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SYLLABUS 2021-2022

MONTH-WISE SYLLABUS

First Semester (May -August 2021)

MAY-JUNE 2021

Chapter 8: CELL: THE UNIT OF LIFE

Chapter 10: CELL CYCLE AND CELL DIVISION

Chapter 1: THE LIVING WORLD

JULY 2021

Chapter 2: BIOLOGICAL CLASSIFICATION

Chapter 3: PLANT KINGDOM
Chapter 4: ANIMAL KINGDOM

AUGUST 2021

Chapter 5: MORPHOLOGY OF FLOWERING PLANTS ANATOMY OF FLOWERING PLANTS

Chapter 7: STRUCTURAL ORGANISATION IN ANIMALS

Second Semester (September 2021 - February 2022)

SEPTEMBER 2021

Chapter 9: BIOMOLECULES

OCTOBER 2021

Chapter 9: BIOMOLECULES (continued) **Chapter 11:** TRANSPORT IN PLANTS

NOVEMBER 2021

Chapter 12: MINERAL NUTRITION

Chapter 13: PHOTOSYNTHESIS IN HIGHER PLANTS

Chapter 14: RESPIRATION IN PLANTS

Chapter 15: PLANT GROWTH AND DEVELOPMENT

Chapter 16: DIGESTION AND ABSORPTION

DECEMBER 2021

Chapter 15: PLANT GROWTH AND DEVELOPMENT

Chapter 16: DIGESTION AND ABSORPTION

Chapter 17: BREATHING AND EXCHANGE OF GASES

JANUARY 2022

Chapter 18: BODY FLUIDS AND CIRCULATION

Chapter 19: EXCRETORY PRODUCTS AND THEIR ELIMINATION

Chapter 20: LOCOMOTION AND MOVEMENT

Chapter 21: NEURAL CONTROL AND COORDINATION

FEBURARY 2022

Chapter 22: CHEMICAL COORDINATION AND INTEGRATION

REVISION

SYLLABUS 2021-2022

UNIT - WISE WEIGHTAGE THEORY

TIME: 3 HOURS MARKS: 70

| UNIT | NAME | MARKS | |
|-------|--|-------|--|
| | | | |
| Ι | DIVERSITY IN THE LIVING WORLD | 12 | |
| | | | |
| II F | STRUCTURAL ORGANISATION IN ANIMALS AND | 12 | |
| 1 | PLANTS | - ! | |
| III \ | CELL: STRUCTURE AND FUNCTION | 12 | |
| 1 | | i | |
| IV | PLANT PHYSIOLOGY | 17 | |
| // | | | |
| V | HUMAN PHYSIOLOGY | 17 | |
| \ | 1003 | // | |
| | TOTAL | 70 | |
| | 1- SEPUL ST | | |

PRACTICALS

TIME: 3 HOURS MARKS: 30

| | CONTENTS |
|---|---|
| 1 | EXPERIMENTS AND SPOTTING |
| 2 | RECORD OF ONE INVESTIGATORY PROJECT AND VIVA BASED ON THE PROJECT |
| 3 | PRACTICAL FILE RECORD AND VIVA BASED ON EXPERIMENTS |



UNIT I DIVERSITY IN THE LIVING WORLD

Chapter 1: The Living World

Chapter 2: Biological Classification

Chapter 3: Plant Kingdom

Chapter 4: Animal Kingdom



hapter No. 1 THE LIVING WORLD

| Learning Outcomes | | | | | |
|---|--|-------------------|--|--|--|
| Students will be able to explain | The concept of growth as a parameter of living being | after doing Q1 | | | |
| Students will be able to differentiate and state examples | between catabolism and anabolism | after doing Q2 | | | |
| Students will be able to list | the rules for writing scientific names | after doing Q3 | | | |
| Students will be able to define | The terms classification, taxonomy and systematics | after doing Q4 | | | |
| Students will be able to depict | The hierarchical arrangement of taxonomic categories | after doing Q5 | | | |

- 1. A crystal increases in size and so does a baby. What is the difference?
- 2. Differentiate between catabolism and anabolism with examples.
- 3. Enlist the rules for writing scientific names. Give an example.
- 4. Define classification, taxonomy and systematics.
- 5. Show the hierarchical arrangement of taxonomic categories.



Chapter No. 2 BIOLOGICAL CLASSIFICATION

LEARNING OUTCOMES

| Learning Outcomes | | | | | |
|---|--|--|--|--|--|
| Students will be able to recall | the important technical terms used in the chapter | after doing Q1 under 1markers. | | | |
| Students will be able to state | the terms and concepts in short | after doing Q2 to Q10 under 1markers. | | | |
| Students will be able to describe and differentiate | the phylogenetic system of classification from artificial system of classification | after doing Q1 under 2markers. | | | |
| Students will be able to state | the importance of mycorrhiza | after doing Q2 under 2markers. | | | |
| Students will be able to observe and state | The concepts related to 5-kingdom classification | after doing Q3 under 2markers. | | | |
| Students will be able to explain | The kinds of nutrition shown by Monera, Protista and Fungi show | after doing Q1 under 3 markers. | | | |
| Students will be able to explain | the 3 systems of classification and the 3-domain classification | after doing Q2 and Q3 under 3 markers. | | | |

1 mark each

1. Fill in the blanks:

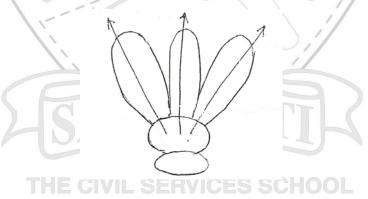
| i) | Two or more species occupying the same or overlapping area are | | | | |
|-------|---|--|--|--|--|
| ii) | The microscopic unicellular organisms found in aquatic bodies are | | | | |
| iii) | In Monera the DNA is and histones. | | | | |
| iv) | Most common method of reproduction in prokaryotes is | | | | |
| v) | Phylogeny refers to | | | | |
| vi) | In the 5 kingdom classification, unicellular eukaryotes, primarily aquatic and | | | | |
| , | both autotrophic and heterotrophic are included under | | | | |
| vii) | Slime moulds resemble but are put under kingdom | | | | |
| viii) | The body of fungi is called and is made of | | | | |
| ix) | Binomial nomenclature was first described by and consists of 2 | | | | |
| , | words and | | | | |
| x) | In artificial system of classification organisms are classified on the basis of | | | | |

xi) Dinoflagellates belong to kingdom _____.Their mode of reproduction is

- xii) Asexual spores produced at the tip of hyphae exogenously are called
- xiii) Fungi where sexual reproduction is not known is ______.
- 2) What kind of nutrition do (i) Monera, (ii) Protista, (iii) Fungi show?
- 3) What is the basis of classification of protozoa?
- 4) What are Mychorrhiza?
- 5) What is red tide?
- 6) What kind of food is stored in Fungi?
- 7) Give the technical name for the fruiting body of a mushroom.
- 8) In which cells of *Nostoc*, does nitrogen fixation take place?
- 9) Why are blue green algae included under Monera?
- 10) In the scientific name Ficus bengalensis L, what does 'L' stand for?

2 marks each

- 1) Describe the phylogenetic system of classification How is it different from the artificial system?
- 2) State the importance of mycorrhiza.
- 3) The figure below shows the 5-kingdom classification. Answer the following questions.



- a. What are the advantages of this of classification?
- b. Label the 5 kingdoms on the diagram.

3 marks each

- 1) What kinds of nutrition do Monera, Protista and Fungi show?
- 2) What are the 3 systems of classification? Explain the terms.
- 3) Write a short note on the three-domain classification.

Chapter No. 3 PLANT KINGDOM

LEARNING OUTCOMES

| Learning Outcomes | | | | | |
|---|--|---------------------------------------|--|--|--|
| Students will be able to recall | after doing Q1 under 1markers. | | | | |
| Students will be able to name and explain | the concept of amphibians of the plant kingdom | after doing Q2 under 1markers. | | | |
| Students will be able to identify and explain | the structure of prothallus | after doing Q1 under 2markers. | | | |
| Students will be able to name | the pigments found in algae | after doing Q2 under 2markers. | | | |
| Students will be able to differentiate | between important stages in plant life cycles | after doing Q3 and Q4 under 2markers. | | | |
| Students will be able to identify and state | the economic importance of algae | after doing Q5 under 2markers. | | | |
| Students will be able to identify and recall | the given technical terms within the plant kingdom | after doing Q6 under 2 markers. | | | |

1 mark each

| I) | F1II | ın | tne | b. | lan | KS: | |
|----|------|----|-----|----|-----|-----|--|
| | | | | | | | |

| i) | Dominant generation in Bryophytes is and gametes are |
|------|---|
| | produced by meiosis occurs in |
| ii) | Spore of a fern belongs to generation. |
| iii) | Gametophytic phase of <i>Pinus</i> is restricted to and |
| iv) | Agar is obtained from |

2) Name the amphibians of the plant kingdom. Why are they called so? Which group do kelps belong to? Give one reason why bryophytes cannot grow taller than a few inches?

2 marks each

- i. What does the prothallus look like? What is its significance?
- ii. What kind of photosynthetic pigment is found in red algae and brown algae?

- iii. Distinguish between the gametophyte of a moss and a fern.
- iv. Where does meiosis occur in bryophytes and pteridophytes?
- v. An organism is aquatic, mainly marine with a filamentous form. Their cell wall is covered with algin. Identify the organism. State any 1 economic use of such organisms.
- vi Where will you find the following:
 - Fucoxanthin,



Chapter No. 4 ANIMAL KINGDOM

| Learning Outcomes | | | | | |
|---|--|--|--|--|--|
| Students will be able to understand | The purpose of certain characters in the given phylums | After completing 1) and 2) of 1mk questions. | | | |
| Students will be able to recall | The names of the required phylums | After completing 3) of 1mk questions. | | | |
| Students will be able to state | The types of polymorphism | After completing 1) of 2mk questions. | | | |
| Students will be able to justify | The given reasonings | After completing 2) and 3) of 2mk questions. | | | |
| Students will be able to identify, classify and justify | The characters of given protochordata | After completing 4) of 2mk questions. | | | |
| Students will be able to define and list | The characters of the given phylum | After completing 1) of 3mk questions. | | | |
| Students will be able to explain | The given body plans | After completing 2) of 3mk questions. | | | |
| Students will be able to differentiate | Between chondrichthyes and osteichthyes | After completing 3) of 3mk questions. | | | |
| Students will be able to identify | The given characters with their respective groups | After completing 4) of 3mk questions. | | | |
| Students will be able to recall | The scientific terms for the given statements | After completing 5) of 3mk questions. | | | |

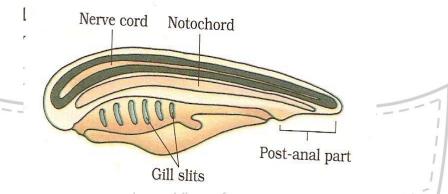
1 mark each

- 1) Why do Platyhelminths need a flat body?
- 2) Why is octopus included under Mollusca?
- 3) Name the phylum where you will find (i) tube feet, (ii) calcareous shell

2 marks each

- 1) What kind of polymorphism do cnidarians show?
- 2) How have reptiles coped with the dry terrestrial habitat?
- 3) Platypus is an oviparous animal. Justify its classification under Mammalia

4)



- a) Classify the above organism according to the labeling given.
- b) Name the organism.
- c) Why are they called protochordates?

3 marks each

1. Define the term 'coelom.' Enlist 3 features that enable the avian organisms to fly giving 2 examples of the group.

Write an explanatory note on

- (a) tube within a tube plan,
- (b) cell aggregate plan,
- (c) blind sac plan.
- 2. Differentiate between Chondrichthyes and Osteichthyes.
- 3. With which animal/ phylum would you associate the following?

 Carapace, malpighian tubules, medusa, mantle, flame cells, ossein, hinged calcareous shell.
- 4. Give scientific terms for the following
 - excretory organs of annelids,
 - stinging organs of jelly fish,
 - free floating forms of cnidaria,
 - collection of nerve bodies.
 - protein found in the skeleton of sharks,
 - blood filled cavity of arthropods.

PLANT KINGDOM AND ANIMAL KINGDOM

| SN o | IMAGE | ORGANIS M | CHARACTERISTICS OF THE GROUP THE IDENTIFIED ORGANISM BELONG TO | SPECIAL POINTS |
|---------|-----------------------------------|--|--|--|
| | | P | LANT KINGDOM | |
| 1 | Parer colon | | Thalloid Autotrophic (has chlorophyll) A lot of them are aquatic Algae can also reproduce both sexually and asexually | It is oogamous. It is formed when a larger, stationary female game combines with a motile, small male gamete. They also live- in colonies. |
| 2 | Air bladder Frond Midrib Holdfast | Fucus(Algae Phaeophyce ae) HE CIVIL | Brown algae-contain fucoxanthin Simple Thalloid Autotrophic Largely aquatic Reproduce by vegetative, asexual and sexual methods | They possess chlorophyll a,c, carotenoids and xanthophylls. The plant body is attached to the substratum by a holdfast, and has a stalk, the stipe and a leaf-like photosynthetic organ called frond. Sexual reproduction may be isogamous, anisogamous or oogamous. |
| 3 | Frond | Porphyra(Al gae- Rhodophyce ae) | Rhodophyceae (Red Algae) Chlorophyll a,d and phycoerythrin Stores food as Floridean starch has no Flagella | Sexual reproduction in Porphyra is oogamous and leads to complex post fertilisation events. |

| | | | | Question: Name the compounds that are similar in structure to Floridean Starch. Answers: Amylopectin/Gly cogen |
|---|--|---|--|--|
| 4 | Archegoniophore Gemma cup Rhizoids | Marchantia (Liverwort, Bryophyta) | Also called amphibians of plant kingdom Plant body is more differentiated and is thallus like and has rhizoids Dominant stage is gametophyte The sex organs are antheridium which produce antherozoids and archegonium which produce eggs. The gametes fuse to produce zygote which gives rise to a sporophyte Sporophyte is dependent on photosynthetic gametophyte. Some cells of sporophyte undergo meiosis to produce haploid spores which give rise to gametophyte. | Liverworts have thalli which are dorsiventral and are pressed close to the substrate. Asexual reproduction is by fragmentation or formation of gemmae, which are green,asexual and mutlticellular buds which gevelop in gemma cups. These gemmae become detached from the body and germinate. |
| 5 | Sporophyte Seta Leaves Main axis Rhizoids | Funaria (MOSS) (BRYOPHYT A) | The predominant stage in the life cycle is gametophyte that consists of two stages. The first stage is protonema -creeping green, filamentous, branched stage. The second stage develops from the lateral bud and is a leafy stage. | In funaria the male gamete is biciliated For fertilization chemicals (chemotactic) and zooidogamy is required. What are the |

