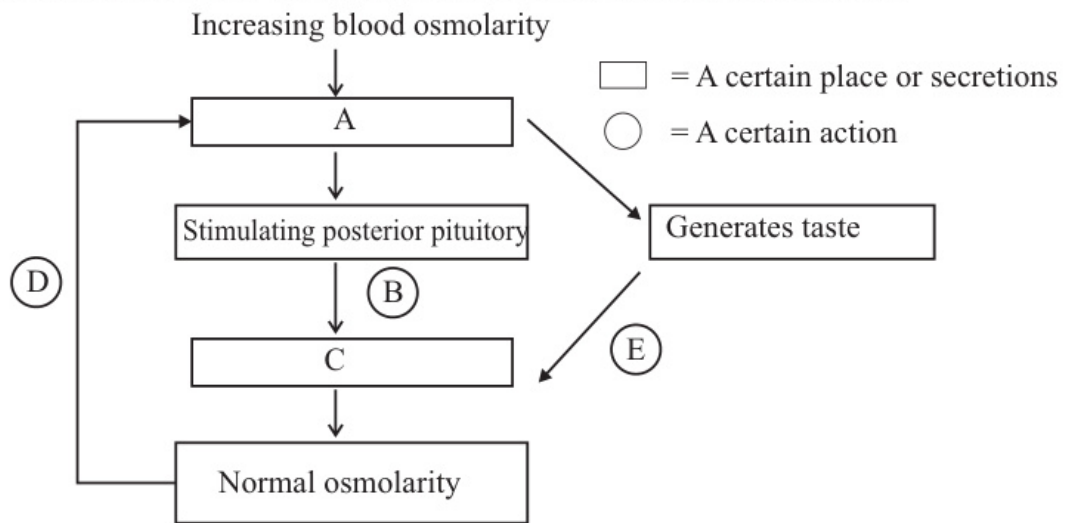
- (1) Molarity of the sucrose solution that create incipient plasmolysis is 0.3
 - (2) Pressure potential of Cells that dip in 0.6 M sucrose solution is positive value.
 - (3) Cells in the visual field is counted by using mid power of the compound light microscope
 - (4) Solute potential of *Rhoeo* lower epidermal peel is - 820
 - (5) Mount fragments of each *Rhoeo* epidermal peels in a drop of the sucrose solution from which peels were immersed.
- (15) Which of the following is true regarding plant nutrition?
- A - Mineral elements that cause strong chlorosis in mature leaves absorbs only as anion.
 - B - Mineral element that cause thick leathery and discolored leaves and cofactor in chlorophyll synthesis is absorbed from soil solution as an anion.
 - C - Mineral nutrient that cause purpling of veins, poor flowering and fruiting component of ATP
- (1) A only
 - (2) B only
 - (3) C only
 - (4) All A, B and C
 - (5) B and C only
- (16) Which of the following is not an example for a photomorphogenesis in plant?
- (1) Seed germination
 - (2) Increasing height of plants grown under canopy layer
 - (3) Flowering
 - (4) Gravitropism
 - (5) Shoot elongation and phototropism
- (17) Following statements are on animal tissues
- A - Cells in tissue closely packed
 - B - Dice shaped cells
 - C - Involved in reabsorption
 - D - Target site for Aldosterone
- Which of the following response is the correct location of this tissue?
- (1) Salivary glands
 - (2) Lining of small intestine
 - (3) Proximal convoluted tubule
 - (4) Endothelium of blood vessels
 - (5) Distal convoluted tubule
- (18) Which of the following is similarity between parts of the stomach and duodenum in the human digestive tract?
- (1) Role of amylase enzyme
 - (2) Having large permanent circular folds
 - (3) Reabsorption of water by osmosis
 - (4) Mechanical digestion by muscle contraction
 - (5) Emulsification of fat

- (19) Which of the following is incorrect regarding food that taken for healthy life ?
- (1) Negative effect on good health occurs as all essential nutrients required for good health is not in appropriate proportion.
 - (2) Diabetes arises when energy expenditure of an active person is much less than the energy intake.
 - (3) If fibres present in diet, prevent gastrointestinal disorders.
 - (4) Allergy reactions can occur in some persons due to some food varieties.
 - (5) Malnutrition arises due to deficiency of one or more essential nutrients.
- (20) Which of the following is not a function of transport system in animal body?
- (1) Transportation of O_2 from respiratory substrate to tissues.
 - (2) Transportation of nutrients from absorptive site to emulsifying site.
 - (3) Removing of non - absorptive materials from the body
 - (4) Carrying hormones from the places where they synthesized to target site.
 - (5) Transportation of CO_2 from tissue to respiratory substrate.
- (21) Which of the following statement regarding the graph given below is incorrect?
- (1) Shows electrical activities of heart muscles in a cardiac cycle
 - (2) Atrial depolarization exhibits by P wave while ventricular repolarization exhibits by T wave.
 - (3) X shows time ;period for a cardiac cycle
 - (4) No atrial repolarizations occur in the person
 - (5) Q, R and S complex represent ventricular depolarization
- 
- (22) Select the correct statement,
- (1) Occuring of AB blood group is codominance and both A and B antibodies present in blood plasma.
 - (2) It is always dangerous when Rh^+ fetus concieve in Rh^- mother
 - (3) The ability of blood recipiency is high in a person with AB^- than AB^+
 - (4) Rh^+ antibodies already present in persons blood who did not recieve blood from blood transfusion
 - (5) It is very important of matching of presence of antigen in red blood cells in donor with antibody in blood plasma in recipient.
- (23) Which of the following combination is correct regarding homeostatic control in human respiration?
- A - Inereasing CO_2 level in tissues - increase blood pH
- B - Removing of CO_2 as increasing of depth and speed of respirations - set blood pH level up to normal value
- C - Activate circuits in pons varolli - increase depth by decreasing speed of respiration.
- D - Decrease pH level in cereberospinal fluid - Identify by sensors in medulla oblongata
- (1) A, B and C
 - (2) A, B and D
 - (3) A and C
 - (4) B and D
 - (5) C and D



- (24) Which of the following occurs when pathogen tries to break down of the first level barrier defense and try to enter into the body ?
- (1) Providing chemical protections by mucus membranes
 - (2) Action of sweat and sebaceous glands
 - (3) Action of complementary protein and interferon
 - (4) Action of cytotoxic T cells.
 - (5) Destroying of pathogen by antibodies.

- (25) The flow chart given below describes action of hormones on activity of kidney.



Which of the following is incorrectly represent when labelling A - E ?

- (1) A - Osmoreceptors in Hypothalamus
 - (2) B - Releasing ADH
 - (3) C - Reabsorption of water at proximal and distal convoluted tubule
 - (4) D - Inhibition of activity
 - (5) E - Drinking of water
- (26) Which of the following regarding action potential in a neuron is incorrect?
- (1) Any stimulations can generate an action potential
 - (2) Na^+ channels which embedded in plasmamembrane opens for depolarization, from polarization.
 - (3) Na^+ channels closed and K^+ channels still opens as membrane become to an action potential
 - (4) Charges inside the membrane become negative as repolarization take place.
 - (5) Na^+ channels closed at hyperpolarization.
- (27) Activities of eye at vision are given below.
- A - Cones stimulate at every light conditions
 - B - Action of external eye muscles are important for foccusing the object closest to the eye.
 - C - Relaxation of cilliary muscles occurs as observing distant object.

Which of the above statement/s is/are correct?

- (1) B only
- (2) A only
- (3) C only
- (4) B and C only
- (5) A and C only



- (28) In oogenesis in human female,
- (1) Ova mother cells produce by mitosis of primordial germ cells at childhood.
 - (2) Development and growth of follicle stimulate by LH beginning at puberty
 - (3) Secondary oocytes arrested at meiosis II released by rupturing follicle
 - (4) Cytokinesis take place equally as meiosis occurs.
 - (5) The ruptured follicle develop into corpus albicans
- (29) Joints their locations and types of movements of human skeletal systems are given below.

