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Accelerated Learning Programme (ALP)

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# BIOLOGY

LAHORE

GUJRANWALA

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**11** **F.Sc**



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**Azeem SOLVED PAST PAPERS**  
**BIOLOGY**

**F.Sc. Part-I**

**2007 - 2019**

**LAHORE, GUJRANWALA, MULTAN, FAISALABAD, RAWALPINDI,  
BAHAWALPUR, SARGODHA, D.G. KHAN, SAHIWAL, A.J.K. BOARDS**

- ☞ MCQs with solutions from exercises of PTBB.**
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(ii)

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**Smart Syllabus**

Chapter No./ Name / Topics / Exercise Q(s)/ Textbook Pages (s)

**CHAPTER 1: INTRODUCTION**

Biology and some major fields of specialization, Biological method, Biology and the service of mankind (excluding the subtopics "Disease Control", "Preventive measures", "Vaccination and Immunization", and "Drug Treatment/ Gene therapy") (Pg. 1-13)

Practicals: No practical

Questions:

Classwork: Fill in the blanks (i-iii, ix), True and false (No), Multiple choice questions (i, iv)

Homework: Short questions (i-iv), Extensive questions (i, iv, v)

**CHAPTER 2: BIOLOGICAL MOLECULES**

Introduction to biochemistry, Importance of water, Carbohydrates (excluding the subtopics "monosaccharides", "oligosaccharides", "polysaccharides"), Lipids (excluding the subtopics "acylglycerols", "waxes", "phospholipids", "terpenoids"), Proteins, Structure of proteins, Nucleic acids (excluding the subtopics "DNA" and "RNA") (Pg. 17-31)

Practicals

1. Identification of biochemical from biological materials.
2. Iodine test for starch
3. Benedict's test for reducing sugars
4. Millon's test for Proteins/Biuret test for proteins
5. Sudan III test for fats and oils and emulsion test

Questions:

Classwork: Fill in the blanks (i, ii), True and false (i), Multiple choice questions (iv)

Homework: Short questions (ii, iv and v), Extensive questions (i, iii)

**CHAPTER 3: ENZYMES**

Introduction, Characteristics of enzymes, Mechanism of enzyme action (catalysis), Inhibitors Irreversible inhibitors, Reversible inhibitors (competitive & non-competitive inhibitors) (Pg. 37-43)

Practicals:

1. Study of starch break down in germinating gram seeds.

Questions:

Classwork: Fill in the blanks (i-v), True and false (i-v), Multiple choice questions (No)

Homework: Short questions (i, iii-v), Extensive questions: (1, 3, 4)

**CHAPTER 4: THE CELL**

Structure of a generalized cell, Plasma membrane, Cell wall, Cytoplasm, Endoplasmic reticulum, Ribosomes, Golgi apparatus, Lysosomes, Vacuoles, Cytoskeleton, Centriole, Mitochondria, Plastids (Chloroplasts, Chromoplasts, Leucoplasts), Nucleus (complete topic) Prokaryotic and eukaryotic cell (Pg. 48-64)

Practicals:

1. Study of animal cells (frog's epithelium cell, frog's buccal cavity cells) and plant cells (mesophyll cells, leaf epidermis cells, onion epidermis cells) by staining with safranin, acid fuchsin, methylene blue, eosine

Questions:

Classwork: Fill in the blanks (i-v), True and false (i-v), Multiple choice questions (i-vi)

Homework: Short questions (i-xi), Extensive questions (i, v)

**CHAPTER 5: VARIETY OF LIFE**

Introduction, Nomenclature, Two to five kingdom classification systems, Viruses (excluding the introductory paragraphs), Characteristics, Structure, Life cycle of bacteriophages, Some viral diseases: small pox, herpes, influenza, mumps and measles, polio, AIDS, Hepatitis (Pg. 67-80)

Practicals: No practical

Questions:

Classwork: Fill in the blanks (i-x), Multiple choice questions (i-xiv)

Homework: No Short question, No extensive question

**CHAPTER 6: KINGDOM PROKARYOTAE (MONERA)**

Structure of bacteria, Size, Shape of bacteria, Bacterial cell structure (complete topic -page 86 to 89), Nutrition of bacteria, Respiration in bacteria, Growth and Reproduction, Control of bacteria (Physical methods, Chemical methods), Use and misuse of antibiotics, Characteristics of Cyanobacteria (Pg.84-94)

**Practicals:**

1. Laboratory safety techniques and use of microscope and measurement of microscopic objects by micrometry.
2. Investigation of bacterial content of fresh and stale milk.
3. Study of Nostoc from fresh material and prepared slides.

**Questions:**

**Classwork:** Fill in the blanks (i-vi, viii), Multiple choice questions (i-vi)

**Homework:** Short questions (i a, b, ii-ix), Extensive questions (i-iii, v)

**CHAPTER 7: THE KINGDOM PROTISTA (OR PROTOCTISTA)**

**Introduction:** Major groups of Protista. Protozoa: Animal-like protists, Amoebae, Zooflagellates  
**Ciliates:** Algae: Plant-like protists, Euglenoids, Brown algae, Red algae, Green algae, Importance of algae, Fungus-like protists, Slime molds, Water molds (Pg. 99-111)

**Practicals:**

1. Identification of Chlorella, Paramecium, Amoeba, Entamoeba, Plasmodium (malarial parasite) Euglena, Volvox, Ulothrix from fresh materials or prepared slides.

**Questions:**

**Classwork:** Fill in the blanks (i, ii, v-viii)

**Homework:** Short questions (i, iv, v), Extensive questions (i-ix)

**CHAPTER 8: FUNGI**

**Introduction:** The body of fungus, Nutrition in fungi, Reproduction, Asexual reproduction, Sexual reproduction, Classification of fungi, Zygomycota, Ascomycota, Basidiomycota, Deuteromycota, Importance of fungi, Ecological importance, Commercial importance, Economic gains due to fungi, Economic losses due to fungi (Pg. 113-128)

**Practicals:**

1. Study of yeast, *Ustilago tritici* and *Penicillium* from fresh materials and slides.

**Questions:**

**Classwork:** Multiple choice questions (i-iv)

**Homework:** Short Questions (i-ii), Extensive questions (i-iv)

**CHAPTER 9: KINGDOM PLANTAE**

**Classification of Plantae:** Division Bryophyta, Adaptation to land habitat, Division Tracheophyta, Evolution of leaf, Evolution of seed habit, Class Gymnosperms (including the subtopic "Pinus - life cycle"), Class Angiosperms, Life cycle of an angiospermic plant, Seed formation, double fertilization, Classification of angiosperms (including the topic and subtopics of "Angiospermic plants") (Pg. 131-155)

**Practicals:**

1. Examination of *Marchantia* and *Funaria* (external morphology) from fresh material and of sex organs from prepared slides.
2. Study of *Pinus*: male and female cones from fresh or preserved materials.

**Questions:**

**Classwork:** Fill in the blanks (i-ix), Multiple Choice Questions (i-iv)

**Homework:** Short Questions (ii b, iv, vii), Extensive questions (ii-vi)

**CHAPTER 10: KINGDOM ANIMALIA**

**Introduction:** Grade Radial, Grade Bilateral, Diploblastic and triploblastic organization, Acoelomates, pseudocoelomates, coelomates. Series protostomia & Series deuterostomia, Phylum Porifera, Phylum Coelenterata (excluding the subtopic "Polymorphism"), Phylum Platyhelminthes (excluding the subtopics "infestation" and "disinfestation"), Adaptation for parasitic mode of life, Aschelminthes (Phylum Nematoda), Phylum Annelida (excluding the subtopics of classes "Polychaeta", "Oligochaeta", and "Hirudinea"), Phylum Arthropoda (excluding the subtopics of classes "Crustacea", "Insecta", "Arachnida", and "Myriapoda"), Metamorphosis, Economic importance of arthropods, Phylum Mollusca (excluding the subtopics of classes "Gastropoda", "Bivalvia" and "Cephalopoda"), Economic importance of Mollusca, Phylum Echinodermata, Echinodermata / Affinities, Phylum Chordata, Sub-phylum Vertebrata, Class Chondrichthyes, Class Osteichthyes (excluding the subtopic "adaptations for aquatic life, Class Amphibia, Class Reptilia, Class Aves; Characters of Birds, Class Mammalia, Sub-class Prototheria, Sub-class Metatheria, Sub-class Eutheria (Pg.167-203)

**Practicals:**

1. Exposure of respiratory system of frog.

**Questions:**

**Classwork:** Fill in the blanks (i-x), Multiple choice questions (i, ii, iv, v, vi, vii)

**Homework:** Extensive questions (i, ii, vii, viii)

**CHAPTER 11: BIOENERGETICS**

**Introduction:** Photosynthesis, Photosynthetic reactants and products, Water and photosynthesis, *Photorespiration*, pigments (Chlorophyll, Carotenoids), Reactions of photosynthesis, Light dependent reactions, Non-cyclic phosphorylation, Cyclic phosphorylation, Chemiosmosis, Light independent (or dark) reactions, Respiration, Anaerobic and aerobic respiration, Anaerobic Respiration (alcoholic fermentation, lactic acid fermentation), Cellular Respiration, Glycolysis, Pyruvic acid oxidation, Krebs cycle, Respiratory chain (Pg. 206-228)

**Practicals:**

1. Extraction and chromatography of leaf chloroplast pigments.

**Questions:**

**Classwork:** Fill in the blanks (i-v), Multiple choice questions (i-iii)

**Homework:** Extensive questions (i-iii, vi-x, xii-xiii)

**CHAPTER 12: NUTRITION**

**Methods of plant nutrition** (saprophytic nutrition, parasitic nutrition, symbiotic nutrition, nutrition in insectivorous plants)  
**Digestion and absorption:** Digestion in Man, Digestion in oral cavity, Digestion in stomach, Digestion in small intestine  
**Absorption of food:** Large intestine, Some common diseases related to nutrition (Dyspepsia, Food poisoning, Obesity, Ulcer) (Pg. 235-256)

**Practicals:**

1. Study of T.S of liver, stomach, small intestine and large intestine of man prepared slides.

**Questions:**

**Classwork:** Fill in the blanks (i-viii), True and false (i-iii), Multiple choice questions (i-iii, vi-vii, ix)

**Homework:** Short questions (i, iii, iv), Extensive questions (i-iv, ix-xii, xvi-xv)

**CHAPTER 13: GASEOUS EXCHANGE**

**Advantages and disadvantages of gas exchange in air and water:** Gaseous exchange in plants, Properties of respiratory surfaces, Respiration in man, Air passage ways, Inspiration, Expiration, Transport of respiratory gases, Transport of oxygen, Transport of carbon dioxide, Carbon dioxide concentration in arterial and venous blood, Respiratory disorders (Cancer, Tuberculosis, Asthma), Role of respiratory pigments, Lung capacities (Pg. 259-275)

**Practicals:** No practical**Questions:**

**Classwork:** Fill in the blanks (ii-v), True and false (i-ii, v), Multiple choice questions (i, iii-v)

**Homework:** Short questions (i-v), Extensive questions (i, v-vii)

**CHAPTER 14: TRANSPORT**

**Transport in plants - Uptake and transport of minerals and water:** Mineral absorption by roots, Processes involved in absorption by roots, Uptake of water by roots, Apoplast pathway, Symplast pathway, Vacuolar pathway, Ascent of sap, Cohesion tension theory, Mechanism of transpiration pull in cohesion and tension theory, Root pressure, Imbibition, Bleeding, Opening and closing of stomata, Mechanism of phloem translocation, Diffusion, Pressure flow theory, Circulatory system, Characteristics of circulatory system, Open and closed circulatory system, Comparison of open and closed circulatory system, Transport in man, The circulatory fluid - the blood, Functions of blood, Disorders (Blood cancer, anaemia, Pumping organ - The heart; Structure and action, The cardiac cycle, Mechanism of heart Excitation and Contraction, Electrocardiogram, Artificial pace-maker, Blue babies, Blood vessels, Arteries, Capillaries, Veins, Blood pressure and rate of blood flow, Hypertension, Thrombus formation and hypertension, Heart attack, Stroke, Hemorrhage, Lymphatic system, Immunity, Types of immunity (Pg. 278-327)

**Practicals:**

1. Demonstration of osmosis in living plant cells, (manifested by plasmolysis and deplasmolysis) of onion cells or *Spirogyra*.
2. Study from prepared slides of internal structure of monocot and dicot root, stem and leaf.
3. Investigation of stomatal distribution (using clear nail varnish or epidermis peel)
4. Study of prepared, stained slide of human blood including identification of phagocytes and lymphocytes and preparation of slide of blood smear of frog.
5. Study of structure of artery, vein, capillary from their T.S. (Prepared Slides)
6. Study of effect of acetylcholine and adrenaline on the heartbeat of frog.
7. Exposure of blood circulatory system of frog (heart and main blood vessels).
8. Measurement of blood pressure during rest and after exercise with B.P apparatus.

**Questions:**

**Classwork:** Fill in the blanks (i-vi), Multiple choice questions (i-ix), True and false (i-v)

**Homework:** Extensive questions (i-v, vii, ix)

## CONTENTS

Ch. #	SUBJECT	Page #
1	INTRODUCTION	2
2	BIOLOGICAL MOLECULES	6
	ENZYMES	10
	THE CELL	15
	VARIETY OF LIFE	25
	KINGDOM PROKARYOTAE (MONERA)	31
	THE KINGDOM PROTISTA (OR PROTOCTISTA)	37
	FUNGI	47
	KINGDOM PLANTAE	57
10	KINGDOM ANIMALIA	64
11	BIOENERGETICS	78
12	NUTRITION	89
13	GASEOUS EXCHANGE	99
14	TRANSPORT	110

## ASSESSMENT SCHEME

For Biology 11<sup>th</sup> Part I Session  
2012-2016 and ONWARD

Time 3:30

Total Marks: 100

### (A) OBJECTIVE

This part consists of only one section i.e  
Section I that includes only MCQ'S

### SECTION-I MCQ'S

Each question carries only one Mark

Question to be asked 17

Question to be attempted 17

Total Marks: 17

Time Allowed: 20 Minutes

### SECTION II

### SHORT QUESTIONS

Each question carries 2 Marks

Q. to be asked 33 Q. to be attempted 22

Total Marks:  $22 \times 2 = 44$

Section II of Short Questions consists of  
three questions i.e.,

#### Question No: 2

Q. to be asked 12 Q. to be attempted 8 Marks:  
( $8 \times 2 = 16$ )

#### Question No: 3

Q. to be asked 12 Q. to be attempted 8 Marks:  
( $8 \times 2 = 16$ )

#### Question No: 4

Q. to be asked 9 Q. to be attempted 6 Marks:  
( $6 \times 2 = 12$ )

## A) SHORT QUESTIONS

### MARKING SCHEME

Chapter No: 1 ----- 2SQs

Chapter No: 2 ----- 1SQ

Chapter No: 3 ----- 3SQs

Chapter No: 4 ----- 2SQs

Chapter No: 5 ----- 1SQ

Chapter No: 6 ----- 1SQ

Chapter No: 7 ----- 4SQs

Chapter No: 8 ----- 2SQs

Chapter No: 9 ----- 2SQs

Chapter No: 10 ---- 4SQs

Chapter No: 11 ----- 2SQs

Chapter No: 12 ----- 3SQs

Chapter No: 13 ----- 4SQs

Chapter No: 14 ----- 2SQs

## B) SHORT QUESTIONS

### COMBINATION SCHEME

Question No: 2

Chapter No: 1 + Chapter No: 9

(Families are not included)

Question No: 3

Chapter No: 2 + Chapter No: 12

Question No: 4

Chapter No: 4 + Chapter No: 8

## SECTION III LONG QUESTIONS

Each question carries 8 Marks

Q. to be asked 5

Q. to be attempted 3

Total Marks:  $8 \times 3 = 24$

### A) LONG QUESTIONS

#### MARKS SCHEME

- Chapter No: 1 ----- 4 Marks  
 Chapter No: 2 ----- 4 Marks  
 Chapter No: 3 ----- Nil  
 Chapter No: 4 ----- 4 Marks  
 Chapter No: 5 ----- 4 Marks  
 Chapter No: 6 ----- 4 Marks  
 Chapter No: 7 ----- Nil  
 Chapter No: 8 ----- 4 Marks  
 Chapter No: 9 ----- 4 Marks  
 Chapter No: 10 ----- Nil  
 Chapter No: 11 ----- 4 Marks  
 Chapter No: 12 ----- 4 Marks  
 Chapter No: 13 ----- Nil  
 Chapter No: 14 ----- 4 Marks

### B) LONG QUESTIONS

#### COMBINATION SCHEME

Question No: 5

Chapter No: 1 + Chapter No: 9  
(Families are not included)

Question No: 6

Chapter No: 2 + Chapter No: 12

Question No: 7

Chapter No: 4 + Chapter No: 8

Question No: 8

Chapter No: 5 + Chapter No: 11

Question No: 9

Chapter No: 6 + Chapter No: 14

## SECTION I MULTIPLE CHOICE QUESTIONS

### Chapter --- 1

#### INTRODUCTION

#### MCQ

#### Multiple Choice

- Which one of the following is correct sequence in biological methods?
  - Observation, Hypothesis, Law, Theory
  - Observation, Hypothesis, Deduction, Testing of deduction
  - Hypothesis, Observations, Deduction, Testing of deduction
  - Law, Theory, Deduction, Observations.
- Which one of the following is not related to cloning?
  - Replacement of nucleus of zygote, by another nucleus of the same organism
  - Separation of cells of embryo to form more embryos
  - The individuals resulting have similar genetic make up
  - Removal of piece of DNA or gene from the cell, and incorporating another gene or piece of DNA in its place

#### Multiple Choice

- Use of living organisms, system or processes in manufacturing and service industries is studied by branch called: (LHR-1-2014-A)
  - Social Biology
  - Human Biology
  - Biotechnology
  - Marine Biology
- The study of tissues is called: (LHR-II-2014-A) (SGD-15-A)
  - Anatomy
  - Histology
  - Palaentology
  - Physiology
- In 1997, scientists in Scotland succeeded in cloning a: (LHR-II-2015-A)
 

*Dolly*

  - Sheep
  - Horse
  - Goat
  - Cow
- The study of parasites is called: (LHR-I-2016-A)
  - Palaentology
  - Histology
  - Microbiology
  - Parasitology
- Embryology is the study of: (GRW-2014-A)
  - Fossils
  - Tissues
  - Development
  - Internal gross structure

- The study of distribution of animals in nature is called: (GRW-2015-A)
  - Zoogeography
  - Biodiversity
  - Geography
  - Wild life
- Study of social behavior of human is called: (GRW-2018-A)
  - Anatomy
  - Social Biology
  - Palaentology
  - Physiology
- The tentative explanation of observation is called: (RWP-2014-A) (SAH-16-A) (MTN-IIA-17-A) (BWP-15-A) (DGK-II-16-A)
  - Hypothesis
  - Deduction
  - Law
  - Theory
- Study of functions of different parts of an organism: (SGD-2017-A)
  - Morphology
  - Physiology
  - Anatomy
  - Ecology
- Living substance of living things is called: (FSD-2014-A)
  - Cytoplasm
  - Cell
  - DNA
  - Protoplasm
- The branch of biology which deals with the study of ancestral history of living organisms is called as: (BWP-14-A) (FSD-2014-A)
  - Palaentology
  - Zoogeography
  - Evolution
  - Heridity
- The technology used for achieving eugenic aims: (FSD-2015-A)
  - Gene therapy
  - Rdiotherapy
  - Chemotherapy
  - Cloning
- The first ever clone was prepared in 1997 in: (FSD-2017-A)
  - England
  - Ireland
  - Scotland
  - Maryland
- An aphid that attacks walnut tree is being controlled biologically by: (MTN-I-2017-A)
  - Wasp
  - Housefly
  - Honey bee
  - Mosquito
- The Unit of Life is called: (BWP-2016, 17-A)
  - organ
  - cell
  - tissue
  - organelle
- Histology is the study of: (D.G.K-I-2014-A)
  - Cell
  - Functions
  - Tissues
  - Fossils
- Technique which is used to check, wether a certain nutrient is essential for plant is: (D.G.K-II-2014-A)
  - Integrated disease management
  - Hydroponic culture technique.
  - Cloning
  - Pasteurization

- The reasoning that moves from general to specific is: (D.G.K-II-2015-A) (MTN-I-19-A)
    - Deductive
    - Inductive
    - Scientific
    - Theoretical
  - The branch of Biology which deals with the study of environmental relations of organisms is called: (D.G.K-II-2018-A)
    - Morphology
    - Ecology
    - Evolution
    - Zoogeography
  - Pasteurization is widely used for preservation of: (SAH-2015-A)
    - Food products
    - Meat products
    - Milk products
    - Meat
  - Internal morphology is also called: (SGD-I-19-A)
    - Physiology
    - Anatomy
    - Histology
    - Palaentology
- #### III. From Entry Test:
- The branch of biology that deals with cell functions is called: (Entrance self-Test-2011)
    - Histology
    - Physiology
    - Molecular Biology
    - Microbiology
  - Statement made by a scientist that may or may not be true is: (Entrance self-Test-2011)
    - Theory
    - Hypothesis
    - Scientific law
    - Statement
  - The method by which pests are destroyed by using some living organisms is called: (Entrance self-Test-2011, 12)
    - Bio-pesticide
    - Integrated Disease Management
    - Biological control
    - Pasteurization
  - The plants having foreign DNA incorporated into their cells are called: (Entrance Test-2013, 14)
    - Clonal plants
    - Transgenic plants
    - Biotech plants
    - Tissue cultured plants
  - Pasteurization technique is widely used for preservation of: (Entrance Test-2013)
    - Water
    - Heat
    - Milk products
    - Vaccines
  - Production of genetically identical copies of organisms by asexual reproduction is called: (Entrance Test-2013)
    - Genetic engineering
    - Integrated disease management
    - Hydroponic culture technique
    - Cloning
  - The use of living organisms in industry for the production of useful products is known as: (Entrance Test-2014)
    - Parasitology
    - Biochemistry
    - Biotechnology
    - Molecular Biology

**SECTION II**  
**SHORT QUESTIONS**

2 SQs

**From Answers**

1. What do you mean by hypothesis? (RWP-15-A)

- Ans. Hypothesis :-
- Hypothesis is an elementary statement of observed facts.
  - It is a tentative explanation of observations.
  - It is formulated by scientists as per experience and background knowledge of the event.
- A hypothesis can be made by two ways. It can be result of deductive reasoning or it can be the consequences of inductive reasoning.
2. How does law differ from theory? (GRW-14,15-A)(MTN-1-17-A)

Ans. Law Different From Theory :-

Theory	Law
1. It is a series of hypotheses supported by results of many tests.	1. It is a theory which proved to be true under different circumstances.
2. It may suggest new and different hypotheses.	2. It is a virtually irrefutable theory.
3. It may change into law.	3. It is uniform and constant fact of nature which can not be changed.
4. It is more specific than law.	4. It is more general than theory.
5. It gives answers of simple questions.	5. It can afford answers to even more complex questions.

3. What is deduction?

- Ans. Deduction :-
- Deduction is a logical consequence of a statement (hypothesis) which is helpful to answer a question / problem.
  - A number of deductions can be made to explain the hypothesis.
  - It does not require any type of experimentation.
  - Deduction can be tested and verified by experiments.
5. Write a short note on cloning. (LHR-1-19-A)

Ans. Short Note On Cloning :-

- Cloning is the production of genetically identical copies of organisms cells by asexual reproduction.
- Cloning is the technology for achieving eugenic aims.
- A clone is defined as a cell or individual and all its asexually reproduced offspring. All members of a clone are genetically identical except when a mutation occurs.

- Cloning is done either by replacement of nucleus of zygote by another nucleus of the same organism or by separation of cells of embryo to form more embryos.
- In 1977 scientists in Scotland succeeded in cloning a sheep. Since then cloning of mice, cows, cattle, horses and other farm animals have been done.

**From Punjab Boards**

1. Define theory. Live important features of good theory. (LHR-1-14-A)

- Ans. A) Theory :-  
A theory is a set statement which is found to be true as a result of testing of many hypotheses.
- B) Important Features of a Good Theory :-
- It has explanatory power.
  - It is predictive.
  - It may suggest new and different hypotheses.
2. What is deductive reasoning? Give its one example. (LHR-11-15, 19-A)

- Ans. Deductive Reasoning with Example :-
- It is analyzing specific cases on the basis of general principles.
  - It moves from general to the specific.
  - It involves drawing conclusion from some general principle / assumptions.
- B) Example :-
- All birds have wings.
  - Sparrows are birds.
- From the above facts following hypothesis can be made through deductive reasoning:  
Sparrows have wings.

3. Define parasitology. (LHR-1-16-A) (SGD-19-A)

- Ans. Parasitology :-
- It is the branch of biology which deals with the study of parasites.
  - The structure, mode of transmission, life histories and host parasite relationships are studied.
4. Differentiate between deductive and inductive reasoning. (MTN-19-A) (LHR-1-16, 17-A) (SAH-14-A) (BWP-14, 19-A) (GRW-16-A) (FSD-14-A)

Ans.

Deductive Reasoning	Inductive Reasoning
1. It moves from general to specific.	1. It moves from specific to general.
2. It involves drawing specific conclusion from some general principle/assumption.	2. It begins with specific observation and leads to the formation of general principle.
<b>Example:-</b> If "all birds have wings" and "sparrows are birds", then we conclude that "sparrows have wings".	<b>Example:</b> If "sparrows have wings and are birds" and "eagle, parrot, hawk and crow are birds", then we conclude that "all birds have wings".

5. Define hydroponic culture technique. Give its importance. (GRW-14, 17-A) (MTN-11-17-A) (RWP-1-17-A) (SGD-18-A)

- Ans. A) Hydroponic Culture Technique :-  
It is the technique in which plants are grown in aerated water to which nutrient mineral salts are added.
- B) Importance of Hydroponic Culture Technique :-
- It is used to test whether certain nutrient is essential for plants or not.
  - Astronauts used it for growing vegetables.
6. Differentiate b/w freshwater and marine biology. (MTN-16-A)

Ans.

Fresh Water Biology	Marine Biology
It deals with physical and chemical characteristics of freshwater bodies (i.e. salt free water) and life dwelling in these fresh water bodies.	It deals with the physical and chemical characteristics of sea and oceans (i.e. marine water) and life inhabiting the "sea" and ocean.