Attached to the soil through two stages of multicellular and branched the rhizoids. This stage bears gametophyte the sex organs. generation in • Vegative reproduction in mosses? mosses is by fragmentation and budding in secondary protonema. the sex organs antheridia and archegonia are produced at the apex of the leafy shoots. After fertilisation, the zygote develops into a sporophyte, consisting of a foot, seta and capsule The capsule contains spores. Spores are formed after meiosis. Ferns are seedless • Ferns of the 6 Fern (Pteridophyt vascular plants of class humid tropics and temperate areas. Some typically ferns live under subpossess a rhizome arctic conditions as well. (horizontal They constitute the stem) that largest living group of grows partially primitive vascular underground; the deeply plants with over 10,000 species. Ferns once divided fronds dominated the earth in (leaves) and the the carboniferous roots grow out of the rhizome. period (about 300 million years ago). Fronds are Plant body is a characteristicall sporophyte. It is y coiled in the differentiated into true bud stem, leaves and roots. (fiddleheads) and uncurl in a The stem is an type of leaf underground rhizome development. in most of the ferns. Some primitive ferns • Polypodiopsida have an above-ground (leptosporangia stem with tree-like habit. They are called ferns)Vascular tree ferns, e.g., plants; Cyathaea, Celeotium. A sporophyte

| Cycas (Gymnosper ms) III | tree fern is like a small palm. It may reach a maximum height of 20 m. Roots are adventitious. Leaves are large and are called fronds. They are often graceful. Leaves may be simple or pinnately compound. In a pinnately compound leaf, the lamina is divided laterally into leaflets. Living fossils Coralloid roots(blue green algae are found with coralloid roots of cycas as symbionts and perform nitrogen fixation.) Characteristic are similar to ferns Megaphyllous/macrop hyllus. | differentiated into stem (rhizome), roots, and leaves (fronds); leaves entire or, more often, divided; arrangement of vascular tissue in stem variable, primary growth only; sporangia usually clustered into sori, often located on the under (abaxial) surface of sporophylls • Multiciliated top shaped motile male gametes . • Leaves are well adapted to withstand extremes of temperature, humidity and wind- needle like leaves, sunken stomata, thick cuticle • The male and female gametophyte do not have an independent |
|--------------------------|---|---|
| | | gametophyte do not have an |
| | (Gymnosper ms) III SAI THE CIVIL | palm. It may reach a maximum height of 20 m. Roots are adventitious. Leaves are large and are called fronds. They are often graceful. Leaves may be simple or pinnately compound. In a pinnately compound leaf, the lamina is divided laterally into leaflets. Cycas (Gymnosper ms) Living fossils Coralloid roots(blue green algae are found with coralloid roots of cycas as symbionts and perform nitrogen fixation.) Characteristic are similar to ferns Megaphyllous/macrop |

| 8. | Sycon (Porifera) | Habitat- generally marine Body symmetry- Asymmetric Digestion- Intracellular Level of organisation- Cellular Development- Indirect Reproduction: Asexual- By fragmentation Sexual- Formation of gametes Fertilisation- Internal | Have water transport/ canal systemhelps in gathering food,removal of wastes and respiratory exchange Water enters minute pores(ostia) into a cavity,spongocoel, from where it goes out through osculum Choanocytes(collar cells) line spongocoel Skeleton made of spicules or spongin fibres |
|----|---|--|---|
| 9 | Aurelia(Med usa) Coelentrates HE CIVIL | Digestion is extracellular and intracellular Diploblastic Acoelomate Exhibit tissue level of organisation The phylum derives its name from the stinging cells(cnidocytes or cnidoblasts) present on the tentacles and body. Some of the cnidarians have a skeleton made of calcium carbonate They have a gastrovascular cavity with a single opening, mouth on hypostome | Have two basic body forms, medusa and polyp the former being umbrella shaped and freeswimming and the latter sessile and cylindrical. Some cnidarians which exist in both forms i.e. polyp and medusa show alternation of generation(metag enesis) |

| 40 | | D1 1 1. | 4 5 1 | 4.11 |
|-----|--------------------|-------------------|----------------------------|---|
| 10. | | Pleurobrachi | 1. Exclusively marine | 1.How are |
| | | a - Ctenophora | 2. Radially symmetrical | ctenophores |
| | | Ctellopilora | 3. Diploblastic | more |
| | | | 4. Tissue level of | advanced than cnidarians, |
| | | | organisation | with respect to |
| | | | 5. Hermaphrodites | the mesoderm? |
| | 1 | | 6. Sexual reproduction | The mesoderm |
| | | | 7. External fertilisation | of ctenophores |
| | A A | | 8. Indirect development | have |
| | A B | | 9. Extracellular and | mesenchymal |
| | | | intracellular digestion | <u>cells</u> |
| | great Lilly Marine | | 10. Some show | (unspecialised |
| | | | bioluminescence | cells) and |
| | | | 11.8 external rows of | <u>specialised</u> |
| | 1: | / | ciliated comb plates | <u>cells</u> (eg- |
| | 1, | | /1 / | muscle |
| | 1, | | | cells). Hence |
| | \i | | 11 5 | they are more |
| | 1 | | 0) | evolved |
| | 1/ | | 95 | than cnidarians. |
| | // | | 1 132 | [(- |
| | // | | 1-0196 | 2. <u>'Echlora rubra'</u> |
| | /\ | 1/1/ | 100 | is an exception |
| | // | 111 | - 21 111 | of ctenophores |
| | // | 51 | | because it has |
| | \- | Sier | -51 | stinging cells. |
| | | CL | | |
| 11 | 100000 | Tapeworm | | Dorsoventrally |
| | | <u>Taenia</u> | | flattened body |
| | NEX COLF F | Phylum- | Bilaterally symmetrical | • Mostly |
| | UPSTHAN | Platyhelmint | Triploblastic | endoparasites |
| | | hes | • Acoelomate | on animals |
| | | CAR | Organ level of body | On parasites- hooks and |
| | H = | DAL | organisation • Monoecious | suckers are |
| | Ĭ. | UZ- | Internal fertilization | present- |
| | | | Development through | adaptation(as |
| | T | HE CIVIL | many larval stages | they are |
| | | | many laivai stages | parasites) |
| | | | | • Flame cells for |
| | | | | osmoregulatio |
| | | | | n and |
| | | | | excretion |
| | | | | |
| | | | | |
| | | | | |

| 12 | Male Female | Ascaris (Round worm) Phylum: aschelminth s | Free living Aquatic, terrestrial or parasitic in plants and animals Organ system level of organisation Exhibit bilateral symmetry Triploblastic and pseudocoelomate Dioecious Internal fertilisation Direct and indirect development | Well-developed muscular pharynx in the alimentary canal. Body wastes are removed through an excretory pore. Females are longer than males Why are they called roundworms? |
|----|-------------|---|--|--|
| 13 | | Hirudinaria (sangivorous) Phylum- Annelida | Dorsal surface-convex, ventral surface- flat There are secretions of mucus on the body. There is a sucker present at the anterior part of the ventral surface. Anus is present on the dorsal surface. The ventral surface is brown and the dorsal surface is green in colour. | There are around hundred or more than hundred annuli on the body Why is the body of a leech always moist? (it is because of the secretions of mucus from the body wall) |
| 14 | | Butterfly Phylum- Arthropoda | Organ system level of organisation Bilaterally symmetrical Triploblastic Segmented Coelomates Body consists of the head, thorax and abdomen. Open circulatory system. Fertilisation is internal. They are oviparous. Development can be | The body is covered with a chitinous exoskeleton. Excretion takes place through malpighian tubules. They are dioecious. They have jointed appendages. Sensory organs |

| | | | direct or indirect | like antennae, eyes statocysts or balance organs are present. |
|----|-----|---|--|---|
| 15 | | PILA GLOBOSA (apple snail) PHYLUM MOLLUSCA - | Hard and one-piece spirally coiled calcareous shell Wide opening at the end of the last whorl, remains closed by a calcareous plate called operculum The body has 4 regionshead, foot, visceral mass and mantle. In shallow freshwater and moves with it's foot. | They are dioecious. The shell of the male is usually smaller in size and less swollen than the female. They have an open circulatory system. Body of octopuses is also covered with a calcareous shell. |
| 16 | (a) | Star fish <u>Asterias</u> Phylum-echinoderma ta | Have calcareous ossicles, hence are called echinodermata (spiny body) Marine Organ-system level of body organisation Adults- radially symmetrical, larvae-bilaterally symmetrical Triploblastic Coelomates Complete digestive system with 2 openings | Water vascular system-locomotion, transport, respiration, and capturing prey Absent excretory system Dioecious Sexual reproduction External fertilisation Indirect development with free swimming larvae |

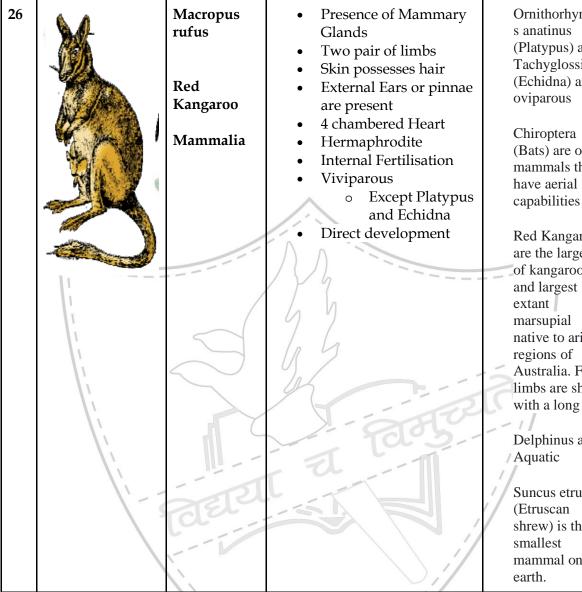
| 17 | Balanog us Hemich ta | structure to a notochord called | Marine Worm like Balanoglossus is a connecting link between Vertebrates and Invertebrates It possesses gill slits-and resembles Ascidians Saccoglossus has concentric muscle rings in proboscis Distinguish between This group and Chordates? Why is this group considered a separate Phylum Now? |
|----|---|---|--|
| 18 | Nerve cord Notochord Chordat Post-anal part Gill slits THE C | Presence of notochord Bilateral symmetry Triploblastic Coelomate Organ-system level of organisation Presence of dorsal hollow nerve cord Pharynx perforated by gill slits Central nervous system is hollow, dorsal and single Heart is ventral Presence of a post-ana part(tail) | Name the subphyla in which this phylum is divided? What is the fundamental characteristic of this phylum? How does this character differ in different subphylums? |

| 19 | | Ascidia Urochordata | Notochord is present only in larval tail Possess a hollow nerve cord and a post anal tail Body has no coelomic body cavity | After metamorphosis, they develop a tunic or a hard covering. (Q: Why are they called Tunicata?) |
|----|----------------------|---|--|--|
| | | | | Cephalochordate: • Exclusivel y marine • Notochord extends from head to tail region and is persistent throughou t their life. |
| 20 | S 1111 ₁₁ | Petromyzon (lamprey) Cyclostomat a HE CIVIL | Have a sucking and circular mouth without jaws. Their body is devoid of scales and paired fins. They have an elongated body bearing 6-15 pairs of gill slits for respiration | Circulatio n is of closed type. They are marine but migrate for spawning to fresh water. They die within a few days after spawning |

| 21 | (a) | Scoliodon | Chondrichthyes: Have a 2-chambered heart Notochord is persistent throughout their life Some possess electric organs and poison sting Cold blooded and can't regulate body temp. Don't have air bladder Have separate sexes; male pelvic fins have bear claspers They have internal fertilisation and many are viviparous | Why do they have to swim constantly? • Since they don't have an air bladder, they have to keep on swimming to avoid sinking. |
|----|-----|------------------------------|---|--|
| 22 | | CATLA (Osteichthye s) | streamlined body cycloid/ctenoid scales oviparous bony endoskeleton presence of air bladder oviparous external fertilization | 4 pairs of gills covered by an operculum on each side mucous lined scales jaws are present Why do osteichthyes have smooth scales? |
| 23 | | RANA (Frog) Amphibians | Lives in both types of habitats Amphibian skin is moist and is a place of gaseous exchange. 3 chambered heart Oviparous and development is external. | Webbed feet Hind legs are modified for longer jumps. |

| 24 | Crocodylina e (Crocodile) Reptilia | Cold Blooded Body covered with scales Oviparous, fertilisation is internal 3-Chambered heart (except for crocodile) Respiration through lungs | • Crocodile, while being a reptile, has a 4-chambered heart instead of 3-chambered |
|----|--|--|---|
| 25 | Neophron (vulture) (AVES) | Presence of feathers Possess beaks The forelimbs are modified into wings. The hind limbs generally have scales and are modified for walking, swimming or clasping the tree branches. Four-chambered heart and warm blooded. Endoskeleton is fully ossified and the long bones are hollow with air cavities. Respiration is through lungs, sexes are separate and fertilisation is internal. | The digestive tract of birds has additional chambers, the crop and gizzard. Most of them can fly except flightless birds (e.g., Ostrich). They have well-developed flight muscles that help during the flight. There are epidermal scales on their legs. Q) What is the function of feathers in birds? What is the importance of pneumatic bones and air sacs in Aves? |

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Ornithorhynchu (Platypus) and Tachyglossidae (Echidna) are

Chiroptera (Bats) are only mammals that have aerial

Red Kangaroo are the largest of kangaroos and largest native to arid Australia. Front limbs are short with a long tail

Delphinus are

Suncus etruscus shrew) is the mammal on



UNIT I

PARAGRAPH BASED MCQs

1. Bacteria have existed from very early in the history of life on Earth. Bacteria fossils discovered in rocks date from at least the Devonian Period (419.2 million to 358.9 million years ago), and there are convincing arguments that bacteria have been present since early Precambrian time, about 3.5 billion years ago. Bacteria were widespread on Earth at least since the latter part of the Paleoproterozoic, roughly 1.8 billion years ago, when oxygen appeared in the atmosphere as a result of the action of the cyanobacteria. Bacteria have thus had plenty of time to adapt to their environments and to have given rise to numerous descendant forms.

1. The organisms which completely lack a cell wall and can live without oxygen

are:

- i) Mycoplasmas
- ii) Archaebacteria
- iii) Methanogens
- iv) Thermoacidophiles
- 2. Which one of the following antibiotics kills bacterial cells by inhibiting the polymerization of peptidoglycan?
 - i) Aminoglycosides
 - ii) Fluoroquinolones
 - iii) Quinines
 - iv) Penicillins
- The shape of cocci bacterium is:
 - i) Rod shaped
 - ii) Spherical
 - iii) Comma shaped
 - iv) Spiral
- 4. The motile bacteria are able to move by:
 - i) Fimbriae
 - ii) Flagella
 - iii) Cilia
 - iv) Pili
- 2. Algae form organic food molecules from carbon dioxide and water through the process of photosynthesis, in which they capture energy from sunlight. Similar to land plants, algae are at the base of the food chain, and, given that plants are virtually absent from the oceans, the existence of nearly all marine life—including whales, seals, fishes, turtles, shrimps, lobsters, clams, octopuses, sea stars, and worms—ultimately depends upon algae. In addition to making organic molecules, algae produce oxygen as a by-product of photosynthesis. Algae produce an estimated 30 to 50 percent of the net global oxygen available to humans and other terrestrial animals for respiration.
 - 1. An example of colonial alga is:
 - i) Volvox
 - ii) Ulothrix
 - iii) Spirogyra
 - iv) Chlorella

- Assertion: red algae contribute in producing coral reefs.
 Reason: Some red algae secrete and deposit calcium carbonate over their walls.
 - i) Both the statements A and B are correct and B is the reason for A.
 - ii) Both the statements A and B are correct and B is not the reason for A.
 - iii) Statement A is correct and B is wrong.
 - iv) Both Statement A and B are incorrect.
- 3. Which of the following groups of algae produces algin?
 - i) Phaeophyceae and Chlorophyceae
 - ii) Rhodophyceae and Phaeophyceae.
 - iii) Chlorophyceae and Rhodophyceae.
 - iv) Phaeophyceae only.
- 4. What is obtained from Gelidium and Gracillaria?
 - i) Agar-agar
 - ii) Carrageein
 - iii) Alginic acid
 - iv) All of these

ASSERTION REASONING QUESTIONS

DIRECTIONS for the question 1 to 5:

In each of the questions given below, there are two statements marked as Assertion (A) and Reason (R). Mark your answer as per the codes provided below:

- a) Both A and R are true and R is the correct explanation of A.
- b) Both A and R are true but R is not the correct explanation of A.
- c) A is true but R is false.
- d) A is false but R is true.
- e) Both A and R are false.
- 1. Assertion: Each group of algae has a characteristic colour. Reason: Each group of algae show predominance of one pigment.
- 2. Assertion: The bryophytes exist in two phases gametophyte and sporophyte. Reason: The sporophyte is nutritionally independent.
- 3. Assertion: Porocytes are present in sponge. Reason: Porocytes are the part of canal system.
- 4. Assertion: Obelia is dimorphic in nature. Reason: Obelia shows polyp and gonangia form.
- 5. Assertion: Liver fluke has undergone great modification to adapt itself with the parasite life.

Reason: The modification in liver fluke is to suit its existence as an endoparasite in the bile duct of sheep.