Types of Joints	Location	Types of movements
A - Pivot	E - Hip Joint	H - flexion, extensions
B - Hinge	F - Atlas-axis joint	I - Rotation
C - Ball and socket	G - between phalanges	J - Adduction, Abduction

Which of the following regarding above facts in table is correct ?

- (1) A - G - H
 - (2) B - G - I
 - (3) A - F - I
 - (4) C - F - J
 - (5) B - E - H
- (30) Which of the following regarding gene linkage is correct ?
- (1) Always linked genes are recombined
 - (2) Parental phenotypes are produced in the progeny
 - (3) Recombination may take place at the metaphase in meiosis II
 - (4) There is more tendency to exchange genes where locate at both side of the centromere.
 - (5) Parental and recombinant phenotypes emerge in equal ratio at incomplete dominance.
- (31) Which of the following regarding interspecific breeding is not correct?
- (1) Progeny obtained may be fertile, partially fertile or sterile
 - (2) The intermediate form of a plant hybrid is more likely to be physiologically successful
 - (3) Sterile interspecific hybrid can undergo a doubling of their chromosome set and become fertile tetraploid.
 - (4) The hybrids can become new species with characteristics different from either of the plants.
 - (5) Infertility can remove by interbreeding of Interspecific hybrid progeny with their parents
- (32) Which of the following correct regarding DNA probes?
- (1) A fragment of double stranded labelled DNA used to detect the presence of complementary nucleic acid sequence.
 - (2) The labeling can be done incorporations of a radioactive only.
 - (3) If the probe is radioactively labelled the band with target sequence can be identified by autoradiography of the membrane.
 - (4) Complementary DNA sequence can be identified by using probes at the gel
 - (5) This single stranded fragment can hybridized only with complementary single DNA fragment

- (33) Which of the following statements / statements is correct regarding events that used in field of genetic engineering ?
- A. DNA sequencing - process to determine the precise order of bases in a DNA molecule.
 - B. Gene cloning - copying millionths of desired DNA in vitro
 - C. Transduction - delivering of foreign DNA to the host cells by bacteriophages
- (1) All A, B and C (2) A and C only (3) A and B only
 (4) B only (5) B and C only
- (34) Which of the following is not an incident for of genetic modification in medicine ?
- (1) Production of human insulin by genetically engineered *E. coli*
 - (2) Production of hepatitis B vaccine in yeast
 - (3) Production of factor VIII in yeast cells that grown in cell culture.
 - (4) Production of tissue plasminogen activator used to treat heart attack.
 - (5) Using of gene therapy to treat Leukemia
- (35) The Biome which North American prairie include is,
- (1) A grassland with tropical climatic regions
 - (2) Dominant species are grass and grass are tall.
 - (3) All prairies grasslands is now in endangered.
 - (4) Large grazers such as horses and many type of burrowing mammals present.
 - (5) Rain is constant throughout the year.
- (36) A several effect of Global environmental issues and causes of them are given below.
- (A) Severe drought - occurring of acid rain
 - (B) Increasing insect population - global warming.
 - (C) Potential risk of skin cancer - occurring of acid rains.
 - (D) Carbon storage capacity of plants and soil reduce in the long runs - Desertification.
 - (E) Leaching of some heavy metals into soil - ozone depletion.
- Which of the above issues and causes combination is / are correct?
- (1) B and D only (2) A, B and D only (3) C and D only
 (4) Band C only (5) B only
- (37) Which of the following statement is not true regarding nitrogen cycle ?
- (1) All the organic matter found in plant and animal residues decompose by extracellular enzymes secreted by micro organisms
 - (2) Nitrifying bacteria converts NH_4^+ into NO_2 by oxidation
 - (3) *Azotobacter* act in special aerobic conditions at fixation of atmospheric nitrogen.
 - (4) *Pseudomonas* involve for oxidations of NO_3^- into N_2
 - (5) Some bacteria and cyanobacteria important for fixation of atmospheric - Nitrogen symbiotically.
- (38) MMR vaccines used for immunization.
- (1) Killed pathogenic micro organisms are included
 - (2) Given for measles rubella and tetanus
 - (3) Is a subunit Vaccine
 - (4) It is given life long immunity
 - (5) Is important to give boosters dose repeatedly.

- (39) Which of the following matching combination regarding viral morphology and their examples is not correct?
- | | | |
|----------------------|---|----------------------|
| (1) Enveloped virus | - | Herpes simplex virus |
| (2) Polyhedral virus | - | Tobacco mosaic virus |
| (3) Complex virus | - | Bacteriophage |
| (4) Helical virus | - | Rabies virus |
| (5) Polyhedral virus | - | Adenovirus |
- (40) Several statements on nano-shells are given below.
- Use for treating diabetes.
 - Used for enhancing bio imaging
 - Used for treating cancers
 - Used for treating pain
- Which of the following is / are correct regarding above statements?
- | | | |
|-------------|-------------|-------------|
| (1) A and B | (2) B and C | (3) C and D |
| (4) A and C | (5) B and D | |
- For each of the questions 41 to 50, one or more of the responses is/are correct. Decide which response / responses is/are correct and then select the correct number.
- | | |
|---|-----|
| If only A, B and D are correct | (1) |
| If only A, C and D are correct | (2) |
| If only A and B are correct | (3) |
| If only C and D are correct | (4) |
| If any other response or combination of responses are correct | (5) |
- (41) Which of the following is / are correct regarding electron transport chain in aerobic respiration?
- Occurs through inner membrane of mitochondrion
 - Movement of electron and proton occurs through inner membrane of mitochondrion
 - Oxidation of NADH and FADH₂ take place
 - Possesses a series of non-proteinous molecules for movement of electron and proton
 - Production of ATP from substrate and oxidative phosphorylation
- (42) Which of the following match correctly as character and phylum
- Sensory papillae present at the anterior end of the body - Platyhelminthes
 - Segmented cylindrical body - Nematoda
 - Muscular foot for locomotion - Mollusca
 - No circulatory system and heart - Echinodermata
 - Vertebral column, dorsal heart - Chordata
- (43) Which of the following response / responses regarding auxin, gibberellin and ethylene is / are correctly represent in sequence?
- Retards leaf abscission, stimulate fruit growth, promotes ripening of fruit.
 - Enhances apical dominance, stimulate pollen development, promote roots and root hair formation.
 - Delay leaf senescence, functions in gravitropism, promote desiccation tolerance.
 - Promotes vascular differentiation, stimulate stem elongation, promote triple response in seedlings.
 - Promote seed dormancy, stimulate seed germination, promote flowering



- (44) Which of the following statement / s is / are true regarding clotting of blood and its importance ?
- Platelet plugs provide instance protection against blood loss
 - Formation of thrombin take place after releasing clotting factor by platelets
 - Activated prothrombin invoved in formation of more thrombin
 - Prevent further blood loss only by blood clotting
 - Heparin prevent the clotting of blood
- (45) Which of the following regarding hormones and their action or places where they acts on is / are correct ?
- Triodothyronin - metabolism of protein, Carbohydrate, and lipids
 - Calcitonin - a thyroid hormone, act on oocytes
 - Oxytocin - produce by hypothalamus acts on milk glands.
 - Cortisol - production of glucose by breaking down of protein in muscle tissues
 - Aldesterone - Produced in adrenal medulla, reabsorption of K^+ from distal convoluted tubule
- (46) Which of the following statements regarding structure of sarcomere is / are not true?
- Sarcomere made of myofibrils
 - Two types of thick and thin filaments are present
 - Boundary of sarcomere is Z line
 - Terminal end of sarcomere have thick and thin filaments
 - Thick filaments bind with M line
- (47) Which of the following / s is / are correct regarding invasive alien species?
- Threaten for native species,
 - Reproduce successfully and spread without limits
 - Lantana camera* causes forest fire
 - Have an ability to tolerate environmental factor
 - All alien species become threaten state and harm to biodiversity.
- (48) Which of the following is / are characteristics of genetic code?
- Possesses codon
 - Every 64 codons code for amino acid
 - Genetic codes are universal
 - No space to limit the words in genetic code
 - Codon is overlapped as it read one after another
- (49) The physical changes occurs of food spoilage is / are,
- | | | |
|-----------------|---------------------------|-------------|
| A. Pigmentation | B. Accumulation of toxins | C. Bad odor |
| D. Ropiness | E. Sour taste | |
- (50) Filariasis related in lymph vessels in sri lanka,
- A' disease caused by a nematoda which spread through water.
 - Permanently cause damages.
 - Number of infected person cause transmission of disease.
 - Microfilaria live in blood vessels associated in lungs at day time.
 - Adult nematode live in lymphatic system about a year.