7. What is scientific law? (SAH-15-A) (MTN-16-A)

- Ans. Scientific Law :-  
Scientific Law is virtually an irrefutable theory that is proved to be true under all tested circumstances. It is a uniform or constant fact of nature.
- Examples :-  
Mendel's Law of Inheritance, Hardy Weinberg Law
8. Define the term fresh water biology and biotechnology. (MTN-1-17-A)

Ans. A) Fresh Water Biology :-  
It is a branch of biology which deals with the organisms living in freshwater bodies (river, lakes etc.) and physical and chemical parameters of these water bodies.

B) Biotechnology :-  
It deals with the use of living organisms, systems or processes in manufacturing and service industries.

9. Define biotechnology and microbiology. (MTN-1-18-A)

- Ans. A) Biotechnology :-  
So It deals with the use of living organisms, systems or processes in manufacturing and service industries.
- B) Microbiology :-  
It deals with the study of microorganisms. (e.g. Bacteria, Viruses, Protozoa, Microscopic Algae and Fungi).

10. Differentiate b/w hypothesis and theory. (MTN-18-A)

Ans.

Hypothesis	Theory
1. It is the statement given as per experience and background knowledge of the event.	1. It is a statement that is supported by the results of many tests.
2. It is tentative explanation of observations.	2. It is the hypothesis that is tested again and again without being falsified.

11. What are bio-pesticides? Give one example. (DGK-1-17-A) (MTN-1-18-A)

- Ans. Bio-Pesticides with One Example :-  
Bio-pesticides are the living organisms which are used to kill the pests.
- Example :-  
Some bacteria act as bio-pesticides.
12. What is biological control? Give its example. (BWP-18-A)

- Ans. A) Biological Control :-
- Control of organisms by some other living organisms is called biological control.
  - Organisms used as biological control, compete with them or even eat up them.

B) Example :-  
An aphid that attacks a walnut tree, is being controlled biologically by a wasp that parasitizes this aphid.

13. Define integrated disease management. (RWP-18-A) (SAH-17, 19-A) (DGK-1-15-A) (FSD-18-A) (BWP-17-A)

Ans. Integrated Disease Management :-

- It is defined as the control of various diseases by utilizing all the relevant methods with the education and participation of community.
- It is used to control a particular disastrous disease or all the common diseases of a plant or control of dangerous diseases from human society.
- In this programme all methods, as and when required, are utilized.
- It requires awareness of the community about the severity of the problem, its causes and its remedies.

14. Define physiology. (RWP-14-A)

Ans. Physiology :-  
It is the branch of biology which deals with the study of functions of parts of organisms.

15. What are pesticides? What are effects of using pesticides chemically. (SDG-18-A)

- Ans. A) Pesticides :-  
Pesticides are the chemicals that are used to kill pests.
- B) The Effects of Using Pesticide Chemicals :-
- Use of pesticides poses toxicity problems for human being.
  - They cause environmental pollution.
  - Insects become resistant due to the effect of pesticides.

16. What is pasteurization? Give its significance. (SGD-16-A)

Ans. A) Pasteurization :-  
Pasteurization is a heating process that destroys bacteria in a fluid and lowers the overall number of bacteria in the fluid.

B) Significance of Pasteurization :-  
It is being widely used for preservation of milk and milk products.

17. Give significance of study of fossils? (DGK-1-14-A)

Ans. Significance of Study of Fossils :-  
Study of fossils allows biologists to place organisms in a time sequence.

**SECTION III  
LONG QUESTIONS**

1. Explain any three steps in biological method. (4)  
(LHR-I-2015-A)
2. Discuss Biology in the service of mankind in field of disease control. (LHR-I-2017-A) (4)
3. Explain the biological method for solving a biological problem. (RWP-I-17, 19-A) (MTN-II-18-A) (4)  
(DGK-II-14-A) (GRW-2017-A)
4. How study of biology helped Mankind to improve production of food. (RWP-2014-A) (FSD-14-A) (4)  
(SGD-15-A) (BWP-2014 19-A) (MTN-14-A)
5. What is Hypothesis? Discuss briefly the deductive and inductive reasonings. (RWP-II-2017-A) (4)  
(DGK-II-2019-A)
6. Write a note on Biological Method of Learning. (4)  
(MTN-II-2017-A, 19-A)
7. State and explain the process of Cloning. (4)  
(BWP-2018-A) (LHR-II-14, 16-A) (GRW-14, 15-A)  
(FSD-15-A) (SAH-17-A)
8. Differentiate between deductive and inductive reasonings with examples. (4)  
(D.G.K-I-2015, 19-A)
9. Discuss the role of biology in the welfare of mankind. (4)  
(D.G.K-I-2017-A)
10. Define hypothesis and discuss different ways for formulation of hypothesis. (D.G.K-II-2017-A)
11. What is cloning? Explain its mechanism and write its importance? (D.G.K-I-2018-A) (BWP-15-A) (4)
12. Define cloning Describe different mechanisms of cloning. (SAH-2014-A) (4)

**SECTION I  
MULTIPLE CHOICE  
QUESTIONS**

**Chapter — 2  
BIOLOGICAL MOLECULES**

**MCQ**

**(I) From Exercise:-**

- 1) Animals obtain carbohydrates mainly from: (MTN-2008-A) (LHR-2007-A) (GRW-2010-A)
  - a) Glucose
  - b) Starch
  - c) Sucrose
  - d) Glycogen
- 2) Peptide is a: (MTN-2007-A, 2010-S) (BWP-16, 17-A)
  - a) C-N link
  - b) C-O link
  - c) N-H link
  - d) C-H link
- 3) Globular proteins differ from fibrous proteins in:
  - a) Having amino acids
  - b) Their repeating units joined by peptide bond
  - c) Being soluble in aqueous medium
  - d) Being non-crystalline
- 4) Which of the following kinds of atoms do not occur in the carbohydrates?
  - a) Carbon
  - b) Hydrogen
  - c) Nitrogen
  - d) Oxygen

**(II) From Punjab Boards:-**

- 1) In bacterial cells the water percentage is: (LHR-I-2016-A) (BWP-14-A)
  - a) 70 %
  - b) 40 %
  - c) 60 %
  - d) 50 %
- 2) Hydrogen bonds between adenine and thymine are: (LHR-II-2018-A)
  - a) Three
  - b) Four
  - c) Five
  - d) Two
- 3) The specific heat of vaporization of water is: (GRW-2014-A) (RWP-19-A)
  - a) 457 k cal/g
  - b) 574 k cal/kg
  - c) 547 k cal/g
  - d) 475 k cal/g
- 4) Human tissues have 85 % of water in cells of: (GRW-2015-A)
  - a) Brain
  - b) Bone
  - c) Blood
  - d) Liver
- 5) Keratin is an example of fibrous protein present in: (RWP-2018-A) (LHR-II-16-A) (GRW-17-A)
  - a) Blood
  - b) Muscles
  - c) Bones
  - d) Nails and hair
- 6) The most organic compounds in mammalian cell: (FSD-2015-A)
  - a) Water
  - b) Proteins
  - c) Carbohydrates
  - d) Lipids

*(Inorganic)*

*Bacteria (18%)*

- 7) For the synthesis of 10 gm of glucose, plants use solar energy of about: (FSD-2016-A) (BWP-I-19-A) (SAH-14-A) (SRGD-19-A)
  - a) 574 kcal/gm
  - b) 550 kcal/gm
  - c) 717.6 kcal/gm
  - d) 717.6 kcal
- 8) Haemoglobin is a: (MTN-2016-A)
  - a) Fibrous protein
  - b) Coiled protein
  - c) Globular protein
  - d) Double coiled protein
- 9) The percentage of water in human bone cells is: (BWP-2018-A)
  - a) 18 %
  - b) 19 %
  - c) 20 %
  - d) 25 %
- 10) Which type of bond is not formed in maintaining tertiary structure of proteins? (D.G.K-I-2014-A)
  - a) Ionic
  - b) Hydrogen
  - c) Disulfide
  - d) Hydrophobic Interactions
- 11) The potential source of chemical energy for cellular activities: (D.G.K-I-2015-A, 19-I-A)
  - a) C-H bond (Lipids)
  - b) C-N bond (Proteins)
  - c) C-O bond (Carbonyl)
  - d) C-C bond
- 12) Helical shape of a polypeptide is due to presence within molecule: (D.G.K-II-2015-A)
  - a) Covalent bond
  - b) Hydrogen bond
  - c) Disulphide bond
  - d) Peptide bond
- 13) The amino acids are mainly different from each other due the type and nature of: (D.G.K-II-2016-A)
  - a) R-group
  - b) Amino group
  - c) Carboxyl group
  - d) Peptide bond
- 14) Which of the following is not a fibrous protein? (D.G.K-I-2018-A)
  - a) Keratin
  - b) Myosin
  - c) Fibrin
  - d) Hormones
- 15) The percentage by weight of RNA in a bacterial cell is: (D.G.K-II-2018-A)
  - a) 0.25 %
  - b) 2 %
  - c) 3 %
  - d) 6 %
- 16) Which one of the following is not a Lipid? (SAH-2016-A)
  - a) Rubber
  - b) Chitin (Protein)
  - c) Cutin
  - d) Cholesterol
- 17) Total number of amino acid in insulin are: (LHR-II-19-A)
  - a) 151
  - b) 51
  - c) 141
  - d) 50
- 18) Our blood normally contains glucose: (MTN-I-19-A)
  - a) 0.6%
  - b) 0.8%
  - c) 0.06%
  - d) 0.08%
- 19) The substance which inhibits blood clotting: (LHR-I-19-A)
  - a) Heparin
  - b) Histamine
  - c) Fibrin
  - d) Albumin

**(III) From Entry Tests:-**

- 1) Which bond is the potential source of chemical energy for cellular activities? (Entry Test 2009)
  - a) C-N
  - b) C-H
  - c) C-O
  - d) O-H
- 2) Name the tissues that contain about 20% of water: (Entry Test 2009)
  - a) Nerve cells
  - b) Bone cells
  - c) Brain cells
  - d) None of these
- 3) Name the human tissues that contain about 85 % water: (Entry Test 2009)
  - a) Nerve cells
  - b) Bone cells
  - c) Brain cells
  - d) None of these
- 4) Of the following terms, the one that includes all others is: (NSTC-8-Sample paper 2010-2012)
  - a) Oxidation
  - b) Respiration
  - c) Metabolism
  - d) Pollination
- 5) The basic element of all organic compounds is: (Entrance Self-Test-2011)
  - a) Oxygen
  - b) Nitrogen
  - c) Hydrogen
  - d) Carbon
- 6) The number of types of amino acids that are found to occur in cells are: (Entrance Self-Test-2011) (Entry Test - 2017)
  - a) 20
  - b) 25
  - c) 100
  - d) 170
- 7) Carbohydrates are organic molecules and contain three elements: (Entry Test-2012)
  - a) Carbon, water and oxygen
  - b) Carbon, sulphur and hydrogen
  - c) Carbon, calcium and hydrogen
  - d) Carbon, hydrogen and oxygen
- 8) Which of the following is a peptide bond? (Amino acid) (Entry Test-2012)
  - a) -C-N
  - b) -C-O
  - c) -C-P
  - d) -C-S
- 9) Amino acid in which the R-group is hydrogen is: (Entrance Test-2013)
  - a) Glycine
  - b) Alanine
  - c) Leucine
  - d) Valine
- 10) Which of the following is purine? (Entrance Test-2013)
  - a) Guanine
  - b) Cytosine
  - c) Thymine
  - d) Uracil
- 11) Myosin is a \_\_\_\_\_ type of protein. (Entrance Test-2015)
  - a) Intermediate
  - b) Simple
  - c) Globular
  - d) Fibrous
- 12) The compounds which on hydrolysis yield polyhydroxy aldehyde or ketone subunits are: (Entrance Test-2016)
  - a) Lipids
  - b) Proteins
  - c) Polynucleotides
  - d) Carbohydrates
- 13) Secondary structure of protein is found in: (Entrance Test-2016)
  - a) Transin
  - b) Keratin
  - c) Insulin
  - d) Glucagon
- 14) Most proteins are made up of \_\_\_\_\_ type of amino acids. (Entry Test-2017)
  - a) 20
  - b) 25
  - c) 170
  - d) 200

*(Lipids)*

*(OHC)*

*A G*

*Fibrous protein*

## SECTION II SHORT QUESTIONS

1 SQ

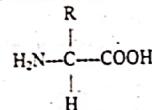
### From Exercise:

- Name the carbohydrates suitable as food for man. The carbohydrates suitable as food for man are:
  - Glucose
  - Fructose
  - Galactose
  - Sucrose
  - Lactose
  - Maltose
- Why are fats considered as high energy compounds? (GRW-14-A)

Ans. Fats Considered as High Energy Compounds:-  
Fats are considered as high energy compounds because of:

- Higher proportion of C-H bonds
  - Very low proportion of oxygen
4. What is the general formula for amino acids? (LHR-14-A) (DGK-II-16) (SAH-114-A) (MTN-19-A)

Ans. General Formula for Amino Acids:-



Where:

- NH<sub>2</sub> is an amino group  
COOH is a carboxyl group  
H is a hydrogen atom  
R is the radical group

5. What is the percentage of water in brain cells of man?

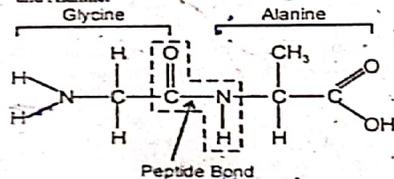
Ans. Percentage of Water in Brain Cells of Man:-  
The percentage of water in brain cells of man is 85.

### (I) From Punjab Boards:-

1. Show peptide bond between two amino acids. (LHR-I-2017-A) (BWP-15-A)

Ans. Diagram of Peptide Bond Between Two Amino Acids:-

Diagram showing a peptide bond formed in Glycyl-Alanine by the condensation reaction between Glycine and Alanine.



2. What is biochemistry? Give its importance. (GRW-2015-A) (RWP-14-A) (FSD-16-A)

Ans. A) Biochemistry:-  
Biochemistry is the branch of science which deals with the study of chemical compounds and chemical processes in living organisms.

### B) Importance of Biochemistry:-

- It explains the biochemical basis of life.
- It is essential for understanding anatomy and physiology because all the structures of organisms have biochemical organization and can be described in biochemical terms.

#### A) Micro molecules:-

Micro molecules are the molecules with low molecular weight

Examples:-

H<sub>2</sub>O, CO<sub>2</sub> etc.

#### B) Macromolecules:-

Macromolecules are the molecules with high molecular weight.

Examples:-

Starch, Protein, etc.

3. How glycosidic bond is different from peptide bond? (GRW-2016-A)

Ans. Glycosidic Bond Different From Peptide Bond:-

Glycosidic Bond	Peptide Bond
1. It is a covalent bond formed between two monosaccharide molecules.	1. It is a bond formed between two amino acid molecules.
2. It is a C—O—C link.	2. It is a C—N link.

4. Define protective role of water. (GRW-2017-A)

Ans. Protective Role of Water:-

- Water is effective lubricant that provides protection against damage resulting from friction. For example, tears protect the surface of eye from the rubbing of eye lids.
  - It also forms a fluid cushion around organs that helps them from trauma.
5. What are lipids? Give two roles of Waxes. (MTN-2014-A) (SAH-15-A)

Ans. A) Lipids:-

Lipids are a heterogeneous group of compounds related to fatty acids which are insoluble in water but soluble in organic solvents such as ether, alcohol, benzene etc.

6. Why do lipids store double energy than Carbohydrates? (MTN-2016-A)

Ans. Lipids store double the amount of energy as compared to the same amount of any Carbohydrate because they have higher proportion of C-H bonds and very low proportion of Oxygen.

7. What are Globular proteins? Give examples. (MTN-1-2017-A)

Ans. A) Globular Proteins:-

- They are spherical or ellipsoidal due to multiple folding of polypeptide chains.
- Tertiary structure is most important in them.
- They are soluble in aqueous media.
- They can be crystallized.
- They disorganize with changes in the physical and physiological environment.

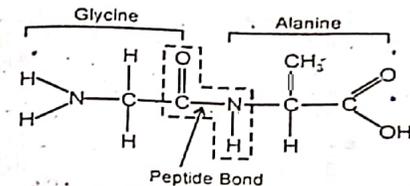
B) Examples:-

Enzymes, Antibodies, Hormones, Hemoglobin.

8. Draw a structural formula of Glycylalanine. (BWP-2014-A)

Ans. Structural Formula of Glycylalanine:-

Diagram of Peptide Bond Between Two Amino Acids:-  
Diagram showing a peptide bond formed in Glycyl-Alanine by the condensation-reaction between Glycine and Alanine.



9. Differentiate between Nucleoside and Nucleotide. (BWP-2016-A)

Ans.

Nucleoside	Nucleotide
1. It is a compound formed by condensation of a base and a pentose sugar.	1. It is a compound formed by condensation of a base, a pentose sugar and one to three phosphoric acid molecules.
2. Adenosine, Uridine and Cytidine are examples of nucleosides of RNA.	2. AMP, ADP, ATP are the examples of nucleotides of adenine of RNA.

10. Define Metabolism and name its two types of processes. (BWP-2017-A)

Ans. A) Metabolism:-

All the chemical reactions taking place within a cell are collectively called Metabolism.

B) Names of Two Types of Metabolism:-

- Anabolism
- Catabolism

11. Differentiate between Heat Capacity and Heat of Vaporization. (BWP-2018-A)

Ans.

Heat Capacity	Heat of Vaporization
1. The number of calories required to raise the temperature of one gram of water by 1 °C is called heat capacity of water.	1. The amount of heat energy required to change the one gram of a substance from liquid phase to the vapor phase is called heat of vaporization.
2. Specific heat capacity of water is 1.0	2. Specific heat of vaporization of water is 574 Kcal/kg.
3. Due to high heat capacity of water, it acts as temperature stabilizer for organisms in the environment and hence protects living material against sudden thermal changes.	3. It plays an important role in the regulation of heat produced by oxidation and provides cooling effect to plants and animals.

12. Why the lipids store double amount of energy than carbohydrates? (D.G.K-II-2014-A)

Ans. Lipids store double the amount of energy as compared to the same amount of any Carbohydrate

because they have higher proportion of C-H bonds and very low proportion of Oxygen.

13. What is heat capacity of water? (D.G.K-I, II-2018-A) (LHR-II-16-A) (MTN-II-18-A)

Ans. Heat Capacity Of Water:-

- The number of calories required to raise the temperature of one gram of water by 1 °C is called heat capacity of water.
- Specific heat capacity of water is 1.0
- Water has hydrogen bonds between its molecules. Hence it has great ability of absorbing heat with minimum of change in its own temperature because much of energy is used to break these hydrogen bonds.
- Due to high heat capacity of water, water acts as temperature stabilizer for organisms in the environment and hence protects living material against sudden thermal changes.

14. What is NAD?

(SHL-2016-A)

Ans. NAD:-

- NAD is a dinucleotide which is abbreviated for Nicotinamide Adenine Dinucleotide.
- It is an important coenzyme in several oxidation-reactions in the cell.

## SECTION III LONG QUESTIONS

1. Describe any four properties of water. (4)

(LHR-II-2015-A)

2. Give the importance of proteins. (4)

(LHR-II-2016-A)

3. Give the biological importance of water. (4)

(GRW-2015-A) (DGK-I-14, 17) (MTN-I-18)

4. Describe function of proteins. (4)

(RWP-I-17-A) (SGD-16-A)

5. Discuss the fibrous and globular proteins. (4)

(RWP-2016-A) (DGK-II-14-A)

6. Justify, that Carbon occupies the central position in the skeleton of life. (4)

(MTN-2016-A)

7. Describe Secondary and Tertiary Structure of Protein. (4)

(RWP-15-A) (SGD-19-A)

8. Classify Proteins according to their structure. (4)

(MTN-II-2017-A)

9. Explain importance of carbon in living organisms. (4)

(BWP-2014-A)

10. Write a note on primary structure of protein. (4)

(D.G.K-I-2014-A) (FSD-16-A)

11. Discuss water as medium of life. Also give its importance. (4)

(SAH-2015-A)

12. Discuss fibrous and globular proteins. (4)

(SAH-2016-A)

13. Discuss primary and secondary structure of proteins. (4)

(SAH-2017-A) (DGK-II-18-A)

(SGD-15, 18-A) (LHR-I-18-A)

## SECTION I MULTIPLE CHOICE QUESTIONS

### Chapter — 3 ENZYMES

#### MCQ

#### I) From Exercises:

- 3) The rate of an enzyme-catalyzed reaction:
- Is constant under all conditions.
  - Decreases as substrate concentration increases.
  - Can not be measured.
  - Can be reduced by inhibitors.
- 4) The active site of an enzyme: (MTN-2008)
- Never changes
  - Forms no chemical bond with substrate
  - Determines, by its structure, the specificity of the enzyme.
  - Looks like a lump projecting from the surface of an enzyme.
- 5) Which statement about enzyme is not true?
- They consist of proteins, with or without a non-protein part.
  - They change the rate of catalyzed reaction.
  - They are sensitive to heat.
  - They are non-specific in their action.

#### II) From Punjab Boards:-

- 1) According to Lock and Key Model, the active site is: (LHR-II-2015-A) (SGD-16-A)
- Soft structure
  - Flexible structure
  - Attractive structure
  - Rigid structure
- 2) Induce fit model was proposed by: (LHR-I-15, 17-A) (MTN-II-18-A) (DGK-II-16-A)
- Jenner
  - Pasteur
  - Koshland
  - Emil Fischer
- 3) An enzyme reacts only with its specific: (LHR-II-2018-A)
- Surface
  - Product
  - Substrate
  - Inhibitor
- 4) The detachable co-factor of an enzyme is known as: (GRW-2014-A) (RWP-18-A)
- Activator
  - Prosthetic group
  - Coenzyme
  - Apoenzyme
- 5) If non-protein part is loosely attached to protein, it is known as: (GRW-2015-A) (DGK-II-14-A)
- Cofactor
  - Coenzyme
  - Holoenzyme
  - Active site

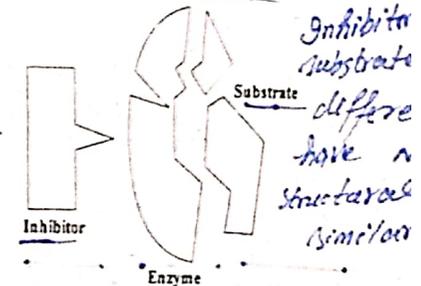
- 6) Enzyme lowers down the energy of: (GRW-2016-A)
- Kinetic
  - Potential
  - Activation
  - Ionic
- 7) The competitive inhibitor of succinic acid is: (GRW-2017-A)
- Fumaric acid
  - Malonic acid
  - Citric acid
  - Acetic acid
- 8) Poisons like cyanides, antibiotics and some drugs are examples of: (LHR-I-19-A) (GRW-2018-A) (FSD-16-A)
- Enzymes
  - Co-enzymes
  - Inhibitors
  - Cofactors
- 9) Lock and key model was proposed by: (RWP-2015-A) (FSD-14-A) (MTN-I-19-A)
- Koshland
  - Emil Fischer
  - Flemming
  - Watson
- 10) In an enzyme molecule, if non-protein part is covalently bonded, it is called: (RWP-2016-A) (SGD-15-A)
- Co-enzyme
  - Apo-enzyme
  - Holo-enzyme
  - Prosthetic group
- 11) Coenzyme is closely related to: (FSD-2014-A) (MTN-16-A)
- Vitamins
  - Mineral
  - Water
  - Lipid
- 12) Three dimensional globular protein is: (FSD-2015-A)
- Starch
  - Glucose
  - Antibiotic
  - Enzyme
- 13) Enzymes involved in respiration are found in: (MTN-2014-A)
- Chloroplasts
  - Ribosomes
  - Mitochondria
  - Nucleus
- 14) The inhibitor which may destroy the Globular structure of Enzyme is: (MTN-II-2017-A)
- Competitive
  - Non-competitive
  - Reversible
  - Irreversible
- 15) An activated enzyme consisting of polypeptide chain and co-factor is known as: (D.G.K-I-2014-A) (MTN-I-18-A)
- Apoenzyme
  - Holoenzyme
  - Co-enzyme
  - prosthetic group
- 16) An enzyme with its co-enzyme or prosthetic group removed is designated as: (D.G.K-II-2018-A)
- Holoenzyme
  - Apoenzyme
  - Co-enzyme
  - Activator
- 17) The vitamins are essential raw material for the synthesis of: (SAH-2015-A)
- Activators
  - Co-factors
  - Co-enzymes
  - Prosthetic group
- 18) The enzymes which are involved in protein synthesis are internal part of: (SGD-19-A)
- Chromosomes
  - Peronosomes
  - Lysosomes
  - Ribosomes

#### III) From Entry Tests:

- 1) Biochemically enzymes are: (Entrance Self-Test-2011)
- Carbohydrates
  - Fatty acids
  - Hormones
  - Proteins
- 2) The presence of enzymes: (Entrance Self-Test-2011)
- Slows down the rate of reaction
  - Increases the rate of reaction
  - Does not show any change
  - Completely stops the reaction
- 3) Lock and Key Model of enzyme reacting with substrate was originally proposed by: (Entrance Self-Test-2011)
- Emil Fisher
  - Koshland
  - Robert Hook
  - Robert Brown
- 4) The type of inhibition in which inhibitor has no structural similarity to substrate and combines with enzyme at other than the active site is called: (Entry Test-2012)
- Irreversible inhibition
  - Competitive inhibition
  - Non-competitive and reversible inhibition
  - Reversible inhibition
- 5) The inhibitors that bind tightly and permanently to enzymes and destroy their globular structure stopping their catalytic activity are: (Entry Test 2012)
- Reversible inhibitors
  - Irreversible inhibitors
  - Competitive inhibitors
  - Non-competitive inhibitors
- 6) Enzyme succinate dehydrogenase converts succinate into: (Entry Test-2012)
- Malate
  - Malonic acid
  - Citrate
  - Fumarate
- 7) If detachable co-factor is an inorganic ion then it is designated as: (Entry Test-2012)
- Coenzyme
  - Prosthetic group
  - Holoenzyme
  - Activator
- 8) If the co-factor is covalently or tightly and permanently bonded to enzyme then it will be called: (Entrance Test-2013, 2014)
- Coenzyme
  - Prosthetic group
  - Activator
  - Apoenzyme
- 9) All coenzymes are derived from: (Entrance Test-2013, 14)
- Proteins
  - Nucleic acids
  - Carbohydrate
  - Vitamins
- 10) The view that active site of an enzyme is flexible and when a substrate combines with it, cause changes in enzyme structure is known as: (Entrance Test-2013, 16)
- Lock and key model
  - Induce fit model
  - Sliding filament model
  - Specificity model

- 11) The competitive inhibitors have structural similarity with: (Entrance Test-2014)
- Active site
  - Binding site
  - Substrate
  - Co-enzyme
- 12) Which one of the following is an example of competitive inhibitor? (Entrance Test-2015)
- Glucose
  - Fumarate
  - Succinic acid
  - Melionate
- 13) Some enzymes require helper which is non-protein part for its efficient functioning that is called: (Entrance Test-2015)
- Accelerator
  - Cofactor
  - Prosthetic group
  - Apoenzyme
- 14) An enzyme required  $Mg^{2+}$  to catalyze the substrate. The  $Mg^{2+}$  is best identified as: (Entrance Test-2016)
- Prosthetic group
  - Activator
  - Co-enzyme
  - Inhibitor

- 15) This figure represents inhibitor.