UNIT II

STRUCTURAL ORGANISATION IN PLANTS AND ANIMALS

Chapter 5: Morphology of Flowering Plants

Chapter 6: Anatomy of Flowering Plants

Chapter 7: Structural Organisation in Animals

- DAINDING

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Chapter 5 MORPHOLOGY OF FLOWERING PLANTS

| Learning Outcomes | | | | | |
|--|---|--|--|--|--|
| Students will be able to name and state examples | Of the plants mentioned | After completing 1) and 2) of 1mk questions. | | | |
| Students will be able to differentiate | between tendrils of pumpkin and pea | After completing3) of 1mk questions. | | | |
| Students will be able to differentiate | between hypogynous and epigynous flowers | After completing 1) of 2mk questions. | | | |
| Students will be able to define | The given terminologies | After completing 2) of 2mk questions. | | | |
| Students will be able to justify | The reason of onion being a modified stem | After completing 3) of 2mk questions. | | | |
| Students will be able to explain | The concept of dicot albuminous seed | After completing 4) of 2mk questions. | | | |
| Students will be able to differentiate | Between true and false fruit | After completing 5) of 2mk questions. | | | |
| Students will be able to explain | the role of the micropyle of a seed | After completing 6) of 2mk questions. | | | |
| Students will be able to identify and state | The origin of different parts of a fruit | After completing 7) of 2mk questions. | | | |

1 marks each

- 1. Name 2 plants that produce rhizomes. Give 2 examples where root system is poorly developed.
- 2. What are haustoria? Name a plant which has them.
- 3. What is the difference between tendrils of pumpkin and pea?

2 marks each

- 1. Differentiate between hypogynous and epigynous flowers
- 2. Explain: superior ovary, aestivation, diadelphous stamens, axile placentation.
- 3. Give 2 reasons to justify that onion is a modified stem.
- 4. Castor is a dicot albuminous seed. Explain.

5. Why apple is called a false fruit but the banana a true fruit?

- 6. What is the role of the micropyle of a seed?
- 7. Where do the different parts of a fruit arise from?



Chapter 6 ANATOMY OF FLOWERING PLANTS

| Learning Outcomes | | | | | |
|---|---|---|--|--|--|
| Students will be able to name and reason | The location of quiescent centre | After completing 1) of 1mk questions. | | | |
| Students will be able to define | Endarch arrangement | After completing 2) of 1mk questions. | | | |
| Students will be able to state | The common name of phloem | After completing 3) of 1mk questions. | | | |
| Students will be able to identify | Root or stem from given sample | After completing 1) of 2mk questions. | | | |
| Students will be able to reason | The presence of annual rings in hilly areas | After completing 2) of 2mk questions. | | | |
| Students will be able to differentiate | between stems of sunflower and maize anatomically | After completing 3) of 2mk questions. | | | |
| Students will be able to state | The various technical terms related to dicot root | After completing 4) of 2mk questions. | | | |
| Students will be able to name and explain | The functionality of cork cambium | After completing 5) of 2mk questions. | | | |
| Students will be able to name | the dead elements of the xylem and the phloem | After completing 6) of 2mk questions | | | |
| Students will be able to explain | The concept of xylem as a complex tissue | After completing 1) of 3mk questions | | | |
| Students will be able to describe | The concept of stellar growth in dicot roots and stem | After completing 2) and 3) of 3mk questions | | | |

1 mark each

- 1) Where is the quiescent center located? Why is it named so?
- 2) What is endarch arrangement? Where will you find it?
- 3) If xylem is called wood, what is phloem called?

2 marks each

1) If you get a 4 cm piece of flowering plant, how will you identify anatomically if it is a stem or a root?

- 2) Why annual rings are better developed in hilly areas than in coastal areas?
- 3) Mention 2 differences between stems of sunflower and maize.
- 4) With reference to a dicot root, answer the following questions:
 - a) Where is the pericycle located?
 - b) How are the xylem vessels arranged?
 - c) What types of cells constitute the cortex?
 - d) What does the pith look like?
- 5) What is another name given to cork cambium? What kind of cells does it give rise to?
- 6) Name the dead elements of the xylem and the phloem.

3 marks each

- 1) Why is the xylem called a complex tissue? Explain the peculiarities of the tissue.
- 2) Describe extra stellar secondary growth in a dicot root.
- 3) Describe stellar secondary growth in a dicot stem.



Chapter 7 STRUCTURAL ORGANISATION IN ANIMALS

| Learning Outcomes | | | | |
|--|---|--|--|--|
| Students will be able to understand | | | | |
| Students will be able to recall | The names of the terms asked. | After completing 3) and 4) of 1mk questions. | | |
| Students will be able to recall and explain | The function of chondrin | After completing 5) of 1mk questions. | | |
| Students will be able to differentiate | Between ligaments and tendons | After completing 6) of 1mk questions. | | |
| Students will be able to explain | The the functioning of the given tissue | After completing 7) of 1mk questions. | | |
| Students will be able to explain and list | the basic characteristics of epithelium and connective tissues | After completing 1) of 2mk questions. | | |
| Students will be able to state and explain | The location of ciliated epithelium. | After completing 2) of 2mk questions. | | |
| Students will be able to differentiate | between keratinized and nonkeratinized epithelium | After completing 3) of 2mk questions. | | |
| Students will be able to recall and explain | the kind of cells found in connective tissue | After completing 4) of 2mk questions. | | |
| Students will be able to identify, label and state | The location of the tissue shown in the diagram | After completing 5) of 2mk questions. | | |
| Students will be able to recall and justify | The type and presence of the given tissues in various locations of the human body | After completing 1) of 5mk questions. | | |
| Students will be able to state | The location of various tissues given | After completing 2) of 5mk questions. | | |

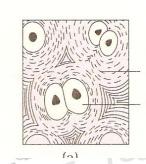
1 mark each

- 1) What do fibroblasts synthesize?
- 2) What are chondriocytes?
- 3) Name the protein found in bone and cartilage.
- 4) Name the most common ion found in blood.
- 5) Where will you find chondrin? Describe the tissue where these proteins are found.

- 6) How is a ligament different from a tendon?
- 7) How do epithelial tissue get their supply of nutrients?
- 8) Where are blood cells produced?

2 marks each

- 1) Enlist the basic characteristics of epithelium and connective tissues.
- 2) Where will you find ciliated epithelium and why?
- 3) State the difference between keratinized and nonkeratinised epithelium. Where are each of them found?
- 4) Name the kind of cells found in connective tissue. State the function of each.
- 5) Study the given diagram and answer the following questions:



- (a) Identify the diagram
- (b) Label the diagram
- (c) Where will you find this structure in the body?

3 marks each

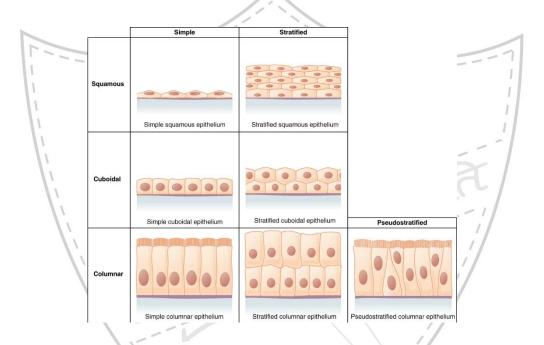
- 1) Name the tissue that lines urinary bladder, intestinal mucosa, fallopian tubes. State the importance of the presence of these tissues in these locations.
- Where will you find the following in the body:
 Ciliated epithelium, myosin, lacunae, lamellae, ossein, axons

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UNIT II

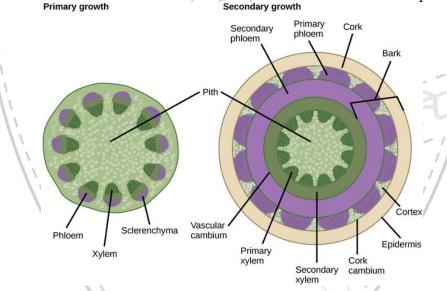
PARAGRAPH BASED MCQs

A. Most epithelial tissues are essentially large sheets of cells covering all the surfaces of the body exposed to the outside world and lining the outside of organs. Epithelium also forms much of the glandular tissue of the body. Skin is not the only area of the body exposed to the outside. Other areas include the airways, the digestive tract, as well as the urinary and reproductive systems, all of which are lined by an epithelium. Hollow organs and body cavities that do not connect to the exterior of the body, which includes, blood vessels and serous membranes, are lined by endothelium (plural = endothelia), which is a type of epithelium.



- 1. In observing epithelial cells under a microscope, the cells are arranged in a single layer and look tall and narrow, and the nucleus is located close to the basal side of the cell. The specimen is what type of epithelial tissue?
 - i) columnar
 - ii) stratified
 - iii) squamous
 - iv) transitional
- 2. Which of the following is the epithelial tissue that lines the interior of blood vessels?
 - i) columnar
 - ii) pseudostratified
 - iii) simple squamous
 - iv) transitional
- 3. Which type of epithelial tissue specializes in moving particles across its surface and is found in airways and lining of the oviduct?

- i) transitional
- ii) stratified columnar
- iii) pseudostratified ciliated columnar
- iv) stratified squamous
- 4. Assertion: Gap junctions perform cementing functions. Reason: Tight junctions facilitate the cells to communicate with each other.
 - i) Both the statements A and B are correct and B is the reason for A.
 - ii) Both the statements A and B are correct and B is not the reason for A.
 - iii) Statement A is correct and B is wrong.
 - iv) Both Statement A and B are incorrect.
- B. Study the following diagram which explains that in woody plants, primary growth is followed by secondary growth, which allows the plant stem to increase in thickness or girth. Secondary vascular tissue is added as the plant grows, as well as a cork layer. The bark of a tree extends from the vascular cambium to the epidermis.



- 1. In dicot stem, the secondary growth takes place by
 - i) Primary cambium
 - ii) Secondary cambium
 - iii) Development of cambium in stele region
 - iv) Development of cambium in stele and in the cortical region
- 2. Cambium causes growth in
 - i) Circumference
 - ii) Width (diameter)
 - iii) Leaves
 - iv) Length
- 3. The function of cork cambium (phellogen) is to produce
 - i) Cork and secondary cortex
 - ii) Secondary xylem and secondary phloem
 - iii) Cork
 - iv) Secondary cortex and phloem

4. Assertion: In woody stems the amount of heart wood continue to increase year after Year

Reason: The activity of cambial ring continues uninterrupted.

- i) Both the statements A and B are correct and B is the reason for A.
- ii) Both the statements A and B are correct and B is not the reason for A.
- iii) Statement A is correct and B is wrong.
- iv) Both Statement A and B are incorrect.

ASSERTION REASONING QUESTIONS

DIRECTIONS for the question 1 to 5:

In each of the questions given below, there are two statements marked as Assertion (A) and Reason (R). Mark your answer as per the codes provided below:

- a) Both A and R are true and R is the correct explanation of A.
- b) Both A and R are true but R is not the correct explanation of A.
- c) A is true but R is false.
- d) A is false but R is true.
- e) Both A and R are false.
- 1. Assertion: Adventitious roots develop from any part of plant. Reason: In such plants, tap root is not developed.
- Assertion: A simple leaf has undivided lamina.
 Reason: Leaves showing pinnate and palmate venation have various type of incisions.
- 3. Assertion: Tepals may be free or fused. Reason: When sepals and petals are similar, they are called as tepals.
- 4. Assertion: Simple permanent tissues are homogenous tissue. Reason: - Simple permanent tissue is made up of cells similar in structure and function
- 5. Assertion The collenchyma is a thick-walled living tissue. Reason The collenchyma is thickened due to deposition of pectin.

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Chapter 8: Cell: The Unit of Life

Chapter 10: Cell Cycle and Cell Division

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CELL: THE UNIT OF LIFE

| Learning Outcomes THE CIVIL SERVICES SCHOOL | | | |
|---|---|---|--|
| Students will be able to recall | The names of the terms asked. | After completing 1) to 3) of 1mk questions. | |
| Students will be able to explain | The role of lysosomes as suicidal bags | After completing 1) of 2mk questions. | |
| Students will be able to describe | the genetic organization of a bacterial cell | After completing 2) of 2mk questions. | |
| Students will be able to | Between cell wall of prokaryotes and eukaryotes | After completing 3) of 2mk | |

| differentiate | | questions. |
|---|--|---------------------------------------|
| Students will be able to explain | the function of any membrane bound cell organelle | After completing 4) of 2mk questions. |
| Students will be able to explain | The given terms in context of the fluid mosaic model | After completing 1) of 3mk questions. |
| Students will be able to explain | the structure of a eukaryotic nucleus | After completing 2) of 3mk questions. |
| Students will be able to observe and identify | The organelle shown | After completing 3) of 3mk questions. |
| Students will be able to draw and describe | the Singer Nicholson Model of the cell membrane. | After completing 1) of 5mk questions. |

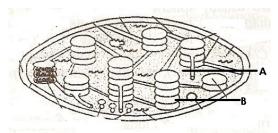
1 mark each

- 1) Name the substance that stabilizes the cell membrane of a eukaryotic cell.
- 2) What kind of ribosomes are found in a prokaryotic cell?
- 3) Name the substance that stabilizes the cell membrane of a prokaryotic cell.

2 marks each

- 1) Why are lysosomes called suicidal vacuoles? What kind of enzymes do they have?
- 2) Describe the genetic organization of a bacterial cell.
- 3) How is a Eukaryotic cell wall different from a prokaryotic cell wall?
- 4) Describe the function of any membrane bound cell organelle.

- 1) How does the fluid mosaic model of a cell membrane explain the following?
 - i. facilitated transport
 - ii. Tissue recognition
 - iii. endocytosis
 - iv. antigenic properties of a tissue
 - v. active transport
- 2) What is euchromatin? Explain the structure of a eukaryotic nucleus
- 3) Observe the given diagram and answer the questions that follow:



- a) Identify the picture shown above.
- b) Label A and B
- c) Give the function of each

5 marks each

1) Describe along with labeled illustrations, the Singer Nicholson Model of the cell membrane.



| Learning Outcomes | | | |
|---------------------------------|--|---|--|
| Students will be able to recall | The names of the phases asked. | After completing 1) to 3) of 1mk questions. | |
| Students will be able to list | the events that occur during diakinesis | After completing 1) of 2mk questions. | |
| Students will be able to state | the events that occur during (a) G2 phase, (b) S phase | After completing 2) of 2mk questions. | |

| Students will be able to justify | The non-occurrence of interphase after meiosis I | After completing 3) of 2mk questions. |
|---|--|--|
| Students will be able to differentiate | between mitotic and meiotic anaphase. | After completing 4) of 2mk questions. |
| Students will be able to explain | Significance of interphase and meiosis | After completing 1) of 3mk questions. |
| Students will be able to observe and identify | The stage of cell division | After completing 2) and 3) of 3mk questions. |

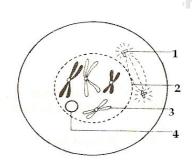
1 mark each

- 1. In which phase does DNA replication take place?
- 2. In which phase of cell division are the chromosomes present in the cytoplasm?
- 3. At which phase do you see sister chromatids during mitosis and meiosis?

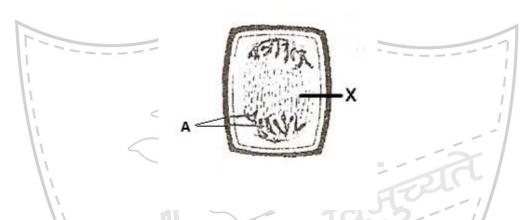
2 marks each

- 1. Enumerate the events that occur during diakinesis. What is the significance of crossing over?
- 2. What are the events that occur during (a) G2 phase, (b) S phase?
- 3. Does interphase take place after meiosis I? Justify.
- 4. Differentiate between mitotic and meiotic anaphase.

- 1. Why the interphase is called a period of great activity? State the significance of meiosis.
- 2. Examine the figure and answer the questions:



- i) Identify the stage.
- ii) Label the diagram.
- iii) What is the importance of '1'
- iv) What will happen after this phase?
- 3. Observe the given diagram and answer the questions that follow.

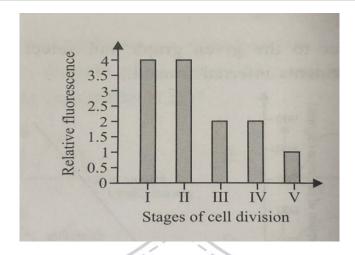


- i) Identify the stage shown in the diagram above.
- ii) How will (X) form in this kind of a cell?
- iii) How will this stage be different from a similar stage in Meiosis I?
- iv) What is the chemical composition of (A)?
- v) Describe briefly, the stage immediately preceding this stage.