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Third Term Test - Grade 13 - 2026

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Index No:

BIOLOGY - II

03 Hours

Extra Reading time 10 minutes

Part -A (Structured Essay)

Introduction:

- Answer all questions

(01)(A)(i) State what are known as cohesion reproduction and inheritance of acquired characteristics.

(a) Cohesion -

.....
.....

(b) Reproduction -

.....
.....

(c) Inheritance of acquired characteristics-.....

.....
.....

(ii) Draw the way of formation of Triacylglycerol.

(iii)(a) State the base of categorizing Fats / Glycerides as Saturated fats and, Unsaturated fats.

.....
.....

(b) State how coconut oil differ from butter.

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

(iv)(a) What is the molecule that act as the genetic material of all organisms ?

.....
.....

(b) State two functional characteristics of above mentioned molecule.

.....
.....

(01)



(v) (a) What is the dynamic supporting structure in Eukaryotic cell ?

.....

(b) What are the components which above mentioned structure made out of?

.....

(B) (i) (a) State the phases where cell cycle controlling check points available.

.....

(b) State the significance of these controlling check points.

.....

.....

(ii) (a) What is the type of cell division occurs in growth of Root apex ?

.....

(b) Draw the structure of a Chromosome in metaphase in Eukaryotic cell cycle.

(iii) State the steps of the energy relationships of living systems in the Biosphere in order.

.....

.....

.....

.....

.....

.....

(iv)(a) What is known as Photoprotection and state the materials engage with the process ?

.....

.....

b) State the importance of Photoprotection.

.....



(v) (a) Mention two factors affecting on rate of Photosynthesis except light intensity.

.....
.....

(b) State the instrument that can be used to identify, the way of affecting light intensity on Photosynthesis.

.....

(C)(i) (a) Write the steps of obtaining readings by using above instrument with different light intensities ?

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

(b) State and assume that was made when conducting this experiment.

.....

(ii) What conditions were favorable for the synthesis of simple organic molecules essential for the origin of life ?

.....

(iii) State the special event occurred in the following systems with the origin of Photosynthetic organism.

Water system -

Atmosphere -

(iv) How does Natural classification differ from Artificial classification ?

.....
.....

(v) State the special events occurred during given below time duration, when studying the evolutionary relationship in the Plant kingdom.

a. Million 470 years -

b. Million 425 years -

c. Million 305 years -



- (02)(A)(i) Some organisms of kingdom Protista are heterotrophs. They have some special structures to engulf food. State that kind of structure and examples for each.

structure	example
.....	
.....	

- (ii) According to the fossils suggestions, the ancestors of vascular plants had Gametophyte and Sporophyte that were about equal in size. Mention the nature of Gametophyte & Sporophyte generations in living vascular plants.

.....

- (iii)(a) What type of cells contributes to transport in the Xylem of all vascular plants ?

.....

- (b) Write answers according to above type of cells ?

Shape of cell -

Way of moving water from end to end -

- (iv) Write the sexual reproductive structures of below genus ?

Rhizopus -

Aspergillus -

- (v) Complete the key by using given animals.

Hydra, Round worm, Leech, Snail, Spider, Star fish

(1) Symmetrical body. -

Asymmetrical body. -

(2) Tentacles present -

Tentacles absent -

(3) With External segmented body -

Without external segmented body-

(4) Presence of suckers -

Absence of suckers -

(5) Possesses tube feet -

Do not possess tube feet -



(B)(i) (a) State what is Stomata.

.....
.....

(b) State the way of regulating the diameter of the Stomata.

.....
.....

(ii) Environmental stress such as drought, high temperature and wind can cause Stomata to close during the day time. State another two factors affecting on the opening & closing of Stomata.

.....

(iii) (a) What is known as Diffusion ?

.....
.....

(b) Mention a different character between Diffusion & Facillitated diffusion.

.....
.....

(iv) (a) What is the difference between Photomorphogenesis and Thigmomorphogenesis ?

.....
.....

(b) State an example for Photomorphogenesis & Thigmomorphogenesis.

Photomorphogenesis-

Thigmomorphogenesis -

(v) (a) Write two growth substances which act oppositely on plant leaves ?

.....
.....

(b) State what are the opposite effects you mentioned above.

.....
.....

(C)(i) (a) What is the basic structural unit of Nervous tissue ?

.....

(b) State the main parts of above mention structure.

.....

(ii) (a) How does a Nerve form ?

.....

(b) What is considered a Nerve impulse ?

.....

(iii) What are the main stages in holozoic nutrition occurred within Oral cavity ?

.....

.....

(iv) What are the main type of muscles in the wall of the Oesophagus and state their functions ?

.....

.....

(v) What are the main consists of each pulmonary and systemic circuits ?

.....

(03)(A)(i) Draw the fully labeled diagram of the conducting system of the Human Heart.

(ii) (a) What is the part of the nervous system that accelerates the heart beat rate ?

.....

(b) How does that part affect on Digestive system ?

.....

.....

(iii) What does an ECG diagram show ?

.....

.....



(iv)(a) A state an Enzyme is contained in the plasma of Human red blood cells ?

.....

(b) What is the function of that Enzyme ?

.....

(v) (a) How does the voice of a person comes out when they speak ?

.....

.....

.....

.....

(b) State the immunity responses is activated when pathogens penetrate the external deffensive barriers in the skin and mucus membrances in the Human body?

.....

(B)(i) State two non cellular components consist in the above mentioned defensive mechanism.

.....

(ii) State two signaling molecules upon infection or injury in inflammatory response and mention type of cells. Which they produce and the function done by them.

Signaling molecule

Producing cell

Function

.....

.....

.....

.....

.....

.....

.....

(iii)(a) State the importance of Osmoregulation and Excretion.

Osmoregulatron -

-

Excretion

-

-

(b) Arrange the Nitrogenous excretory products in order of increasing solubility in water

.....

(iv)(a) State what is chronic Kidney disease.

.....

(b) Mention two things that you can do to prevent chronic Kidney disease.

.....

.....



(v) (a) State the processes done by the eye which are involved in producing a clear Image on the Retina.

.....

.....

(b) State a method that can be done to control Hypothyroidism ?

.....

(C)(i) (a) What causes the secretion of Gonadotrophic hormones by the anterior pituitary to be inhibited in the early stages of follicular phase ?

.....

(b) What is the reason of increase GnRH secretion sharply ?

.....

.....

(ii) (a) State what is implantation.

.....

.....

(b) State the nature of Vertebral column in the foetus.

.....

(iii)(a) Indicate the time frame and reason by which the child is able to straighten the head and body.

Head upright -

.....

Body upright -

.....

(b) What is the percision grip in the arm is unique to humans?

.....

(c) How did human acquire that ability?

.....

.....



(iv) How does incomplete dominance differ from mendelian inheritance ?

.....

.....

.....

(v) (a) State the difference between Inbreeding & Hybrid breeding.

.....

.....

.....

.....

(b) Name a plant whose yield has been increased through Hybridization today.

.....

(04)(A)(i) (a) State two functions of Restriction Endonuclease enzyme in gene technology.

.....

.....

(b) Which enzyme is involved in the synthesis of DNA chain from a RNA template ?

.....

(ii) (a) What is DNA probe ?

.....

.....

(b) State two methods of labeling.

.....

.....

(iii) State two advantages of YACs than other DNA vectors.