- 16) All enzymes are: (Entry Test-2017)
- Fibrous proteins
  - Low molecular weight proteins
  - Lipoproteins
  - Globular proteins
- 17) The reactants on which enzyme works are: (Entry Test-2017)
- Products
  - Metabolites
  - Substrates
  - Catbolites
- 18) W.O.F comprises of inorganic ions: (Entry Test-2017)
- Coenzymes
  - Activators
  - Prosthetic group
  - Apoenzyme

## SECTION-II

### SHORT QUESTIONS

3 SQs

**From Experiments**

3. What is a prosthetic group? (LHR-I-16-A)

Ans. Prosthetic Group: -

- It is a cofactor (an essential non-protein part of some enzymes).
- It is covalently bonded with the enzyme on permanent basis.

4. Define inhibitors of enzyme. (RWP-14, 15-A)

(DGK-I-17) (LHR-I-15-A, I-16, II-15) (GRW-15)

(SGD-18-A)

Ans. Inhibitors of Enzyme: -

- Substances which decrease the activity of enzyme are called Inhibitors.
- Inhibitors are molecules that attach themselves to enzymes in place of substrates.
- They form enzyme inhibitor-complexes and decrease the enzymes ability to form enzyme-substrate complexes and are not transformed into products.
- They inhibit the enzyme activity permanently or temporarily either by forming enzyme-inhibitor complexes at active sites (thus blocking them) or forming enzyme inhibitor complex other than active sites.

Examples: -

Poisons like cyanide, Antibiotics, Antibodies, Antimetabolites, Malonic acid and Some Drugs.

5. How does an enzyme accelerate a metabolic reaction? (GRW-14-A)

Ans. Acceleration of a Metabolic Reaction by Enzyme: -

Enzyme lowers the amount of activation energy needed. The reduction in activation energy, by the enzyme, accelerates a metabolic reaction.

**II) From Punjab Boards:**

1. Define active site of an enzyme. (LHR-I-14-A)

(RWP-15-A) (SGD-16-A) (DGK-II-19-A) (MTN-19-A)

Ans. Active Site of an Enzyme: -

- Active site is a small part of enzyme which takes part in a chemical reaction and binds to a substance called substrate.
- It is a three dimensional cavity made up of many amino acids, the shape of which matches with the structure of particular substrate molecule.
- It has a specific charge which is also complementary to its substrate.

d. It undergoes a slight change in shape when substrate combines to it.

e. It is made up of two definite regions i.e. binding site and catalytic site.

f. The binding site recognizes the proper enzyme and allows it to bind with it forming ES complex.

g. The catalytic site activated by the ES complex catalyzes the transformation of substrate into product (s).

2. What do you know about lock and key model.

(GRW-17-A) (LHR-I-14-A, II-15-A, I-19)

(SGD-16, 19-A) (BWP-17, 19-A) (DGK-II-14-A)

(MTN-15-A, II-17)

Ans. Lock And Key Model: -

It states that:

a. One specific enzyme can transform only one substrate into product (s) just as one specific key can open only a specific lock.

b. Active site is a rigid and acts as a template only. There is no modification or flexibility in the active site before, during or after the enzyme action.

3. Differentiate between irreversible and reversible inhibitors. (SGD-15-A) (LHR-I-14-A) (GRW-16-A)

(BWP-14, 17-A)

Ans.

Irreversible Inhibitors	Reversible Inhibitors
1. They usually destroy the enzymes.	1. They do not damage the enzymes.
2. They physically block the active sites of the enzymes or form covalent bonds with the active site.	2. They form weak chemical bonds with the enzyme.
3. Activity of the enzymes is stopped permanently.	3. Activity of the enzyme is restored when the inhibitor is removed.
Example: - Pesticides, Poisons like Cyanide etc.	Example: - Malonic acid

4. Differentiate between apoenzyme and holoenzyme.

(MTN-II-18-A) (LHR-I-15-A, II-15, 16-A)

(GRW-14, 15-A) (DGK-I-17) (BWP-15, 18-A)

(SGD-18-A) (MTN-I-15, 18-A)

Ans.

Apoenzyme	Holoenzyme
1. It is an inactive enzyme.	1. It is an active enzyme.
2. It is an enzyme with its co-enzyme or prosthetic group removed.	2. It has two parts, the protein part consisting of polypeptide chain called apoenzyme and a non-protein part which is either coenzyme or prosthetic group.

5. What is cofactor? (LHR-II-14, 16-A) (FSD-17-A) (DGK-I-14-A) (SAH-17-A) (DGK-II-19)

Ans. Cofactor: -

a. Cofactors are non-protein part of some enzymes which are essential for the proper functioning of the enzymes.

b. They usually act as bridge between enzymes and their substrates.

c. Cofactors often contribute directly to the chemical reactions and bring about catalysis.

d. Sometimes co-factors provide a source of chemical energy, helping to derive reactions which would otherwise be difficult or impossible.

e. Cofactors may be essential ions or complex organic molecules.

6. What is Irreversible inhibitor? (LHR-II-14-A)

Ans. Irreversible Inhibitor: -

a. Irreversible inhibitors are the inhibitors which inhibit the enzyme activity permanently.

b. They check the reaction rate of enzymes by one of the following way:

i) By destroying its globular structure

ii) By in-activating the enzyme permanently by:

a. Occupying the active site by forming covalent bond with it, or

b. Physically blocking the active site permanently

7. What is Induce Fit Model of enzyme?

(LHR-I-15, 16-A) (MTN-16-A) (DGK-II-4-A, II-16-A)

(BWP-15-A) (FSD-16, 17-A)

Ans. Induce Fit Model of Enzyme: -

It states that:

a. When a substrate combines with enzyme, the active site of the enzyme undergoes a slight change in shape.

b. This change in the shape of active site enables the enzyme to perform its catalytic activity more effectively.

c. After the reaction has been completed and product (s) is released, the active site returns to its original state.

8. Give difference between prosthetic group and activator.

(LHR-II-15-A)

Ans. Differences between Prosthetic Group and Activator: -

Prosthetic Group	Activator
1. It is covalently bonded co-factor.	1. It is detachable cofactor.
2. It is organic non-proteinaceous group.	2. It is an inorganic ion.

9. Define apoenzyme and prosthetic group.

(LHR-I-17-A) (GRW-15-A)

Ans. A) Apoenzyme: - *only protein part is present*

An Apoenzyme is an inactive core enzyme (protein part) with its coenzyme or prosthetic group (i.e. cofactor) removed.

B) Prosthetic Group: -

A co-factor which is covalently or tightly bound to the enzyme on the permanent basis is called Prosthetic group.

10. Differentiate between competitive and non-competitive inhibitors. (LHR-I-17-A, II-18-A)

(DGK-II-16, 19-A) (BWP-15, 18, 19-A) (GRW-14-A)

(SAH-17-A) (MTN-14-A, I-17) (FSD-15-A)

Ans.

Competitive Inhibitors	Non-Competitive Inhibitors
1. It is similar to substrate.	1. It is <u>not</u> similar to substrate.
2. It forms enzyme inhibitor complex at active site.	2. It forms enzyme inhibitor complex at a point other than active site.
3. It does not change the shape of the enzyme.	3. It changes the shape of the enzyme.

11. Differentiate between pepsin and pepsinogen.

(LHR-I-17-A) (RWP-19-A) (GRW-16-A) (MTN-I-18-A)

Ans. Comparison of Pepsin And Pepsinogen: -

Pepsin	Pepsinogen
1. It is a powerful protein digesting enzyme and is quite capable of destroying cell's internal structure.	1. It is inactive form of pepsin.
2. It is produced in an inactive form by the cells of stomach and is converted in its active form only in the digestive tract when it is exposed to HCl of gastric juice.	2. It is produced by the cells of stomach.

12. Differentiate between prosthetic group and coenzyme.

(LHR-II-19-A) (DGK-I-19-A) (FSD-14-A)

(GRW-15, 17-A) (SGD-15, 19-A) (SAH-14-A)

Ans.

Prosthetic Group	Coenzyme
1. It is a cofactor which forms covalent bond with the enzyme and hence is tightly attached.	1. This cofactor is loosely attached with the enzyme forming no covalent bond with it.
2. It is <u>not</u> closely related to vitamins.	2. It is closely related to vitamins and has vitamin as its part.

13. What is Holoenzyme? (MTN-16-A)

Ans. Holoenzyme: -

a. Holoenzyme is an active enzyme.

b. It consists of two parts:

i. Protein part called core enzyme or apoenzyme which consists of polypeptide chain.

ii. A non-protein part which is either a coenzyme or a prosthetic group.

**SECTION-II**  
**SHORT QUESTIONS**

3 SQs

**From Exercises**

3. What is a prosthetic group? (LHR-I-16-A)

Ans. Prosthetic Group:-

- a. It is a cofactor (an essential non-protein part of some enzymes).
- b. It is covalently bonded with the enzyme on permanent basis.

4. Define inhibitors of enzyme. (RWP-14, 15-A)  
(DGK-I-17) (LHR-I-15-A, I-16, II-15) (GRW-15)  
(SGD-18-A)

Ans. Inhibitors of Enzyme:-

- a. Substances which decrease the activity of enzyme are called Inhibitors.
- b. Inhibitors are molecules that attach themselves to enzymes in place of substrates.
- c. They form enzyme inhibitor-complexes and decrease the enzymes ability to form enzyme-substrate complexes and are not transformed into products.
- d. They inhibit the enzyme activity permanently or temporarily either by forming enzyme-inhibitor complexes at active sites (thus blocking them) or forming enzyme inhibitor complex other than active sites.

Examples:-

Poisons like cyanide, Antibiotics, Antibodies, Antimetabolites, Malonic acid and Some Drugs.

5. How does an enzyme accelerate a metabolic reaction? (GRW-14-A)

Ans. Acceleration of a Metabolic Reaction by Enzyme:-

Enzyme lowers the amount of activation energy needed. The reduction in activation energy, by the enzyme, accelerates a metabolic reaction.

**II) From Punjab Boards:-**

1. Define active site of an enzyme. (LHR-I-14-A)  
(RWP-15-A) (SGD-16-A) (DGK-II-19-A) (MTN-19-A)

Ans. Active Site of an Enzyme:-

- a. Active site is a small part of enzyme which takes part in a chemical reaction and binds to a substance called substrate.
- b. It is a three dimensional cavity made up of many amino acids, the shape of which matches with the structure of particular substrate molecule.
- c. It has a specific charge which is also complementary to its substrate.

- d. It undergoes a slight change in shape when substrate combines to it.
  - e. It is made up of two definite regions i.e. binding site and catalytic site.
  - f. The binding site recognizes the proper enzyme and allows it to bind with it forming ES complex.
  - g. The catalytic site activated by the ES complex catalyzes the transformation of substrate into product (s).
2. What do you know about lock and key model. (GRW-17-A) (LHR-I-14-A, II-15-A, I-19)  
(SGD-16, 19-A) (BWP-17, 19-A) (DGK-II-14-A)  
(MTN-15-A, II-17)

Ans. Lock And Key Model:-

It states that:

- a. One specific enzyme can transform only one substrate into product (s) just as one specific key can open only a specific lock.
- b. Active site is a rigid and acts as a template only. There is no modification or flexibility in the active site before, during or after the enzyme action.

3. Differentiate between irreversible and reversible inhibitors. (SGD-15-A) (LHR-I-14-A) (GRW-16-A)  
(BWP-14, 17-A)

Ans.

Irreversible inhibitors	Reversible Inhibitors
1. They usually destroy the enzymes.	1. They do not damage the enzymes.
2. They physically block the active sites of the enzymes or form covalent bonds with the active site.	2. They form weak chemical bonds with the enzyme.
3. Activity of the enzymes is stopped permanently.	3. Activity of the enzyme is restored when the inhibitor is removed.
Example:- Pesticides, Poisons like Cyanide etc.	Example:- Malonic acid

4. Differentiate between apoenzyme and holoenzyme. (MTN-II-18-A) (LHR-I-15-A, II-15, 16-A)  
(GRW-14, 15-A) (DGK-I-17) (BWP-15, 18-A)  
(SGD-18-A) (MTN-I-15, 18-A)

Ans.

Apoenzyme	Holoenzyme
1. It is an inactive enzyme.	1. It is an active enzyme.
2. It is an enzyme with its co-enzyme or prosthetic group removed.	2. It has two parts, the protein part consisting of polypeptide chain called apoenzyme and a non-protein part which is either coenzyme or prosthetic group.

5. What is cofactor? (LHR-II-14, 16-A) (FSD-17-A)  
(DGK-I-14-A) (SAH-17-A) (DGK-II-19)

Ans. Cofactor:-

- a. Cofactors are non-protein part of some enzymes which are essential for the proper functioning of the enzymes. *Function*
- b. They usually act as bridge between enzymes and their substrates.
- c. Cofactors often contribute directly to the chemical reactions and bring about catalysis.
- d. Sometimes co-factors provide a source of chemical energy, helping to derive reactions which would otherwise be difficult or impossible.
- e. Cofactors may be essential ions or complex organic molecules.

6. What is Irreversible inhibitor? (LHR-II-14-A)

Ans. Irreversible Inhibitor:-

- a. Irreversible inhibitors are the inhibitors which inhibit the enzyme activity permanently.
- b. They check the reaction rate of enzymes by one of the following way:

- i) By destroying its globular structure
- ii) By in-activating the enzyme permanently by:
  - a. Occupying the active site by forming covalent bond with it, or
  - b. Physically blocking the active site permanently

7. What is Induce Fit Model of enzyme? (LHR-I-15, 16-A) (MTN-16-A) (DGK-II-4-A, II-16-A)  
(BWP-15-A) (FSD-16, 17-A)

Ans. Induce Fit Model of Enzyme:-

It states that:

- a. When a substrate combines with enzyme, the active site of the enzyme undergoes a slight change in shape.
- b. This change in the shape of active site enables the enzyme to perform its catalytic activity more effectively.
- c. After the reaction has been completed and product (s) is released, the active site returns to its original state.

8. Give difference between prosthetic group and activator. (LHR-II-15-A)

Ans. Differences between Prosthetic Group and Activator:-

Prosthetic Group	Activator
1. It is covalently bonded co-factor.	1. It is detachable cofactor.
2. It is organic non-proteinous group.	2. It is an inorganic ion.

9. Define apoenzyme and prosthetic group. (LHR-I-17-A) (GRW-15-A)

Ans. A) Apoenzyme:- *only protein part is present*  
An Apoenzyme is an inactive core enzyme (protein part) with its coenzyme or prosthetic group (i.e. cofactor) removed.

B) Prosthetic Group:-

A co-factor which is covalently or tightly bound to the enzyme on the permanent basis is called Prosthetic group.

10. Differentiate between competitive and non-competitive inhibitors. (LHR-I-17-A, II-18-A)  
(DGK-II-16, 19-A) (BWP-15, 18, 19-A) (GRW-14-A)  
(SAH-17-A) (MTN-14-A, I-17) (FSD-15-A)

Ans.

Competitive Inhibitors	Non-Competitive Inhibitors
1. It is similar to substrate.	1. It is not similar to substrate.
2. It forms enzyme inhibitor complex at active site.	2. It forms enzyme inhibitor complex at a point other than active site.
3. It does not change the shape of the enzyme.	3. It changes the shape of the enzyme.

11. Differentiate between pepsin and pepsinogen. (LHR-I-17-A) (RWP-19-A) (GRW-16-A) (MTN-I-18-A)

Ans. Comparison of Pepsin And Pepsinogen:-

Pepsin	Pepsinogen
1. It is a powerful protein digesting enzyme and is quite capable of destroying cell's internal structure.	1. It is inactive form of pepsin.
2. It is produced in an inactive form by the cells of stomach and is converted in its active form only in the digestive tract when it is exposed to HCl of gastric juice.	2. It is produced by the cells of stomach.

12. Differentiate between prosthetic group and coenzyme. (LHR-II-19-A) (DGK-I-19-A) (FSD-14-A)  
(GRW-15, 17-A) (SGD-15, 19-A) (SAH-14-A)

Ans.

Prosthetic Group	Coenzyme
1. It is a cofactor which forms covalent bond with the enzyme and hence is tightly attached.	1. This cofactor is loosely attached with the enzyme forming no covalent bond with it.
2. It is not closely related to vitamins.	2. It is closely related to vitamins and has vitamin as its part.

13. What is Holoenzyme? (MTN-16-A)

Ans. Holoenzyme:-

- a. Holoenzyme is an active enzyme.
- b. It consists of two parts:
  - i. Protein part called core enzyme or apoenzyme which consists of polypeptide chain.
  - ii. A non-protein part which is either a coenzyme or a prosthetic group.

14. Define competitive inhibitors. (GRW-18-A)  
(RWP-18-A) (MTN-16-A) (DGK-II-19-A)

Ans. Competitive Inhibitors:-

- Competitive inhibitors are reversible inhibitors structurally similar to substrate.
- They occupy binding sites of active sites.
- They are unable to activate the catalytic sites, hence no products are formed.
- They occupy the active sites only temporarily and do not permanently damage the enzyme.
- They occupy the active site for part of the time. If the concentration of the substrate is increased relative to the concentration of the inhibitor, the active site is usually occupied by the substrate reversing the competitive inhibition.

Example:-

Malonic acid.

15. Differentiate between binding site and catalytic site of an enzyme. (MTN-II-18-A) (DGK-I-19-A)

Ans.

Binding Site	Catalytic Site
It helps the enzyme in recognition and binding of proper substrate to produce an ES Complex, due to which catalytic site becomes activated.	It catalyzes the transformation of the substrate into product.

16. What are activators of enzyme.

(RWP-16-A) (FSD-15-A) (SGD-19-A)

Ans. A) Cofactor:-

Cofactor is a non-protein part which is essential for the proper functioning of some enzymes.

B) Activators of Enzymes:-

The detachable co-factor is known as an activator if it is an inorganic ion.

17. How irreversible inhibitor inhibit enzyme activity? (FSD-16-A)

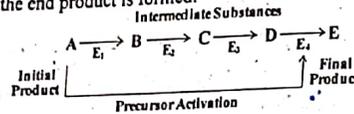
Ans. Irreversible Inhibitor:-

- Irreversible inhibitors are the inhibitors which inhibit the enzyme activity permanently.
  - They check the reaction rate of enzymes by one of the following way:
    - By destroying its globular structure
    - By in-activating the enzyme permanently by:
      - Occupying the active site by forming covalent bond with it, or
      - Physically blocking the active site permanently
- Give functions of binding and catalytic site of enzyme. (FSD-18)
- s. A) Function Of Binding Site:-  
It helps the enzyme in recognition and binding of proper substrate to produce an ES Complex, due to which catalytic site becomes activated.

B) Function of Catalytic Site:-  
Activated Catalytic Site catalyzes the transformation of the substrate into product.

19. How enzyme catalyse series of chemical reactions? (SGD-17-A)

Ans. In some cases, enzymes catalyse in series or chains. These enzymes are present in a specific order. Each enzyme controls a specific reaction. One enzyme hands over the substrate to another enzyme, forming an enzyme to enzyme chain. The product formed by one enzyme is transferred to the next Enzyme. Finally the end product is formed.



Where E = Enzyme

Enzyme to enzyme chain is found in respiration and photosynthesis.

20. What Koshland proposed in 1959. (SGD-15-A)

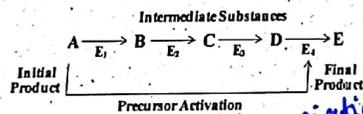
Ans. What Koshland Proposed:-

Koshland proposed in 1959 Induce Fit Model of Enzyme Action.

21. What is enzyme to enzyme chain? (SAH-15-A) (LHR-I-19-A)

Ans. Enzyme to Enzyme Chain:-

In some cases, enzymes act in series or chains. These enzymes are present in a specific order. Each enzyme controls a specific reaction. One enzyme hands over the substrate to another enzyme, forming an enzyme to enzyme chain. The product formed by one enzyme is transferred to the next Enzyme. Finally the end product is formed.



Where E = Enzyme

Enzyme to enzyme chain is found in respiration and photosynthesis.

### SECTION III

### LONG QUESTIONS

No Essay Type Question According to New Pattern

## SECTION I MULTIPLE CHOICE QUESTIONS

### Chapter 4

### THE CELL

#### MCQ

(I) From Exercise:-

- Which statement about the nuclear envelope is not true?
  - It has pores. (True)
  - It is a double membrane structure. (True)
  - Its inner membrane bears ribosome.
  - RNA and some proteins pass through it. (True)
- Which statement about plastids is true? (MTN-2008-A)
  - They are surrounded by a single membrane.
  - They are the power house of cell.
  - They are found in all organisms.
  - They contain DNA and ribosomes.
- Which type of cell would probably be most appropriate to study lysosomes?
  - Phycoctytic white blood cell
  - Nerve cell
  - Mesophyll cell of leaf.
  - Muscle cell
- Which of the following pairs of structure-functions mismatched?
  - Ribosome: protein synthesis
  - Nucleolus: ribosome production.
  - Golgi complex: muscle contraction
  - Lysosome: intracellular digestion
- Which of the following statements about ribosome is correct?
  - They are structurally different from free ribosome.
  - They are enclosed in their own membrane. (with outer membrane)
  - They are concentrated in the cisternal space of rough endoplasmic reticulum.
  - They are attached to cisternal surface.

(II) From Punjab Boards:-

- De Duve discovered the cell organelle: (LHR-II 2014-A)
  - Mitochondria
  - Lysosomes
  - Ribosomes
  - Chloroplast
- A group of ribosomes attached to mRNA are known as: (GRW-18-A) (SGD-18-A) (FSD-15-A) (LHR-II-2015-A)
  - Lysosomes
  - Polysomes
  - Glyoxisomes
  - Peroxisomes

- The plasma membrane and everything present within it is called: (LHR-II-2016-A)
  - Chloroplast
  - Protoplast
  - Cytoplasm
  - Protoplasm
- Cell wall is secreted by: (GRW-2015-A)
  - Protoplasm
  - Nucleoplasm
  - Golgi complex
  - Ribosome
- Ribosomal RNA (rRNA) is synthesized and stored in: (GRW-2016-A) (SGD-17-A) (LHR-19-A)
  - Nucleolus
  - Mitochondria
  - Nucleus
  - Chloroplast
- The attachment of two sub units of ribosomes is controlled by: (GRW-2017-A)
  - Ca<sup>2+</sup>
  - Mg<sup>2+</sup>
  - K<sup>+</sup>
  - Fe<sup>2+</sup>
- Tay-Sach's disease results due to accumulation in brain cells of: (RWP-2014-A, 18-A) (FSD-18-A) (SAH-14-A)
  - Mg<sup>2+</sup> ions
  - Glucose
  - Proteins
  - Lipids
- Cristae are found in: (RWP-2015-A)
  - Golgi complex
  - Chloroplast
  - Endoplasmic reticulum
  - Mitochondria
- When cross-section of centriole is observed, it shows as it consists of: (RWP-2016-A)
  - 9-microtubules
  - 3-microtubules
  - 11-microtubules
  - 6-microtubules
- Haem portion of Haemoglobin contains an atom of: (RWP-II-2017-A)
  - Magnesium
  - Iron
  - Phosphorous
  - Copper
- The size of prokaryotic ribosomes is: (SGD-2015-A)
  - 30S
  - 50S
  - 70S
  - 80S
- Erythrocytes have Pores Per Nucleus: (mature) (RBC) (Differentiated) (SGD-2016-A)
  - 3000
  - 30000
  - 6 or 8
  - 3 or 4
- Which is found in primary wall? (FSD-2014-A)
  - Silica
  - Pectin
  - Lignin
  - Cutin
- Infoldings of inner membrane of mitochondria are: (FSD-2017-A) (BWP-14-A)
  - Granum
  - Thylakoids
  - Cisternae
  - Cristae
- Organelle — is concerned with cell secretion. (MTN-2014-A)
  - Ribosomes
  - Mitochondria
  - Centriole
  - Golgi complex

- 16) Stroma is a fluid in the chloroplast: (MTN-2015-A)  
 a) Thylakoids b) Matrix  
 c) Granum d) Intergranum
- 17) The protein present in Microtubules is: (MTN-II-2017-A) (BWP-18-A)  
 a) Actin b) Myosin  
 c) Tubulin d) Tropomyosin
- 18) Golgi apparatus is concerned with cell. (MTN-II-2018-A) (DGK-II-16-A) (SAH-15-A)  
 a) Division b) Lysis  
 c) Secretions d) Storage
- 19) Cell Walls of Prokaryotic Organisms lack cellulose, instead of cellulose its strengthening material is: (BWP-2014-A)  
 a) Silica b) Wax  
 c) Cutin d) Muricin
- 20) Plastids are present only in: (BWP-2016-A, 17-A)  
 a) Bacteria b) Animal Cell  
 c) Virus d) Plant Cell
- 21) The number of chromosomes in *Drosophila melanogaster* is. (D.G.K-I-2014-A)  
 a) 26 b) 48 c) 8 d) 14
- 22) Any foreign object that Gains Entry inside the cell is immediately engulfed by: (D.G.K-II-2014-A)  
 a) Lysosome b) Ribosome  
 c) Peroxisome d) Glyoxisome
- 23) A structure is found attached to membranes in cell. It consists of 2 part. Name it: (D.G.K-II-2015-A)  
 a) Golgi complex b) Mitochondrion  
 c) Lysosome d) Ribosome
- 24) Chitin is found in cell wall of: (D.G.K-II-2017-A)  
 a) Algae b) Bacteria  
 c) Fungi d) Plants
- 25) Palade was first person to study: (D.G.K-II-2018-A)  
 a) Nucleus b) Peroxisome  
 c) Ribosomes d) Mitochondria
- 26) The fluid which surrounds the thylakoids is called: (SAH-2016-A) (MTN-I-17-A, 19-A)  
 a) Matrix b) Stroma  
 c) Cytoplasm d) Nucleoplasm
- 27) The process of taking in liquid material by cell membrane is called: (SAH-2017-A)  
 a) Phagocytosis b) Exocytosis  
 c) Pinocytosis d) Lymphocytosis
- 28) Cell membrane has 60 - 80%: (LHR-I-19-A)  
 a) Lipids b) Proteins  
 c) Carbohydrates d) Vitamins
- 29) Cistern are associated with: (RWP-I-19-A)  
 a) ER b) Mitochondria  
 c) Nucleus d) Chloroplast
- 30) Harmful substances are detoxified in liver cell by: (SGD-19)  
 a) Mitochondria b) ER  
 c) Golgi Complex d) Nucleus