PARAGRAPH BASED MCQs:

A. The amount of DNA in a cell can be determined by measuring the fluorescence of a dye that binds in direct proportion to the amount of DNA. The histogram given below represents the fluorescence of a eukaryotic germ cell during different stages of cell division (I, II, III, IV and V)



- 1. Which stages of cell division can represent prophase I and anaphase I of meiosis
 - a) I and II
 - b) I and III
 - c) I and IV
 - d) II and III
- 2. Which stages of cell division can represent prophase II and anaphase II of meiosis
 - a) I and II
 - b) I and III
 - c) III and IV
 - d) II and III
- 3. Which stage of cell division will represent cytokinesis following telophase II
 - a) \ \]
 - b) \ II
 - c) III and IV
 - d) V

ASSERTION REASONING QUESTIONS

DIRECTIONS for the question 1 to 5:

In each of the questions given below, there are two statements marked as Assertion (A) and Reason (R). Mark your answer as per the codes provided below:

- a) Both A and R are true and R is the correct explanation of A.
- b) Both A and R are true but R is not the correct explanation of A.
- c) A is true but R is false.
- d) A is false but R is true.
- e) Both A and R are false.
- **1.** Assertion: Meiosis II is known as equational or homotypic division. Reason: Meiosis II produces same number of chromosomes in cell.
- 2. Assertion: Diplotene is characterized by the presence of chiasmata. Reason: Diplotene can last for months and years in oocytes of some vertebrates.

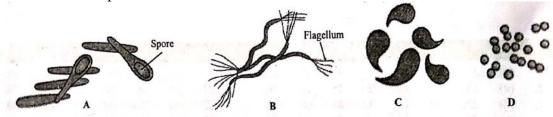


TERM 1

MCQ's AND CASE BASED QUESTIONS

I. Choose the correct options of the given MCQ's:

Bacteria are grouped under four categories according to their shapes. Study the given figures and select the correct option.



| | A | В | C | D |
|----|----------|----------|----------|--------|
| a) | Cocci | Bacilli | Spirilla | Vibrio |
| b) | Spirilla | Bacilli | Vibrio | Cocci |
| c) | Bacilli | Spirilla | Vibrio | Cocci |
| d) | Bacilli | Spirilla | Cocci | Vibrio |

- 2. Read the following statements and select the correct option.
 - Statement A: Viruses are inert crystalline structures outside a living cell. Statement B: Viriods possess a distinct protein coat.
 - a) Both the statements A and B are correct and A is the reason for B.
 - b) Both the statements A and B are correct and A is not the reason for B.
 - c) Statement A is correct and B is wrong.
 - d) Both Statement A and B are incorrect.
- 3. Which of the following pigments are found in brown algae?
 - a) Chl a, Chl c
 - b) Chl a, Chl d
 - c) Chl a, Chl c and fucoxanthin
 - d) Chl a and phycoerythrin
- 4. Protonema is

1.

- a) Haploid and is found in mosses.
- b) Diploid and is found in liverworts
- c) Diploid and is found in Pteridophytes.
- d) Haploid and is found in Pteridophytes.
- 5. In (i) type of inflorescence, main axis terminates in a flower, hence is limited in growth and flowers are borne in (ii) succession.
 - (i)
- (ii)
- a) Racemose acropetal
- b) Racemose basipetal
- c) Cymose acropetal
- d) Cymose basipetal
- 6. Read the given statements:
 - i. Gynoecium occupies the highest position while the other floral parts are situated below it
 - ii. Ovary is superior.

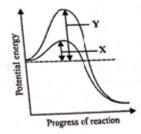
Which condition of flowers is being described by the above statements?

- a) Hypogyny
- b) Perigyny

- c) Epigyny
- d) Both b and c
- Both apical and intercalary meristems are _____ meristems.
 - a) Primary
 - b) Secondary
 - c) Lateral
 - d) Both b and c
- Read the following statements and select the correct option.

Statement A: Cardiac muscle of the heart is striated and has intercalated discs between its cells. Statement B: It provides quick, powerful and rhythmic contractions to the heart.

- v) Both the statements A and B are correct and B is the reason for A.
- vi) Both the statements A and B are correct and B is not the reason for A.
- vii) Statement A is correct and B is wrong.
- Both Statement A and B are incorrect.
- What is denoted by X and Y in the given graph?



- Activation energy without enzyme a)
- Activation energy with enzyme b)
- Substrate concentration with c) enzyme
- d) Substrate concentration without enzyme

Activation energy with enzyme

Activation energy without enzyme

Substrate concentration without enzyme

Substrate concentration with enzyme

Holoenzyme is the complete enzyme consisting of an apoenzyme and a cofactor. Select the option that correctly identifies the nature of apoenzyme and cofactor.

Apoenzyme

Cofactor

Protein a) Non-Protein b) Non-Protein Protein Protein c) Protein d) Non-Protein Non-Protein

II. CASE BASED QUESTION:

1. A mule is the offspring of a horse and a donkey. A donkey sperm contains 31 chromosomes and a horse egg cell contains 32 chromosomes, so the zygote contains a

total of 63 chromosomes. The zygote develops normally. The combined set of chromosomes is not a problem in mitosis, and the mule combines some of the best characteristics of horses and donkeys. However, a mule is sterile; meiosis cannot occur normally in its testes or ovaries.

Explain why mitosis is normal in cells containing both horse and donkey chromosomes but the mixed set of chromosomes interfere with meiosis.

- 2. Choose from the following cells for the questions that follow:
 - a) Pancreatic cell that secretes digestive enzymes.
 - b) Ovarian cell that produces estrogen (a steroid hormone).
 - c) Muscle cell in the thigh of a long-distance runner.
 - d) White blood cell that engulfs bacteria.
 - i. In which cell would you find the most lysosomes?
 - ii. In which cell would you find the most smooth ER?
 - iii. In which cell would you find the most rough ER?
 - iv. In which cell would you find the most mitochondria?



REVISION ASSIGNMENT

TERM 1

| Q1 | Name a plant disease caused by a viriods. | 1 |
|----------|---|--------|
| Q2 | What is meant by: a) Anthridiophore b) Archegoniophore | 1 |
| Q3 | Write a brief note on the three domain system of classification. | 1 |
| Q4 Q5 | Give the technical term for the class of fungi commonly called gill-fungi. Name one unicellular and one colonial form among green algae. | 1 1 |
| Q6 | What is the significance of vacuole in a plant cell? | 1 |
| Q7 | Why 'mitochondria' are called semiautonomous organelles? | 1 |
| Q8 | Give one difference between acrocentric and telocentric chromosomes. | 1 |
| Q9 | Draw a labelled diagram of cardiac muscle fibres. | 2 |
| Q10 | Answer the following with reference to the anatomy of dicot root: a) Where is pericycle located? b) How are xylem vessels arranged? c) What do you call such an arrangement? d) Which type of cells constitutes the cortex? | 2 |
| Q11 | Brassica campestris linn.a) Give the common name of the plant.b) What do the first two parts of the name denote?c) Why are they written in italics?d) What is the meaning of linn written at the end of the name? | 2 |
| Q12 | a) Sand dollars, sea cucumbers and sea lilies are representatives of which phylum? What kind of symmetry the adult representatives of this phylum have?b) Name the organs of locomotion in these organisms. | 3 |
| Q13 | Mention two modifications in reptiles required for terrestrial mode of life. | 3 |
| Q14 | What is periderm? How does periderm formation take place in dicot stems? | 3 |
| Q15 | What is a perianth? What term is given to its constituent members? Give an example. | 3 |
| Q16 | a) Draw a well labeled diagram of a cnidoblast. Mention its two functions.b) Write two differences between chlorophyceae and phaeophyceae. | 5 |

Q17 What are taxonomical aids? Give the importance of herbaria and museums. How are botanical gardens and zoological parks useful in conserving biodiversity? Q18

Write the functions of the following:

5

5

- a) Centromere.
- b) Cell wall
- c) Smooth ER.
- d) Golgi apparatus
- e) Centrioles.





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UNIT III CELL: STRUCTURE AND FUNCTIONS (Contd.)

Chapter 9: Biomolecules



Chapter 9
BIOMOLECULES

Learning Outcomes

| Students will be able to recall | The names of the terms asked. | After completing 1), 2) and 3) of 1mk questions. |
|--|--|--|
| Students will be able to understand | The purpose of certain cells in connective tissues | After completing 1) and 2) of 1mk questions. |
| Students will be able to explain | The antiparallel nature of DNA | After completing 4) of 1mk questions. |
| Students will be able to recall | The kinds of bonds are found in a starch molecule. | After completing 5)of 1mk questions. |
| Students will be able to explain | The occurrence of oedema during protein deficiency | After completing 1) of 2mk questions. |
| Students will be able to recall | The names of the terms asked. | After completing 2) and 3) of 2mk questions. |
| Students will be able to differentiate | Between coenzyme and cofactor | After completing 4) of 2mk questions. |
| Students will be able to draw | The secondary structure of proteins | After completing 5) of 2mk questions. |
| Students will be able to state and explain | The significance of Km E CIVIL SERVICES SC | After completing 6) of 2mk questions. |
| Students will be able to draw | The glycosidic, a peptide, and a phosphodiester bond | After completing 1) of 3mk questions. |
| Students will be able to explain | the concept of feedback inhibition of enzymes. | After completing 2) of 3mk questions. |

| Students will be able to list and explain | factors that affect enzyme activity | After completing 3) of 3mk questions. |
|---|---|---------------------------------------|
| Students will be able to explain | The role of phospholipids in biomembranes | After completing 4) of 3mk questions. |
| Students will be able to classify | enzymes | After completing 5) of 3mk questions. |
| Students will be able to explain | The stated aspects of the biomolecules | After completing 1) of 5mk questions. |

1 mark each

- 1) Name the homopolysaccharide found in an animal cell.
- 2) What are nucleosides?
- 3) Name 2 essential fatty acids.
- 4) What do you mean by anti parallel nature of DNA?
- 5) What kinds of bonds are found in a starch molecule?

2 marks each

- 1) Why does oedema occur in persons suffering from deficiency of protein?
- 2) Name 2 coenzymes derived from vitamins?
- 3) Name 2 non-iron products of the breakdown of hemoglobin.
- 4) Differentiate between coenzyme and cofactor. Describe any 3 factors that affect enzyme activity
- 5) With the help of illustrations describe the secondary structure of proteins.
- 6) What is Km? What is its significance?

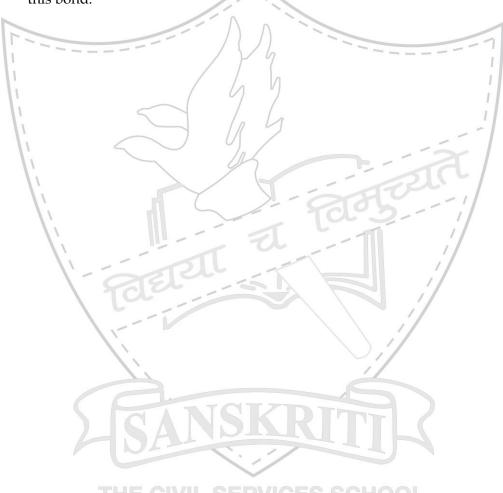
- 1) Illustrate a glycosidic, a peptide, and a phosphodiester bond.
- 2) With the help of illustrations explain the concept of feedback inhibition of enzymes.
- 3) Enlist 3 factors that affect enzyme activity. Describe how they change enzyme function.

4) Why are phospholipids called amphipathic? State the significance of such molecules with respect to biomembranes. State any 1 role of the proteins found in association with biomembranes.

5) How are enzymes classified? How do they act as biocatalysts?

5 marks each

1) What is a polysaccharide? Describe the levels of organization of protein structure. What is a glycosidic bond? Draw a diagram to show the formation of this bond.



UNIT III

PARAGRAPH BASED MCQs:

- A. **Lipids** are very diverse in both their respective structures and functions. These diverse compounds that make up the lipid family are so grouped because they are insoluble in water. They are also soluble in other organic solvents such as ether, acetone, and other lipids. Lipids serve a variety of important functions in living organisms. They act as chemical messengers, serve as valuable energy sources, provide insulation, and are the main components of membranes. Major lipid groups include **fats**, **phospholipids**, **steroids**, and **waxes**.
- 1. A typical fat molecule is made up of:
 - a) One glycerol and three fatty acid molecules
 - b) One glycerol and four fatty acid molecules
 - c) One glycerol and three fatty acid molecules
 - d) Three glycerol molecules and one fatty acid molecule.
- 2. What is the solubility of lipids in water?
 - a) Soluble
 - b) Partially soluble
 - c) Insoluble
 - d) Partially insoluble
- 3. Find the INCORRECT statement about the biological functions of lipids.:
 - a) Storage form of metabolic fuel
 - b) Have a protective function in bacteria, plant, and insects
 - c) The structural component of membranes
 - d) Exhibit increased catalytic activity.
- 4. Assertion: Most plant oils are unsaturated.

Reason: Oils have lower melting point.

- a) Both Assertion and reason are true but reason is not the correct explanation of Assertion
- b) Both Assertion and reason are true and reason is the correct explanation of Assertion
- c) Assertion is and reason are false
- d) Assertion is true but reason is false.

ASSERTION REASONING QUESTIONS

DIRECTIONS for the question 1 to 5:

In each of the questions given below, there are two statements marked as Assertion (A) and Reason (R). Mark your answer as per the codes provided below:

- a) Both A and R are true and R is the correct explanation of A.
- b) Both A and R are true but R is not the correct explanation of A.
- c) A is true but R is false.
- d) A is false but R is true.
- e) Both A and R are false.

1. Assertion: At isoelectric point, the amino group does not migrate under the influence of electric field.

Reason: At isoelectric point, amino acid exists as a zwitterion.

- 2. Assertion: Enzyme substrate complex remains throughout the reaction. Reason: The greater the affinity of the enzyme for a substrate, the higher is the catalytic activity.
- 3. Assertion: Coenzymes are also called prosthetic groups. Reason: Coenzymes and prosthetic groups are cofactors.



UNIT IV PLANT PHYSIOLOGY

Chapter 11: Transport in Plants

Chapter 12: Mineral Nutrition

Chapter 13: Photosynthesis in Higher Plants

Chapter 14: Respiration in Plants

Chapter 15: Plant Growth and Development



Chapter 11 TRANSPORT IN PLANTS

| Learning Outcomes | | | |
|---|--|---|--|
| Students will be able to recall and explain | The concepts asked. | After completing 1mk questions. | |
| Students will be able to explain | The different aspects of water movement | After completing i to iii of 2mk questions. | |
| Students will be able to explain | The different factors affecting transpiration | After completing iv to vi of 2mk questions. | |
| Students will be able to explain | Mechanism of water transport in tall trees | After completing vi of 2mk questions. | |
| Students will be able to explain | the role of K+ in the opening and closing of stomata | After completing i) of 3mk questions. | |
| Students will be able to observe and identify | The apoplastic and symplastic pathway of water transport | After completing ii) and 3) of 3mk questions. | |

1 mark each

- i) What happens to the plant cell if it is placed in higher water potential?
- ii) A plant cell when kept in a certain solution got plasmolysed. What was the nature of the solution?
- iii) What does capillarity in the xylem depend on?
- iv) What do you understand by the chemical potential of a solute?
- v) What does the water potential of a solution depend on?
- vi) What are the conditions necessary for imbibition to take place?
- vii) What is the peculiarity of the endodermis that it prevents apoplastic pathway of water?

- i) How does the casparian strip affect water movement?
- ii) Under what conditions will water enter a cell?
- iii) What is reverse osmosis? What is its application?
- iv) Name a hormone that acts as an anti transpirant. How does it function?
- v) Why does an increase in internal CO2 concentration close stomata?
- vi) How does humidity and temperature affect transpiration?
- vii) How is water transported to leaves in trees that are more than 100 m tall?

- i) Explain the role of K+ in the opening and closing of stomata.
- ii) Label the pathway (a) and (b), shown in the given diagram?What happens to (a) pathway when it reaches E? Why does this happen?