.....

.....

(iv)(a) What is the reason for only one strand of double stranded DNA acts as a template for transcription ?

.....

(b) Write a type of protein that degrades rapidly after its function ?

.....

(v) What are Exons ?

.....

(B)(i) What is known as Niche ?

.....

(ii) (a) State the largest Biome on the Earth.

.....

(b) Name a place where Wet Pathana Grassland can be seen in Sri Lanka.

.....

(iii)(a) State three effects of the global warming and climatic change.

.....

.....

.....

(b) State the aims of CITES.

.....

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.....

(iv) How *Lantana camera* threat on natural bio diversity as an invarsive alien species ?

.....

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.....

(v) Mention two organisms which have affected due to over exploitation except *Salacia reticulata*.

.....

.....



(C) (i) (a) Mention unique characteristic of mollicutes.

.....

(b) State a micro organism that can be used to produce Protase enzyme commercially.

.....

(ii) (a) State what is culture media.

.....

.....

.....

(b) State a culture media that can be used to grow bacteria.

.....

(c) Mention two primary purposes of a simple stain.

.....

.....

.....

(iii) (a) State the antibiotic that disrupting plasma membrane.

.....

(b) Mention an Extra - cellular enzyme which releases by pathogens that disrupt cell membrane.

.....

(iv) (a) What is known as Nursery ?

.....

.....

.....

(b) Write the main reason of following protected cultivation technology ?

.....

.....

(v) (a) What is known as Human Genome Sequencing ?

.....

(b) Name a plant sp. that has completed Genome Sequencing except Human Genome Sequencing.

.....



Part B - Essay

Answers 04 questions only.

- (05) (a) Explain the regulation mechanism of enzymatic activity in cells.
(b) Briefly explain the process of DNA replication in Eukaryotes.
- (06) (a) Describe the Phloem translocation of Angiosperms by pressure flow hypothesis.
(b) Explain the life cycle of a non vascular plant with an example.
- (07) (a) Describe the mechanism of ventilation of lungs.
(b) Briefly describe the functions performed by the sympathetic division of the autonomic nervous system on internal body organs.
- (08) (a) Describe the ultrafiltration occurs in the process of urine formation.
(b) Describe the structure of inner ear of Human.
- (09) (a) Explain the applications of genetically modified organisms (GMO) in agriculture.
(b) Describe human sex - linked characteristics.
- (10) Write short notes on followings.
(a) Exotoxins
(b) Mangroves
(c) Applications of nano technology in medical field.

Provincial Department of Education - NWP

Third Term Test - 2026

BIOLOGY

Grade 13

Answer Paper

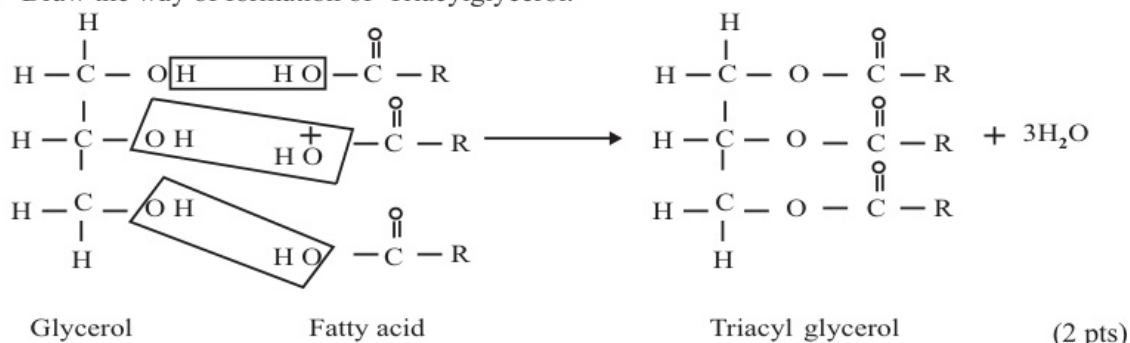
Part - I

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

Structured Essay

01. A. (i) State what are known as cohesion reproduction and inheritance of acquired characteristics.
(a) Cohesion - Attraction between water molecules due to Hydrogen bonding
(b) Reproduction - Ability to produce offspring for continuous existence of Species.
(c) Inheritance of acquired characteristics -
Acquire characteristics during their life time as adaptations to the environment and pass those characteristics to the Next generation. (3 pts)

- (ii) Draw the way of formation of Triacylglycerol.



- (iii) (a) State the base of categorizing Fats / Glycerides as Saturated fats and, Unsaturated fats.
The nature of Hydrocarbon chains of Fatty acids. (1 pt)
(b) State how coconut oil differ from butter.
Coconut oil - Unsaturated, Butter - Saturated
Coconut oil - Liquid at room temperature, Butter - solid at room temperature (any 1 pt)
- (iv) (a) What is the molecule that act as the genetic material of all organisms?
DNA (1 pt)
(b) State two functional characteristics of above mentioned molecule.
• Self replication
• Store and transmit genetic information from one Generation to next Generation
• Store the genetic information for Protein synthesis (any 2 pts)
- (v) (a) What is the dynamic supporting structure in Eukaryotic cell?
Cytoskeleton (1 pt)
(b) What are the components which above mentioned structure made out of?
Microtubules and Protein filaments (both 1 pt)
- (B) (i) (a) State the phases where cell cycle controlling check points available.
 G_1 , G_2 , M (1 pt)
(b) State the significance of these controlling check points.
The cell is ready for moving into upcoming phases and giving go ahead signal at the G, check point.
If it does not receive a go head signal at the point it may exit the cycle. (any 1 pt)

(01)

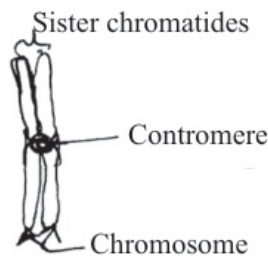


- (ii) (a) What is the type of cell division occurs in growth of Root apex ?

Mitotic division

(1 pt)

- (b) Draw the structure of a Chromosome in metaphase in Eukaryotic cell cycle.



Correct diagram

Labeling all there

(1 pt)

- (iii) (a) State the steps of the energy relationships of living systems in the Biosphere in order.

- Energy flows into Biological systems from the environment through Solar radiation.
- Light energy is captured in the cells having Photosynthetic pigments / Chlorophyll by the process of Photosynthesis and stored as Chemical energy in the Organic compounds such as Carbohydrates.
- Captured energy in Organic food is transformed into Chemical energy in ATP by a process called Cellular respiration.
- The energy stored in ATP is utilized in various energy requiring processes. (4 pts)

- (iv) (a) What is known as Photoprotection and state the materials engaged with the process ?

Absorption and dissipation of excessive light energy, (some) Carotenoids (2 pts)

- (b) State the importance of Photoprotection.

Excessive light may cause damage to the Chlorophylls or interact with Oxygen and form reactive Oxidative molecules which are dangerous to the cell. (2 pts)

- (v) (a) Mention two factors affecting on rate of Photosynthesis except light intensity.

- CO₂ concentration • Temperature • Water • Pollutants and inhibitors (2 pts)

- (b) State the instrument that can be used to identify, the way of affecting light intensity on Photosynthesis.

Audus micro burette

(1 pt)

- (C) (i) (a) Write the steps of obtaining readings by using above instrument with different light intensities ?

- Fixing *Hydrilla* plant in to the apparatus
- Oxygen bubbles get collected at the bend
- Air column was taken in to the Capillary tube
- Measuring the Length of the Air column

(4 pts)

- (b) State and assume that was made when conducting this experiment.

Photosynthetic rate $\propto$ volume of O₂ release during give time period

(1 pt)

- (ii) What conditions were favorable for the synthesis of simple organic molecules essential for the origin of life ?

- Reducing Atmosphere
- Volcanic eruption / Lightning / Extreme UV radiation / Hydrothermal vents / Alkaline vents

(2 pts)

- (iii) State the special event occurred in the following systems with the origin of Photosynthetic organism.