### III) From Family Tests

- 1) Which of the following are colorless? (Entry Test 2009)  
 a) Chloroplasts b) Leucoplasts  
 c) Chromoplasts d) None of these
- 2) Which of the following is most slender in structure? (Entry Test 2009)  
 a) Microtubules b) Both A and B.  
 c) Intermediate filaments d) Microfilaments
- 3) Which of the following modifies proteins and lipids by adding carbohydrates? (Entry Test 2009)  
 a) Golgi Apparatus b) Plasma membrane  
 c) Lysosome d) None of these
- 4) The nucleus contains: (NSTC-8-Sample paper 2010-2012)  
 a) Mitochondria b) Cytosol  
 c) Enzyme d) DNA
- 5) Another name for Golgi complex is: (NSTC-8-Sample paper 2010-2012)  
 a) Dictyosome b) Endoplasmic Reticulum  
 c) Cyto-membrane system d) None of the above
- 6) Leucoplasts are a kind of: (NSTC-8-Sample paper 2010-2012)  
 a) Lysosomes b) Chloroplasts  
 c) Plastids d) Granum
- 7) Vacuole in plants is responsible for: (NSTC-8-Sample paper 2010-2012)  
 a) Photosynthesis b) Cellular excretion  
 c) Turgor pressure d) Starch storage
- 8) By which of the following can movements of materials across animal cell membranes be accomplished? (NSTC-8-Sample paper 2010-2012)  
 I Active transport a) I only  
 II Diffusion b) II only  
 III Pinocytosis c) I and II only  
 d) All of the above
- 9) Cell membranes are composed of: (NSTC-8-Sample paper 2010-2012)  
 a) Lipids and proteins b) Phospholipids  
 c) Proteins and carbohydrates  
 d) Lipids and terpenoids
- 10) A cell wall is present only in all: (NSTC-8-Sample paper 2010-2012)  
 a) Bacteria b) Protozoa  
 c) Algae d) Viruses
- 11) In generalized plant cell the nucleus is: (Entrance Self-Test-2011)  
 a) Present in the middle of the cell  
 b) Displaced to the site of the cell  
 c) Absent  
 d) Modified into endoplasmic reticulum
- 12) Plasma membrane is found in the cells of: (Entrance Self-Test-2011)  
 a) Animals only  
 b) Plants only  
 c) Both in plants and animals  
 d) Bacteria only

- 13) The semi-circular channels and system of tubes found in the cytoplasm are known as: (Entrance Self-Test-2011, 14)  
 a) Ribosomes b) Endoplasmic reticulum  
 c) Chloroplast d) Vacuoles
- 14) The structures that are evolved in the manufacture and supply of energy to the cell are: (Entrance Self-Test-2011)  
 a) Centrioles b) Nucleolus  
 c) Plastids d) Mitochondria
- 15) In a plant cell chlorophyll is present in: (Entrance Self-Test-2011)  
 a) Chromoplasts b) Stroma  
 c) Leucoplasts d) Chloroplasts
- 16) Ribosomes have equal amount of: (Entry Test 2012)  
 a) DNA and Protein b) mRNA and Protein  
 c) RNA and Protein d) None
- 17) Plastids are only found in the: (Entry Test 2012)  
 a) Animals and plants b) Plants  
 c) Animals d) Viruses
- 18) Plasma membrane is chemically composed of: (Entry Test 2012)  
 a) Phospholipids only b) Lipids and carbohydrates  
 c) Lipids and proteins d) Glycoproteins
- 19) Endoplasmic reticulum contains a system of flattened membrane-bounded sacs which are named as: (Entry Test 2012)  
 a) Cristae b) Cisternae  
 c) Matrix d) Tubules
- 20) Lipids synthesis / metabolism takes place in which of the following organelle? (Entry Test 2012, 13)  
 a) Mitochondria b) Vacuoles  
 c) Rough endoplasmic reticulum  
 d) Smooth endoplasmic reticulum
- 21) Ribosomes exist in two forms, either attached with the RER or freely dispersed in the: (Entry Test 2012)  
 a) Tonoplasts b) Cytoplasm  
 c) Golgi bodies d) SER
- 22) The ribosomal RNA is synthesized and stored in: (Entry Test 2012)  
 a) Endoplasmic reticulum  
 b) Golgi complex  
 c) Nucleolus d) Chromosomes
- 23) The model of plasma membrane suggests that proteins are embedded in lipid bilayer. (Entrance Test-2013)  
 a) Unit membrane b) Permeable  
 c) Fluid mosaic d) Ultracentrifuge
- 24) The function of nucleolus is to make: (Entrance Test-2013)  
 a) rDNA b) RNA  
 c) Ribosomes d) Chromosomes
- 25) The enzymes of lysosomes are synthesized on: (Entrance Test-2013)  
 a) RER b) Chloroplast  
 c) SER d) Golgi Apparatus
- 26) Centrioles are made up of microtubules. (Entrance Test-2013)  
 a) 9 b) 27  
 c) 3 d) 12
- 27) Which of the following structure is absent in higher plants and found in animal cells: (Entrance Test-2013, 17)  
 a) Centriole b) Mitochondria  
 c) Cytoskeleton d) Cytoplasm
- 28) The soluble part of cytoplasm or fluid that remains when all organelles are removed is known as: (Entrance Test-2009, 13)  
 a) Solution b) Gelatin material  
 c) Cytoskeleton d) Cytosol
- 29) The outer membrane of the nuclear envelope is at places continuous with the: (Entrance Test-2013)  
 a) Golgi apparatus b) Lysozymes  
 c) Endoplasmic reticulum d) Peroxisomes
- 30) The process by which unwanted structures within the cell are engulfed and digested within the lysosome is known as: (Entrance Test-2013)  
 a) Endocytosis b) Hydrolysis  
 c) Exocytosis d) Autophagy
- 31) In mitochondria, small knob-like structures called F1 particles are found in: (Entrance Test-2014)  
 a) Outer membrane b) Inner membrane  
 c) Outer compartment d) Inner compartment
- 32) Peptidoglycan or murein is a special or distinctive feature of cell wall in: (Entrance Test-2014)  
 a) Algae b) Bacteria  
 c) Fungi d) Plants
- 33) The intake of liquid materials across the cell membrane is: (Entrance Test-2014)  
 a) Phagocytosis b) Pinocytosis  
 c) Endocytosis d) Exocytosis
- 34) Which component of the cell is concerned with cell secretions? (Entrance Test-2014)  
 a) Plasma membrane b) Cytoskeleton  
 c) Golgi complex d) Mitochondria
- 35) During animal cell division, the spindle fibers are formed from: (Entrance Test-2014)  
 a) Mitochondria b) Ribosomes  
 c) Centriole d) Lysosomes
- 36) Fluid mosaic model of plasma membrane states that protein molecules float in a fluid of layer. (Entrance Test-2015)  
 a) Galactose b) Glucose  
 c) Phospholipids d) Carbohydrates
- 37) How many triplets of microtubules are present in centriole? (Entrance Test-2015)  
 a) Ten b) Eight  
 c) Nine d) Seven

## SECTION II

### SHORT QUESTIONS

2 SQs

#### From Exercise:

1. Describe various movements involved in transport of materials across the cell membrane.

Ans. Following movements are involved in the transport of material across the cell membrane:

- Diffusion --- Movement of solute particles across the membrane from higher to lower concentration
- Osmosis --- Movement of solvent molecules (e.g. water) across the membrane from higher to lower concentration
- Facilitated Diffusion --- Movement of ions or molecules across the membrane from higher to lower concentration by carrier proteins.
- Active Transport --- Movement of ions or molecules across the cell membrane against the concentration gradient i.e. from lower to high concentration at the cell's metabolic energy -ATP.

2. State various structural modifications in a cell involved in secretions.

Ans. Following structural modifications occur in a cell involved in secretions:

- Proteins are modified into glycoproteins by the addition of carbohydrates.
- Lipids are modified into glycolipids by the addition of carbohydrates.
- Polysaccharides are also formed.

3. List the processes blocked by mitochondrial failure in a cell.

Ans. The processes that are blocked by mitochondrial failure in a cell are:

- Kreb's cycle
  - Electron transport chain
  - Fatty acid metabolism
- Due to blockage of these processes production of ATP is stopped.

4. What will happen if a chromosome loses its centromere?

Ans. When a chromosome loses its centromere, it can not attach to the mitotic spindle and remains in the cytoplasm and this leads to the chromosomal fragmentation.

5. How does autophagy help in converting a tadpole into an adult amphibian?

Ans. Autophagy helps in converting a tadpole into an adult amphibian by removing tail and gills from its body during metamorphosis in the tadpole.

37) Which one of the following cell structure is involved in the synthesis of lipids?

- (Entrance Test-2015)
- a) Endoplasmic Reticulum    c) Centriole  
b) Golgi complex            d) Mitochondria

39) Which organelle is bounded by two membranes:

- (Entrance Test-2015)
- a) Ribosomes *No Membr*    c) Lysosome *Single*  
b) Mitochondria            d) Nucleolus *No Membr*

40) Ribosomes are tiny organelles, which are involved in the synthesis of:

- (Entrance Test-2015)
- a) Protein                    c) Nucleus  
b) RNA                        d) Nucleosome

41) The inner membrane of mitochondria form extensive infoldings called:

- (Entrance Test-2016)
- a) Cristae                    c) Lamella  
b) Cisternae                d) Bifidae

42) Which of the following organelle is found in both prokaryotic and eukaryotic cells?

- (Entrance Test-2016)
- a) Centriole                c) Nucleus  
b) Endoplasmic Reticulum    d) Ribosome

43) Out of given options, choose the one which shows structures found only in plants:

- (Entrance Test-2016)
- a) Vacuole, Chloroplast, Ribosomes *both plants*  
b) Chloroplast, Mitochondria, Peroxisomes *animals*  
c) Chloroplast, Cell wall, Vacuole  
d) Chloroplast, Cell wall, Mitochondria *both*

44) Presence of large central vacuole is the characteristic of:

- (Entrance Test-2016)
- a) Prokaryotes            c) Fungi  
b) Protists                d) Plants

45) The basic structure of plasma membrane is provided by:

- (Entrance Test-2016)
- a) Proteins                c) Cytoskeleton  
b) Cholesterol            d) Phospholipids

46) The organelles involved in detoxification of drugs and poisons in the liver cells is:

- (Entrance Test-2016)
- a) Smooth Endoplasmic Reticulum  
b) Rough Endoplasmic Reticulum  
c) Golgi apparatus  
d) Lysosomes

47) Ribosomes present in prokaryotes are:

- (Entry Test-2017)
- a) 80 S                    c) 50 S  
b) 60 S                    d) 70 S

48) W.O.F structures is present in both plant and animal cells but is absent in prokaryotic cells:

- (Entry Test-2017)
- a) Centrioles              c) Plastids  
b) Microtubule            d) Sieve-tubes

#### D) From Punjab Boards:

1. What is glycogenesis type-II disease?

(LHR-2014-A) (RWP-19-A)

Ans. Glycogenesis Type II Disease: -

- In this disease, the enzyme which degrades glycogen to glucose is absent.
- The liver and muscles become filled with glycogen within membrane bound organelles.

2. Define differentially permeable membrane.

(LHR-I-2014-A) (RWP-19-A)

Ans. Differentially Permeable Membrane:-

- Differentially (Selectively) Permeable Membrane means that a membrane will allow certain molecules to pass across it and prevent passage of others.
- Biological membranes are differentially (selectively) permeable membranes that allow some but not all substances to pass through them.
- In response to varying environmental conditions or cell needs, a membrane may be a barrier to a particular substance at one time and actively promotes its passage at another time. Whether a molecule is able to pass through the membrane also depends on its size, electric charge, and solubility in the phospholipids membrane.

3. What are cisternae?

(LHR-II-2014-A)

Ans. Cisternae: -

- Cisternae are spherical or tubular membranes that form a network of interconnected channels of Endoplasmic Reticulum.
- Cisternae vary widely in appearance from cell to cell.

4. What are storage diseases? Give an example.

(LHR-I-2015-A) (MTN-I-17, 18) (GRW-15-A) (SAH-15-A)

Ans. A) Storage Diseases:-

Storage Diseases are genetic diseases produced by mutation in which one of the normally present lysosomal enzymes, involved in catabolism of certain substance, is absent that leads to accumulation of substances such as glycogen or glycolipids within the cells.

B) Example: -

Tay Sach's disease is a storage disease in which lipids are accumulated in brain cells leading to mental retardation and even death. In this disease, an enzyme that is involved in the catabolism of lipids, is absent.

5. Give important functions of cytoplasm,

(LHR-I-2015-A)

Ans. Important Functions of Cytoplasm:-

- It is the site for certain metabolic processes such as Glycolysis.
- It acts as a store house of vital chemicals.

6. What are chromoplasts? Give function.

(LHR-II-2015-A) (MTN-14-A)

Ans. A) Chromoplasts: -

Chromoplasts are the plastids that contain colored pigments other than green (such as xanthophyll,

carotene) which are present in the petals of flower and in the ripened fruit.

B) Function of Chromoplasts: -

- The chromoplasts are responsible for various color combinations found in flowers, fruits and other colored parts except green.
- They help the flowers to attract animals that serve as pollinators and as seed dispersers.

7. What is endocytosis? (LHR-I-2016-A) (RWP-14-A)

Ans. Endocytosis: -

- The intake of materials by infolding of the cell membrane, in the form of vacuoles or vesicles, is termed Endocytosis.
- It can be either phagocytosis (to engulf solid particles) or pinocytosis (to take in liquid material).

8. What is endocytosis? Differentiate between phagocytosis and pinocytosis? (LHR-II-2016-A)

(FSD-16-A) (DGK-II-18-A)

Ans. A) Endocytosis: -

It is the process in which cell membrane helps to take in material by infolding in the form of vacuole or vesicle.

B) Differences Between Phagocytosis And Pinocytosis:

Phagocytosis	Pinocytosis
1. When the material taken in by endocytosis is large or solid, the process is called Phagocytosis.	1. When material taken in by endocytosis is liquid or dissolved, the process is called Pinocytosis.
2. Phagocytosis can be seen with the light compound microscope.	2. Electron microscope must be used to observe pinocytosis.
3. Phagocytosis is common in unicellular organisms such as Amoeba. It also occurs in humans by leucocytes.	3. Blood cells, cells that line the kidney tubules or the intestinal walls all use pinocytosis to ingest substances.

9. What are microfilaments? Give their functions.

(LHR-I-2017-A)

Ans. A) Microfilaments: -

- They are thinnest solid filaments of the cytoskeleton.
- They are made of contractile action protein.

B) Functions: -

They are involved in internal cell motion. The movement of cytolysis and amoeboid movements are because of microfilaments.

10. Give chemical composition of primary and secondary cell wall.

(LHR-I-2017-A) (FSD-15-A) (GRW-14-A, 16-A) (SAH-16-A)

Ans. A) Chemical Composition of Primary Cell Wall: -

The primary cell wall is chemically composed of cellulose and some deposition of pectin and hemicellulose. Cellulose molecules are in a criss cross arrangement.

B) Chemical Composition of Secondary Cell Wall: -

Chemically, secondary cell wall is composed of cellulose, inorganic salts, silica, wax, cutin, lignin etc.

11. Define autophagosomes. (LHR-II-2018-A) (DGK-I-17-A)

Ans. Autophagosomes:-  
 a. The lysosomes which eat parts of their own cell are known as autophagosomes.  
 b. They are secondary lysosomes.  
 c. They are involved in the autophagy (self-eating).

Example:-  
 Autophagosomes digest some worn out parts of the cell or old organelles such as mitochondria

12. Give three functions of smooth endoplasmic reticulum. (GRW-2014-A) (MTN-15-A, I-18-A) (BWP-17-A)

Ans. Three Functions of Smooth Endoplasmic Reticulum:-  
 a. SER helps in metabolism of a number of different types of molecules particularly lipids.  
 b. They also help to detoxify the harmful drugs.  
 c. SER is responsible for transmission of impulses e.g. muscle cells, nerve cells.

13. Write any two important functions of centriole. (GRW-2015-A) (SGD-18-A)

Ans. Any Two Important Functions of Centriole:-  
 a. It plays an important role in the location of furrowing during cell division.  
 b. It also plays an important role in the formation of cilia.

14. How smooth endoplasmic reticulum is different from rough type? (GRW-2016-A)

Ans. Smooth Endoplasmic Reticulum Different From Rough Endoplasmic Reticulum:-

Smooth Endoplasmic Reticulum	Rough Endoplasmic Reticulum
1. It is without ribosome's.	1. It has ribosome's attached at its outer surface.
2. It helps in the metabolism of different types of molecules particularly lipids.	2. It is involved in protein synthesis.
3. It is found in steroid producing cells like adipose cells.	3. It occurs mostly in protein synthesizing cells.

15. What is the function of parenchyma and xylem cell? (GRW-2016-A)

Ans. A) Function of Parenchyma Cell:-  
 Parenchyma cell stores surplus food.

B) Function of Xylem Cell:-  
 It conducts water and mineral salts from soil to aerial parts of plants.

16. Give role and composition of cytoskeleton. (GRW-2017-A)

Ans. A) Composition of Cytoskeleton:-  
 Cytoskeleton is formed of microtubules, microfilaments and intermediate filaments. The main proteins that are present in the cytoskeleton are tubulin, actin, tropomyosin and others.

B) Role of Cytoskeleton:-  
 a. Microtubules are involved in assembly and disassembly of spindle. Several organelles (such as

cilia, flagella, basal bodies and centrioles) are also derived from microtubules.  
 b. Microfilaments are involved in internal cell motion. The movement of cyclosis and amoeboid movements are because of microfilaments.  
 c. Intermediate filaments are involved in determination of cell shape and integration of cellular compartments.

17. Differentiate between microtubules and microfilaments. (GWR-2018-A) (RWP-16-A) (SAH-15-A) (BWP-19-A)

Microtubules	Microfilaments
1. They are thickest filaments of the cytoskeleton.	1. They are thinnest filaments of the cytoskeleton.
2. They are small, hollow cylinders about 25 nm in diameter and from 0.2-25 um in length.	2. They are long, extremely thin, flexible, solid fibers about 7 nm in diameter.
3. They are composed of tubulin protein.	3. They are made of actin protein.
4. They have a role in assembly and disassembly of spindle structure during mitosis.	4. They are involved in internal cell motion.

18. What are Golgi apparatus? Give its function. (GRW-2018-A)

Ans. A) Golgi Apparatus:-  
 Golgi apparatus, discovered by Golgi in 1898, an organelle found in all eukaryotic cells, consists of stacks of flattened membranous sacs called cisternae, which along with associated vesicles are called Golgi complex.

B) Functions of Golgi Apparatus:-  
 a. Golgi apparatus is involved in formation of cell secretions. Secretions are products formed within the cell on ribosome's and then passed to the outside through ER and Golgi complex.

b. It is also the place where particular chemicals (secretions) are converted into finished products, concentrated and packed, before export. For example in mammals, the pancreas secretes granules containing enzymes that help in digestion. The Golgi complex has a role in the formation of these granules.

c. The most important function of this apparatus is to modify the proteins and lipids by adding carbohydrates and converting them into glycoprotein's and glycolipids.

d. Golgi apparatus also modifies existing glycoprotein's and glycolipids made in the ER.

e. It also manufactures certain macromolecules by itself, such as polysaccharides or cell plate material in plant cell, are Golgi products.

f. In animal cells, the Golgi complex also manufactures lysosomes.

19. What are two subunits of ribosomes and how their attachment is controlled? (MTN-2015-A) (RWP-II-17-A) (DGK-I-14-A)

Ans. A) Two Subunits of Ribosomes:-  
 Two subunits of ribosomes are larger subunit and smaller subunit. The larger unit is dome-shaped and smaller unit forms a cup on the flat surface of larger subunit. The larger subunit sediments at 60 S while smaller sub unit sediments at 40 S.

B) Control of Attachment of Two Subunits of Ribosomes:-  
 Two subunits attach with each other during protein synthesis forming 80 S particle. This attachment is controlled by the presence of Mg<sup>2+</sup> ions. Ribosomes are attached to m RNA through small ribosomal subunit.

20. Cell membrane is selectively permeable membrane. Justify. (MTN-2016-A)

Ans. Cell Membrane as Selectively Permeable Membrane:-

a. Differentially (Selectively) Permeable Membrane means that a membrane will allow certain molecules to pass across it and prevent passage of others.

b. Biological membranes are differentially (selectively) permeable membranes that allow some but not all substances to pass through them.

c. In response to varying environmental conditions or cell needs, a membrane may be a barrier to a particular substance at one time and actively promotes its passage at another time. Whether a molecule is able to pass through the membrane also depends on its size, electric charge, and solubility in the phospholipids membrane.

21. Define Tay-sach's disease. (MTN-2016-A) (RWP-18-A)

Ans. Tay-Sach's Disease:-

A) Storage Diseases:-  
 Storage Diseases are genetic diseases produced by mutation in which one of the normally present somal enzymes, involved in catabolism of certain substance, is absent that leads to accumulation of substances such as glycogen or glycolipids within the cells.

B) Two Examples of Storage Diseases:-

a. Glycogenesis Type II:-  
 It is one example of storage disease in which the liver and muscles appear filled with glycogen within membrane bound organelles. In this disease, an enzyme, that degrades glycogen to glucose, is absent.

b. Tay Sach's Disease:-  
 It is the second example of storage disease in which lipids are accumulated in brain cells leading to mental retardation and even death. In this disease, an enzyme that is involved in the catabolism of lipids, is absent.

22. Define the term polysome. Also give its function. (MTN-I-2017-A) (BWP-16-A)

Ans. A) Polysome:-  
 A group of ribosomes attached to mRNA is known as Polysome.

B) Function of Polysome:-  
 It synthesizes protein.

23. How cell wall of plants differs from Prokaryotes? (MTN-II-2017-A)

Cell Wall of Plants	Cell Wall of Prokaryotes
The cell wall of plants is composed of cellulose arranged in three layers, primary wall, secondary wall and middle lamella. The cellulose molecules are arranged in criss-cross arrangement.	The cell wall of prokaryotic cell is composed of peptidoglycan which consists of a carbohydrate matrix (polymers of sugar) that is cross-linked by short polypeptide chains.

24. Define Congenital Disease. Give example. (MTN-II-2017-A) (RWP-15-A)

Ans. Congenital Diseases with Example:-

A) Congenital Diseases:-  
 The diseases which are transferred from other to offspring are called Congenital Diseases.

B) Examples of Congenital Diseases:-

a. Glycogenesis Type II:-  
 It is one example of storage disease in which the liver and muscles appear filled with glycogen within membrane bound organelles. In this disease, an enzyme, that degrades glycogen to glucose, is absent.

b. Tay Sach's Disease:-  
 It is the second example of storage disease in which lipids are accumulated in brain cells leading to mental retardation and even death. In this disease, an enzyme that is involved in the catabolism of lipids, is absent.

25. Differentiate between Prokaryotic and Eukaryotic Cells. (MTN-I-2018-A) (DGK-II-17) (RWP-I-17) (SGD-15-A)

Ans.

Prokaryotic Cell	Eukaryotic Cell
1. Cell is smaller than eukaryotic cell.	1. Cell is larger than prokaryotic cell.
2. DNA is not separated from the cytoplasm by a membrane.	2. DNA is found within nucleus with a membrane separating it from the cytoplasm.
3. DNA is not packaged into chromosome.	3. DNA is wound tightly around proteins and packaged into compact units called chromosomes.
4. It is characterized by few membraneous organelles.	4. It has many highly organized membrane bound organelles.
5. Cytoskeleton is absent in prokaryotic cell.	5. It is supported by internal protein cytoskeleton.
6. It has small sized ribosome of 70 S.	6. It has large sized ribosomes of 80 S.
7. The cell wall of prokaryotic cell is composed of peptidoglycan which consists of a carbohydrate matrix (polymers of sugar) that is cross-linked by short polypeptide chains.	7. Cell wall, if present, consist

26. Differentiate between Mononucleate and Binucleate cell. Give examples. (MTN-I-2018-A)

Mononucleate Cell	Binucleate Cell
The cell which has one nucleus is called Mononucleate Cell. Example:- Cell of monokaryotic hypha of fungus	The cell which has two nuclei is called Binucleate Cell. Example:- Cell of dikaryotic hypha of fungus

27. Differentiate between Chromoplasts and Leucoplasts. (BWP-2014-A) (DGK-II-15-A) (FSD-17-A) (RWP-19-A) (SAH-19-A)

Chromoplast	Leucoplast
1. It is a colored (other than green) pigmented plastid.	1. It is a colorless or unpigmented plastid.
2. It is present in the petals of flower and in the ripened fruit.	2. It is usually found in Cells not exposed to light such as under ground parts of the plant.
3. It helps in pollination and dispersal of seeds.	3. It synthesizes and stores starches and oils in the cells of many seeds, roots, and tubers such as white potatoes.

28. What is Plasma Membrane? Give its composition. (BWP-2015-A)

Ans. A) Plasma Membrane:-

Plasma membrane is the outermost boundary of animal cells. However, in most plant cells, it is covered by a cell wall.

B) Composition of Plasma Membrane:-

Cell membrane is chemically composed of lipids and proteins; 60-80% are proteins, while 20-40% are lipids. In addition there is small quantity of carbohydrates.