Chapter 12 MINERAL NUTRITION

| Learning Outcomes | | |
|---|---|---|
| Students will be able to reason and state | The essentiality of minerals for plants for their growth and development. | After completing i) to iv) of 1mk questions. |
| Students will be able to list | the reasons that cause deficiency disease in plants | After completing i) of 2mk questions. |
| Students will be able to explain | the role of K+ ions in opening of stomata | After completing ii) of 2mk questions. |
| Students will be able to state | the role of nitrogenase and leghemoglobin | After completing iii) and iv) of 2mk questions. |
| Students will be able to expalin | The requirements of insectivorous plants | After completing iv) of 2mk questions. |
| Students will be able to draw and explain | The various steps of nitrogen cycle | After completing 1) and 2) and 3) of 3mk questions. |

1 mark each

- i) A healthy potted *Nepenthes* when kept in a greenhouse with favorable condition of light, temperature, and soil water, showed poor growth. Though there was no infection. State the possible cause of this problem.
- ii) How will you determine the essentiality of a mineral?
- iii) Some of its leaves in insectivorous plants are modified to ______ for the purpose of _____.
- iv) Why is Mn and Mo required by plants?

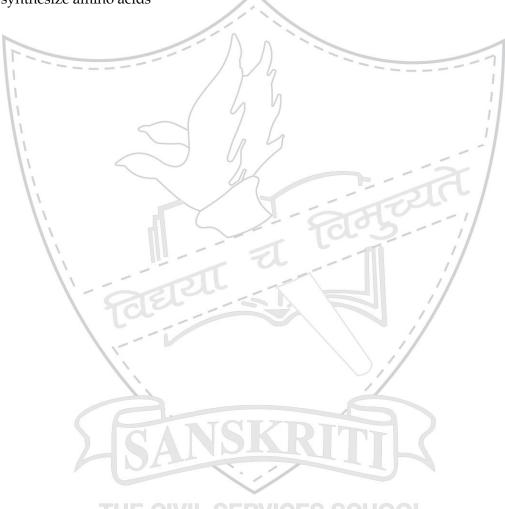
- i) How will you make out that a plant is suffering from a deficiency disease? How will you find a cause of this disease?
- ii) How do K+ ions help in opening of the stomata?
- iii) In root nodules of leguminous plants what is the role of nitrogenase and leghaemoglobin?
- iv) A section of root nodules of a leguminous plant appears pinkish. What is the colour due to? What is the role of this substance?

v) Give any 1 example of an insectivorous plant. What kind of soil do these plants grow in? How do these plants utilize the insect

3 mark each.

- 1) Draw the nitrogen cycle and name all the organisms involved at each step.
- 2) Give an account of Biological Nitrogen fixation.

3) Describe how ammonia that is formed by nitrogen fixation is used by plants to synthesize amino acids



Chapter 13 PHOTOSYNTHESIS IN HIGHER PLANTS

| Learning Outcomes | | | |
|--|---|--|--|
| Students will be able to recall and reason | The concept asked. | After completing 1) of 1mk questions. | |
| Students will be able to differentiate | Between chl a and chl b | After completing 2) of 1mk questions. | |
| Students will be able to recall | The number of ATP molecules needed | After completing 3) of 1mk questions. | |
| Students will be able to recall | The keywords asked. | After completing 4)of 1mk questions. | |
| Students will be able to define and state | Chemosynthesis and name a bacteria that is chemosynthetic | After completing 5) of 1mk questions. | |
| Students will be able to analyse and explain | The concept of PAR | After completing 6) of 1mk questions. | |
| Students will be able to state | The conditions under which PSI of the light reaction works. | After completing 7) of 1mk questions. | |
| Students will be able to explain | The concept asked | After completing 1), 2) and 3) of 2mk questions. | |
| Students will be able to state | The full form and advantages of the keywords asked | After completing 4) and 5) of 2mk questions. | |

| Students will be able to explain | The functions of photorespiration and carotenoids | After completing 6) and 7) of 2mk questions. |
|---|--|--|
| Students will be able to explain | The significance of photolysis of water | After completing 1) of 3mk questions. |
| Students will be able to name | The keywords asked | After completing 2) and 3) of 3mk questions. |
| Students will be able to explain | The Kranz anatomy and the function of RUBISCO | After completing 4) and 5) of 3mk questions. |
| Students will be able to explain and draw | The concept of photophosphorylation, photorespiration and Z-Scheme | After completing 1), 2) and 3) of 5mk questions. |

- 1. A potted plant kept in sunlight is shifted to monochromatic red light. How will this affect the rate of photosynthesis?
- 2. What is the difference between chlorophyll a and chlorophyll b?
- 3. How many molecules of ATP are required for the synthesis of glucose in the C3, C4 cycle?
- 4. Fill in the blanks:

| a. | Enzyme that accepts O2 during photorespiration | |
|----|--|--|
| b. | Chlorophyll of mesophyll cells of C4 plants have a high concentration of | |
| | enzyme. | |
| c. | Calvin cycle takes place in | |
| d. | Noncyclic photophosphorylation needs a constant supply of | |
| e. | First electron donor in cyclic photophosphorylation is | |
| f. | First acceptor of CO2 in C3 cycle is | |

- g. First acceptor of CO2 in C4 cycle is ______.
 h. First product formed in C4 cycle is ______.
 i. First product formed in C3 cycle is ______.
 j. Pigments of PSI occur in the ______ part of the chloroplasts.
- 5. Define chemosynthesis. Name a bacteria that is chemosynthetic
- 6. What is PAR? Give its importance.
- 7. Mention the conditions under which PSI of the light reaction works.

2 mark each.

- 1. The photosynthetic lamellae are taken out from a chloroplast and suspended in nutrient medium in presence of light and CO2. Will they synthesize glucose? Justify.
- 2. 2 green potted plants were kept inside bell jars. One was kept in sunlight while the other kept in the dark. Which will survive longer? Explain.
- 3. Why do plants need to reduce photorespiration?
- 4. Expand PGA, PSI, P700, Rubisco.
- 5. State the advantages of having more than 1 pigment molecule in the photocentre.
- 6. Why is photorespiration considered to be a wasteful process as well as a threat?
- 7. Give any 1 example of an insectivorous plant. What kind of soil do these plants grow in? How do these plants utilize the insect?
- 8. Mention any 2 functions of carotenoids.

- 1. What is the significance of photolysis of water in photophosphorylation? What happens to each product of this process?
- 2. Name the 3 cellular organelles involved in photorespiration. Mentioned the various steps of this pathway.
- 3. Name the enzyme that catalyzes carboxylation and oxygenation. In which cell organelle is this enzyme found?
- 4. Describe Kranz anatomy. State its importance.
- 5. Rubisco acts as a oxygenase as well as carboxylase. Explain both the reactions. Under what conditions does this shift from one role to the other occur?

5 marks each

1. What is photophosphorylation? Where does it take place? With the help of a flow chart only, describe the process occurring when the illumination is equal to 680nm. What are the products of this process?

- 2. What is photorespiration? Why does it happen? Why is it considered a wasteful process? How do plants overcome these losses?
- 3. Explain the Z scheme of photosynthesis.



Chapter 14 RESPIRATION IN PLANTS

| Learning Outcomes | | | | |
|--|--|---|--|--|
| Students will be able to recall and reason | The concept asked. | After completing 1) to 8) of 1mk questions. | | |
| Students will be able to analyse and explain | The process of alcoholic fermentation. | After completing 1) of 2mk questions. | | |
| Students will be able to name | The specific regions of mitochondria responsible for the different steps of respiration. | After completing 2) of 2mk questions. | | |
| Students will be able to explain | The Kreb's cycle with different substrates | After completing 1) of 3mk questions. | | |
| Students will be able to justify | Respiration as an amphibolic pathway. | After completing 2) of 3mk questions. | | |
| Students will be able to explain and calculate | The RQ value | After completing 3) of 3mk questions. | | |

- What are the end products of anaerobic respiration in a plant cell and animal cell.
 Name the connecting link between glycolysis and TCA cycle.
- 2. Where is O_2 used in the process of respiration?
- 3. Where does the ETS operate in the cell?
- 4. What is the role of the F0-F1 particles in respiration?
- 5. Which intermediate is oxidized during glycolysis to form NADH.H+?
- 6. What is the acceptor molecule in Kreb's cycle?
- 7. Which is the first product in TCA cycle?

8. ETC acceptors in the mitochondrial membrane are arranged along-----.

2 marks each

- 1. How is pyruvic acid converted to ethyl alcohol?
- 2. In mitochondria, name the specific regions responsible for the different steps of respiration.

- 1. Krebs's cycle is a common metabolic pathway for carbohydrates, fats and proteins. Explain.
- 2. Respiration is considered to be an amphibolic pathway. Explain.
- 3. What is RQ? Derive the RQ value for carbohydrates, fats and proteins.



Chapter 15 PLANT GROWTH AND DEVELOPMENT

| Learning Outcomes | | | | |
|--|--|--|--|--|
| Students will be able to name | The keywords of the concept related to plant growth and development asked. | After completing 1) to 14) of 1mk questions. | | |
| Students will be able to recall and name | The hormones according to their function | After completing 1) of 2mk questions. | | |

| 1. | Growth can be measured by an |
|-----|--|
| 2. | Where are auxins synthesized? |
| 3. | Function of auxins are |
| 4. | Natural auxins are and synthetic auxins are |
| | 1-81818-51 |
| 5. | A bioassay for auxin is |
| 6. | Define critical period. |
| 7. | Cut leaves remain green longer if sprayed with |
| | |
| 8. | Cytokinin was first isolated from |
| 9. | The pigment that helps in seed germination is |
| 9. | The pigment that helps in seed germination is |
| | THE CIVIL SERVICES SCHOOL |
| 10. | Hormone responsible for photoperiodism is |
| | |
| 11. | Enlist the conditions for vernalisation. |
| 12. | Statoliths are starch grains found in roots. Their movement causes |
| | |
| | |

- 13. Why do the seeds not germinate immediately after they are released from the fruits?
- 14. How will you artificially ripen raw fruits?

2 marks each

1) Fill in the table:

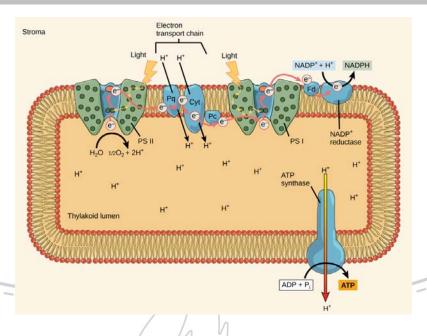
| S.No. | Hormone | Function/application |
|--------------|----------|------------------------|
| 1 | | Overcome seed dormancy |
| 2 | Ethylene | |
| 3 | | Hormone causing ageing |
| 4 | | Bolting |
| 5 | | Used as a weedicide |
| 6 | | Stress hormone |

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UNIT IV

PARAGRAPH BASED MCQs

- A. Plant growth regulators (PGRs) are organic compounds, other than nutrients, that modify plant physiological processes. PGRs, called biostimulants or bioinhibitors, act inside plant cells to stimulate or inhibit specific enzymes or enzyme systems and help regulate plant metabolism. They normally are active at very low concentrations in plants. The importance of PGRs was first recognized in the 1930s. Since that time, natural and synthetic compounds that alter function, shape, and size of crop plants have been discovered. Today, specific PGRs are used to modify crop growth rate and growth pattern during the various stages of development, from germination through harvest and post-harvest preservation.
- 1. Which of the following PGR generally acts as an antagonist to gibberellins?
 - a. Zeatin
 - b. Ethylene
 - c. ABA
 - d. IAA
- 2. The rosette habit of cabbage can be changed by application of:
 - a. IAA
 - b. GA
 - c. ABA
 - d. Ethephon
- 3. A farmer wants to grow cucumber plants in his field. He wants to increase the number of female flowers in them. Which PGR can be applied to achieve this?
 - a. Auxin
 - b. ethylene
 - c. GA₃
 - d. GA₁₀
- 4. Which of the following is not an effect of ethylene?
 - a. Promotes senescence and abscission of plant organs.
 - b. Breaks seed and bud dormancy.
 - c. Hastens fruit ripening
 - d. Helps to overcome apical dominance.
- B. In the photosystem II (PSII) reaction center, energy from sunlight is used to extract electrons from water. The electrons travel through the chloroplast electron transport chain to photosystem I (PSI), which reduces NADP+ to NADPH. The electron transport chain moves protons across the thylakoid membrane into the lumen. At the same time, splitting of water adds protons to the lumen, and reduction of NADPH removes protons from the stroma. The net result is a low pH in the thylakoid lumen, and a high pH in the stroma. ATP synthase uses this electrochemical gradient to make ATP.



- 1. What is the initial source of electrons for the chloroplast electron transport chain?
 - a) water
 - b) oxygen
 - c) carbon dioxide
 - d) NADPH
- 2. Photosynthesis takes place in sac like membranes called
 - a. Thylakoids
 - b. Grana
 - c. Photosystems
 - d. Photons
- 3. Energy required for ATP synthesis in ps II comes from
 - a) Proton gradient
 - b) Electron gradient
 - c) Reduction of glucose
 - d) Oxidation of glucose.
- 4. Assertion: In light reaction of photosynthesis, light is required for the functioning of PS I and PS II, and production of NADPH and ATP.

Reason: Dark reaction does not occur in light.

- a) Both Assertion and reason are true but reason is not the correct explanation of Assertion
- b) Both Assertion and reason are true and reason is the correct explanation of Assertion
- c) Assertion and reason are false
- d) Assertion is true but reason is false.

ASSERTION REASONING QUESTIONS

DIRECTIONS for the question 1 to 5:

In each of the questions given below, there are two statements marked as Assertion (A) and Reason (R). Mark your answer as per the codes provided below:

- a) Both A and R are true and R is the correct explanation of A.
- b) Both A and R are true but R is not the correct explanation of A.
- c) A is true but R is false.
- d) A is false but R is true.
- e) Both A and R are false.
- 1. Assertion: Transport proteins of endodermal cells are control points. Reason: At control points plant adjusts the quantity and types of solutes that reach the xylem.
- 2. Assertion: Imbibition is a type of diffusion. Reason: In imbibition, water movement is against concentration gradient.
- 3. Assertion: In Cycas, nitrogen fixation is found Reason: In coralloid roots of Cycas, cyanobacteria present.
- 4. Assertion: Development is the sum of growth and differentiation. Reason: Development in plants is under the control of extrinsic factors only.
- 5. Assertion: The inner membrane of mitochondria contains systems involving electron transport.

Reason: The mitochondrial matrix contains enzymes of Krebs's cycle.



UNIT V HUMAN PHYSIOLOGY

Chapter 16: Digestion and Absorption

Chapter 17: Breathing and Exchange of Gases

Chapter 18: Body Fluids and Circulation

Chapter 19: Excretory Products and their Elimination

Chapter 20: Locomotion and Movement

Chapter 21: Neural Control and Coordination

Chapter 22: Chemical Coordination and Integration



Chapter 16 DIGESTION AND ABSORPTION

| Learning Outcomes | | | |
|---|---|--|--|
| Students will be able to recall and name | The keywords regarding asked. | After completing 1) to 6) of 1mk questions. | |
| Students will be able to explain | The role of liver as digestive and excretory organ. | After completing 1) of 2mk questions. | |
| Students will be able to name and explain | The role of enzymes on different components of food. | After completing 2) and 3) of 2mk questions. | |
| Students will be able to explain | The role of chylomicrons in fat digestion | After completing 1) of 3mk questions. | |
| Students will be able to name | The secretions of different parts of the digestive system | After completing 2) and 3) of 3mk questions. | |

1 mark each

- 1. State the function of enterokinase.
- 2. Why is the larynx raised while swallowing food?
- 3. What is chyme?
- 4. Name the kind of movement and the muscles involved in sending the food down the gut.

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- 5. What are the three parts of the colon?
- 6. Name the protein digesting enzymes secreted by the gastric glands.

2 marks each

- 1. How does the liver serve as a digestive and excretory organ?
- 2. In what form are enzymes secreted in the gut? Why?

3. What is the site of fat and protein digestion in humans? Name the enzyme that digests fats and protein. Mention the end products of digestion of each.

3 marks each

- 1. What are chylomicrons? How are they different from micelles? What is their role in fat absorption in the human gut?
- 2. Give the secretions of stomach and function of each.
- 3. Give the functions of small intestine and liver.