Water system - Fe⁺² Ion were Oxidized water bodies saturated with O₂

Atmosphere - Amount of Atmospheric O₂ had accelerated

(2 pts)

- (iv) State the special events occurred during given below time duration, when studying the evolutionary relationship in the Plant kingdom.
- Origin of Land Plants by Chlorophyte
 - Origin of Vascular plants
 - Origin of Seed Plants (3 pts)
- (v) How does Natural classification differ from Artificial classification ?
- Represents evolutionary relationship
 - Grouping is based on many characteristics (any 1 pt)

(40 x 2.5 = 100)

- (02) (a) (i) Some organisms of Kingdom Protista are heterotrophs. They have some special structures to engulf food. State that kind of structure and examples for each.
- Oral groove - *Paramecium* (02 pt)
- Pseudopodia - *Amoeba* (02 pt)
- (ii) According to the fossils suggestions, the ancestors of vascular plants had Gametophyte and Sporophyte that were about equal in size. Mention the nature of Gametophyte & Sporophyte generations in living vascular plants.
- Sporophyte generation is large and more complex than Gametophyte. (01 pt)
- (iii) (a) What type of cells contributes to transport in the Xylem of all vascular plants ?
- Xylem Trachids (01 pt)
- (b) Write answers according to above type of cells ?
- Shape of cell - Long thin cells with tapering ends, (01 pt)
 - Way of moving water from end to end - Through pits. (01 pt)
- (iv) Write the sexual reproductive structures of below genus ?
- Rhizopus* - Zygosporangium (01 pt)
- Aspergillus* - Asci (01 pt)
- (v) Complete the key by using given animals.
- Symmetrical body - (2)
Asymmetrical body - Snail
 - Tenacles present - *Hydra*
Tentacles absent - (3)
 - With External segmented body - (4)
Without external segmented body - (5)
 - Presence of suckers - Leech
Absence of suckers - Spider
 - Possesses tube feet - Star fish
Do not possess tube feet - Round worm If one is incorrect no marks further (05 pts)
- (B) (i) State what is Stomata.
- Pores surrounded by Guard cells in the Epidermis of the Leaves and Stems of Plants, which can open and close. (01 pt)
 - State the way of regulating the diameter of the Stomata.
By changing shape, widening or narrowing the gap between the pair of Guard cells. (01 pt)
- (ii) Environmental stress such as drought, high temperature and wind can cause Stomata to close during the day time. State another two factors affecting on the opening & closing of Stomata. Internal clock & CO₂ concentration in the sub Stomatal cavity. (02 pts)
- (iii) (a) What is known as Diffusion ?
(In the absence of other forces), the movement of molecules of a substance from a place where it is more concentrated to place where it is less concentrated. (01 pt)
- (b) Mention a different character between Diffusion & Facilitated diffusion.
Facilitated diffusion - water & hydrophilic solutes across the membranes passively with the help of transport Protein that span the membrane.
Diffusion. - Across the membrane or without membrane (01 pt)

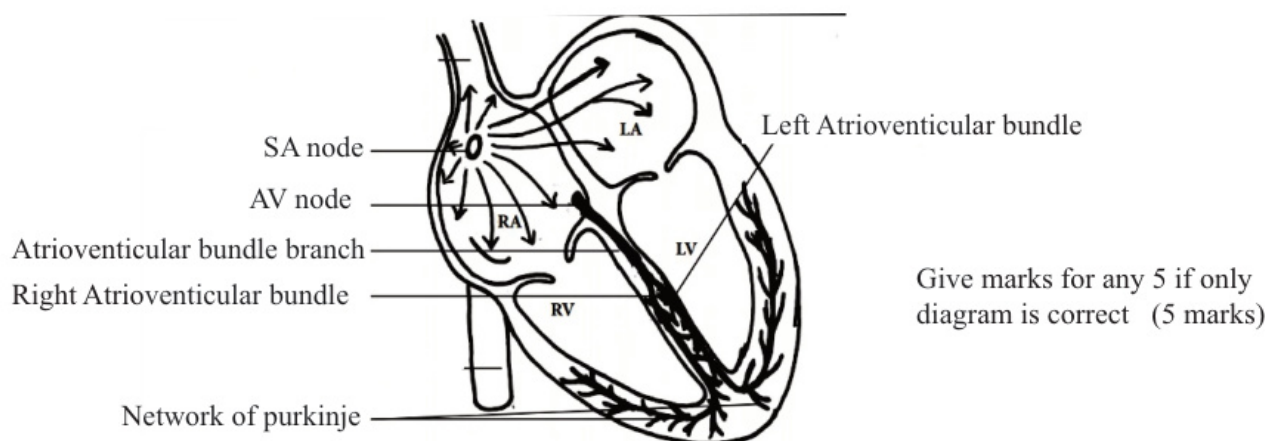
- (iv) (a) What is the difference between Photomorphogenesis and Thigmomorphogenesis ?
 Photomorphogenesis - key events in the growth and development of Plants that are triggered by light collectively.
 Thigmomorphogenesis - Response to Physical disturbances (02 pts)
- (b) State an example for Photomorphogenesis & Thigmomorphogenesis.
 Photomorphogenesis - Seed germination
 Shade avoidance
 Flowering
 Shoot elongation
 Phototropism
 Thigmomorphogenesis - Directional growth of tendril towards support.
Mimosa pudica Collapses its Leaflets when touched. (02 pts)

- (v) (a) Write two growth substances which act oppositely on plant leaves ?
 • Auxin & Ethylene
 • Cytokinins & Absciscic acid for any pair (2 pts)
- (b) State what are the opposite effects you mentioned above.
 • Auxin & Ethylene
 Auxin - Retards Leaf abscission
 Ethylene - Promotes Leaf abscission
 • Cytokinins & Absciscic acid
 Cytokinins - Delay Leaf senescence
 Absciscic acid - Promotes Leaf senescence (2 pts)

(Give marks if only part (a) is correct)

- (C) (i) (a) What is the basic structural unit of Nervous tissue ?
 Neurone (1 pt)
- (b) State the main parts of above mention structure.
 Cell body, Dendrites, Axon (for all 3 - 1 pt)
- (ii) (a) How does a Nerve form ?
 Axon are bundled together into Nerve. (1 pt)
- (b) What is considered a Nerve impulse ?
 A series of action potentials that are move along an Axon. (1 pt)
- (iii) What are the main stages in holozoic nutrition occured within Oral cavity ?
 Ingestion, Digestion (2 pts)
- (iv) What are the main type of muscles in the wall of the Oesophagus and state their functions ?
 Uppermost part - Skeletal muscle Swallowing (2 pts)
 Smooth muscle (rest of the Oesophagus) Peristalsis (2 pts)
- (v) What are the main consists of each pulmonary and systemic circuits ?
 Major Arteries, Arteries, Arterioles, Capillary beds, Venules and Veins, Major veins (1 pt)
 (any 40 x 2.5 = 100)

- (03) (A) (i) Draw the fully labeled diagram of the conducting system of the Human Heart.