29. How many types of Endoplasmic Reticulum are present? (BWP-2015-A)

Ans. Types of Endoplasmic Reticulum:-

Two types of Endoplasmic Reticulum are present:

- Rough Endoplasmic Reticulum (RER):-**  
These are the Endoplasmic Reticulum with attached ribosomes.
- Smooth Endoplasmic Reticulum (SER):-**  
These are the Endoplasmic Reticulum without ribosomes.

30. Differentiate between Granum and Thylakoid Membrane. (BWP-2018-A)

Thylakoid	Granum
1. Thylakoids are flattened vesicles in the stroma of chloroplast which may or may not be stacked on each other like coins. 2. A large part of thylakoid is green and its some part is non-green.	1. Granum is a pile of usually about 50 or more thylakoids stacked on each other like coins. 2. Granum is always green.

31. What is Centromere and its role? (BWP-2018-A)

Ans. A) Centromere:-

Centriole is the region of chromosome.

B) Role of Centromere:-

- It is the region that holds together the two identical sister chromatids of a chromosome.
- It is the point of attachment of the kinetochore, a structure to which the microtubules of mitotic spindle become attached. It plays an essential role in proper chromosome segregation during mitosis and meiosis in eukaryotic cells.

32. What is cytosol? (FSD-2014-A)

Ans. Cytosol:-

a. Cytosol literally means cell solution in which the organelles reside.

b. It is the soluble part of cytoplasm.

c. It forms the ground substance of the cytoplasm.

d. Chemically it is composed of 90% water.

It forms a solution containing all fundamental molecules of life.

e. In the cytosol small molecules and ions may form true solution and some large molecules form colloidal solution.

33. What is stroma? Give function. (FSD-2016-A)

Ans. A) Stroma:-

Stroma is a fluid in the chloroplast that surrounds the thylakoids.

B) Function of Stroma:-

It is the site where  $CO_2$  is fixed to manufacture sugars (the site of reactions of Calvin Cycle). Some proteins are also synthesized in this part.

34. What are intermediate filaments? (RWP-I-2017-A) (LHR-I-19-A)

Ans. Intermediate Filaments:-

- Intermediate filaments are the elements of cytoskeleton made up of protein with diameter in between microtubules and microfilaments.
- Intermediate filaments are involved in determination of cell shape and integration of cellular compartments.

35. Differentiate between chloroplast and leucoplast. (RWP-II-2017-A)

Chloroplast	Leucoplast
1. It is a green plastid containing green pigments called chlorophylls.	1. It is a colorless or unpigmented plastid.
2. It is usually found in leaves and green parts of a plant.	2. It is usually found in cells not exposed to light such as under ground parts of the plant.
3. It manufactures carbohydrates by a process of photosynthesis.	3. It synthesizes and stores starches and oils in the cells of many seeds, roots, and tubers such as white potatoes.

36. What is the role of nucleolus in cell. (SGD-2015-A)

Ans. Role of Nucleolus in Cell:-

A nucleolus is the site where a type of RNA called ribosomal RNA (rRNA) is produced and where rRNA joins with proteins to form subunits of ribosomes that are exported to the cytoplasm via nuclear pores.

37. Define Plastids. Give their types. (SGD-2016-A)

Ans. A) Plastids:-

Plastids are double membrane bound organelles found in plant cells only, which contain different types of pigments.

B) Types of Plastids:-

a. Chloroplasts:-

They have a green pigment called chlorophyll found in leaves and other green parts of a plant. They manufacture carbohydrates by a process of photosynthesis.

b. Chromoplasts:-

They have colored pigments other than green found in the petals of flowers and ripened fruit. They help in pollination and dispersal of seeds.

c. Leucoplasts:-

They are colorless plastids found in the cells of underground parts of plants. They store the food material.

38. Compare cisternae with cristae. (SAH-17-A)

(D.G.K-I-2014-A, I-15-A)

Ans.

Cisternae	Cristae
1. Cisternae are flattened membrane bound sacs in the Endoplasmic Reticulum as well as in Golgi complex.	1. Cristae are folds of inner membrane that extend into the matrix of mitochondrion.
2. Cisternae contain enzymes that are involved in the detoxification of various chemicals, metabolism of lipids and various modifications of proteins.	2. Located on the surface of the cristae are particular enzymes involved in aerobic cellular respiration.
3. Their terminal portion is pinched off and forms transport vesicles that transport materials from ER to Golgi complex and from Golgi complex to lysosome or cell membrane.	3. They do not pinch off in transport vesicles.
4. They do not have F1 particles.	4. The inner surface of cristae has small knob like F1 particles.

39. Describe any two functions of nucleolus.

(D.G.K-II-2014-A)

Ans. Two Functions of Nucleolus:-

- It is the site where rRNA is produced from DNA by a process called Transcription.
- It is also a site where rRNA joins with proteins to form two sub-units of ribosomes.

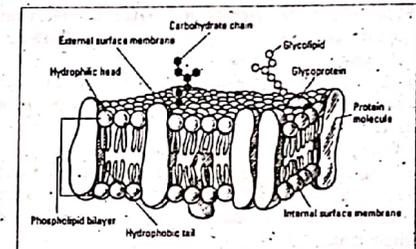
40. What is fluid mosaic model about the structure of cell membrane?

(D.G.K-II-2014-A, I-15, II-17-A, I-19-A)

Ans. Fluid Mosaic Model:-

According to Fluid Mosaic Model, proteins layers are not continuous and confined to the surface of membrane, and are not sandwiching lipid bilayer, instead protein molecules are embedded in the lipid bilayer of fluid nature in a mosaic manner. It actually states that protein molecules float in a fluid of phospholipid bilayers.

Diagram of Fluid Mosaic Model of Plasma Membrane:-



41. What are nuclear pores? What are their functions?

(D.G.K-I-2015-A)

Ans. A) Nuclear Pores:-

- The outer and inner membranes of nuclear envelope are continuous at certain points resulting in the formation of pores, the nuclear pores.
- Nuclear pores consist of protein complexes.
- They are about 20 to 40 nm in diameter.
- The number of nuclear pores is highly variable from 3 or 4 pores/nucleus (in erythrocytes) to about 30,000 pores/nucleus (in eggs).

B) Functions of Nuclear Pores:-

They control the traffic of substances passing through them between nucleus and cytoplasm.

42. How Thylakoid differs from Granum?  
(D.G.K-II-2016-A)

Thylakoid	Granum
1. Thylakoids are flattened vesicles in the stroma of chloroplast which may or may not be stacked on each other like coins.	1. Granum is a pile of usually about 50 or more thylakoids stacked on each other like coins.
2. A large part of thylakoid is green and its some part is non-green.	2. Granum is always green.

43. What are Cristae and Polysomes? (D.G.K-II-2016-A)

Ans. A) Cristae:-

Cristae are infoldings of inner membrane of Mitochondrion into mitochondrial matrix.

B) Polysomes:-

Polysomes are groups ribosomes attached to mRNAs.

44. What is plasma membrane? Give its chemical composition.  
(D.G.K-I-2018-A)

Ans. Resolution of Microscope:-

Resolution of a microscope is the minimum distance that two points can be separated and be distinguished as two separate points by a microscope (an optical instrument).

Example:- In a typical compound microscope, the resolution is 2.0  $\mu$ .

45. What is plasma membrane? Give its chemical composition.  
(D.G.K-I-2018-A)

Ans. A) Plasma Membrane:-

Plasma membrane is the outermost boundary of animal cells. However, in most plant cells, it is covered by a cell wall.

B) Composition of Plasma Membrane:-

Cell membrane is chemically composed of lipids and proteins; 60-80% are proteins, while 20-40% are lipids. In addition there is small quantity of carbohydrates.

46. What is cell fractionation?  
(SHL-2014-A)

Ans. Cell Fractionation:-

a. Cell fractionation is a technique used to isolate various cellular components including its organelles to determine their chemical composition.

b. During cell fractionation the tissues are homogenized or disrupted with special instruments and the various parts of the cells are separated by density gradient centrifugation.

47. What are plastids? Give function of one of them.  
(SHL-2015-A)

Ans. A) Plastids:- Plastids are membrane bound, mostly pigment containing bodies present in plant cells only.

B) Function of One of Plastids:-

Chromoplasts help in pollination and dispersal of seeds.

48. Why is mitochondrion called self-replicating organelle?  
(SHL-2016-A)

Ans. Mitochondrion as Self-Replicating Organelle:-

Mitochondrion is a self-replicating organelle because it contains DNA in mitochondrial matrix.

## SECTION III LONG QUESTIONS

- Describe structure and function of chloroplast. (4)  
(LHR-I-2014-A) (SGD-18-A) (SAH-15-A)  
(GRW-15-A) (LHR-II-16-A)
- Discuss the structure and functions of endoplasmic reticulum. (LHR-II-2014-A) (SGD-16-A) (4)  
(FSD-14-A) (MTN-II-17-A) (DGK-II-15-A)
- Write a note on ribosomes. (LHR-II-2015-A) (4)
- Explain the structure and functions of lysosomes. (4)  
(LHR-I-2017-A)
- What are lysosomes and explain its phagocytic role with the help of diagram. (4)  
(LHR-II-2018-A) (DGK-II-2018, 19-A)
- Write note on cytoskeleton. (GRW-2018-A) (4)
- Describe the structure and function of plasma membrane. (RWP-2014-A)
- Differentiate between prokaryotic and eukaryotic cell.  
(RWP-I-2017-A) (SAH-14-A) (DGK-II-14, 17-A)  
(FSD-14, 17-A) (RWP-15-A) (MTN-I-17-A)  
(DGK-I-19-A)
- Write a note on mitochondria. (MTN-16-A) (4)  
(RWP-2017-A, II-18-A) (LHR-I-2016, 19-A)  
(SGD-15-A) (FSD-15-A) (BWP-I-17-A) (GRW-17-A)
- What are plastids? Discuss the chloroplast in detail. (4)  
(SGD-2017-A) (LHR-II-19-A) (RWP-19-A)
- Write note on Plastids. (FSD-2016-A) (GRW-16-A) (4)  
(MTN-14-A) (DGK-II-16-A)
- Write a note on Golgi Apparatus. (FSD-2018-A) (4)
- Describe structure and function of Golgi apparatus (4)  
in a cell. (MTN-2015-A)
- Define Cell Cytoplasm. Explain its functions. (4)  
(MTN-II-2018-A)
- What are Plastids? Describe its types and their role.  
(BWP-2015-A)
- Describe Fluid Mosaic Model and functions of Plasma Membranes. (BWP-2016-A) (RWP-16-A) (4)
- Show the similarities and differences in structure and functions of Mitochondria and Chloroplast. (4)  
(D.G.K-I-2015-A)
- Describe structure and functions of plasma membrane. (D.G.K-I-2017-A) (SAH-17-A, 19-A)  
(BWP-19-A) (MTN-19-A)
- Discuss chloroplasts in plants. (D.G.K-I-2018-A) (4)
- Write a detailed note on chromosomes. (4)  
(SAH-2017-A)

## SECTION I MULTIPLE CHOICE QUESTIONS

### Chapter --- 5 VARIETY OF LIFE MCQs

#### I) From Exercise:-

- The enzymes involved in viral replication are synthesized:
  - On the viral ribosome
  - On the interior surface of viral membrane
  - By the host cell
  - On the interior surface of viral coat
- An isolated virus is not considered living, since it:
  - Separates into two inert parts.
  - Can not metabolize.
  - Rapidly loses its genome chemically inert.
  - Is coated with an air tight shield.
- In the lytic cycle of a bacteriophage, the host DNA is:
  - Replicated
  - Turned off by a protein coat
  - Digested into its nucleotides
  - Turned on by removal of a protein coat
- In the lysogenic cycle, the DNA of a bacteriophage:
  - Joins the bacterial chromosome.
  - Attaches to the inner surface of the host membrane.
  - Is immediately degraded when it enters the host.
  - Goes directly to the host's ribosome for translation.
- Temperate phage may exist as: (GRW-16-A)  
(LHR-II-14-A)
  - Prophage
  - Capsid
  - Viriod
  - Retrovirus
- Phylogeny describes a species: (MTN-15-A)
  - Morphological similarities with other species
  - Evolutionary history
  - Reproductive compatibilities with other species
  - Geographical distribution
- In the binomial system of taxonomy developed during the 18<sup>th</sup> century by C. Linnaeus, Linnaeus, the first word of an organism's name (e.g. *Homo sapiens*) is its:
  - Species
  - Genus
  - Race
  - Family

9) In the five kingdom system of classification developed by Robert Whittaker, the members of kingdom Plantae are autotrophic, eukaryotic and:  
(Multan Board-1<sup>st</sup> Annual 2007)

- Multi cellular
  - Motile
  - Either unicellular or multi-cellular
  - Have sexual reproduction
- 10) Five kingdom system of classification proposed by Margulis and Schwartz is not based on:
- Genetics
  - Cellular organization
  - Nucleic acid
  - Mode of nutrition
- 11) The common name of *Allium cepa* is: (SAH-16-A)  
(BWP-16, 17-A)
- Piyaz
  - Bathu
  - Amaltas
  - Chana
- 12) Arrange the following in order of increasing group size, beginning with the smallest: family, kingdom, species, phylum (or division), genus, order and class:
- Species
  - Genus
  - Family
  - Order
  - Class
  - Phylum (or Division)
  - Kingdom
- 13) Pigs are reservoirs to: (LHR-I-19-A)
- Hepatitis A
  - Hepatitis B
  - Hepatitis C
  - Hepatitis D
  - Hepatitis E
- 14) Which one of the following is false about AIDS?
- HIV
  - Acquired immune deficiency syndrome
  - T-lymphocytes
  - HAV
  - Host specific
- #### II) From Punjab Boards:-
- Orders include related: (LHR-I-2014-A) (GRW-18-A)
    - Families
    - Genera
    - Species
    - Classes
  - Organelle of symbiotic origin is: (LHR-I-2015-A) (DGK-II-16-A)
    - Cell wall
    - Cell membrane
    - Mitochondrion
    - Vacuole
  - Mad cow disease is caused by: (LHR-II-2015-A) (RWP-15, 19-A)
    - Virus
    - Bacteria
    - Prions
    - Fungus
  - The number of capsomere present in herpes virus capsid is: (LHR-I, II-2016-A) (DGK-II-17-A)
    - 252 capsomeres
    - 162 capsomeres
    - 250 capsomeres
    - 100 capsomeres

## Solved Past Papers (2007-2019)

- 5) The single stranded RNA-tumor viruses are: (LHR-II-2018-A)
- a) Spherical      b) Elongated  
c) Spiral          d) Cubical
- 6) To accommodate *Euglena* like organisms and bacteria, kingdom. Protista was proposed by: (GRW-2014-A)
- a) Ernst Hackle      b) Linnaeus  
c) Robert Whittaker      d) E-Chatton
- 7) Bacteriophage replicates only in \_\_\_\_\_ cell. (GRW-2015-A)
- a) Animal          b) Plant  
c) Bacterial      d) Fungal
- 8) Hepatitis B is also called: (SGD-16-A) (GRW-2017-A)
- a) Delta hepatitis      b) Infectious hepatitis  
c) Infusion hepatitis      d) Serum hepatitis
- 9) Paramyxo-viruses cause the disease: (RWP-2014-A)
- a) Influenza      b) Polio  
c) Mumps & measles      d) Herpes simple
- 10) The process in which the phage is called a prophage is termed as: (RWP-2016-A)
- a) Induction      b) Lysogeny  
c) Deduction      d) Penetration
- 11) The number of capsomeres in capsid of adenovirus: (BWP-18-A) (MTN-II-18-A, 19-A) (RWP-II-2017-A) (DGK-I-18-A)
- a) 152              b) 352  
c) 252              d) 452
- 12) The infectious proteins are: (GRW-2018-A)
- a) Viruses          b) Virions  
c) Prions            d) Peptones
- 13) Binomial system of Nomenclature of organisms was devised by: (LHR-I-17) (SGD-2015-A) (BWP-14-A)
- a) Robert Whittaker      b) Ernst Hackel  
c) E-Chatton          d) Carlous Linnaeus
- 14) First infectious disease against which, effective method of prevention was developed: (SGD-2017-A)
- a) Small pox      b) Yellow fever  
c) Measles        d) Mumps
- 15) Infectious Hepatitis is caused by: (FSD-2014-A)
- a) Hepatitis A virus      b) Hepatitis B virus  
c) Hepatitis C virus      d) Hepatitis D virus
- 16) Prions are made up of: (FSD-2015-A)
- a) Lipids            b) Nucleic acids  
c) Proteins          d) None of these

- 17) The basic unit of classification is: (FSD-2016-A)
- a) Genus            b) Phylum  
c) Class            d) Species
- 18) A disease which is highly contagious is: (FSD-2017-A)
- a) Measles          b) Mumps  
c) Influenza        d) Herpes
- 19) Icosahedral virus have nearly: (FSD-2018-A)
- a) 10 faces          b) 20 faces  
c) 30 faces          d) 40 faces
- 20) Carlous Linnaeus took the scientific names from: (MTN-2014-A)
- a) Latin words      b) Greek words  
c) English          d) Spanish
- 21) *Solanum esculentum* is the scientific name of: (MTN-2016-A, I-17-A)
- a) Potato          b) Tobacco  
c) Onion            d) Tomato
- 22) The smallest know viruses contain RNA in spherical Capsid are the: (MTN-II-2017-A)
- a) Polio Viruses      b) Pox Viruses  
c) Herpes Viruses      d) Influenza Viruses
- 23) Influenza viruses are: (MTN-I-2018-A)
- a) Enveloped RNA viruses  
b) Non-enveloped viruses  
c) DNA enveloped viruses  
d) DNA naked viruses
- 24) The common name for *Solanum melangena* is: (BWP-2015-A) (SGD-18-A)
- a) Onion            b) Brinjal  
c) Potato            d) Amaltas
- 25) Which one is not RNA virus? (D.G.K-I-2014-A)
- a) Small pox virus  
b) Influenza virus  
c) Mumps and Measles virus  
d) Polio virus
- 26) Genetically engineered vaccine is not available for: (D.G.K-II-2014-A)
- a) HAV              b) HBV  
c) HCV              d) HDV
- 27) Lytic cycle completion occurs about: (D.G.K-I-2015-A)
- a) 15 min            b) 25 min  
c) 35 min            d) 05 min
- 28) Influenza viruses are: (D.G.K-II-2015-A)
- a) DNA naked      b) DNA enveloped  
c) RNA enveloped      d) RNA naked

- 29) Hepatitis is an inflammation of: (D.G.K-I-2017-A)
- a) Stomach          b) Pancreas  
c) Liver            d) Kidney
- 30) In five kingdom system, Eukaryotic multi cellular reducers are placed in kingdom: (D.G.K-II-2018-A)
- a) Monera            b) Protista  
c) Fungi            d) Animalia
- 31) Mumps and measles are caused by viruses' belong to group: (SAH-2014-A)
- a) Parvovirus      b) Paramyxo-virus  
c) Myxovirus      d) Polio
- 32) About 60 % of adults are immune to disease: (SAH-2015-A)
- a) Mumps            b) Measles  
c) Influenza        d) Polio
- 33) HIV belongs to the group of viruses called: (SAH-2017-A)
- a) Pox virus          b) DNA virus  
c) Retro virus      d) Bacteriophage
- 34) Capsomer are subunits which form capsid of a virion. (LHR-I-19)
- a) Lipids            b) Nucleic acid  
c) Carbohydrates      d) Proteins
- III) From Entry Test:-**
- 1) Name the enveloped RNA virus that causes infusion hepatitis: (Entry Test 2009)
- a) HBV              c) HCV  
b) HAV              d) None of these
- 2) Of the following terms, which one includes all the others? (NSTC-8-Sample paper 2010-2012)
- a) Species          b) Class  
c) Phylum        d) Order
- 3) An independent organism is discovered that does not contain a nucleus. In all likelihood, it would be classified in the kingdom: (NSTC-8-Sample paper 2010-2012)
- a) Monera          b) Protista  
c) Fungi            d) Animal
- 4) Bacteriophages are: (NSTC-8-Sample paper 2010-2012)
- a) Parasitic bacteria      b) Spore forming bacteria  
c) Virus attacking bacteria  
d) None of the above
- 5) Bacteriophages exhibit life cycle that are: (NSTC-8-Sample paper 2010-2012)
- a) Lytic              b) Lysogenic  
c) Neither a nor b      d) Both a and b
- 6) Herpes simplex is caused by -virus. (Entry Test 2009)
- a) DNA              c) Glycogen  
b) RNA tumor        d) Both B and C
- 7) In HIV viruses, reverse transcriptase convert single stranded RNA into double stranded viral DNA. This process is called: (Entry Test 2012)
- a) Translation      c) Replication  
b) Duplication      d) Reverse transcription
- 8) The major cause of hepatitis B is: (Entrance Test-2014)
- a) Blood transfusion      c) Absence of fibrinogen  
b) Blood clotting      d) Contaminated soil
- 9) Which one of the following cells are mainly infected by HIV? (Entrance Test-2014)
- a) T-killer lymphocytes      c) B-plasma cells  
b) T-helper lymphocytes      d) B-memory cells
- 10) What are the sequence of steps in which a bacteriophage attacks bacteria and injects its DNA? (Entrance Test-2014)
- a) Landing→Tail contraction → Penetration →DNA injection  
b) Penetration → Landing→Tail contraction→DNA injection  
c) Tail contraction→ Landing → DNA injection → Penetration  
d) Landing → Tail contraction→DNA injection
- 11) HIV is classified as: (Entrance Test-2015)
- a) Bacteriophage      c) Retroviruses  
b) Oncovirus          d) Icosahedral virus
- 12) AIDS is caused by: (Entrance Test-2016)
- a) Bacteria            c) Fungi  
b) Virus              d) Alga
- 13) All viruses are can reproduce within living organisms only, so they are known as: (Entrance Test-2016)
- a) Ectoparasites  
b) Endoparasites  
c) Obligate Intracellular Parasites  
d) Facultative Intracellular Parasites
- 14) W.O.F is a non-cellular infectious entity: (Entry Test-2017)
- a) Mycoplasma          c) Herpes virus  
b) Escherichia coli      d) Diplococcus
- 15) The viruses can reproduce: (Entry Test-2017)
- a) Without invading any cell      c) By mitosis  
b) In bacterial cell              d) By meiosis
- 16) The life cycle in which the phage kills the bacteria is known as: (Entry Test-2017)
- a) Transduction  
b) Temperate phage cycle  
c) Lytic cycle  
d) Lysogenic phage cycle

**SECTION II**

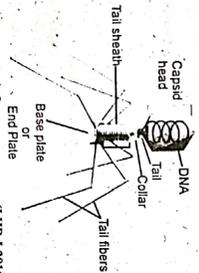
1 SQ

**SHORT QUESTIONS**

**No Short Question From Exercise**

**70 From Previous Papers**

1. What are symptoms of small pox? (LHR-1-2014-A)  
 Ans. Symptoms of Small Pox -  
 a. The earliest symptoms of Small Pox are fever and small raised fluid filled vesicles formed first on face and then on the body trunk.  
 b. These vesicles soon become deep pustules which break open and emit pus.  
 c. If person survives, the pustule will leave pitted scars or pocks.  
 2. Write down four characteristics of viruses. (LHR-II-2014-A)  
 Ans. Four Characteristics of Viruses -  
 a. They are extremely small (10 to 1000 times smaller than bacteria) which can pass through porcelain filters.  
 b. They are obligate intracellular parasites.  
 c. They are composed of protein coat and genome of DNA or RNA.  
 d. They lack metabolic machinery for synthesis of their own nucleic acid and protein.  
 3. Sketch and label diagram of bacteriophage. (LHR-1-2015-A) (RWP-II-17)



4. What are pocks? (LHR-1-2016-A)  
 Ans. Pocks: -  
 a. They are pitted scars in the skin of the persons affected by small pox (Variola).  
 b. They are formed by bursting of pustules or pus blisters.  
 5. Write names of four common human viral diseases. (LHR-II-2016-A) (GRW-17-A)  
 Ans. Names of Four Common Human Viral Diseases -  
 a. Small pox  
 b. Herpes simplex  
 c. Influenza  
 d. Mumps

6. What are prions? (LHR-1-2017-A) (GRW-16-A) (RWP-1-17-A) (SAH-17-A)

Ans. Prions:-  
 Prions are infectious protein particles which can be passed from one individual to another.  
 It is composed of protein only that contains the information coding for its own replication.  
 It is responsible for mad cow infection and mysterious brain infection in man.

7. Write down symptoms and prevention of hepatitis. (GRW-2015-A)  
 Ans. A) Symptoms of Hepatitis:-  
 a. Jaundice (Acute stage)  
 b. Abdominal pain (Acute stage)  
 c. Liver enlargement (Acute stage)  
 d. Fatigue (Acute stage)  
 e. Loss of appetite (Acute stage)  
 f. Fever (Acute stage)  
 g. Liver damage (Chronic stage)  
 B) Prevention of Hepatitis:-  
 Hepatitis can be prevented by adopting hygienic measures, with routine vaccination and screening of blood/ organ/ tissue of the donor.  
 8. What is binomial nomenclature? (GRW-2018-A) (BWP-19) (FSD-14-A) (DCK-II-19) (SAH-14-A)  
 Ans. Binomial Nomenclature:-  
 It is a naming system devised by Linnaeus that uses two Latin names, generic name and specific name for each species of organisms.  
 Examples:- scientific name for human being is *Homo sapiens*, for onion is *Allium cepa*, for animal *Canis familiaris*, for potato *Solanum tuberosum* and for bacterial *Escherichia coli*.

9. What is herpes simplex? (MTN-2014-A)  
 Ans. Herpes Simplex:-  
 a. It is caused by Herpes virus which is large DNA virus. Herpes virus has envelope with spikes.  
 b. Herpes simplex is naturally occurring disease of mankind.  
 c. This disease is characterized by cold sores (for blisters), the vesicular lesions in the epithelial layers of ectodermal tissues, that form on lips, gums, nose and subject areas.  
 10. Write down the cause of measles and small pox. (MTN-1-2018-A)  
 Ans. A) Cause of Measles:-  
 Measles is caused by large enveloped RNA virus belonging to group Paramyxoviruses.  
 B) Cause of Small Pox:-  
 Small pox is caused by DNA enveloped virus called pox virus.