Chapter 17 BREATHING AND EXCHANGE OF GASES

| Learning Outcomes | | | |
|---|--|--|--|
| Students will be able to name and reason | The key concepts asked. | After completing 1) to 6)of 1mk questions. | |
| Students will be able to explain | The continuous process of gas exchange in lungs. | After completing 1) of 2mk questions. | |
| Students will be able to give reason | For the statements given | After completing 2) of 2mk questions. | |
| Students will be able to name and explain | The muscles that are involved in breathing. | After completing 3) of 2mk questions. | |
| Students will be able to explain | the role of carbonic anhydrase | After completing 1) of 3mk questions. | |
| Students will be able to define | The terms given | After completing 2) of 3mk questions. | |
| Students will be able to explain | The mechanism of transport of gases | After completing 1) of 5mk questions. | |

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1 mark each

- 1. Why does vigorous exercise result in muscular pain?
- 2. Which is the respiratory center of the brain?
- 3. It is always advisable to breathe through the nose. Why?
- 4. How does the pH of blood affect respiration?
- 5. What prevents the collapse of alveoli and trachea?

6. What prevents the damage of the delicate alveoli from the particulate matter of the air?

2 marks each

- 1. The process of gas exchange never stops in the lungs. Comment.
- 2. Explain
 - (a) More O_2 is released from oxyhaemoglobin in a more active tissue than in a less active one.
 - (b) Oxygenation of blood promotes release of CO₂ in the lungs.
- 3. What are the muscles that are involved in breathing? How do they function?

3 marks each

- 1. What is the role of carbonic anhydrase? Show by a series of reactions, how carbonic anhydrase starts reaction leading to formation of haemoglobinic acid.
- Define the terms:
 Tidal volume, Respiratory quotient, Vital capacity.

5 marks each

1. How is CO₂ and O₂ carried by blood? What are the factors affecting the O₂ dissociation curve?



Chapter 18 BODY FLUIDS AND CIRCULATION

| Learning Outcomes | | | |
|---|--|--|--|
| Students will be able to name and reason The key concepts asked. | | After completing 1) to 4)of 1mk questions. | |
| Students will be able to reason | The concept of Rh incompatibility. | After completing 1) of 2mk questions. | |
| Students will be able to explain | Myogenic heart | After completing 2) of 2mk questions. | |
| Students will be able to name and state | Different heart valves | After completing 3) of 2mk questions. | |
| Students will be able to name and explain | The heart sounds | After completing 3) of 2mk questions. | |
| Students will be able to explain | atherosclerosis and arteriosclerosis as heart circulatory disorders. | After completing 4) of 2mk questions | |
| Students will be able to | The blood vessels associated with the heart. | After completing 1) of 3mk questions. | |
| Students will be able to explain | The mechanism of transport of gases | After completing 2) of 3mk questions. | |
| Students will be able to name | The part of heart called as pacemaker and the plasma proteins | After completing 3) and 4) of 3mk questions. | |

| Students will be able to draw and explain | A standard ECG and the different segments in it. | After completing 5) of 3mk questions. |
|---|--|---------------------------------------|
| Students will be able to explain | the cardiac cycle. | After completing 6) of 3mk questions. |

1 mark each

- 2. Why is blood group identification not required while transfusing blood?
- 3. Where does the cardiac impulse originate?
- 4. Name the membrane that covers the heart.
- 5. What is the role of the Purkinje fibres?

2 marks each

- 1. How is the foetus with Rh-positive blood affected if the mother is Rh-negative?
- 2. Human heart is myogenic. Explain. Name the nerve that can reduce heart rate.
- 3. What causes the heart sounds?
- 4. Name the different valves found in the heart. What is the function of these valves?
- 5. Discuss atherosclerosis and arteriosclerosis as heart circulatory disorders.

3 marks each

- 1. Name any 6 blood vessels associated with the heart.
- 2. Which part of the heart is called the pacemaker? Why? Name the disease that occurs due to its failure to function.
- 3. Plasma contains 3 classes of proteins. What are these? Give their functions.
- 4. Draw a standard ECG and explain the different segments in it.
- 5. Explain in detail the cardiac cycle.

Chapter 19

EXCRETORY PRODUCTS AND THEIR ELIMINATION

| Learning Outcomes | | | |
|--|---|---------------------------------------|--|
| Students will be able to name The key concepts asked. | | After completing 1mk questions. | |
| Students will be able to identify and name | The blood vessels related to bowman's capsule and kidney. | After completing 1) of 2mk questions. | |
| Students will be able to list | The animals according to their mode of excretion | After completing 2) of 2mk questions. | |
| Students will be able to explain | | | |
| Students will be able to name | The substances reabsorbed in different parts of the nephron | After completing 3) of 3mk questions. | |
| Students will be able to describe the role of ADH | | After completing 4) of 3mk questions | |
| Students will be able to list | The factors that favor glomerular filtration | After completing 5) of 3mk questions. | |
| Students will be able to discuss | the role of Renin Angiotensin mechanism | After completing 6) of 3mk questions. | |
| Students will be able to explain | the process of urine formation | After completing 1) of 5mk questions. | |

1 mark each

| Fill in | the blanks: |
|---------|---|
| 1. | Bowman's capsule is a part of |
| 2. | The liquid collected in the Bowman's capsule is called |
| 3. | Reabsorption of water in nephrons is regulated by |
| | |
| 4. | pH of urine is normally |
| 5. | hormone controls the reabsorption of Na+ in the nephrons. |

2 marks each

- 1) What is the blood vessel that
 - (a) is present in the Bowman's capsule
 - (b) Enters and leaves the bowman's capsule
 - (c) Surrounds the PCT, DCT
 - (d) enters and leaves the kidneys.
- 2) Enlist 3 ways by which animals excrete nitrogenous wastes. Which product requires minimum water for excretion?

3 marks each

- 1) How does the proximal convoluted tubule contribute to homeostasis?
- 2) Give examples of ureotelic, uricotelic and ammonotelic animals.
- 3) What kind of substance are reabsorbed in the ascending limb, descend limb, DCT of the nephron.
- 4) Describe the role of ADH on formation of hypertonic urine.
- 5) What are the factors that favor glomerular filtration?
- 6) Discuss the role of Renin Angiotensin mechanism in osmoregulation.

5 marks each

1) Explain the process of urine formation.

Chapter 20 LOCOMOTION AND MOVEMENT

| Learning Outcomes | | | |
|--|---|--|--|
| Students will be able to name | O | | |
| Students will be able to explain | Troponin and tropomyosin | After completing 3) of 1mk questions. | |
| Students will be able to list | the functions of the skeletal system and joints | After completing 1) and 2) of 2mk questions. | |
| Students will be able to explain | the function of Ca++ in muscle contraction | After completing 3) of 2mk questions. | |
| Students will be able to name and categorize | The types of ribs | After completing 1) of 3mk questions. | |
| Students will be able to name and explain | The components and role of actin and myosin in muscle contraction | After completing 2) of 3mk questions. | |
| Students will be able to draw and label | the peculiarities of actin and myosin | After completing 3) of 3mk questions. | |
| Students will be able to explain | the sliding filament theory of muscle contraction | After completing 1) of 5mk questions | |

1 mark each

- 1. What are antagonistic muscles? Give 1 example.
- 2. Name the tissue that connects muscle to bone and the one which connects muscle to muscle.
- 3. What are troponin and Tropomyosin?

2 marks each

- 1. List 4 functions of the skeletal system.
- 2. Point out 2 common features in a hinge and ball and socket joint.
- 3. What is the function of Ca++ in muscle contraction?

3 marks each

- 1. How many pairs of ribs are found in humans? How would you categorize them on the basis of their attachment? Explain.
- 2. What are the components of Actin and Myosin filaments? Explain the role of each in muscle contraction.
- 3. Draw a diagram to show the peculiarities of actin and myosin.

5 Marks

1. Describe in detail the sliding filament theory of muscle contraction.



Chapter 21 NEURAL CONTROL AND COORDINATION

| Learning Outcomes | | | |
|---|---|--|--|
| Students will be able to name | The keywords related to sense organs | After completing 1), 2) and 4) of 1mk questions. | |
| Students will be able to state | the function of the pineal gland | After completing 3) of 1mk questions. | |
| Students will be able to explain | The concept of reflex action | After completing 1), 2) of 2mk questions. | |
| Students will be able to name and list | The function of cerebrospinal fluid | After completing 3) of 2mk questions. | |
| Students will be able to explain | The concepts related to sense organs eye and ear | After completing 4) to 7) of 2mk questions. | |
| Students will be able to identify and state | The location and function of given parts of the brain | After completing 1) of 3mk questions. | |
| Students will be able to draw and label | T.S of spinal cord | After completing 2) of 3mk questions. | |
| Students will be able to state | the events that take place at the point of stimulation of an axon | After completing 1) of 5mk questions. | |
| Students will be able to explain | The mechanism of synaptic transmission | After completing 2) of 5mk questions. | |

1 mark each

- 1. Name the fluid in which the membranous labyrinth floats.
- 2. Name the area of the retina that contains only cones and no rods.
- 3. State the function of the pineal gland.
- 4. What kind of pigment is found in the rods and the cones?

2 marks each

- 1. Give 4 examples of reflex actions.
- 2. Trace the path of the sympathetic nerve fibre as it leaves the ventral root of the spinal cord and reaches the effector organ.
- 3. Name the space and cavities through which the CSF circulates. List the functions of the CSF.
- 4. What do you understand by accommodation of the eye?
- 5. Give the technical terms for the ear ossicles. What is their function?
- 6. What are layers of the retina?
- 7. Describe the Organ of Corti.

3 marks each

- 1. Where are the following located and state their function: hypothalamus, cerebellum, corpus callosum?
- 2. Draw a diagram of the TS of the spinal cord and label afferent nerve, motor nerve, gray matter.

5 marks each

- 1. What are the events that take place at the point of stimulation of an axon?
- 2. How does synaptic transmission take place?

Chapter 22 CHEMICAL COORDINATION AND INTEGRATION

| Learning Outcomes | | | |
|---|---|--|--|
| Students will be able to name and reason The key concepts asked. | | After completing 1) to 3)of 1mk questions. | |
| Students will be able to identify, name and state | The function of the hormone asked | After completing 1) of 2mk questions. | |
| Students will be able to state | The technical terms for anterior and posterior pituitary. | After completing 2) of 2mk questions. | |
| Students will be able to name | hormones that work synergistically and some that work antagonistically | After completing 3) of 2mk questions. | |
| Students will be able to explain | How glucose homeostasis is maintained in the body | After completing 1) of 3mk questions. | |
| Students will be able to compare | diabetes mellitus and diabetes insipidus | After completing 2) of 3mk questions. | |
| Students will be able to name | the forms of thyroxine, more active form and the amino acid needed for its production | After completing 3) of 3mk questions. | |
| Students will be able to explain | The integrated functioning of the pituitary and the hypothalamus | After completing 4) of 3mk questions. | |
| Students will be able to explain The mechanism of hormone action | | After completing 1) and 2) of 5mk questions. | |

1 mark each

- 1. Name the birth hormone.
- 2. What do you understand by target organs?
- 3. Why is Pitutary called the master gland?

2 marks each

- 1. What causes cretinism? Name any other hormone secreted by the same gland and state its function
- 2. Give technical terms for anterior and posterior pituitary.
- 3. Name a few hormones that work synergistically and some that work antagonistically.

3 marks each

- 1. What hormones are produced when the body's blood glucose level drops below normal? How do these hormones act to return the level to normal?
- 2. Distinguish between diabetes mellitus and diabetes insipidus. Mention any 1 common symptoms of the diseases.
- 3. What are the 2 forms of thyroxine? Which is more active? Name the amino acid used to prepare thyroxine.
- 4. Explain how the pituitary and the hypothalamus function as an integrated system.

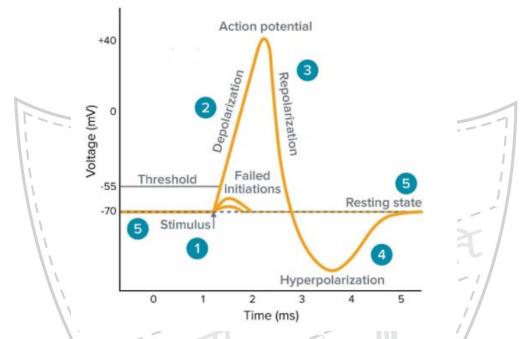
5 marks each

- 1. How do protein hormones affect changes in their target organs? Explain with the help of an example. How is it that a few molecules of hormones are able to produce widespread effect in the target organ?
- 2. Explain in detail the cellular effect of a steroid and non steroid hormone.

UNIT V

PARAGRAPH BASED MCQs

1. An action potential is a rapid rise and subsequent fall in voltage or membrane potential across a cellular membrane with a characteristic pattern. Sufficient current is required to initiate a voltage response in a cell membrane; if the current is insufficient to depolarize the membrane to the threshold level, an action potential will not fire. Examples of cells that signal via action potentials are neurons and muscle cells.



- A. What is largely responsible for the negative resting membrane potential (around -70 mV) in a neuron?
 - i) Axonal insulation by Schwann cells.
 - ii) Voltage-gated sodium channels opening.
 - iii) The action potential.
 - iv) Na+-K+ pump.
- B. The opening of axon membrane voltage-gated potassium channels is responsible for which part of the action potential?
 - i) Depolarisation of the membrane
 - ii) Repolarisation of the membrane
 - iii) Contraction of the postsynaptic muscle fibre
 - iv) Signalling vesicular release of neurotransmitters
- C. Which term describes the cell membrane potential of a neuron at rest?
 - i) Polarized
 - ii) Depolarized
 - iii) Hyperpolarized
 - iv) Repolarized
- D. Assertion: Myelin sheath insulates the nerve fibres and prevents its depolarization. Reason: Nerve impulses are conducted more rapidly in non-myelinated nerve fibers than in myelinated ones.

- i) Both Assertion and Reason are true but reason is not the correct explanation of Assertion.
- ii) Both Assertion and Reason are true and reason is the correct explanation of Assertion.
- iii) Assertion and Reason both are false.
- iv) Assertion is true but the Reason is false.
- 2. There are three basic types of hormones: lipid-derived, amino acid-derived, and peptide. Lipid-derived hormones are structurally similar to cholesterol and include steroid hormones such as estradiol and testosterone. Amino acid-derived hormones are relatively small molecules and include the adrenal hormones epinephrine and norepinephrine. Peptide hormones are polypeptide chains or proteins and include the pituitary hormones, antidiuretic hormone (vasopressin), and oxytocin.
 - A. A newly discovered hormone contains four amino acids linked together. Under which chemical class would this hormone be classified?
 - i) lipid-derived hormone
 - ii) amino acid-derived hormone
 - iii) peptide hormone
 - iv) glycoprotein
 - B. Which class of hormones can diffuse through plasma membranes?
 - i) lipid-derived hormones
 - ii) amino acid-derived hormones
 - iii) peptide hormones
 - iv) glycoprotein hormones
 - C. After consuming a banana split, which hormones would be expected to increase?
 - i) Prolactin
 - ii) Glucagon
 - iii) Insulin
 - iv) Parathyroid hormone
 - D. The binding of a steroid hormone to its receptor would lead to the ______.
 - i) formation of cAMP
 - ii) direct activation of enzymes in the cell
 - iii) transcription of the DNA for the gene that is "turned on" by this event
 - iv) direct activation of second-messenger agents in the cell

ASSERTION REASONING QUESTIONS

DIRECTIONS for the question 1 to 5:

In each of the questions given below, there are two statements marked as Assertion (A) and Reason (R). Mark your answer as per the codes provided below:

a) Both A and R are true and R is the correct explanation of A.

- b) Both A and R are true but R is not the correct explanation of A.
- c) A is true but R is false.
- d) A is false but R is true.
- e) Both A and R are false.
- 1. **Assertion**: Pituitary gland releases a hormone which is helpful in childbirth. **Reason**: Pituitary gland releases vasopressin and antidiuretic hormone which helps in childbirth.
- 2. **Assertion**: During muscle contraction I-band and A-band get reduced. **Reason**: During contraction thin filament slides over myosin filament.
- 3. Assertion: Urea is a less toxic excretory substance comparatively to uric acid Reason: Birds and insects are uricotelic animals.
- 4. Assertion: Heart of fish contains only deoxygenated blood. Reason: Oxygenated blood do not return back to the heart in fishes.
- 5. Assertion: The chemical stored in the synaptic vesicles are termed as neurotransmitters. Reason: Synaptic vesicles release these chemicals in the synaptic cleft.