- (ii) (a) What is the part of the nervous system that accelerates the Heart beat rate ?
 Sympathetic division in the Autonomic nervous (1 pt)

(04)

- (b) How does that part affect on Digestive system ?
 • Inhibits activity of Stomach and Intestine system
 • Inhibits activity of Pancreas
 • Stimulates Glucose release from Liver
 • Inhibits Gallbladder (4 pts)
- (iii) What does an ECG diagram show ?
 ECG indicates the spread of the electrical signal generated by the SA node as it travels throughout the Heart. (1 pt)
- (iv) (a) A state an Enzyme is contained in the plasma of Human red blood cells ?
 Carbonic anhydrase (1 pt)
 (b) What is the function of that Enzyme ?
 Catalyze the combination of CO_2 with water to form Bicarbonate (HCO_3^-) and H^+ Ions. (1 pt)
- (v) (a) How does the voice of a person comes out when they speak ?
 Vocal cords help produce sound when expired air rushes across the stretched or tensed Vocal cords causing them to vibrate. (2 pts)
 (b) State the immunity responses is activated when pathogens penetrate the external defensive barriers in the skin and mucus membranes in the Human body?
 Internal defense in innate immunity. (1 pt)
- (B) (i) State two non cellular components consist in the above mentioned defensive mechanism.
 Antimicrobial Proteins and Inflammatory responses. (2 pts)
 (ii) State two signaling molecules upon infection or injury in inflammatory response and mention type of cells. Which they produce and the function done by them.
- | | | |
|-----------|--------------------------------------|---|
| Histamine | Most cells | Increase permeability and dilation of nearby blood vessels. |
| Cytokines | Activated Phagocytes and neutrophils | Promote Blood flow to the injured or infected site |
- (6 pts)
- (iii) (a) State the importance of Osmoregulation and Excretion.
 Osmoregulation - to regulate the chemical composition of Body fluids by balancing uptake and loss of Water and Solute.
 Excretion - excretory end products become toxic to the Body cells. (2 pts)
 (b) Arrange the Nitrogenous excretory products in order of increasing solubility in water
 Uric acid < Urea < Ammonia (1 pt)
- (iv) (a) State what is chronic Kidney disease.
 Gradual loss of Kidney function over time. (1 pt)
 (b) Mention two things that you can do to prevent chronic Kidney disease.
 Follow a low Salt, low Fat diet
 Doing proper exercise
 Having regular checkups
 Prevent Smoking. (any 2 pts)
- (v) (a) State the processes done by the eye which are involved in producing a clear Image on the Retina.
 Refraction of Light rays
 Changing the size of the Pupil
 Accommodation. (3 pts)
 (b) State a method that can be done to control Hypothyroidism ?
 Increasing dietary Iodine intake
 oral Thyroid Hormone treatment. (any 1 pt)



- (C) (i) (a) What causes the secretion of Gonadotrophic hormones by the anterior pituitary to be inhibited in the early stages of follicular phase ?
Low levels of Estradiol. (1 pt)
- (b) What is the reason of increase GnRH secretion sharply ?
growing follicle starts increase sharply, high levels of Estradiol stimulate the Hypothalamus to increase GnRH secretion. (2 pts)
- (ii) (a) State what is implantation.
Around seven days after fertilization, the Blastocyst attaches to the Endometrium of the mother's uterus. (1 pt)
- (b) State the nature of Vertebral column in the foetus.
One curvature concave anteriorly (1 pt)
- (iii) (a) Indicate the time frame and reason by which the child is able to straighten the Head and Body.
- | | | | | |
|---------------|--------|--------------------|--------|-----------------------------|
| Head up right | —————> | about three months | —————> | Cervical curvature develops |
| Body up right | —————> | about 7-8 months | —————> | Lumbar curvature develops |
- (4 pts)
- (b) What is the percision grip in the arm is unique to Humans?
Precision Grip (1 pt)
- (c) How did Human acquire that ability?
The Thumb which permits the Thumb to move perpendicular to the other Fingers (1 pt)
- (iv) How does incomplete dominance differ from mendelian inheritance ?
- Expressing blend Phenotypes from both Alleles
 - But in mendilian inheritance dominant Allele completely masking the recessive Phenotype
- (2 pts)
- (v) (a) State the difference between Inbreeding & Hybrid breeding.
The breeding among genetically similer individuals when genetically unrelated pure Bred Plants or Animals in the same Species are mated with each other know hybridization (2 pts)
- (b) Name a plant whose yield has been increased through Hybridization today.
Maize (1 pt)

(50 x 2 = 100)

- (04) A (i) (a) State two functions of Restriction Endonuclease enzyme in gene technology.
- Cutting DNA at precise location recognize specific sequences of DNA (2pts)
- (b) Which enzyme is involved in the synthesis of DNA chain from a RNA template ?
Reverse transcriptase (1 pt)
- (ii) (a) What is DNA probe ?
- DNA probe is a fragment of single stranded labeled DNA used to detect the presence of complementary Nucleic acid sequences by hybridization. (2pts)
- (b) State two methods of labeling.
- Incorporation of a radioactive isotope addition of a fluorescent molecule to the structure of the probe. (2pts)
- (iii) State two advantages of YACs than other DNA vectors.
- YAC s are large therefore large amount of DNA can be copied. (2pts)
 - They can be operate in the Eukaryotic system. (2pts)
- (iv) (a) What is the reason for only one strand of the double stranded DNA acts as a template for transcription ? (1Pt)
- Because only the template strand will have the promoter sequence in the correct orientation.
- (b) Write a type of protein that degrades rapidly after its function ?
- Regulatory Proteins (1pt)
- (v) What are Exones ?
- DNA sequences that code for Polypeptides (1pt)

- (B) (i) What is known as Niche ?
Niche is the role that a particular Organism plays in the Ecosystem. (1pt)
- (ii) (a) State the largest Biome on the Earth.
Northern coniferous forest (1pt)
- (b) Name a place where Wet Pathana Grassland can be seen in Sri Lanka.
Horton plains (1pt)
- (iii)(a) State three effects of the global warming and climatic change.
1. Sea level rising
2. Extreme weather events
3. Less production of Food (threat to food security)
4. Degradation of Coral reefs
5. Loss of Bio diversity
6. Increase the Insect population (any 3pts)
- (b) State the aims of CITES.
• International trade of Specimens such as
• Horns and Skins of Wild Animals and Whole Plant or parts of Plants.
• Does not threaten their survival (2pts)
- (iv) How *Lantana camera* threat on natural bio diversity as an inversive alien species ?
• By *lantana camera* does not allow Germination and Seedling growth of many other Plants as it produces Toxins which are added to the Soil through Leaf litter. (3pts)
- (v) Mention two organisms which have affected due to over exploitation except *Salacia reticulata*.
1. Sea cucumber
2. Ebony / Kaluwara (2pts)
- (C) (i) (a) Mention unique characteristic of mollicutes.
Absence of cell wall (1pt)
- (b) State a micro organism that can be used to produce Protinase enzyme commercially.
Aspergillus oryzae (1pt)
- (ii) (a) State what is culture media.
• A nutrient material prepared for providing nutrition and anchorage essential to the growth of Micro Organisms at laboratory condition. (3pts)
- (b) State a culture media that can be used to grow bacteria.
Nutrient Agar (NA) (1 pt)
- (c) Mention two primary purposes of a simple stain.
• To highlight the entire Micro-Organisms so that cellular shape, cell arrangement, basic structures are visible. (3 pts)
- (iii)(a) State the antibiotic that disrupting plasma membrane.
Daptomycin (1pts)
- (b) Mention an Extra - cellular enzyme which releases by pathogens that disrupt cell membrane.
Phospholypase (1 pt)
- (iv) (a) What is known as Nursery ?
A specialized place for Young Plants and Seedlings to be produced for transplanting in another place. (1pt)
- (b) Write the main reason of following protected cultivation technology ?
To protect Plants from adverse climatic conditions by providing optimum conditions to achieve maximum yield and the best quality. (1pts)
- (v) (a) What is known as Human Genome Sequencing ?
An enormous undertaking in genomics to find location and function of human genes (1pt)
- (b) Name a plant sp. that has completed Genome Sequencing except Human Genome Sequencing.
Arabidopsis thaliana (Give marks to the scientific name) (1pt)