Solved Pgst Papers (2007-2019)

**11. Differentiate between Capsid and Capsomere.** (LHR-1-19-A) (MTN-II-2018-A, 19-A)

Capsid	Capsomeres
Capsids are protein coats around the genome of viruses which protect and give shape to the viruses.	Capsomeres are individual protein subunits of capsids that form the capsids and their number is characteristic for a particular virus.

12. What are Capsomeres? How many Capsomeres are present in the Capsids of Herpes Virus? (BWP-2018-A)  
 Ans. A) Capsomeres:-  
 Capsomeres are individual protein subunits of capsids that form the capsids and their number is characteristic for a particular virus.  
 B) Number of Capsomeres Present in the Capsids of Herpes Virus:-  
 162 Capsomeres  
 13. On the basis of morphology, how viruses are classified? (FSD-2015-A)  
 Ans. Classification of Viruses On the Basis of Morphology:-  
 On the basis of morphology, viruses are classified into:  
 a. Rod-shaped (e.g. TMV)  
 b. Spherical (e.g. Polio)  
 c. Tadpole like (e.g. Bacteriophages)  
 14. What are intracellular obligate parasites? Give example. (FSD-2017-A)  
 Ans. A) Intracellular Obligate Parasites:-  
 Intracellular obligate parasites are the organisms that grow only in the cells of their living host and cannot be grown on available defined growth culture medium.  
 B) Examples:-  
 a. Viruses:- intracellular obligate parasites that only grow inside the cells of plants or animals or inside microorganisms.  
 b. Mistlew and most rust species are also obligate parasites.  
 15. What is a virion? (FSD-2018-A)  
 Ans. Virion:-  
 a. It is a complete assembled virus outside its host cell.  
 b. It consists of nucleic acid (DNA or RNA) and a protein.  
 c. It is usually synonymous with virus that infects animals, plants or bacteria and causes a variety of diseases.  
 16. Differentiate betweenytic and lysogenic phage. (RWP-2014-A)

Lytic Phage	Lysogenic Phage
1. It lyses bacteria.	1. It does not lyses bacteria.
2. It form master slave relationship with bacterium.	2. It form host guest relationship with bacterium.
3. It replicates and forms new phages.	3. It excists for a time within the bacterium without replicating in.

**17. What are the rules of Binomial nomenclature?** (RWP-2018-A)

- Ans. Rules of Binomial Nomenclature -  
 a. Two Latin words are used for each species of organism.  
 b. First word belongs to genus of the organism and is called generic name, the first letter of generic name is capitalized and remainder is written in small letters.  
 c. The second word refers to one species within that genus and is known as specific name which is written in small letters.  
 d. Both words should be printed in italics but if this is not possible, they should be underlined.  
 18. What are intracellular obligate parasites? Comment. (SGD-2015-A)  
 Ans. Intracellular Obligate Parasite:-  
 a. Obligate parasites are the organisms that grow only in their living host and cannot be grown on available defined growth culture medium.  
 b. Viruses are intracellular obligate parasites that only grow inside the cells of plants or animals or inside microorganisms.  
 c. Mistlew and most rust species are also obligate parasites.

19. How Virion differs from Prion? (SGD-2016-A) (DCK-1-19-A)  
 Ans. Virion Different From Prion:-  

Virion	Prion
1. It is a complete assembled virus outside its host cell.	1. It is disease causing form of proteins only.
2. It consists of nucleic acid (DNA or RNA) and a protein.	2. Infectious protein particles.
3. It is usually synonymous with virus that infects animals, plants or bacteria and causes a variety of diseases.	3. It is the least understood organism which causes several kinds of brain diseases.

20. What are symptoms of AIDS? (SGD-2017-A)  
 Ans. Symptoms of AIDS:-  
 a. Rare Vascular Cancer  
 b. Sudden weight loss  
 c. Swollen lymph nodes  
 d. General loss of immune function.  
 21. What are prions? Name two diseases they cause. (DCK-K-1-2014-A)  
 Ans. A) Prions:-  
 Prions are infectious protein particles which can be passed from one individual to another.  
 B) Two Diseases Caused by Prions:-  
 a. Mad Cow Infection or Bovine Spongiform Encephalitis or BSE.  
 i. This disease occurred in Britain.  
 ii. The disease was caused by spread of prions from sheep to cattle.

iii. This occurred because of practice of processing unusable parts of sheep carcasses into a protein supplement that was fed to cattle.

b. Mysterious Brain Infection in Man or Creutzfeldt-Jacob Disease or CJD:-

- It is found throughout the world.
- Contaminated surgical instruments and tissue transplant such as corneal transplant are the most likely causes of transfer of prions from affected to uninfected persons.

(Note:- You may write only their names.)

22. What is HIV? (D.G.K-1-2018-A) (RWP-19-A)

Ans. HIV:-

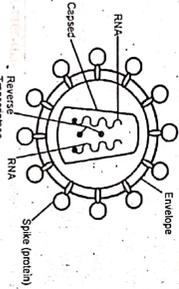
- HIV, acronym for human immune deficiency virus, is a retrovirus.
- It causes acquired immune deficiency syndrome (AIDS) in humans.

c. HIV consists of two molecules of RNA and two molecules of reverse transcriptase. A spherical protein capsid surrounds the genome and a lipid-protein envelope with spikes of protein lies outside capsid.

d. The major cell infected by HIV is the helper T-Lymphocyte which is a major component of immune system. Cells of nervous system can also be infected by HIV.

e. The HIV is spread by intimate sexual contact, contact with blood and breast feeding.

Labelled Diagram of HIV:-



23. Define capsid. (SHL-2015-A)

Ans. Capsid:-

- A surrounding coat or layer of protein that encloses the genome of virus is known as Capsid of Virus.
- The capsid is composed of one to a few different protein molecules repeated many times.
- Generally, capsid is subdivided into individual protein subunits called Capsomers. The number of capsomers is characteristic for a particular virus.
- The capsid protects the genome because the chemical construction of capsid amino acids resists temperature, pH, and other environmental fluctuations.
- It also gives shape to the virus and is responsible for the helical, icosahedral, or complex symmetry.

f. In some viruses, specialized enzymes are stored within the capsid that assist cell penetration during the replication process.

e. Capsid is the structure that stimulates an immune response during periods of disease.

24. What are capsomers and what is their number in adeno virus? (SHL-2015-A)

Ans. A) Capsomers:-

- Capsomers are subunits of a capsid.
- Number of capsomers is a characteristic of a particular virus.

B) Number of Capsomers in Adenovirus:-

252

### SECTION III

#### LONG QUESTIONS

- Write a detailed note on hepatitis. (SGD-19-A) (4)  
(LHR-1-2014-A) (DGK-1-19) (SAH-15-A) (MTN-1-17) (FSD-15-A)
- Define binomial nomenclature: (RWP-19-A) (4)  
(LHR-11-2014-A) (BWP-19-A) (4)
- Write a note on any two viral diseases. (LAH-2016-A) (4)  
(LHR-11-2016-A) (4)
- Describe some viral diseases, which are common in Pakistan. (LHR-11-2016-A) (4)
- Explain lytic cycle of bacteriophage. (LHR-1-2017-A, 11-18-A, 11-19-A) (SAH-16-A) (DGK-11-14, 15, 17, 19) (BWP-14, 16-A) (MTN-15, 19-A) (RWP-11-17, 18-A) (SGD-17-A) (GRW-2016-A) (FSD-17-A) (SAH-19-A) (4)
- Explain five kingdom classifications. (RWP-2016-A) (FSD-17-A) (SAH-19-A) (4)
- Explain the structure of bacteriophage. (GRW-2017-A) (MTN-1-18-A) (4)
- Describe Linnaeus system of Binomial Nomenclature in detail. (RWP-2015-A) (4)
- Illustrate the life cycle of Bacteriophage diagrammatically. (SGD-2017-A) (4)
- Describe lysogenic cycle in bacteriophages. (FSD-2018-A) (4)
- Write a note on AIDS. (LHR-11-19) (BWP-1-17-A) (MTN-11-2018-A) (LHR-11-18-A) (BWP-17-A) (DGK-11-16-A) (SGD-15-A) (BWP-2015-A) (4)
- How HIV is transmitted? (BWP-2015-A) (4)
- Write a note characteristics of Viruses. (BWP-2018-A) (DGK-1-15-A) (4)
- Draw infectious cycle of HIV. (DGK-1-2014-A) (GRW-14, 15-A) (DGK-1-18-A) (MTN-14, 11-17) (4)
- Write a note on Acquired Immune Deficiency Syndrome. (D.G.K-1-2017-A) (4)
- Explain structure of virus. (SAH-2017-A) (RWP-16-A) (MTN-16-A) (4)

### SECTION I

#### MULTIPLE CHOICE QUESTIONS

### C h a p t e r ----- 6

#### KINGDOM PROKARYOTAE (MONERA)

##### MCQs

- D From Prokaryotes**
- Which of the following is not found in all bacterial cells? (GRW-2006-A) (SAH-15-A) (4)
    - Cell membrane
    - Ribosome
    - Nucleoid
    - Capsule
  - A major locomotory structures in bacteria are: (LHR-1-2014-A) (FSD-15-A) (4)
    - Flagella
    - Fimbriae
    - Pili
    - Cilia
  - Bacterial endospores function in: (D.G.K.-2012-A) (4)
    - Reproduction
    - Protein synthesis
    - Survival
    - Storage
- 10 From Prokaryotes**
- Bacteria increase in number by sexual mean of reproduction: (LHR-1-2014-A) (FSD-15-A) (4)
    - Binary fission
    - Budding
    - Regeneration
    - Multiple fission
  - Pili are made of special protein called: (FSD-16-A) (4)
    - Peilin
    - Flagellin
    - Tubulin
    - Myosin
  - A bacterium with single polar flagellum is called: (LHR-11-2015-A) (MTN-16-A) (4)
    - Archieus
    - Monotrichous
    - Lophotrichous
    - Amphitrichous
  - The bacterium with a tuft of flagella at one pole is called: (LHR-1-2016-A, 11-14-A) (MTN-1-17-A) (FSD-14) (4)
    - Archieus
    - Monotrichous
    - Lophotrichous
    - Amphitrichous
  - The bacteria without any flagella are called: (LHR-11-2016, 17-A) (GRW-17-A) (SGD-16-A) (DGK-1-18-A) (4)
    - Archieus
    - Monotrichous
    - Lophotrichous
    - Peritrichous
  - When coot occur in pairs, their arrangement is: (LHR-11-2018-A) (4)
    - Tetrad
    - Diplococcus
    - Sarcina
    - Streptococci
- 7) When tuft of flagella is present at each of two poles in bacteria, it is known as: (GRW-2014-A) (4)
  - Archieus
  - Lophotrichous
  - Peritrichous
  - Amphitrichous
- 8) Which is an anaerobic bacterium? (GRW-2015-A) (4)
  - E.coli
  - Spirrochetes
  - Campylobacter
  - Pseudomonas
- 9) Important vector in modern genetic engineering is: (GRW-2016-A) (4)
  - Nucleoid
  - Mitosome
  - Ribosome
  - Plasmid
- 10) Conjugation in bacteria is promoted by: (GRW-2018-A) (DGK-1-15-A) (4)
  - Flagella
  - Pili
  - Cilia
  - Ganetes
- 11) Which one of the following is an aerobic bacterium: (RWP-2014-A) (MTN-14-A) (LHR-15-A) (4)
  - E.coli
  - Spirrochetes
  - Campylobacter
  - Pseudomonas
- 12) Curved or comma shaped bacteria are called: (RWP-2015-A) (4)
  - Vibrio
  - Spirillum
  - Spirrochetes
  - Bacilli
- 13) The bacteria which can grow either in the presence or absence of oxygen are called: (RWP-2016-A) (SAH-14-A) (4)
  - Facultative bacteria
  - Aerobic bacteria
  - Micraerophilic bacteria
  - Anaerobic bacteria
- 14) Reserve food material in the cyanobacteria is in the form of: (RWP-11-2017-A, 18-A, 19-A) (SGD-15-A) (DGK-11-16-A) (4)
  - Sucrose
  - Starch
  - Glycogen
  - Protein
- 15) Bacterial flagella originate from: (SGD-2017-A) (4)
  - Cell wall
  - Basal body
  - Capsule
  - Slime
- 16) A cube of 8 coct is termed as: (MTN-11-17-A) (SGD-2018-A, 19-A) (4)
  - Tetrad
  - Streptococcus
  - Diplococcus
  - Sarcina
- 17) Bacteria divide at exponential rate during: (FSD-2017-A) (DGK-1-1) (4)
  - Stationary phase
  - Decline phase
  - Log phase
  - Lag phase
- 18) Peptidoglycan is absent in: (MTN-2015) (4)
  - Eubacteria
  - Cyano bacteria
  - Archieo bacteria
  - Gram negative bacter

- 19) Cysts are dominant, thick-walled, desiccation resistant forms and develop during: (MTN-I-2018-A)
- Late stage of cell growth
  - Differentiation of vegetative cells
  - Differentiation of reproductive cells
  - During conjugation
- 20) The interval of time until the completion of next division is known as: (MTN-II-2018-A)
- Interphase
  - Generation time
  - Reproductive time
  - Growth
- 21) *E. coli* is an example of: (BWP-2014-A)
- Aerobic Bacterium
  - Anaerobic Bacterium
  - Facultative Anaerobic Bacterium
  - Microaerophilic Bacterium
- 22) A square of 4 cocci is termed as: (BWP-2015-A)
- Tetrad
  - Tetrose
  - Pentoses
  - Hexoses
- 23) Rod Shaped Bacteria are called: (BWP-2016-A)
- Cocci
  - Bacilli
  - Spirilla
  - Vibrio
- 24) Oval Shaped Bacteria are: (BWP-2017-A)
- Spirilla
  - Vibrio
  - Cocci
  - Bacilli
- 25) Pili are primarily involved in: (BWP-2018-A)
- Parthenogenesis
  - Vaccination
  - Conjugation
  - Mortality
- 26) Chemical substances used on living tissues that inhibit the growth of micro organisms are called: (D.G.K-Group-I-2014-A)
- Disinfectants
  - Antiseptics
  - Chemotherapeutic agents
  - Antibiotics
- 27) Some bacteria transfer genetic material from a donor to recipient bacteria during a process: (D.G.K-II-2014-A)
- Binary fission
  - Budding
  - Regeneration
  - Conjugation
- 28) Bacterial pathogenicity is due to: (D.G.K-II-2015-A)
- Cell wall
  - Capsule
  - Slime
  - Cell envelope all
- 29) Cell wall is absent in: (SAH-2015-A) (LHR-II-19-A)
- E. coli*
  - Mycoplasma*
  - Vibrio
  - Spirochete*
- 30) Rapid phase of growth of Bacteria is: (MTN-I-19-A)
- Lag phase
  - Log phase
  - Stationary phase
  - Death / Decline phase

## III - From Entry Test:

- 1) Which of the following are spiral-shaped bacteria? (Entry Test-2009)
- Cocci
  - Pseudomonas*
  - Bacilli
  - Vibrio
- 2) Name the structure involved in DNA replication: (Entry Test-2009)
- Cysts
  - Ribosomes
  - Mesosomes
  - Spores
- 3) Name the Cyanobacteria which are helpful in fixing atmospheric nitrogen: (Entry Test-2009)
- Heterocyst
  - Akinetes
  - Nostoc
  - Hormogonium
- 4) The most ancient bacteria are: (Entrance Self-Test-2011)
- Eubacteria
  - Escherichia coli*
  - Archaeobacteria
  - Streptococci
- 5) The bacteria that cause diseases in human beings, are called: (Entrance Self-Test-2011)
- Photosynthetic bacteria
  - Facultative bacteria
  - Chemosynthetic bacteria
  - Pathogenic bacteria
- 6) Chemicals produced by microorganisms which are capable of destroying the growth of microbes are called: (Entry Test-2012)
- Antigens
  - Antiseptics
  - Disinfectants
  - Antibiotics
- 7) Most widespread problem of antibiotics misuse is: (Entry Test-2012)
- Rapid outbreak
  - Disturbance of metabolism
  - Increased resistance in pathogens
  - Immunity
- 8) Mesosomes are infoldings of the cell membrane and are involved in: (Entry Test-2012)
- DNA replication
  - Protein synthesis
  - RNA synthesis
  - Metabolism
- 9) Which statement about bacteria is true: (Entrance Test-2013)
- Gram positive bacteria have more lipids in their cell wall
  - Gram negative bacteria have more lipids in their cell wall
  - Lipids are absent in cell wall of both gram positive and gram negative bacteria
  - Both have equal amount of lipids
- 10) Antibiotics are produced by fungi and certain bacteria of group: (Entrance Test-2013)
- Actinomycetes
  - Ascomycetes
  - Oomycetes
  - Basidiomycetes
- 11) Treatment by using attenuated culture of bacteria is called: (Entrance Test-2014)
- Chemotherapy
  - Antisepsis
  - Sterilization
  - Vaccination

SECTION II  
SHORT QUESTIONS

1 SQ

## From Exercise:

5. List functions that the cell membrane performs in bacteria. Following functions cell membrane performs in bacteria:
- Ans.
- Regulation of transport of proteins, nutrients, sugar and electrons or other metabolites.
  - Respiratory metabolism
  - Endocytosis
  - Exocytosis
  - Homeostasis
6. What are mesosomes and some of their possible functions?
- Ans. A) Mesosomes: - Mesosomes are invagination of cell membrane into the cytoplasm and are in the form of vesicles, tubules or lamellae.
- B) Some Possible Functions of Mesosomes: - Their Function is to help in DNA replication, cell division, respiration and in export of exocellular enzymes.
7. What is unique about the structure of bacterial ribosome?
- Ans. They are smaller than eukaryotic ribosomes and are of 70 S.
8. Draw three bacterial shapes.
- Ans.
- Spherical shaped called Cocci
  - Rod shaped called Bacilli
  - Spiral shaped called Spirilla
9. Name the bacterium that has no cell wall.
- Ans. *Mycoplasma* is the bacterium that has no cell wall.
10. A Gram stain discharge from an abscess shows cocci in regular, grape like clusters. What is the most likely genus of this bacterium?
- Ans. Genus of Grape like Cocci: - The genus of this bacterium is *Staphylococcus*.
11. Draw an outline and label.
- Streptobacilli
  - Diplococci
  - Staphylococci
- 12) Which one of the following antibiotic causes permanent discoloration of teeth in young children if it is misused? (Entrance Test-2014)
- Penicillin
  - Sulfonamide
  - Streptomycin
  - Tetracycline
- 13) Which one of the following edible products is widely pasteurized? (Entrance Test-2015)
- Soft drinks
  - Milk
  - Mango squash
  - Orange Juice
- 14) Cyanobacteria are: (Entrance Test-2015)
- Photoautotrophic bacteria
  - Chemosynthetic bacteria
  - Saprotrophic bacteria
  - Parasitic bacteria
- 15) During unfavorable conditions, certain bacteria produce: (Entrance Test-2015)
- Ribosomes
  - Mitochondria
  - Plasmids
  - Spores
- 16) Many bacteria are motile due to the presence of: (Entrance Test-2016)
- Flagella
  - Cilia
  - Pilli
  - Microtubules
- 17) \_\_\_\_\_ is an invagination of cell membrane which helps in cell division: (Entrance Test-2016)
- Fimbriae
  - Mesosome
  - Nucleoid
  - Endospore
- 18) DNA molecule in prokaryotes is: (Entry Test-2017)
- Single, circular, double stranded molecule not bound by membrane
  - Double, circular molecule
  - Linear double stranded molecule
  - Single, circular, double stranded, membrane bound
- 19) Nucleoid is a structure not found in: (Entry Test-2017)
- Compylobacter*
  - Spirochete*
  - Cyanobacter*
  - Goblet cells
- 20) Cell wall structure of a cell of unknown origin was studied and was found to contain polysaccharide chain linked with short chain of amino acid. What do you think it can be? (Entry Test-2017)
- Bacteria
  - Algae
  - Fungi cell
  - Cortex cells
- 21) Functionally mesosomes can be compared with: (Entry Test-2017)
- Ribosomes
  - Polysomes
  - Mitochondria
  - Golgi-bodies
- 22) Binary fission is a characteristic cell division not found in: (Entry Test-2017)
- Pseudomonas*
  - Euglena*
  - Compylobacter*
  - E. coli*

ii) Diplococci:



iii) Staphylococci:



12. You observe a culture of predominantly round (presumably spherical) bacteria that though apparently fully divided, nevertheless have failed to separate, thus resulting in long chain of cells. What, generally, might you call such an arrangement?

Ans. Name of Long Chain of Cells: -

Such an arrangement is called Streptococci.

13. Match the following descriptions with the best answer.

- a) Division in one plane; cocci arranged in pairs a) Bacilli
- b) Division in one plane; cocci arranged in chains b) Streptobacillus
- c) Division in two planes; cocci arranged in a square c) Spirochete four
- d) Division in one plane; rods completely separate d) Spirillum after division
- e) Division in plane; rods arranged in chains e) Vibrio
- f) A comma shaped bacterium f) Streptococcus
- g) A thin, flexible spiral g) Staphylococcus
- h) A thick, rigid spiral h) Diplococcus
- i) Tetrad
- j) Sarcina

Ans. Matching With The Best Answer: -

- a) Division in one plane; cocci arranged in pairs h) Diplococcus
- b) Division in one plane; cocci arranged in chain --f) Streptococcus
- c) Division in one plane; cocci arranged in a square of four --i) Tetrad
- d) Division in one plane; rods completely separate after division --a) Bacilli
- e) Division in one plane; rods arranged in chain --b) Streptobacillus
- f) A comma shaped bacterium e) Vibrio
- g) A thin, flexible spiral c) Spirochete
- h) A thick rigid spiral d) Spirillum

**(II) From Punjab Boards:-**

1. Differentiate between streptococcus and staphylococcus bacteria. (LHR-I-2014-A)

Streptococi	Staphylococci
1. They are straight chains of spherical bacteria.	1. They are irregular grape-like clusters of spherical bacteria.
2. When division of bacterial cells occurs in one plane, it may produce a streptococcus arrangement.	2. When division of bacterial cells occurs in random planes, it will produce a staphylococcus arrangement.

2. Differentiate between gram-positive and gram-negative bacteria. (LHR-II-2014-A) (MTN-16-A) (FSD-17, 18-A) (SAH-14-A)

Ans.

Gram Positive Bacteria	Gram Negative Bacteria.
1. Gram Positive Bacteria are blue purple because they retain crystal violet stain (primary stain in Gram staining technique).	1. Gram Negative Bacteria appear as orange or red because they lose primary stain when they are rinsed with 95 percent alcohol and accept safranin (secondary stain in Gram staining technique).
2. Their cell wall is 20-80 nm thick and consists of thick layer of peptidoglycan (50%), an additional polysaccharide, the teichoic acid, and lipoteichoic acid. Lipid contents are only 1-4%. Cell wall is not surrounded by an outer membrane.	2. Their cell wall is 8-11 nm thick and consists of thin layer of peptidoglycan (only 10%), lipopolysaccharides and lipoprotein. Lipid contents are 11-12%. Cell wall is also surrounded by an outer membrane.
<b>Examples:-</b> Spore forming bacilli and many cocci	<b>Example:-</b> Many intestinal bacilli and few cocci

3. What is periplasmic space? In which bacteria it is present? (LHR-I-2015-A)

Ans. A) Periplasmic Space: -

It is the space present between the cell membrane and the cell wall.

B) In Which Bacteria Periplasmic Space Is Present: -

Periplasmic space is present in all Gram-negative bacteria but in some Gram positive bacteria.

4. Name three general shapes of bacteria and explain only one. (LHR-II-2015-A, 19-A)

Ans. A) Names of Three General Shapes of Bacteria: -

- a. Cocci ----- Spherical bacteria
- b. Bacilli ----- Rod shaped bacteria
- c. Spirilla, Vibrio or Spiral ----- Spiral or comma shaped bacteria

B) Explanation of One Shape of Bacteria i.e. Cocci: -

- a. Cocci are spherical or oval bacteria.
- 2. They have one of several distinct arrangements based on their planes of division:
  - a. If division is one it will produce either a diplococcus (when cocci occur in pairs) or streptococcus (when cocci form long chain of cells) arrangement.

- b. When plane of cell is in two planes, it will produce a tetrad (a square of four cocci) arrangement.
- c. When division in three planes, it will produce a cubical (a cube of eight cocci) arrangement.
- d. When division occurs in random plane, it will produce a staphylococcus (when cocci are arranged in irregular, often grape like clusters) arrangement.

5. Write down misuses of antibiotics. (LHR-II-2016-A) (GRW-14-A) (MTN-I-18-A)

Ans. Misuses of Antibiotics:-

- a. Penicillin can cause allergic reactions.
- b. Streptomycin can affect auditory nerve causing deafness.
- c. Tetracycline can cause discoloration of teeth.
- 6. What are pili, give their functions. (LHR-II-2016-A) (DGK-II-14-A) (FSD-16-A) (RWP-15-A)

Ans. A) Pili: -

- a. Pili are hollow, non-helical, filamentous appendages.
- b. They appear as short flagella but have no function in motility.
- c. Pili are primarily found on Gram-negative bacteria such as *Neisseria gonorrhoeae*, the causative agent of gonorrhoea.
- d. Pili are composed of Pilin protein.

B) Functions of Pili: -

- a. Certain elongated pili, called sex pili aid transfer of genetic material among bacteria during conjugation.
- b. They help bacteria adhere to certain surfaces such as the cell they infect. As attachment structures, pili enhance the organism's ability to cause disease.

7. Differentiate between tetrad and sarcina. (LHR-I-2017-A)

Ans.

Tetrad	Sarcina
1. Tetrad is a square of four cocci.	1. Sarcina is a cube of eight cocci.
2. When the division of bacterial cells is in two planes, it will produce a tetrad arrangement.	2. When division of bacterial cells is in three planes, it will produce a sarcina arrangement.

8. Differentiate between amphitrichous and peritrichous. (LHR-I-2018-A) (MTN-19-A)

Ans.

Amphitrichous	Peritrichous
Amphitrichous bacteria are characterized by groups (or tuft) of flagella at both ends.	Peritrichous bacteria are covered with flagella or surrounded by flagella.

9. What are mesosomes? Write their role. (FSD-14-A) (GRW-2015-A) (RWP-16, 17-A) (SGD-16, 17-A)

Ans. A) Mesosome: -

Mesosomes are invagination of cell membrane into the cytoplasm which are in the form of vesicles, tubules or lamellae.