TERM2

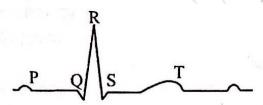
MCQ's AND CASE BASED QUESTIONS

- I. Choose the correct options of the given MCQ's:
- 1 Match the columns:

Column- I

Column - II

- A. Peptic Cells
- (i) Mucus
- B. Oxyntic Cells
- (ii) Alkaline fluid
- C. Goblet cells
- (iii) Pro-enzymes
- (iv) HCl
- a) A- (ii), B- (i), C- (iv)
- b) A- (iv), B- (iii), C- (ii)
- c) A- (iv), B- (i), C- (ii)
- d) A- (iii), B- (iv), C- (i)
- 2. Which of the following pairs of food reaches the stomach totally undigested?
 - a) Starch and fat
 - b) Fat and cellulose
 - c) Starch and cellulose
 - d) Protein and starch
- 3. Vital capacity of the lungs is:
 - a) IRV+ERV
 - b) IRV+ERV+TV-RV
 - c) IRV+ERV+TV+RV
 - d) IRV+ERV+TV
- 4 Examine the diagrammatic representation of standard ECG. Select the option with correct matching



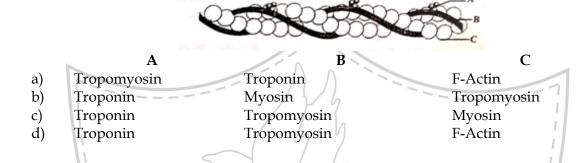
| | P-Wave | QRS Complex | T-Wave |
|----|-----------------------|----------------------------------|-----------------------|
| a) | Repolarisation of the | Repolarisation of the ventricles | Depolarisation of the |
| | atria I HE CIV | IL SERVICES SCHOOL | atria |
| b) | Depolarisation of the | Depolarisation of the | Repolarisation of the |
| | atria | ventricles | ventricles |
| c) | Repolarisation of the | Repolarisation of the atria | Depolarisation of the |
| | ventricles | | ventricles |
| d) | Depolarisation of the | Depolarisation of the atria | Repolarisation of the |
| | ventricles | | atria |

5. Read the following statements and select the correct option.

Statement A: the final reabsorption of water from the urine into the blood occurs through the collecting duct of the nephrons to produce hyperosmotic urine.

Statement B: The loop of Henle creates a sodium gradient in the interstitial fluid.

- a) Both the statements A and B are correct and A is the reason for B.
- b) Both the statements A and B are correct and A is not the reason for B.
- c) Statement A is correct and B is wrong.
- d) Both Statement A and B are incorrect.
- 6 The given figure shows an actin filament. Identify the labelled parts A, B and C and select the correct option.



7. Which of the following options illustrates the distribution of Na and K ions in a section of non-myelinated axon which is at resting potential?

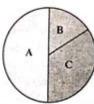


- 8. Adrenocorticotrophic hormones are secreted by
 - a) Thyroid
 - b) Adrenal
 - c) Pancreas
 - d) Anterior pituitary
- 9 Select the option that correctly identifies the labels A, B, C and D in the given diagram:



| | \mathbf{A} | В | C | D |
|----|---------------------|---------------------|--------------------|--------------------|
| a) | Anterior pituitary | Posterior pituitary | Blood vessels | Thalamus |
| b) | Posterior pituitary | Anterior pituitary | Hypothalamus | Thalamus |
| c) | Anterior pituitary | Posterior pituitary | Portal circulation | Hypothalmic |
| | | | | neurons |
| d) | Hypothalmic | Posterior pituitary | Anterior pituitary | Portal circulation |
| | neurons | | | |

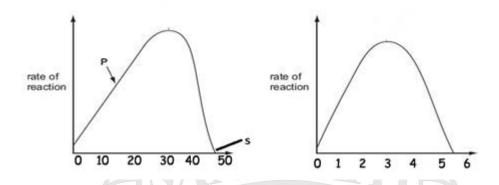
In the given figure the durations of the events of the cardiac cycle are given. Identify these events and select the correct option.



В \mathbf{C} Auricular systole Joint diastole Ventricular systole a) b) Ventricular systole Joint diastole Auricular systole Ventricular systole Auricular systole Joint diastole c) Auricular systole d) Joint diastole Ventricular systole

II. CASE BASED QUESTIONS:

- 1. The graphs given below show the effect of temperature and pH on enzyme activity. Based on the graph answer the following:
 - a) Name the point at which the rate of reaction of the enzyme is increasing steadily. Also mention the value of the temperature at that point.
 - b) Name the point at which the enzyme is denatured. Also mention the value of the temperature at that point.
 - c) What is the value of pH at which the enzyme shows optimum activity?

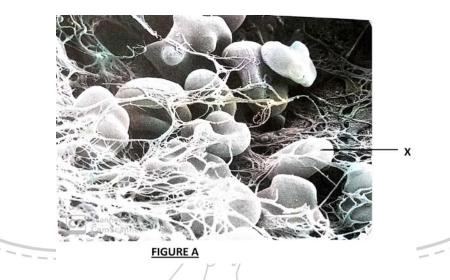


Fermentation is a metabolic process in which an organism converts a carbohydrate, such as starch or a sugar, into an alcohol or an acid. For example, yeast performs fermentation to obtain energy by converting sugar into alcohol. Bacteria perform fermentation, converting carbohydrates into lactic acid. The study of fermentation is called **zymology**.

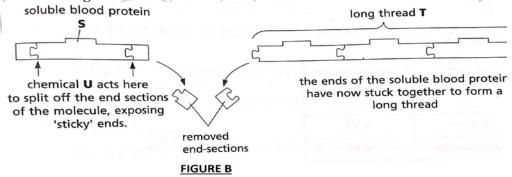
Answer the following questions:

- a) Fermentation is considered as a wasteful process. Justify by giving two reasons.
- b) What would be the maximum concentration of alcohol in beverages that are naturally fermented? Give reason.
- c) Name the enzymes used in alcoholic fermentation.

3 Figure A shows a photograph of a blood clot taken using an electron microscope.



Long, insoluble threads that are shown in Figure A are formed as the blood clots over a cut in the skin. Figure B shows how these insoluble threads are formed.



On the basis of the above given pictures answer the following questions:

- a) Identify the structure X and give its function.
- b) Name the soluble protein S and the long insoluble thread T.
- c) Explain the formation of chemical U to bring about the above mechanism.

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REVISION ASSIGNMENT
TERM 2

| SmartSkills | | Sanskriti School |
|-------------|---|------------------|
| Q1 | Differentiate between fibrous roots and adventitious roots. | 1 |
| Q2 | Define solute potential. | 1 |
| Q3 | What are histones? Give their function. | 1 |
| Q4 | A farmer adds <i>Azotobacter</i> culture to soil before sowing maize. Which mineral element is being replenished? | n 1 |
| Q5 | Name the amino acid whose R- group is a) Hydrogen b) Hydroxy methyl | 1 |
| Q6 | Why are deuteromycetes commonly called imperfect fungi? Mention two characteristics of mycelium of such fungi. | 2 |
| Q7 | Answer the following with reference to the anatomy of dicot root: e) Where is pericycle located? f) How are xylem vessels arranged? g) What do you call such an arrangement? h) Which type of cells constitutes the cortex? | 2 |
| Q8 | Name the two types of fibres found in connective tissue. Write their functions. | 2 |
| Q9 | Differentiate between arithmetic and geometric growth rates. | 2 |
| Q10 | Mention the two steps in glycolysis where ATP is consumed. | 2 |
| Q11 | Explain the mechanisms which aid the opening of stomata. | 2 |
| Q12 | In which phase of meiosis are the following formed:a) Synaptonemal complex.b) Recombination nodules.c) Terminalisation of chiasmatad) Formation of dyad cells. | 2 |
| Q13 | Draw a standard ECG graph and explain it. | 2 |
| Q14 | Name the hormones involved in the calcium regulation in the human body and mention their respective source glands. | n 2 |
| Q15 | Diagrammatically show the position of diaphragm and the rib cage during inhalation and exhalation. | 2 |
| Q16 | a) Why catecholamines are called emergency hormones?b) What is the role of second messenger in the mechanism of protein hormone action? | 2 n |
| Q17 | a) Define biocatalysts.b) How does temperature and substrate concentration affect enzymactivity? Explain. | 3 e |

| Q18 | Enumerate the factors which help to decide the essentiality of an element for a plant. | 3 |
|-----|--|---|
| Q19 | Explain the regulation of kidney function. | 3 |
| Q20 | a) Name the bones of the pectoral girdle.b) Give an example of fibrous joint.c) What is the role of calcium ions in muscle contraction? | 3 |
| Q21 | a) Differentiate between cyclic and non cyclic photophosphorylation.b) Describe the three phases of Calvin cycle. | 5 |
| Q22 | a) Define respiratory quotient.b) Fermentation is considered to be a hazardous process. Why? Give two reasons.c) Respiration is considered to be an amphibolic pathway. Support the statement with an example. | 5 |
| Q23 | a) Describe the mechanism of generation and conduction of nerve impulse through a neuron.b) Why is blind spot devoid of vision?c) Which part of the ear functions to maintain body balance? | 5 |
| Q24 | a) How fatty acids and glycerol are absorbed in spite of being insoluble in blood?b) Draw a well labeled diagram of the T.S. of the human gut. | 5 |

PROJECT (summer vacation work)

The Biology students are required to submit a research based project report on any one of the following topics. This is a tentative list and the students are free to choose any other topic of their interest.

Please note that the project work is a compulsory part of grade XII practical examination.

New Age diseases

Modern Vaccines

Global food crisis

Lifestyle diseases

Genetically modified crops

Genetic diseases

Human genographic project

Stem cell therapy

Human genome project



Practice Paper I

Academic Session: 2020-21 Term 1 Subject: Biology Class XI

Time: 2hrs M.M=60

General Instructions:

- Reading time is from 7:45 am to 8:00 am.
- The writing time is from 8:00 am to 10:00 am.
- The Google form, which needs to be submitted by 10:00 am.
- By 10:15 am, the PDF file of the answer sheets needs to be created, attached and submitted.
- Once submitted, it can't be resubmitted.
- Children who avail extra time, may submit the answer sheets by 11:00 am.
- All questions are compulsory.
- Q1 to Q30 are MCQ's of 1 mark each. They are to be submitted through the Google form only.
- Q31 to Q 40 are in the PDF format of the question paper.
- The Answer sheets need to be scanned and uploaded as a PDF file in portrait mode.
- Make sure that you turn in the work in the time frame assigned.
- Name of the PDF should be your Name, Class and Section.
- No image to be uploaded.
- Q1. Which of the following is a defining characteristic of living organisms?
- 1

- a. Growth from outside the body
- b. Growth from inside the body
- c. Response to external stimuli
- d. Both b) and c)
- Q2. As we go from species to kingdom in a taxonomic hierarchy, the number of common characteristics
- 1

- a. Will decrease
- b. Will increase
- c. Remain same
- d. May increase or decrease.
- Q3. Which one of the following matches is correct?

1

| a) | Aseptate mycelium | Basidomycetes |
|----|------------------------------|----------------|
| b) | Sexual reproduction absent | Deuteromycetes |
| c) | presence of basidium | Ascomycetes |
| d) | Brached and septate mycelium | Phycomycetes |

Q4 Statement A: Viruses are inert crystalline structures outside a living cell. Statement B: Viroids possess a distinct protein coat.

1

SmartSkills

- a. Both the statements A and B are correct and A is the reason for B.
- b. Both the statements A and B are correct and A is not the reason for B.
- c. Statement A is correct and B is wrong.
- d. Both Statement A and B are incorrect.
- Q5. Pteridophytes differ from mosses in having

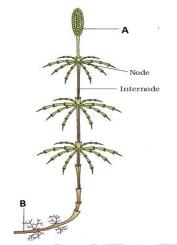
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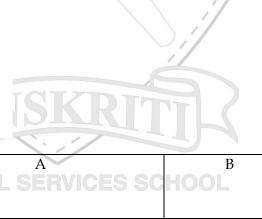
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- a. Inconspicuous free-living gametophyte.
- b. Dependent gametophyte.
- c. Independent and dominant gametophyte.
- d. None of the above.
- Q6. Assertion: Most of the red algae are marine.

Reason: red algae contain pigment anthocyanin.

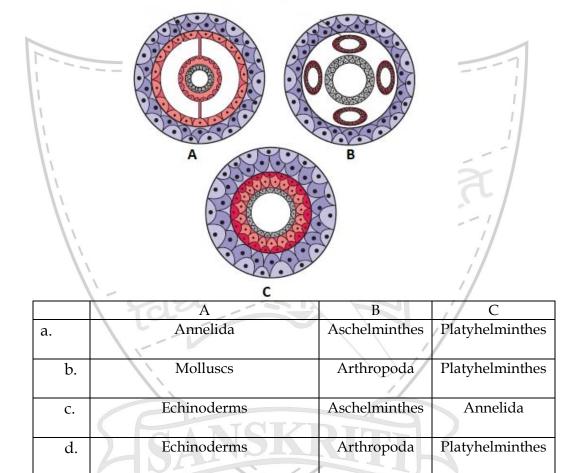
- a. Assertion and Reason are true and the Reason is the correct explanation of the Assertion.
- b. Assertion and Reason are true and the Reason is not a correct explanation of the Assertion.
- c. Assertion is true but Reason is false.
- d. Assertion and Reason both are false.
- Q7. Identify the parts labeled A and B in the given figure of Equisetum and select the correct option.





| Т | HE CIVIL SERVICES SC | HOOL |
|----|----------------------|---------|
| a. | Strobilus | Rhizome |
| b. | Sporophylls | Tuber |
| C. | Sporangia | Rhizome |
| d. | Sporophyte | Tuber |

- Q8. Which of the following classes is incorrectly matched with its general characters?
 - a. Cyclostomata: Circular mouth with jaws and body covered with placoid scales.
 - b. Osteichthyes: Four pairs of gills covered with an operculum and body covered with cycloid scales.
 - c. Reptilia: Tympanum represents ear and fertilization is internal.
 - d. Aves: endoskeleton is fully ossified and presence of long, hollow pneumatic bones.
- Q9. The figures given below show the types of coelom. Identify them and select the correct group of organisms which possess them.



Q10. Match column I with column II and select the correct option from the codes given 1 below:

| | Column I | Column II | |
|---|------------|-----------|--------------------|
| A | Porifera | i. | Canal system |
| В | Ctenophora | ii. | Metameres |
| С | Annelida | iii. | Jointed Appendages |
| D | Arthropoda | iv. | Comb plates |

1

- a. A- (ii), B- (iv), C-(i), D- (iii)
- b. A- (iii), B- (iv), C-(ii), D- (i)
- c. A- (i), B- (iv), C-(ii), D- (iii)
- d. A- (iv), B- (i), C-(ii), D- (iii)
- Q11. In ______ aestivation, sepals or petals in a whorl just touch each other at the 1 margins without overlapping.
 - a. Valvate
 - b. Imbricate
 - c. Twisted
 - d. Vexillary

Q12

Which floral conditions are represented by the symbols $\stackrel{ullet}{=}$ and % respectively?

- a. Zygomorphic and actinomorphic flowers
- b. Actinomorphic and zygomorphic flowers.
- c. Bisexual and unisexual flowers
- d. Hypogynous and epigynous flowers
- Q13. Which of the following types of placentation is found in Tomato?
- 1

1

- a. \ Axile
- b. Marginal
- c. Basal
- d. Parietal
- Q14 Add the missing floral part in the given floral formula of family Liliaceae.

1



- a. C₆
- b. C.
- c. P₆
- d. P 3+3
- Q15 Assertion: Diadelphous stamens are found in pea flowers.

1

Reason: In pea flowers, stamens are found in two bundles.