essay

- (05) (a) (1) In many cases, the molecules that naturally regulate Enzyme activity in a cell behave like reversible non-competitive inhibitors.
- (2) Regulatory molecules "(either activators or inhibitors) bind to specific regulatory sites elsewhere of the Enzyme molecule.
- (3) Via non-covalent interactions
- (4) And affect the shape and function of the Enzyme
- (5) It may result in either inhibition or stimulation of an Enzyme activity.
- (6) Allosteric activation
- (7) Co-operativity are two stimulations of an enzyme activity
- (8) In allosteric regulation are made from two or more sub units.
- (9) Each sub unit composed of a Polypeptide chain.
- (10) With its own active site.
- (11) The entire complex oscillates between two different shapes.
One catalytically active and other inactive.
- (12) In this two forms regulatory molecules bind to a regulatory site called allosteric site.
- (13) Often located where sub units join.
- (14) When an activator binds with regulatory site stabilizes the shape with functional active site.
- (15) Through the interaction of sub units even a single activator molecule that bind to one regulatory site will affect the active site of all sub units.
- (16) ADP function as allosteric activator bind to the Enzyme and stimulates the production of ATP by Catabolism.
- (17) Binding of one substrate molecule can stimulate
Binding or activity at other active site
- (18) Ex :- Co-operativity work similarly in multi subunit Enzymes.
- (b) (1) The tightly packed DNA/ Chromatin has to relax
- (2) Helicase unwind the Double helix and separate two strands of DNA molecule
- (3) With the expense of energy as ATP
- (4) This separation occurs by breaking Hydrogen bonds between the base pairs of two strands.
- (5) The separation of the double helix occurs at the origin of replication. (Ori)
- (6) The parent DNA strands are used as the templates.
- (7) Topoisomerase Enzyme are working ahead of the direction of DNA synthesis.
- (8) The untwisting of the strands at one place causes further twisting and strain on other places.
- (9) These Protein molecules bind to exposed single stranded DNA to prevent re-pairing of the separated DNA and to stabilize them.
- (10) DNA Polymerase initiates DNA Polymerizations by adding a Deoxyribonucleotide
- (11) To the free end of a Primer
- (12) And continues polymerizations on 5' to 3' direction elongating the new DNA strand with Deoxyribonucleotide and bases complementary to template
- (13) Complementary Deoxyribonucleotide should be added one after the other in the correct sequence
- (14) DNA Polymerase can add Nucleotides only to the 3' end
- (15) RNA Polymerase can initiate synthesis of RNA on DNA template by adding Ribonucleotides
- (16) Primase adds a short RNA Primer on the DNA template
- (17) Forming DNA - RNA Hybrid to facilitate the action of DNA Polymerase
- (18) New strands can be synthesized continuously, it is leading strand
- (19) While the other will be synthesized as small fragments, lagging strand, it is known as Okazaki fragments



- (20) When wrong Nucleotide is added to the growing chain of DNA by DNA Polymerase identify it and stops adding the next Nucleotide
- (21) DNA ligase joints the newly synthesized adjacent fragments making a complete strand by formation of a Phosphodiester bond

a - 18

b - 21

(38 × 4 = 152 maximum 150)

- (06) (a) (1) Loading of Sugar into the sieve tube.
 (2) Reduces Water potential.
 (3) Inside the sieve tube elements at the source.
 (4) This causes the sieve tube to take up Water from the Xylem.
 (5) By Osmosis
 (6) This uptake of Water generates a positive pressure.
 (7) That forces the sap to flow along the tube.
 (8) The pressure is reduced.
 (9) By unloading of Sugar.
 (10) And consequent loss of Water from Phloem to the Xylem at the Sink.
- (b) (1) Ex :- Life cycle of *pogonatum*
 (2) Gametophyte is the dominant Plant / longer living than Sporophyte.
 (3) Gametophyte is Photosynthetic.
 (4) Gametophytes are Dioecious (Unisexual)
 (5) Mature male Gametophytes produce Antheridia.
 (6) In which several Sperms are produced.
 (7) Female Gametophyte produce Archegonia.
 (8) A single Egg is produced within the Archegonium.
 (9) The Egg is not released.
 (10) Flagellated motile Sperm.
 (11) Swims through external Water towards Egg.
 (12) Entering the Archegonium.
 (13) In response to chemical attractants.
 (14) Sperm fuses with the Egg resulting Diploid Zygote.
 (15) After fertilization Zygote develops into Embryo
 (16) The Ebryo is also retained within the Archegonium.
 (17) Develops into the Diploid Sporophyte.
 (18) By obtaining nutrients from the Gametophyte.
 (19) The Sporophyte remains attached to the Gametophyte
 (20) The sporophyte consists of a Foot
 (21) Seta
 (22) And a capsule (Sporangium)
 (23) The foot abosrbs Nutrients and Water from Gametophyte.
 (24) The capsule produces spores by Meiosis
 (25) Homosporous.
 (26) If spores are dispersed to a favourable habitat
 (27) Such as moist Soil or Tree bark
 (28) They may germinate and grow into (green branched filament called) Protonema
 (29) Protonema produces Buds that grow into Gametophyte.

(a) 10 + (b) 29 → 39

(For any 38 x 4 → 152
maximum 150)

(09)



- (07) (a) (1) Ventilation is accomplished by breathing
 (2) Which is the alternating movement of Air in to (Inhalation) and out of (Exhalation) the Lungs.
 (3) Humans employ what is referred to as negative pressure breathing.
 (4) Where air is pulled rather than pushed into Lungs.
 (5) Inhalation is an active process.
 (6) Contraction of Rib muscles or Intercoastal muscles and Diaphragm.
 (7) Leads to the expansion of the Thoracic cavity, increase its volume.
 (8) The visceral and parietal pleurae surrounding the Lung.
 (9) Stick together due to the surface tension.
 (10) Of the Fluid between these two membranes
 (11) This allows the two membranes to slide smoothly pass each other.
 (12) Hence, as the volume of Thoracic cavity increases, the Lung volume increases as well.
 (13) As a result, the pressure within the lungs decrease relatively to the outside Air.
 (14) This create a pressure gradient between the Atmosphere and Lungs.
 (15) Thus, Air flows from high pressure in the Atmosphere to a lower pressure gradient in the Lungs.
 (Inhalation)
 (16) Exhalation which is usually a passive process.
 (17) The Rib muscle and the Diaphragm relax
 (18) This cause the volume of the Thoracic cavity to reduce.
 (19) As a results, the pressure inside the Lungs increase in relation to the Air outside.
 (20) This pressure forces Air to move out of the Lungs through the respiratory tubes into the Atmosphere.
 (21) When a man is at rest contraction of both Rib muscles and contraction of Diaphragm are enough for breathing.
 (22) However depending on the activity level additional muscles may be used to deep breathing.
 (23) Such as muscles of the Neck, Back and Chest.
 (24) These muscles further help to increase the volume of the Thoracic cavity by raising the Rib cage.
 (25) During exercise.
- (b) (1) Dilates pupil of Eye
 (2) Inhibits salivary Gland Secretion.
 (3) Relaxes Bronchi in Lungs.
 (4) Accelerates Heart
 (5)/(6) Inhibits activity of Stomach and Intestine
 (7) Inhibits activity of Pancreas
 (8) Stimulates Glucose release from Liver.
 (9) Inhibits Gallbladder
 (10) Stimulates adrenal Medulla
 (11) Stimulates emptying of Bladder
 (12) Promotes ejaculation
 (13) Promotes Vaginal contractions.

a - 25

b - 13

(38 x 4 = 152 maximum 150)

- (08) (a) (1) Filtration of Blood under high pressure into the cavity of the Bowman's capsule is called ultrafiltration.
 (2) Filtration occurs through the capillary walls of Glomerulus.
 (3) and Inner wall of Bowman's capsule
 (4) Blood capillaries of Glomerulus are porous and cells lining the Bowman's capsule are specialized for filtration of small size Molecules and Ions.

- (6) Platelets
- (7) and large Molecules such as Plasma Proteins do not pass into the Bowman's capsule.
- (8) The filtrate in the Bowman's capsule contains Water.
- (9) Ions
- (10) Amino acids
- (11) Glucose
- (12) Vitamins
- (13) Nitrogenous wastes
- (14) And other small molecules.