B) Role of Mesosome: -

- a. It serves as an anchor for the attachment of DNA during replication.
- b. It serves as a site for enzymes that function in cell wall synthesis.
- c. It is involved in DNA replication.
- d. It is involved in cell division.
- e. It is also involved in export of extracellular enzymes.
- f. Respiratory enzymes are also present on the mesosome.

10. Differentiate between microbicidal and microbistatic effects. (GRW-2017-A) (SGD-15-A)

Ans.

Microbicidal Effects of Chemicals	Microbistatic Effects of Chemicals
1. Microbicidal Effects of Chemicals are one that kill microbes immediately.	1. Microbicidal Effects of Chemicals are one that temporarily prevent further multiplication of microbes without necessarily killing them.
2. A microbicidal chemical or microbistatic agent may inactivate the enzymes of a microbe and interfere with its metabolism so that it dies.	2. A microbistatic chemical Or microbistatic agent disrupts minor chemical reaction and slows the metabolism resulting in a longer time between divisions.

11. What are plasmids?

(GRW-2018-A) (SAH-15, 16-A) (DGK-II-19-A)

Ans. Plasmids: -

- a. Plasmids are circular, double stranded DNA molecules in addition to chromosomes.
- b. They are self-replicating.
- c. They are not essential for growth and metabolism.
- d. They often contain drug resistance, heavy metal, disease and insect resistant genes on them.
- e. They are important vectors in modern genetic engineering techniques.

12. Name the bacteria, which are photosynthetic. (MTN-2014-A)

Ans. Names of Photosynthetic Bacteria:

- a. Purple sulfur bacteria.
- b. Green sulfur bacteria.
- c. Purple non-sulfur bacteria.

13. Give structure and composition of bacterial cell wall.

(MTN-II-2017-A)

Ans. Bacterial cell wall is a multilayered structure located external to the cytoplasmic membrane. It is composed of an inner layer of peptidoglycan and outer membrane that varies in thickness and chemical composition depending upon the bacterial type. Peptidoglycan is composed of frame work of long glycan chains cross-linked with peptide fragments.

14. Differentiate between Antibiotics and Antiseptics with examples. (MTN-II-2018-A)

Antibiotics	Antiseptics
<p>1. Chemical agents which are used to destroy or inhibit the growth of microorganisms in living tissues.</p> <p>2. They work with natural defense and stop the growth of bacteria and other microbes.</p> <p>Examples: - Sulfonamides, penicillin, tetracycline etc.</p>	<p>1. Chemical agents used to destroy pathogens on living object such as a tissue of human body are known as Antiseptics.</p> <p>2. Antiseptics are used on body tissues such as on a wound or before piercing the skin to take blood.</p> <p>Examples: - Tincture of iodine, silver nitrate, 70 % ethyl alcohol etc.</p>

15. Write down any two characteristics of cyanobacteria. (RWP-2014-A)

Ans. Two Characteristics of Cyanobacteria: -

- Their reserve food material is glycogen.
- They reproduce asexually by hormogonia, akinetes or by fragmentation at heterocysts.

16. What are chemosynthetic bacteria? Give their function. (RWP-2018-A)

Ans. A) Chemosynthetic Bacteria: -

Chemosynthetic bacteria are organisms that use inorganic molecules as a source of energy and convert them into organic substances.

B) Function of Chemosynthetic Bacteria: -

They oxidize compounds like ammonia, nitrate, nitrite, sulfur or ferrous iron and trap the energy thus released for their synthetic reactions.

For example, *Nitrosomonas* convert ammonium ions into nitrite ions under aerobic conditions and in the process obtain ATP. This ATP is then used to fix atmospheric carbon dioxide into carbohydrates in a process known as chemosynthesis.

17. What are different types of respiration in bacteria? (D.G.K-I-2014-A) (SAH-19-A)

Ans. Different Types of Respiration in Bacteria:-

- Aerobic respiration - oxygen is required e.g. *Pseudomonas*.
- Aerobic respiration - Oxygen is not needed e.g. *Spirochete*.

c. Facultative respiration - Respiration occurs both in the presence or absence of oxygen.

e.g. *E.coli*

d. Microaerophilic respiration - Respiration occurs in the low concentration of oxygen.

e.g. *Compylobacter*

18. What is peptidoglycan? (D.G.K-I-2015-A)

Ans. Peptidoglycan: -

a. It is a unique macromolecule found in the cell walls of most bacteria. It is absent in the cell walls of archeobacteria.

b. Its amount varies in different types of bacteria. Gram positive bacteria have upto 70 % of it while Gram negative bacteria have 10 % of it.

c. It is composed of framework of long glycan chains cross-linked with peptide fragments.

19. Discuss the role of Edward Jenner in vaccination method of treatment. (D.G.K-II-2015-A)

Ans. Role of Edward Jenner in Vaccination Method of Treatment: -

Edward Jenner in 1796 successfully vaccinated a boy named Phipps against small pox. Jenner had learned that milkmaids who contracted cowpox from the cows, they milked, never subsequently contracted the much more virulent small pox. Accordingly he tested this hypothesis by inoculating young boy first with cow pox causing material and later with small pox causing material. The boy did not get small pox.

20. What is difference between bacterial cell membrane and eukaryotic cell membrane? (D.G.K-II-2016-A)

Ans. Difference between Bacterial Cell Membrane and Eukaryotic Cell Membrane: -

Bacterial Cell Membrane	Eukaryotic Cell Membrane
1. It lacks sterol such as cholesterol.	1. It contains cholesterol.
2. It contains enzymes for respiratory metabolism.	2. It lacks enzymes.

21. Write down the role of pili in bacteria. (D.G.K-I-2018-A)

Ans. Role of Pili in Bacteria: -

Functions of Pili: -

- Certain elongated pili, called sex pili aid transfer of genetic material among bacteria during conjugation.
- They help bacteria adhere to certain surfaces such as the cell they infect. As attachment structures, pili enhance the organism's ability to cause disease.

22. Differentiate between flagellum and flagellin. (D.G.K-II-2018-A)

Flagellum	Flagellin
Flagellum is extremely thin, hair like appendage found in bacteria and other unicellular organisms as locomotory organelle.	Flagellin is a protein from which a flagellum is made up of.

### SECTION III LONG QUESTIONS

- Classify the bacteria with reference to presence of flagella. (LHR-I-2014-A) (GRW-15, 18-A) (4)
- Write down the characteristics of cyanobacteria. (4)  
(LHR-II-2014, 19-A) (RWP-16-A) (SGD-15-A)  
(FSD-14-A) (DGK-I-14, II-15-A)
- Differentiate between gram positive and gram negative bacteria. (LHR-II-2016-A) (SGD-16-A) (4)
- Discuss the use and misuse of antibiotics. (4)  
(LHR-I-2017-A) (FSD-17-A) (MTN-15, 16-A)  
(BWP-14, 16, 17-A)
- Give general characters of cyanobacteria. (4)  
(RWP-2015-A) (DGK-II-19-A)
- Write physical and chemical methods to control bacteria. (4)  
(RWP-2018-A)
- Explain physical methods of Control of bacteria. (4)  
(SGD-2018-A)
- Discuss about bacterial cell wall. (4)  
(FSD-2015-A) (MTN-17)
- Describe different physical and chemical methods to control bacteria. (MTN-2014, 19-A) (RWP-14-A) (4)  
(DGK-I-19-A) (GRW-17-A) (DGK-II-16-A)
- Describe structure of a Bacteriophage. (4)  
(MTN-I-2018-A)
- Write down the main characteristics and economic importance of cyanobacteria. (MTN-II-2018-A)  
(DGK-I-15-A, II-17, 18-A)
- Explain Respiration in Bacteria. (BWP-2018-A) (4)
- Write a detail note on nutrition of bacteria. (4)  
(D.G.K-II-2014-A)
- Write a note on cyanobacteria. (4)  
(D.G.K-I-2015-A) (SAH-19-A)
- Write a note on nutrition in Bacteria. (4)  
(D.G.K-II-14-A, I-2018-A) (GRW-14, 16-A) (SGD-17-A)  
(LHR-II-15, I-16-A, II-18-A, I-19) (SAH-14, 15, 16-A)  
(BWP-15-A) (FSD-16-A) (RWP-I, II-17-A)
- Give an account of growth and reproduction in bacteria. (LHR-I-15-A) (SAH-2017-A) (SGD-19-A)  
(DGK-I-17-A) (FSD-18-A)

### SECTION I MULTIPLE CHOICE QUESTIONS

## Chapter --- 7 THE KINGDOM PROTISTA (PROTOCTESTA)

### MCQs

#### I) From Exercise:-

- Amoebas move and obtain food by means of: (MTN-II-18-A)
    - Plasmodium
    - Flagella
    - Cilia
    - Pseudopodia
    - Gametangia
  - The sexual process exhibited by most ciliates is called: (SAH-16-A)
    - Oogamy
    - Binary fission
    - Conjugation
    - Fertilization
    - Zygote
  - Algae in which body is differentiated into blades, stipes and holdfast belong to:
    - Golden algae
    - Diatoms
    - Kelps
    - Euglenoids
    - Green algae
  - Chlorophyll a, chlorophyll b and carotenoids are found in:
    - Green algae, golden algae and diatoms
    - Green algae, golden algae and euglenoids
    - Green algae, euglenoids and plants
    - Red algae, euglenoids and brown algae
    - Red algae, golden algae and plants
  - The feeding stage of a slime mold is called: (DGK-II-14, 15-A) (FSD-16-A) (SGD-17-A) (RWP-18-A)
    - Mycelium
    - Pseudopodium
    - Hyphae
    - Plasmodium
    - Rhizoids
  - Cell wall in Oomycetes is chemically composed of
    - Cellulose
    - Chitin
    - Proteins
    - Lignin
    - Proteins and some carbohydrates
- #### II) From Punjab Boards:-
- Entamoeba histolytica* cause amoebic: (LHR-I-2014-A) (GRW)
    - Cholera
    - Fever
    - Dysentery
    - Migraine

- 2) Algae, in which body is differentiated into blades, stripes and hold fast, belong to: (LHR-II-2014-A)
- a) Golden algae      b) Diatoms  
c) Brown algae      c) Green algae
- 3) The causative agent of African sleeping sickness is: (LHR-I-2015-A) (MTN-I-17-A)
- a) Tsetse fly      b) Mosquito  
c) *Trypanosoma*      d) *Trichonympha*
- 4) An outer flexible covering of ciliates is: (LHR-II-2015-A) (RWP-14-A) (GRW-15-A)
- a) Sheath      b) Cuticle  
c) Cell wall      d) Pellicle
- 5) A unicellular, non-motile green alga is: (LHR-I-2017-A)
- a) Volvox      b) Ulva  
c) *Chlorella*      d) Kelps
- 6) The classification of algae into phyla is largely based on the composition of: (LHR-II-2018-A)
- a) Cell wall      b) Cell membrane  
c) Cytoplasm      d) Pigments
- 7) *Trypanosoma* is an example of: (GRW-2014-A) (MTN-II-17-A) (LHR-II-19-A)
- a) Actinopods      b) Zooflagellates  
c) Apicomplexans      d) Ciliates
- 8) The edible algae is: (GRW-2017-A)
- a) Mushroom      b) Kelps  
c) Diatoms      d) Dinoflagellates
- 9) Amebic dysentery in humans is caused by: (RWP-II-2017-A)
- a) *Amoeba*      b) *Entamoeba histolytica*  
c) *Trypanosoma*      d) *Plasmodium*
- 10) The protozoans have two kinds of nuclei are: (SGD-2018-A)
- a) Amoeba      b) Zooflagellates  
c) Ciliates      d) Actinopods
- 11) On or more, small diploid micronuclei of ciliates function in: (FSD-2014-A)
- a) Metabolism      b) Growth  
c) Sexual process      d) Excretion
- 12) The protozoans having two kinds of nuclei: (FSD-2015-A)
- a) Amoebae      b) Zooflagellates  
c) Ciliates      d) Actinopods
- 13) Algae which take part in building coral reefs along with coral animals: (FSD-2017-A)
- a) Red algae      b) Brown algae  
c) Green algae      d) Diatoms
- 14) Margulis and Shwartz accommodate the diverse assemblage of organisms of Protista into: (MTN-2016-A)
- a) 37 Phyla      b) 27 Phyla  
c) 10 Phyla      d) 5 Phyla

- 15) One of the most unusual protest phyla is that of: (MTN-I-2018-A)
- a) Zooflagellates      b) Euglenoids  
c) Dinoflagellates      d) Apicomplexa
- 16) *Polysiphonia* is an example of: (BWP-2014-A)
- a) Red algae      b) Green algae  
c) Brown algae      d) Diatoms
- 17) Kingdom Protocista was proposed by: (D.G.K-I-2014-A)
- a) Herbert Copland      b) John Hogg  
c) Robert Whittaker      d) Margulis and Schwartz
- 18) Sleeping sickness is spread by: (D.G.K-II-2016-A, I, II-17-A)
- a) Tsetse fly      b) *Trypanosoma*  
c) Mosquito      d) *Plasmodium*
- 19) Length of brown algae range from few centimeters to: (D.G.K.II-2018-A)
- a) 170 meters      b) 75 meters  
c) 70 cm      d) 75 cm
- 20) Giants of the protists kingdom are included in: (SHL-2015-A)
- a) Brown algae      b) Red algae  
c) Green algae      d) Diatoms
- 21) *Phytophthora infestans* belongs to the group: (SHL-2017-A)
- a) Myxomycota      b) Oomycetes  
c) Euglenoids      d) Rhodophyta
- 22) *Pelomyxa Palustris* is commonly called: (SGD-I-19-A)
- a) Entamoeba      b) *Trypanosoma*  
c) *Trichonympha*      d) Giant amoeba
- 23) Most green algae possess cell walls with: (MTN-I-19-A)
- a) Cellulose      b) Chitin  
c) Silica      d) Pectin
- 24) *Pelomyxa palustris* is an example of: (RWP-I-19-A)
- a) Bacterium      b) Ciliate  
c) Algae      d) Amoeba
- 25) *Trypanosoma* is an example of: (LHR-II-19-A)
- a) Amoeba      b) Zooflagellates  
c) Ciliates      d) Foraminiferan
- III. From Entry Test:**
- 1) The African sleeping sickness is caused by: (Entry Test 2009, 2013)
- a) *Entamoeba histolytica*  
b) *Trypanosoma*      c) Zooflagellates  
d) Ciliates
- 2) Which of the following may build coral reefs along with coral animals? (Entry Test 2009)
- a) Myxomycota      c) Green algae  
b) Brown algae      d) Red algae

## SECTION II

### SHORT QUESTIONS

4 SQs

**From Exercise:**

1. Write two characteristics of each of the following groups:
- i) Protozoa      iv) Slime Mold
1. Two Characteristics of Each Of The Following Groups: -
- i) PROTOZOA: -
- a. They are unicellular organisms.  
b. Like animals, they are ingestive heterotrophs i.e. they ingest their food by endocytosis.
- iv) SLIME MOLDS: -
- a. A slime mold consists of a naked mass of cytoplasm having many nuclei that creeps over damp, decaying logs and leaf litter.  
b. Slime mold, during unfavorable conditions, forms resistant spores by meiosis within stalk sporangia.

**II) From Punjab Boards:**

1. Write down the functions of micronuclei and macronuclei found in ciliates. (LHR-I-2014-A) (SAH-14-A) (FSD-17-A) (DGK-17-A) (GRW-15-A) (BWP-15-A)
- Ans. A) Function of Micronuclei Found in Ciliates  
They function in sexual process.
- B) Function of Macronuclei Found in Ciliates:  
They control cell metabolism and growth.
2. Write down four characters of green algae similar to those of plants. (LHR-I-2014-A)
- Ans. Four Characters of Green Algae Similar To Those of Plants: -
- a. Green algae have RNA sequencing similar to plants.  
b. Green algae have starch as reserve material similar to plants.  
c. Algae have pigments chl. a and chl. b and carotenoids similar to land plants.  
d. Algae have cellulose cell walls similar to plants.
3. Write down two differences between fungi and oomycetes. (LHR-I-2014-A)
- Ans. Two Differences Between Fungi And Oomycetes: -

Fungi	Oomycetes
1. Fungi have cell wall of chitin	1. Oomycetes have cell wall of cellulose.
2. Fungi lack centrioles	2. Oomycetes have centrioles.

4. What are choanoflagellates? (FSD-16-A) (RWP-18-A) (LHR-I-2014-A II-15-A) (DGK-II-14, I-17-A) (MTN-14-A) (BWP-19-A) (SAH-15, 16, 19)

Ans. Choano flagellates: -

- a. They are free living marine and fresh water zooflagellates.  
b. They are colonial and sessile.  
c. Each colony is permanently attached by a thin stalk to bacteria rich debris, each cell of which is 5 to 10 um long with a collar surrounding a single flagellum.  
d. They have evolutionary significance as their cells resemble collar cells of sponges.
5. Give two examples of chlorophyta. (LHR-II-2014-A)

Ans. Two Examples of Chlorophyta:

- a. *Chlorella*  
b. *Ulva*

6. Give two differences between fungus like protista and fungi. (LHR-II-2014-A) (DGK-I-19-A)

Ans. Two Differences Between Fungus Like Protists

And Fungi: -

Fungus Like Protists	Fungi
1. They have centrioles.	1. They lack centrioles.
2. They have cell walls of cellulose.	2. They have cell walls of chitin.

7. What are red tides? (LHR-I-2015-A) (GRW-15, 16-A) (FSD-17-A) (RWP-I-17-A)

Ans. Red Tides: -

Red Tide is an occasional population explosion, or bloom of few dinoflagellates which frequently colors coastal water orange, red, or brown. Some dinoflagellates that form red tide produce a toxin that attacks the nervous system of fishes, leading to fish kills. Birds sometimes die when exposed to toxin by eating dead fish.

8. What is the importance of trichonymphs? (LHR-I-2015-A)

Ans. Importance of Trichonymphs: -

Trichonymphs, living in the gut of termites, help in the digestion of dry wood eaten by termites.

9. What was the infamous role played by *Phytophthora infestans* in human history? (LHR-I-2015-A, II-16-A)

(BWP-18-A) (FSD-16, 18-A) (DGK-I-19-A)

Ans. *Phytophthora infestans*, causes the disease late blight of potatoes. In Ireland, in 1840's (1845 and 1847), it multiplied unchecked in several summers in Ireland causing potato tubers to rot in the field. Since potatoes were the staple of Irish peasants diet, a famine resulted. During the famine, 250,000 to one million people starved to death or died of diseases complicated by starvation. Millions of Irish people migrated to the United States and elsewhere as a result of this disease.

10. How algae differ from plants? (LHR-I-2015-A)

Algae	Plants
1. They have unicellular sex organs.	1. They have multi cellular sex organs.
2. Fertilization is external.	2. Fertilization is internal within the female body.
3. Zygote is not protected by the parent body and it does not develop into embryo.	3. Plant zygote grows into multi cellular embryo that is protected by parental tissue.

11. Write down two characters of ciliates. (LHR-II-2015-A)

Ans. Two Characters of Ciliates:-

A) Name of a Parasitic Amoeba:-

*Entamoeba histolytica*

B) Disease Caused by Parasitic Amoeba:-

Amebiasis, the one form of which is Amebic Dysentery.

12. Name the body size and locomotory organs of zooflagellates. (LHR-I-2016-A)

Ans. A) Names of Body Shape of Zooflagellate:-  
Spherical or Elongated

B) Name of Locomotory Organs of Zooflagellates:-  
Flagella

13. What is sleeping sickness? (LHR-I-2016-A)

Ans. Sleeping Sickness:-

- Sleeping sickness is a disease caused by two species of *Trypanosoma*, a parasitic zooflagellate.
- This disease is found in humans only in Africa.
- It is transmitted by the bite of infected Tsetse fly.
- In sleeping sickness, parasites first enter into the blood stream, into lymphatic system and then in the brain. As the trypanosomes invade brain, the patient slips into coma and dies.

14. What are protists, how they are different from plant and animal? (LHR-II-2016-A)

Ans. A) Protists:-

Protista is defined by exclusion i.e., all members characteristics that exclude them from other four kingdoms. They are unicellular, colonial or simple multi cellular organisms that possess a eukaryotic cell organization.

B) Protists Different From Plant and Animal:-

Unlike plants and animals, protists do not develop from a blastula or an embryo.

15. What are trichonymphs? (LHR-II-2016-A)  
(MTN-I-17-A) (FSD-15, 16-A)

Ans. Trichonymphs:-

- Trichonympha is a specialized zooflagellate with hundreds of flagella.
- It lives as a symbiont in the gut of termite.

Trichonympha ingests wood chips and rely on endosymbiotic bacteria to digest cellulose in the wood that termite eats. The termite, trichonympha and bacteria obtain nutrients from this source. This is an excellent example of mutualism.

16. What are kelps? (LHR-II-2016-A) (FSD-15-A)

(RWP-14, 16-A) (DGK-II-15, 18-A) (GRW-17)

(MTN-15-A, II-17-A) (BWP-15, 18-A)

Ans. Kelps:-

- Kelps are giant brown algae which are tough and leathery in appearance.
- They are exclusively marine and may grow along the shore line. In deeper waters, giant kelps often grow extensively in vast beds.
- The large thallus of kelp is differentiated into a leaf like *blades* in which most photosynthesis occurs, stem like *stipes* and a root like *holdfast*, which attaches the substrate.

Example:-

*Laminaria*

17. How ciliates differ from other protozoans?

(LHR-I-2017-A)

Ans.

Ciliates	Other Protozoan
1. All known ciliates have two different types of nuclei within their cells—small micronuclei and larger macronuclei. acronuclei control normal metabolism of the cells, while the micronuclei are concerned with reproduction.	1. All other prozoans have a single nucleus.
2. Most ciliates are capable of a sexual process called conjugation, in which two individuals come together and exchange genetic material.	2. The process of conjugation is absent in other protozoans.

18. What do you know about giant amoeba?

(LHR-I-2017-A) (MTN-II-17-A)

Ans. Giant Amoeba:-

- Giant amoeba *Pelomyxa palustris* may be the most primitive of all eukaryotic like forms.
- It lacks mitochondria and other membranous organelles found in all other eukaryotes but has multiple membrane-bound nuclei.
- It obtains energy from methanogenic bacteria (bacteria that produce large quantities of methane in their metabolism) which reside inside it.
- It lives only at the bottom of ponds where oxygen is fairly scarce.
- It contributes to the degradation of organic molecules.

19. Write down the importance of algae. (GRW-16-A)

(LHR-II-2018-A) (BWP-17-A) (DGK-I-15, 17, 18)

(MTN-19-A) (SAH-14-A)

Ans. A) Economic Importance of Algae:-

- Some algae such as kelps are edible and may be used to overcome shortage of food in the world.
- Marine algae are also source of many useful substances like algin, agar, carrageenan and antiseptics.

B) Ecological Importance of Algae:-

- Algae are major producers of aquatic ecosystem, thus they play a basic role in food chains providing food to other organisms.
- Algae also provide large amount of oxygen to aquatic animals.

20. Write down evolutionary significance of euglenoids.

(LHR-II-2018-A) (GRW-17-A) (RWP-18-A)

(SAH-19-A) (DGK-II-19-A)

Ans. Evolutionary Significance of Euglenoids:-

A) Zooflagellates:-

- Zooflagellates are mostly heterotrophic, unicellular (a few are colonial) protists with spherical or elongated bodies.
- They move rapidly by lashing one to many long, whip like flagella which are usually located at the anterior end.
- Some zooflagellates ingest living or dead organisms by means of a definite mouth or oral groove. Other obtain their food by absorbing nutrients from dead or decomposing organic matter.
- They include free living, symbiotic and parasitic species.

B) One Example:-

*Trypanosoma*

21. Write down similarities and differences between fungi and fungus like protists. (GRW-2014-A)

Ans. A) Similarities between Fungi and Fungus Like Protists:-

- Both are saprobes.
- Both usually have hyphae.

B) Differences between Fungi and Fungus-Like Protists:-

Ans. What is *Chlorella*? Give its significance.

(GRW-2015-A)

(DGK-II-18) (BWP-17, 18-A) (MTN-14, 15-A)

22. A) *Chlorella*:-

- It is a fresh water, unicellular, non-motile, solitary, alga found floating in stagnant water of ponds, pools, ditches etc.
- Its body is spherical which contains a single nucleus and a cup shaped chloroplast usually without pyrenoid.

B) Significance of *Chlorella*:-

- It is easily cultured and has been used as an experimental organism in research on photosynthesis.
- It is being investigated as an alternate source of food.

23. Name a parasitic Amoeba. What disease does it cause? (GRW-2016-A)

Ans. A) Name of a Parasitic Amoeba:-

*Entamoeba histolytica*

B) Disease Caused by Parasitic Amoeba:-

Amebiasis, the one form of which is Amebic Dysentery.

24. Give characteristics of oomycetes. (GRW-2017-A)

Ans. Characteristics of Oomycetes:-

- Water molds show close relationship with fungi and have a similar structure, but are now regarded as more ancient group.
- Their cell walls contain cellulose, not chitin.
- Their hyphae are aseptate (without cross walls).

Example:-

*Phytophthora infestans*

25. What are zooflagellates? Give one example.

(GRW-2018-A)

Ans. A) Zooflagellates:-

- Zooflagellates are mostly heterotrophic, unicellular (a few are colonial) protists with spherical or elongated bodies.
- They move rapidly by lashing one to many long, whip like flagella which are usually located at the anterior end.
- Some zooflagellates ingest living or dead organisms by means of a definite mouth or oral groove. Other obtain their food by absorbing nutrients from dead or decomposing organic matter.
- They include free living, symbiotic and parasitic species.

B) One Example:-

*Trypanosoma*

26. Define thallus. (GRW-2018-A)

Ans. Thallus:-

Thallus is the simple body of an alga, fungus, or non-vascular plant that lacks root, stems, or leaves.

Examples:-

- Liverwort Thallus
- Lichen thallus

27. What are Trichonymphs? (MTN-2014-A)

Ans. Trichonymphs:-

- Trichonympha is a specialized zooflagellate with hundreds of flagella.
- It lives as a symbiont in the gut of termite.

Trichonympha ingests wood chips and rely on endosymbiotic bacteria to digest cellulose in the wood that termite eats. The termite, trichonympha and bacteria obtain nutrients from this source. This is an excellent example of mutualism.