- a. Assertion and Reason are true and the Reason is the correct explanation of the Assertion.
- b. Assertion and Reason are true and the Reason is not a correct explanation of the Assertion.
- c. Assertion is true but Reason is false.
- d. Assertion and Reason both are false.

| Q16 | | septum in: | 1 | |
|-----|--|---|---|--|
| | a. | Mustard | | |
| | b. | Pea | | |
| | C. | China rose | | |
| | d. | Sunflower | | |
| Q17 | The ci | liated columnar epithelial cells in humans are known to occur in: | 1 | |
| | a. | Fallopian tubes and urethra | | |
| | b. | Eustachian tube and stomach lining | | |
| | C. | Bronchioles and fallopian tubes | | |
| | d. | Bile duct and oesophagus | | |
| | 1 | | | |
| Q18 | Matri | x of the connective tissue is secreted by: | 1 | |
| | a. | Mast cells | | |
| | b. | Fibroblasts | | |
| | c. \ | Histocytes | | |
| | d. | Plasma cells | | |
| | 1, | 6 | | |
| Q19 | Extrac | cellular fluids are LEAST likely to move through the space between cells | 1 | |
| QI | that are joined by which type of intercellular junction? | | | |
| | a. | Desmosome | | |
| | b. | Tight junction | | |
| | C. | Macula adherens | | |
| | d. | Gap junction | | |
| Q20 | In car | diac muscle tissue, what is the primary purpose of intercalated discs? | 1 | |
| Q20 | a. | Depolarization and repolarization of cells | 1 | |
| | b. | Generating electrical impulses in cells | | |
| | c. | Permitting the passage of ions between cells | | |
| | d. | Preventing separation of muscle cells during contraction | | |
| | . | TO A NSK PITTI | | |
| O21 | F '11 | II II CHA EVERT | 1 | |
| Q21 | _ | elial tissue is characterized by the following EXCEPT | 1 | |
| | a. b | Epithelial cells tend to form junctions. | | |
| | b. | Absence of cell polarity. SERVICES SCHOOL Does not contain blood vessels. | | |
| | c. d. | Little intercellular material | | |
| | u. | Ettic intercential material | | |
| Q22 | | tion: Simple columnar epithelium with microvilli are found in the lining of nall intestine. | 1 | |
| | | n: Maximum absorption of nutrients takes place through the wall of the intestine. | | |
| | a. | Assertion and Reason are true and the Reason is the correct explanation of the Assertion. | | |

- b. Assertion and Reason are true and the Reason is not a correct explanation of the Assertion.
- c. Assertion is true but Reason is false.
- d. Assertion and Reason both are false.

Choose from the following cells for Q23 - Q26

- i. Pancreatic cell that secretes digestive enzymes.
- ii. Ovarian cell that produces estrogens (a steroid hormone).
- iii. Muscle cell in the thigh of a long-distance runner.
- iv. White blood cell that engulfs bacteria.

| Q23 | In which cell would you find the most lysosomes? | 1 |
|-----|---|---|
| | a. In cell (i) | |
| | b. In cell (ii) | |
| | c. In cell (iii) | |
| | d. In cell (iv) | |
| Q24 | In which cell would you find the most SER? | 1 |
| | a. In cell (i) | |
| | b. In cell (ii) | |
| | c. In cell (iii) | |
| | d. In cell (iv) | |
| Q25 | In which cell would you find the most RER? | 1 |
| | a. In cell (i) | |
| | b. In cell (ii) | |
| | c. In cell (iii) | |
| | d. In cell (iv) | |
| Q26 | In which cell would you find the most mitochondria? | 1 |
| | a. In cell (i) | |
| | b. In cell (ii) | |
| | c. In cell (iii) | |
| | d. In cell (iv) | |
| Q27 | Human cells in culture show a cell cycle to be completed in approximately | 1 |
| | a. 42 hours | |
| | b. 24 hours | |
| | c. 24 minutes | |

Read the give paragraph and answer Q 28 - Q30 that follow:

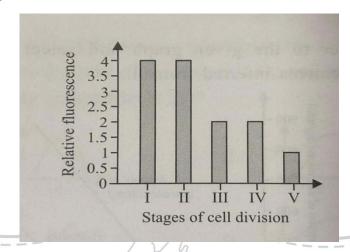
d.

24 seconds

The amount of DNA in a cell can be determined by measuring the fluorescence of a dye that binds in direct proportion to the amount of DNA. The histogram

1

given below represents the fluorescence of a eukaryotic germ cell during different stages of cell division (I, II, III, IV and V)



- Q28 Which stages of cell division can represent prophase I and anaphase I of meiosis
 - a. I and II
 - b. I and III
 - c. I and IV
 - d. II and III
- Q29 Which stages of cell division can represent prophase II and anaphase II of meiosis
 - a. I and II
 - b. I and III
 - c. III and IV
 - d. II and III
- Q30 Which stage of cell division will represent cytokinesis following telophase II
 - a. I
 - b. II
 - c. III and IV
 - d. V

Descriptive questions for PDF

- Q31 Explain the rules of binomial nomenclature.
- Q32 State the economic importance of bryophytes. Give two points.

2

2

Q33 Name the inflorescence shown in figure A and B. Also give one difference between them.

2





A patient is diagnosed with a neurological disorder in which certain neuroglial Q34 cells in the brain are non-functional. Which two functions of the nervous tissue will get disturbed in this patient?

2

Q35 What is diatomaceous earth? Mention any two economic uses of it. a.

3

- Euglena can behave both as a plant and an animal. Explain how? b.
- Flowers can be classified into three types on the basis of position of ovary with Q36 respect to other floral parts. Name these types and represent them diagrammatically.

3

Give one difference between the following: Q37

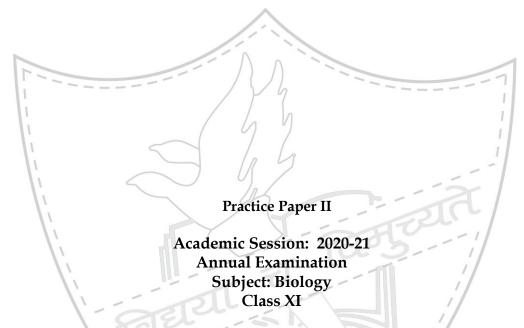
3

- Muscles found in biceps and stomach. a.
- Dense regular and dense irregular tissues. b.
- Endocrine and exocrine glands.

Q38 Some cells in adult animals do not exhibit cell division. 3

- Name the stage of cell cycle in which they are arrested. a.
- h. Give the characteristic feature of the above-named stage.
- Give an example of one such cell in the human body. c.
- O39 a. Name the two subphylums collectively called as protochordates. Give one 5 difference between them.

- b. Where are cnidoblasts found? What is their function?
- Q40 What is the function of a cell envelope in a prokaryotic cell? Name the components which make up the cell envelope starting from outside.
- 5
- Give one difference between Gram positive and Gram-Negative bacteria. b.
- What are plasmids? Describe their role in bacteria. c.



Time: 3 Hours Maximum Marks: 70

General Instructions:

- The reading time is from 7:45 am to 8:00 am.
- The writing time is from 8:00 am to 11:00 am.
- By 11:20 am, the pdf file of the answer sheets needs to be created, attached and submitted. Once submitted, it can't be resubmitted.
- Children who avail extra time, may submit the answer sheets by 12:20pm.
- All questions are compulsory.
- The question paper has four sections: Section A, Section B, Section C and Section D. There are 33 questions in the question paper.
- Section–A has 14 questions of 1 mark each and 02 case-based questions. Section–B has 9 questions of 2 marks each. Section–C has 5 questions of 3 marks each and Section–D has 3 questions of 5 marks each.
- Wherever necessary, neat and properly labeled diagrams should be drawn.

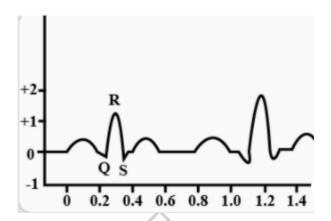
SECTION A

Why is Rhodophyceae commonly called red algae? Q1 1 Q2 The spread of living pteridophytes is limited and restricted to narrow 1 geographical regions. Why? Q3 Why are the parasitic forms of Platyhelminthes provided with hooks and 1 suckers, while the free-living forms don't have them? Name the types of placentation shown in figures A and B. Q4 1 Q5 State the functional importance of intercalated discs found in the cardiac 1 tissue. What are nuclear pores? State their function. Q6 1 If you damage your liver, new liver cells can be produced to replace up to Q7 1 75% of the liver. However, if you sustain brain dam-age, your body does not produce new brain cells. Explain this observation using what you have learned about the cell cycle. What is the function of cholesterol in cell membranes? Q8 1 If a DNA double helix is made up of 100 nucleotide pairs and contains 25 Q9 1 adenine bases, how many guanine bases does it contain? Q10 In the given electrocardiogram, what does the QRS complex stand for?

1

1

1



Q11 Assertion: Metacentric chromosomes are V-shaped.

Reason: In these chromosomes the centromere occurs in the center forming two equal arms.

- a. Assertion and reason are true and reason is the correct explanation of assertion.
- b. Assertion and reason are true and reason is not the correct explanation of assertion.
- c. Assertion is true but the Reason is false.
- d. Assertion and reason both are false.
- Q12 Assertion: In C₄ plants, the bundle sheath cells are rich in PEPcase.

Reason: In C₄ plants, the mesophyll cells are rich in an enzyme RuBisCO.

- a. Assertion and reason are true and reason is the correct explanation of assertion.
- b. Assertion and reason are true and reason is not the correct explanation of assertion.
- c. Assertion is true but the Reason is false.
- d. Assertion and reason both are false.
- Q13 Assertion: Angiotensin II increases the glomerular blood pressure thereby GFR.

Reason: Angiotensin II activates the JG cells to release renin.

- a. Assertion and reason are true and reason is the correct explanation of assertion.
- b. Assertion and reason are true and reason is not the correct explanation of assertion.
- c. Assertion is true but the Reason is false.
- d. Assertion and reason both are false.
- Q14 Assertion: Neurohypophysis is under direct regulation of the hypothalamus.

1

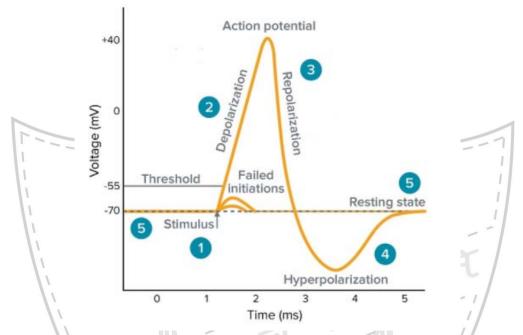
1x4 =

Reason: Neurohypophysis stores and releases two hormones oxytocin and vasopressin which are actually synthesized by the hypothalamus.

- a. Assertion and reason are true and reason is the correct explanation of assertion.
- b. Assertion and reason are true and reason is not the correct explanation of assertion.
- c. Assertion is true but the Reason is false.
- d. Assertion and reason both are false.
- Q15 Plant growth regulators (PGRs) are organic compounds, other than nutrients, that modify plant physiological processes. PGRs, called biostimulants or bioinhibitors, act inside plant cells to stimulate or inhibit specific enzymes or enzyme systems and help regulate plant metabolism. They normally are active at very low concentrations in plants. The importance of PGRs was first recognized in the 1930s. Since that time, natural and synthetic compounds that alter function, shape, and size of crop plants have been discovered. Today, specific PGRs are used to modify crop growth rate and growth pattern during the various stages of development, from germination through harvest and post-harvest preservation.
 - A. Which of the following PGR generally acts as an antagonist to gibberellins?
 - 1. Zeatin
 - 2. Ethylene
 - 3. ABA
 - 4. IAA
 - B. The rosette habit of cabbage can be changed by application of:
 - 1. IAA
 - 2. GA
 - 3. ABA
 - 4. Ethephon
 - C. A farmer wants to grow cucumber plants in his field. He wants to increase the number of female flowers in them. Which PGR can be applied to achieve this?
 - 1.TAuxin VIL SERVICES SCHOOL
 - 2. ethylene
 - 3. GA₃
 - 4. GA₁₀
 - D. Which of the following is not an effect of ethylene?
 - 1. Promotes senescence and abscission of plant organs.
 - 2. Breaks seed and bud dormancy.
 - 3. Hastens fruit ripening
 - 4. Helps to overcome apical dominance.

1x4 = 4

Q16 An action potential is a rapid rise and subsequent fall in voltage or membrane potential across a cellular membrane with a characteristic pattern. Sufficient current is required to initiate a voltage response in a cell membrane; if the current is insufficient to depolarize the membrane to the threshold level, an action potential will not fire. Examples of cells that signal via action potentials are neurons and muscle cells.



- A. What is largely responsible for the negative resting membrane potential (around -70 mV) in a neuron?
 - 1. Axonal insulation by Schwann cells.
 - 2. Voltage-gated sodium channels opening.
 - 3. The action potential.
 - 4. Na+-K+ pump.
 - B. The opening of axon membrane voltage-gated potassium channels is responsible for which part of the action potential?
 - 1. Depolarisation of the membrane
 - 2. Repolarisation of the membrane
 - 3. Contraction of the postsynaptic muscle fibre
 - 4. Signalling vesicular release of neurotransmitters.
 - C. Which term describes the cell membrane potential of a neuron at rest?
 - Polarized
 - 2. Depolarized
 - 3. Hyperpolarized
 - 4. Repolarized

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D. Assertion: Myelin sheath insulates the nerve fibres and prevents its depolarization.

Reason: Nerve impulses are conducted more rapidly in nonmyelinated nerve fibers than in myelinated ones.

- 1. Both Assertion and Reason are true but reason is not the correct explanation of Assertion.
- 2. Both Assertion and Reason are true and reason is the correct explanation of Assertion.
- 3. Assertion and Reason both are false.
- 4. Assertion is true but the Reason is false.

SECTION B Q17 What are gemma cups? What is their function? 2 Q18 Differentiate between polyps and medusae. (give one difference only). 2 Identify and give the technical terms for the following conditions found in 2 flowers: a. A sterile stamen. h. Stamens are attached to the petals. Stamens are attached to the perianth. c. d. Stamens united to form two bundles. Q20 Name the stage of cell cycle at which the following events occur: 2 Chromosomes move to the equator of the spindle. b. Centromere splits and Chromatids separate. Pairing between homologous chromosomes takes place. c. Crossing over between homologous chromosomes takes place. d. Q21 State the factors that favour the dissociation of oxyhaemoglobin in the 2 tissues? Q22 Describe the role of Loop of Henle in the formation of concentrated urine 2 in mammals which is an adaptation for terrestrial living. Q23 How is the nerve impulse transmitted from one neuron to another via 2 synapse? Q24 Indicate the flow of blood in the heart during joint diastole. State whether 2 the semilunar valves are open or closed during this phase of cardiac cycle. With some strains of yeast, fermentation stops before the sugar is 2 Q25 A.

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3

exhausted in the medium, usually at an alcohol concentration of about 13%. What is a possible explanation?

B. Why is fermentation considered as a wasteful process? Give two points.

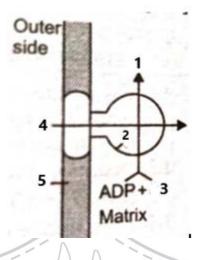
SECTION C

- Q26 A. What technical term is given to the bone cells?

 B. Give one functional difference between ciliated epithelium and brush-border epithelium.
- Q27 A. What are the two forms of glycocalyx found among different bacteria?
 - B. Give one function each of the following structures found in prokaryotic cells:
 - a. inclusion bodies
 - b. mesosomes
- Q28 Name the two hormones grouped under catecholamines. Why are they called emergency hormones? How do they affect the functioning of the human heart? (Give two points)
- Q29 A. Respiratory pathway is amphibolic. Justify.
 B. State the assumptions that are to be kept in mind while calculating the net ATP gain for every molecule of glucose oxidised.
- Q30 A. Write the complete word equation to show the fate of pyruvate after 3 it enters the mitochondrial matrix before participating in the kreb's cycle.



B. The given diagram shows ATP synthesis during aerobic respiration. Replace the numbers 1, 2, 3 4, and 5 by appropriate terms.



SECTION D

- Q31 A. Write in detail the steps involved in the catalytic action of an enzyme.
 - B. What is a competitive inhibitor? Give an example.
- Q32 ATP synthesis during the light reaction phase of photosynthesis is linked to development of a proton gradient across a membrane.
 - A. Name the membrane across which this gradient is created.
 - B. On which side of the membrane does the protons get accumulated?
 - C. Enlist the steps that cause this proton gradient to develop.
- Q33 A. What is a sarcomere?
 - B. Diagrammatically explain the stages in the cross bridge formation.



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