(b) Inner ear is composed of three main regions

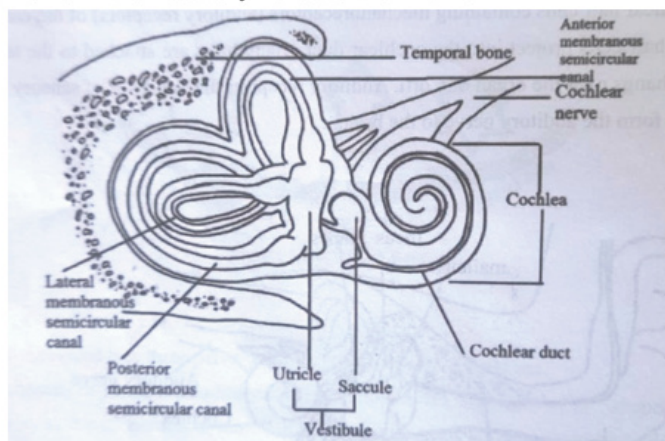
- (1) Vestibule
- (2) Three Semicircular canals
- (3) Cochlea
- (4) Vestibule is the expanded part near the Middle ear.
- (5) Oval & round windows are present in the Lateral walls.
- (6) Vestibule contains two membranous sacs called Utricle and Sac cule
- (7) Semi circular canals are three tubes arranged at right angles to one another, so is situated in each of the three Planes of space.
- (8) They are continuous with the vestibule.
- (9) Cochlea is a coiled structure.
- (10) With broad base which is continuous with the vestibule.
- (11) Cochlea has three Compartments.
- (12) An upper Vestibular canal
- (13) A lower Tympanic canal
- (14) Middle cochlear duct that separates the upper and lower canals
- (15) Vestibular canal originates at the oval window
- (16) Tympanic canal ends at the round window
- (17) The two canals are continuous with each other and filled with Perilymph
- (18) The floor of the Cochlear duct is called Basilar membrane.
- (19) Which bears the organ of corti
- (20) Corti contains supporting cells and specialized Cochlear hair cells.
- (21) Many hairs are attached to the Tectorial membrane that Hangs over the organ of cort.
- (22) Auditory receptors and dendrites of sensory Nerves combine.
- (23) To form the Auditory nerve to the Brain.

b - any 23

a - 14 + 23 → 37

36 x 4 → 144

(Fully labeled diagram 06
150)



Fully labeled diagram 06 marks

Half 03 marks

Unlabeled 0 mark



- (09) (a) Most significant & contribution in crop yield enhancement by gene technology in agriculture are due to the production of GM crops that are resistant to,
- (1) Pests and Diseases
 - (2) Herbicides
 - (3) Environmental stresses
 - (4) In addition crops with higher nutritional values are also available.
 - (5) Several GM crops have been engineered with a gene producing a toxic Protein (Bt toxin)
 - (6) That kills the Plant eating larval stages of certain Lepidopteron and Coleopteron insects
 - (7) Most widely cultivated pest resistant GM plants are Cotton, maize, Canola and Potato.
 - (8) By Toxins, they die due to the ingestion of the Toxin.
 - (9) When larvae feed on Plant parts that express By Toxins, they die due to the ingestion of the Toxin.
 - (10) Disease resistant crops developed by genetic engineering is the availability of new varieties of Papaya resistant to Papaya Ring Spot Virus (PRSV)
 - (11) Potato varieties resistant to Potato virus Y (PVY), Potato Leaf Roll Virus (PLRV) and late blight disease.
 - (12) HTCs are developed in order to be able to spray a broad spectrum herbicide to control weeds. (Herbicide Tolerant crops)
 - (13) The best known example of Herbicide tolerant
 - (14) These Plants are known as 'Roundup Ready' Crops because, the commercial name of Glyphosate is roundup.
 - (15) Another type of popular Herbicide tolerant Crops are called 'Liberty Link' and 'Invigor'.
 - (16) And are resistant to Glufosinate.
 - (17) Cotton modified to tolerate Bromoxynol are called BXN cotton.
 - (18) GM Canola varieties with increased Triglyceride component and with increased Phytase Enzyme to break-down indigestible Plant phytate to release Phosphorus.
 - (19) Soybean with increased Oleic acid content in the Seed are commercially available.
 - (20) A rice variety named Golden rice
 - (21) Tomato with delayed fruit ripening to increase the Flavour.
 - (22) Non-browning Apple due to reduced Polyphenol oxidation.
 - (23) and Maize
- (b)
- (1) Certain characters of Humans are carried on the genes located on the Sex Chromosomes.
 - (2) Those genes located on the Sex Chromosomes are called Sex Linked Genes.
 - (3) Characters expressed by them are called Sex Linked Characters.
 - (4) Characters expressed by or carried on the x - Chromosome are called X - linked characters.
 - (5) Characters expressed by or carried on the Y- Chromosome are called Y-linked characters.
 - (6) Y Chromosome carry only few genes
 - (7) Other than related to the Sex
 - (8) Some disorder carried on the Y - linked genes are transferred and expressed only through Male progeny.
 - (9) Absence of certain Y - linked genes causes inability to produce Normal Sperm.
 - (10) In addition to Sex related characters, X Chromosomes carry many other characters.
 - (11) Red green colour blindness.
 - (12) An - X linked recessive disorder.
 - (13) Characterized by the difficulty in perceiving difference between red and green colours.
 - (14) Haemophilia
 - (15) An X-linked recessive disorder.
 - (16) Where one or more of the Proteins required.
 - (17) for Blood clotting are absent.
 - (18) Haemophilic persons run the risk of severe bleeding.
 - (19) During injuries due to the delay in clot formation.

any a - 23

b - 19

42

(Any 38 x 4 = 152 Maximums 150)



- (10) (a) (1) Exotoxins are produced inside Bacterial cells as part of their growth and Metabolism.
(2) Secreted or released to the surrounding environment after Cell lysis.
(3) Majority of them are Enzymes.
(4) These are Thermo - labile Protein Toxins.
(5) Being inactivated by boiling.
(6) Exotoxins are most commonly produced by Gram - positive Bacteria and a few gram negative.
(7) Exotoxins are classified into three types
(8) Neurotoxins
(9) Interfere with normal transmission of nerve impulses.
(10) Eg - Toxins produced by *Clostridium tetani*
(11) Enterotoxins
(12) Stimulates cells of the Gastrointestinal tract in an Abnormal way
(13) Eg - Toxins produced by *Vibrio cholera*
(14) Cytotoxins
(15) Kills host cells by Enzymatic attack
(16) Toxins produced by *Corynebacterium diphtheriae*.
- (b) (1) Mangroves Ecosystem is an intertidal vegetation that covers fringes.
(2) Lagoons and estuaries
(3) They share characteristics usually of Saline / Brackish water.
(4) Loose soil
(5) and anoxic conditions.
(6) The vegetation is also exposed to intense sunlight They can be categorized into two groups
(7) True Mangroves
(8) That occur towards the boundary between Sea and Land
(9) Mangrove associates that occur more towards inland
(10) Common true Mangrove Species are
Kadon & Masathugas
(11) Common Mangrove associates are Karan kalu, Golden leather fern, Katukili
(12) In order to protect from sunlight Leaves of Mangrove have a thick cuticle.
(13) Some have salt Glands to secrete excess salt.
(14) There are Special Roots to intake Atmospheric Oxygen.
(15) Vivipary / some Mangrove germinate while attached to the mother Plant.
(16) Mangrove provide a unique habitat for many Crustaceans and Mollusks.
- (C) (1) Titanium dioxide (TiO_2) and silver (Ag) nanoparticles are used for sterilization of operation theatres and Surgical instruments in hospitals.
(2) Silver nano lotions are applied in theatres to prevent the entry of Microbes.
(3) Nano - particles are used in the production of Antimicrobial coatings and filters
(4) TiO_2 and Ag nano - filters prevent the entrance of tiny particles such as viruses.
(5) Nano filters are used to examine SARS patients.
(6) Nano device sensors are used to monitor Blood pressure / Blood Oxygen level / Hormone concentration
(7) In Cancer treatments.
(8) Viva gel is a vaginally applied Microbicide in development for HIV / HSV
(9) In the treatment of diabetes a Nano device is attached to the Body

a - 16

b - 16

c - 09

(38 x 4 = 150 Maximum 150)