28. Name four Phyla of Algae. (MTN-2016-A)

Ans. Names of Four Phyla of Algae:-

- Pyrophyta --- Commonly called Dinoflagellates
- Euglenophyta ---- Commonly called Euglenoids
- Chrysophyta ---- Commonly called Diatoms
- Phaeophyta ---- Commonly called Brown algae

Solved Past Papers (2007-2019)

29. What is *Physarum polycephalum*? (MTN-2016-A)

Ans. *Physarum polycephalum*:-  
It is a model organism that has been used to study many fundamental biological processes such as growth and differentiation, cytoplasmic streaming and function of cytoskeleton.

30. Give the importance of *Chlorella*. (MTN-II-2017-A) (RWP-II-17-A)

Ans. Importance of *Chlorella*:-  
Significance of *Chlorella*:-  
a. It is easily cultured and has been used as an experimental organism in research on photosynthesis.  
b. It is being investigated as an alternate source of food.

31. How Algae differ from Plants? (MTN-II-2017-A) (BWP-16-A) (RWP-14, 19-A) (MTN-19-A)

Ans. Algae Different From Plants:-

Algae	Plants
1. They have unicellular sex organs.	1. They have multi cellular sex organs.
2. Fertilization is external.	2. Fertilization is internal within the female body.
3. Zygote is not protected by the parent body and it does not develop into embryo.	3. Plant zygote grows into multi cellular embryo that is protected by parental tissue.

32. Give two characteristics of Giant Amoeba. (MTN -I-2018-A, 19-A)

Ans. Two Characteristics of Giant Amoeba:-  
a. It has multiple membrane-bound nuclei.  
b. It lacks all other organelles found in eukaryotes.

33. Differentiate between Fungi like Protists and Fungi. (MTN-I-2018-A) (RWP-15-A)

Ans. Differences Between Fungi Like Protists And Fungi:-

Fungus Like Protists	Fungi
1. They have centrioles.	1. They lack centrioles.
2. They have cell walls of cellulose.	2. They have cell walls of chitin.

34. Why Euglenoids are placed in Algae as well as in Protozoa? (MTN-I-2018-A)

Ans. Why Euglenoids Placed in Algae as Well as in Protozoa:-

Euglenoids are placed in algae as well as in protozoa because they resemble with plants and green algae in having similar pigments (Chl. a; Chl. b and carotenoids), on the other hand they are thought to be closely related to zooflagellates on the basis of molecular data.

35. Differentiate between Pseudopodia and Flagella. (MTN-II-2018-A)

Ans. Differences between Pseudopodia And Flagella:-

Pseudopodia	Flagella
1. Pseudopodia are present only in eukaryotic cells.	1. Flagella are present in eukaryotic as well as prokaryotic cells.
2. Pseudopod is usually temporary internal structure of the amoeba and amoeboid like cells that projects out like finger in which whole cytoplasm and cell contents shift.	2. Flagellum is a whip like structure that is always present in the cell.
3. Microfilaments (linear polymers of action) are responsible for pseudopodia.	3. Eukaryotic flagella are made up of microtubules with 9+2 arrangement. Prokaryotic flagella are made up of flagellin and are hollow helical shaped tubes.

36. What are Pyrrophytas? Give its example and pigments. (MTN-II-2018-A)

Ans. A) Pyrrophytas:-  
Pyrrophytas are the members of phylum Pyrrophyta of photosynthetic Protocists. They are commonly known as Dinoflagellates.

B) Example of Pyrrophyta:-

- Ceratium*
  - Gonyaulax*
- C) Pigments of Pyrrophyta:-  
a. Chlorophyll a  
b. Chlorophyll b  
c. Carotenes including Fucoxanthin

37. What adaptations slime mold develop during unfavourable conditions? (BWP-2014-A)

Ans. Adaptations Which Slime Molds Develop During Unfavourable Conditions:-

Slime molds develop resistant haploid spores by meiosis within stalked structures called sporangia.

38. Compare forms and locomotion of zoo-flagellates and ciliates. (BWP-2014-A)

Ans. Comparison of Forms and Locomotions of Zoo Flagellates and Ciliates:-

	Zoo flagellates	Ciliates
Forms	Unicellular some colonial	Unicellular
Locomotion	Flagella one or more	Cilia

39. Write down the phylum, form, pigments and examples of red algae. (BWP-2014-A)

Ans. Phylum, Form, Pigments and examples of Red Algae:

Phylum	Form	Pigments	Examples
Rhodophyta	Multicellular or Unicellular	Chl. carotenes phycoerythrin	<i>Chondrus polysiphonia</i>

40. What is the function of Pellicle in Ciliates?

Ans. Function of Pellicle In Ciliates:- (BWP-2016-A)  
It gives ciliates a definite but changeable shape.

41. What is Trypanosoma? What disease does it cause? (BWP-2017-A) (SGD-18-A) (RWP-19-A) (MTN-15-A)

Ans. A) *Trypanosoma*:-  
a. It is a parasitic zooflagellate infecting humans.  
b. It is transmitted by the bite of infected Tsetse fly.

B) Disease Caused by *Trypanosoma*:-  
Its two species cause sleeping sickness in Africa, in which parasites first enter into the blood stream, into lymphatic system and then in the brain. As the trypanosomes invade brain, the patient slips into coma and dies.

42. Write any two characteristics of red algae. (FSD-2014-A) (DGK-II-19-A)

Ans. Two Characteristics of Red Algae:-

- Some red algae are flattened sheets of cells while most red algae are composed of complex interwoven filaments that are delicate and feathery.
- Some red algae incorporate calcium carbonate in their cell walls from the ocean and take part in building coral reefs along with coral animals.

43. Why green algae are considered as ancestors of plants? (FSD-2014-A) (SGD-19)

Ans. Green Algae Considered As Ancestors of Plants:-  
Green algae are considered as ancestors of plants because:

- They have pigments chlorophyll a, chlorophyll b and carotenoids similar to plants.
- They have cell wall of cellulose similar to plants.
- They have starch as main energy reserve just like plants.
- RNA sequencing of green algae is similar to plant

44. What is reason for migration out of Ireland? (FSD-2015-A)

Ans. Reason for Migration Out of Ireland:-  
Reason for migration out of Ireland was Irish potato famine of the 19<sup>th</sup> century caused by destruction of several crops of potatoes due to late blight of potatoes (a disease of potato caused by an oomycete *Phytophthora infestans*).

45. Give two examples of unicellular green algae. (FSD-2016-A)

Ans. Two Examples of Unicellular Green Algae:-

- Spirogyra* --- It is a unicellular freshwater alga which grows in colonial form known as filament. Filament is unbranched and consists of uniform cylindrical cells which are joined end to end. Each cell has a ribbon shaped chloroplast.

- Chlamydomonas* --- It is a unicellular, freshwater, spherical, oval or pear-shaped alga with pointed anterior end, two flagella, distinct nucleus and cup shaped chloroplast

46. Give important characters of water molds. (FSD-2017-A) (SGD-18) (RWP-18-A)

Ans. Important Characters of Water Molds:-

- Water molds show close relationship with fungi and have a similar structure, but are now regarded as more ancient group.
- Their cell walls contain cellulose, not chitin.
- Their hyphae are aseptate (without cross walls).

Example:-  
*Phytophthora infestans*

47. How protists are different from other eukaryotes? (FSD-2018-A)

Ans. Protists Different From Other Eukaryotes:-

Unlike other eukaryotes, protists do not develop from a blastula or an embryo.

48. What is the evolutionary significance of choanoflagellates? (FSD-2018-A)

Ans. Evolutionary Significance of Choano flagellates:-  
They have evolutionary significance as their cells resemble collar cells of sponges. It is suggested that sponges have been evolved from choano flagellates.

49. Describe *Physarum polycephalum*. (RWP-2014-A)

Ans. *Physarum polycephalum*:-  
It is a model organism that has been used to study many fundamental biological processes such as growth and differentiation, cytoplasmic streaming and function of cytoskeleton.

50. What is *Chlorella*? Give its importance. (RWP-2015-A)

Ans. *Chlorella* and its Importance:-  
A) Function of Micronuclei Found in Ciliates  
They function in sexual process.

B) Function of Macronuclei Found in Ciliates:  
They control cell metabolism and growth.

51. Give two examples of unicellular green algae. (RWP-2016-A)

Ans. Two Examples of Unicellular Green Algae:-

- Spirogyra* --- It is a unicellular freshwater alga which grows in colonial form known as filament. Filament is unbranched and consists of uniform cylindrical cells which are joined end to end. Each cell has a ribbon shaped chloroplast.

- Chlamydomonas* --- It is a unicellular, freshwater, spherical, oval or pear-shaped alga with pointed anterior end, two flagella, distinct nucleus and cup shaped chloroplast

52. How ciliates differ from other protozoans?  
(RWP-2016-A) (DGK-II-14-A)

Ans. Ciliates Different From Other Protozoans:-

Ciliates	Other Protozoan
1. All known ciliates have two different types of nuclei within their cells—small micronuclei and larger macronuclei. acronuclei control normal metabolism of the cells, while the micronuclei are concerned with reproduction.	1. All other protozoans have a single nucleus.
2. Most ciliates are capable of a sexual process called conjugation, in which two individuals come together and exchange genetic material.	2. The process of conjugation is absent in other protozoans.

53. How is chalk formed? (RWP-Group-I-2017-A)

Ans. Formation of Chalk:-

Dead foraminiferans when sink to bottom of the ocean where their shells form a grey mud that is gradually transformed into chalk.

54. Define a thallus. (RWP-I-2017-A)

Ans. Thallus:-

Thallus is the simple body of an alga, fungus, or non-vascular plant that lacks root, stems, or leaves.

Examples:-

- Liverwort Thallus
- Lichen thallus

55. What are zooflagellates? (RWP-II-2017-A)

Ans. Zooflagellates:-

- Zooflagellates are mostly heterotrophic, unicellular (a few are colonial) protists with spherical or elongated bodies.
- They move rapidly by lashing one to many long, whip like flagella which are usually located at the anterior end.
- Some zooflagellates ingest living or dead organisms by means of a definite mouth or oral groove. Other obtain their food by absorbing nutrients from dead or decomposing organic matter.
- They include free living, symbiotic and parasitic species.

56. Give importance of algae. (RWP-II-2017-A)

Ans. Importance of Algae:-

- Some algae are edible and may be used to overcome shortage of food in the world.
- Algae are major producers of ecosystem.
- Algae provide large amount of oxygen to aquatic animals.
- Marine algae are source of many useful substances like agar, algin, carrageenan etc.

57. Write two characters of zooflagellates. (RWP-2018-A)

Ans. Two Characters of Zooflagellates:-

- They are mostly unicellular, a few are colonial.
- They possess from one to many long, whip-like flagella that enable them to move.

58. Give the pigments and example of Rhodophyta. (SGD-2015-A)

Ans. A) Pigments of Rhodophyta:-  
Rhodophyta have Chl. a and carotenes  
B) Example of Rhodophyta:-  
*Chondrus*

59. Write the structure of oomycetes. (SGD-2015-A)

Ans. Structure of Oomycetes:-  
Oomycetes are fungus like protists with aseptate hyphae (without cross walls) and cell walls of cellulose.

60. Give the structure of red algae. (SGD-2015-A)

Ans. Structure of Red Algae:-

- The multicellular body form of red algae is commonly composed of complex intertwined filaments that are delicate and leathery.
- A few red algae are flattened sheets of cells.
- Most multicellular red algae have a basal hold fast for attachment to rocks and other substrates.
- Some red algae incorporate calcium carbonate in their cell walls from the oceans and take part in building coral reefs along with coral animals.

61. Discuss the adaptations of slime molds during unfavorable conditions. (SGD-2015-A)

Ans. During unfavorable conditions, slime molds resistant haploid spores by meiosis within stalked structures within sporangia.

62. Give two characters of green Algae similar to green plants. (SGD-2016-A)

Ans.

- Like plants, green algae contain chlorophyll a and chlorophyll b and carotenoid.
- Like plants, green algae have cell wall with cellulose

63. Write two reasons for creating separate Kingdom Protista. (SGD-2016-A)

Ans.

- All protists are eukaryotes and have evolved from prokaryotes.
- Members eukaryotes of other kingdom have their evolutionary origin from in kingdom Protista.

64. Write two examples and two characters of Zooflagellates. (SGD-2016-A)

Ans. A) Two Characters of Zooflagellates:-

ii) DINOFLAGELLATES:

- They are mostly uni-cellular, cells are often covered with shells of interlocking cellulose plates impregnated with silicates.
- Cells have one posteriorly directed flagellum plus a unique transverse flagellum positioned in a girdle encircling the cell.

B) Two Examples:-

- Trypanosoma*
- Trichonympha*

65. Name four major groups of Kingdom Protista. (SGD-2017-A)

- Single celled protozoa
- Unicellular algae
- Multicellular algae
- Slime molds and oomycetes

66. What are Chlorophytes? Give example. (SGD-2018-A)

Ans. A) Chlorophytes:-

- Chlorophytes are members of phylum Chlorophyta of photosynthetic Protoctists.
- They are commonly known as Green algae.
- Majority of Chlorophytes are unicellular, however, filamentous, colonial and multi cellular forms also exist.
- They inhabit a variety of environments including oceans, freshwater environments, snow banks, the bark of trees, and backs of turtle. Some green algae also form symbiotic relationships with fungi, plants and animals.
- Chlorophyll a and b and carotenoids found in green algae are similar to those found in land plants.
- Their main energy reserves are stored as starch.
- Most Chlorophytes possess cell walls with cellulose.
- RNA sequencing of green algae is similar to plants.
- It is believed that land plants arose from green algae.

B) Examples:-

- Ulva*
- Spirogyra*
- Chlorella*
- Volvox*
- Acetabularia*
- Chlamydomonas*
- Desmids*

67. Write a note on Brown algae. (D.G.K-I-2014-A)

Ans. Note on Brown Algae:-

- All brown algae are multi cellular.
- They range from a few centimeters to approximately 75 meters in length.
- They have two flagella on reproductive cells.
- They belong to phylum Phaeophyta.
- They possess pigments chlorophyll a. c and carotenes including fucoxanthin.
- Brown algae are common in colder marine waters, especially along rocky coastlines in the intertidal zone.
- The largest brown algae are known as kelps which are tough and leathery and possess leaf like blades, stem like stripes and root like anchoring holdfast.
- Laminaria* is a brown algae which possess blades, stripes and holdfast.
- Focus* and *Macrocystis* are two other examples of brown algae.

68. Give the examples, form and mode of locomotion of Zooflagellates. (D.G.K-I-2014-A)

Ans. Examples, Form and Mode of Locomotion of Zooflagellates:-

Examples	Form	Mode of Locomotion
<i>Trypanosoma</i> , <i>Trichonymphas</i> , <i>Chanoflagellates</i>	Mostly unicellular but a few colonial	One or more flagella located at the anterior end

69. Give the structure and mode of life of *Pelomyxalustris*. (D.G.K-I-2014-A)

Ans. A) Structure of *Pelomyxa palustris*:-

It is a giant amoeba which has pseudopodia and multiple membrane bound nuclei but lacks mitochondria other organelles usually found in all other eukaryotes.

B) Mode of Life of *Pelomyxa palustris*:-

It inhabits mud at the bottom of freshwater ponds where it contributes to the degradation of organic molecules. It obtains energy from methanogenic bacteria which reside inside it.

70. What is the cause of Amebic dysentery? (D.G.K-II-2014-A)

Ans. The Cause of Amebic Dysentery:-

The cause of Amebic Dysentery is an intestinal parasitic amoeba *Entamoeba histolytica*.

71. What are symbiotic zooflagellates? Give one example. (D.G.K-I-2015-A)

Ans. A) Symbiotic Zooflagellates:-

- They are heterotrophic protozoa.
- They are unicellular eukaryotes that have flagella.
- They are symbionts that form mutual association with their hosts.

B) One Example of Symbiotic Zooflagellate:-

*Trichonymphas* are complex, specialized flagellates with many flagella which live as symbionts in the guts of termites and help in the digestion of dry wood.

72. What do you know about amoebae? (D.G.K-I-2015-A)

Ans. Amoebae:-

- Amoebae are the heterotrophic protozoans that lack flagella or cilia and move by forming specialized cytoplasmic projections called pseudopodia.
- Amoebae include all free living, freshwater, marine and soil amoebae as well as those that are parasites of animals.

Examples:-

- Amoeba proteus* --- It is a free living amoeba the flowing pseudopodia of which constantly change as the organism moves and feeds.
- Entamoeba histolytica* --- It is intestinal parasite which causes amoebic dysentery in humans.

73. Write a note on Euglenoids. (D.G.K-I-2015-A)

Ans. Note on Euglenoids:-

- Euglenoids are unicellular autotrophic as well heterotrophic Protists belonging to phylum Euglenophyta.

1. They have two flagella, one long and one short.
- c. Euglenoids have special evolutionary significance as they resemble with plants and green algae in having similar pigments (Chl. *a*, Chl. *b* and carotenoids), on the other hand they are thought to be closely related to zooflagellates on the basis of molecular data. It is therefore, they have at various times been classified in the plant kingdom (with algae) and in animal kingdom in protozoans.
- d. Some photosynthetic Euglenoids such as *Euglena*, lose their chlorophyll when grown in dark and obtain their nutrients heterotrophically by ingesting other organic matter.
74. Name a parasitic amoeba. What does it cause? (D.G.K-II-2015-A)

Ans. A) Name of A Parasitic Amoeba: -

*Entamoeba histolytica*

B) Disease Caused By Parasitic Amoeba: -

Amoebiasis, the one form of which is Amoebic dysentery.

75. What is Pellicle? (D.G.K-II-2016-A)

Ans. Pellicle: -

- a. Pellicle is flexible outer covering found in ciliates.
- b. It gives ciliate a definite but a changeable shape.
76. What are pigments found in Algae. (D.G.K-I-2017-A)

Ans. Pigments Found In Algae: -

- a. All algae, in addition to green chlorophyll *a*, have photosynthetic pigments yellow and orange carotenoids.
- b. Other algae possess a variety of other pigments such as xanthophylls and phycoerythrin that are also important in photosynthesis.
- c. Algae are classified on the basis of composition of these pigments

77. What are characteristics of fungus like protists? (D.G.K-II-2017-A)

Ans. Characteristics of Fungus Like Protists: -

- a. They have bodies formed of thread like structures called hyphae.
- b. They have centrioles in their cells.
- c. They have cellulose as major components of their cell walls.

78. How do slime molds behave during unfavorable conditions? (D.G.K-II-2017-A)

Ans. During unfavorable conditions, slime molds form restart haploid spores by meiosis within stalked structures called sporangia.

79. What is the role of contractile vacuole in freshwater ciliates? (D.G.K-II-2017-A)

Ans. Role of Contractile Vacuole in Freshwater Ciliates: - Contractile vacuole in freshwater ciliates regulates water.

80. Write down any two characteristics of protists. (D.G.K-I-2018-A)

Ans. Two Characteristics of Protists: -

- a. They are eukaryotes that are not fungi, plants or animals. All members of protista have characteristics that exclude them from the other four kingdoms.

- b. Most protists do not develop multicellular reproductive organs, nor do they form embryos.
81. Differentiate between Flagellum and Flagellin. (D.G.K-II-2018-A)

Ans. Differences Between Flagellum And Flagellin: -

Flagellum	Flagellin
Flagellum is a whip like long process that is usually located at the anterior end of most unicellular and some colonial protists called flagellates. It is also found in some bacteria.	Flagellin is a protein that makes up a prokaryotic flagellum.

82. Differentiate between Oomycetes and Myxomycota. (D.G.K-II-2018-A)

Ans. Differences Between Oomycetes And Myxomycota: -

Oomycetes	Myxomycota
1. They are commonly known as water molds.	1. Members of phylum Myxomycota are commonly known as slime molds.
2. They have aseptate hyphae with cellulose cell wall.	2. Their feeding stage is a plasmodium with a multinucleate, creeping cytoplasm with stalked sporangia.
Examples: - <i>Phytophthora infestans</i>	Example: - <i>Physarum polycephalum</i>

83. What are Rhodophyta? Give examples and their pigments. (D.G.K-II-2018-A)

Ans. A) Rhodophyta: -

- a. Rhodophyta is the phylum of photosynthetic Protocists. Its members are commonly known as red algae
- b. Most members of Rhodophyta have multi cellular body commonly composed of complex interwoven filaments that are delicate and feathery.
- c. Few members of Rhodophyta are flattened sheets of cells.

B) Examples of Rhodophyta: -

*Chondrus*, *Polysiphonia*

C) Pigments of Rhodophyta: -

Chlorophyll *a*, Carotenes, Phycoerythrin

84. Write down two differences between slime mold and a fungi. (SAH-2014-A)

Ans. Two Differences Between Slime Mold And Fungi:

- a. Slime mold cell wall is composed of cellulose while cell wall of fungi is composed of chitin.
- b. Slime molds have centrioles while fungi lack them.

85. Write down four similarities between green algae and plants. (SAH-2014-A)

Ans.

- a. Green algae have RNA sequencing similar to plants.
- b. Green algae have starch as reserve material similar to plants.
- c. Algae have pigments chl. *a* and chl. *b* and carotenoids similar to land plants.
- d. Algae have cellulose cell walls similar to plants.

## SECTION I MULTIPLE CHOICE QUESTIONS

### Chapter ---- 8 FUNGI MCQ

#### D) From Exercise:

- 1) Which statement about fungal nutrition is not true?
- a) Some fungi are active predators.
- b) Some fungi are mutualist.
- c) Facultative parasitic fungi can grow only on their specific host.
- d) All fungi require mineral nutrients.
- 2) The absorptive nutrition of fungi is aided by:
- a) Spore formation
- b) Their large surface area-volume ratio
- c) They are all parasites
- d) They form fruiting bodies
- 3) The Zygomycetes:
- a) Have hyphae without regularly occurring cross walls.
- b) Produce motile gametes.
- c) Are haploid throughout their life.
- d) Answers "a" and "c" are both correct.
- 4) Which of the following cells/structures are associated with asexual reproduction in fungi? (LHR-II-14-A) (SGD-17-A) (BWP-2007-A)
- a) Ascospores      b) Conidia
- c) Zygosporangia      d) Basidiospores
- 5) The closest relatives of fungi are probably: (GRW-2010-A)
- a) Animals      b) Slime molds
- c) Brown algae      d) Vascular plants
- 6) Unicellular fungi are the: (E. coli)
- a) Rusts      b) Brown mold
- c) Green mold      d) Yeasts
- 7) An ascus is to ascomycetes as is a basidiomycetes:
- a) Basidiopore      b) Basidiocarp
- c) Basidium      d) Haustorium
- 8) Which statement is not true about Deuteromycetes?
- a) They are also called imperfect fungi.
- b) Their asexual spores are called conidia.
- c) It is a heterogenous polyphyletic group.
- d) They have both asexual and sexual reproduction.

*only asexual*

86. Why kingdom Protista is regarded as a polyphyletic group of organism? (SAH-2015-A)

Ans. Kingdom Protista as a Polyphyletic Group of Organism: -

Kingdom Protista is regarded as polyphyletic group because of its diversity. The protists probably do not share a single common ancestor.

87. What is the importance of any two algae? (SAH-2015-A)

Ans. Importance of Any Two Algae: -

- a. They are main producers of aquatic ecosystem.
- b. They provide oxygen to aquatic organisms.

88. Name any four phyla of protoctista. (SAH-2015-A)

Ans. Names of Any Four Phyla of Protoctista: -

- a. Pyrrophyta --- Commonly called Dinoflagellates
- b. Euglenophyta --- Commonly called Euglenoids
- c. Chrysophyta --- Commonly called Diatoms
- d. Phaeophyta --- Commonly called Brown algae

89. Name the nuclei of ciliates. (SAH-2016-A)

Ans. Nuclei of Ciliates: -

All known ciliates have two different types of nuclei within their cells—small micronuclei and larger macronuclei. Macronuclei control normal metabolism of the cells, while the micronuclei are concerned with reproduction.

90. Name the causal organisms of Irish potato. (SAH-2016-A)

Ans. Name of the Causal Organisms of Irish Potato: -

*Phytophthora infestans*

91. From where do giant amoebae get energy? (SAH-2016-A)

Ans. Giant Amoebae Getting Energy: -

It obtains energy from methanogenic bacteria (bacilli that produce large quantities of methane in their metabolism) which reside inside it.

92. Name six groups of animal like protists. (SAH-2017-A)

Ans. Names of Six Groups of Animal Like Protists: -

- a. Amoebae
- b. Zooflagellates
- c. Actinopods
- d. Foraminifera
- e. Apicomplexans
- f. Ciliates

## SECTION III LONG QUESTIONS

No Essay Type Question According to New Pattern

II) From Punjab Boards:

- 1) Parasitic fungi directly absorb the nutrient from the living host cytoplasm by: (LHR-I-2014-A)
- Haustoria
  - Roots
  - Rhizoids
  - Gametangia
- 2) The most common rust fungi are: (GRW-16-A) (LHR-I-2015-A) (RWP-18-A)
- Ustilago
  - Puccinia
  - Penicillium
  - Yeast
- 3) Poisonous mushrooms are called: (LHR-II-2015-A) (SGD-16-A)
- Truffles
  - Morels
  - Toad stools
  - Agaricus
- 4) In fungi, spores are produced inside the reproductive structures called: (LHR-I-2016-A)
- Conidia
  - Sporangia
  - Basidia
  - Ascocarps
- 5) Lovastatin is used to control blood: (LHR-II-2016-A, I-2017-A) (RWP-2014, 15-A)
- Pressure
  - Cholesterol
  - Glucose
  - Uric acid
- 6) All fungal nuclei are haploid except for transient diploid: (LHR-II-2018-A)
- Spores
  - Zygote
  - Conidia
  - Zygospores
- 7) Example of soil dwelling carnivorous fungus is: (GRW-2014-A) (FSD-17-A)
- Arthrotrix
  - Armillaria
  - Pleurotus
  - Penicillium
- 8) The visible part of lichen is: (GRW-2017-A) (DGK-II-15-A)
- Bacteria
  - Roots
  - Algae
  - Fungi
- 9) Histoplasmosis is a: (GRW-2018-A)
- Heart disease
  - Kidney disease
  - Lung disease
  - Liver disease
- 10) Which of the following is not symptom of Ergotism? (RWP-New Scheme-2015-A)
- Convulsion
  - Psychic Delusion
  - Gangrene
  - Indigestion
- 11) The fungi which obtain their food from organic matter are called: (RWP-2016-A)
- Saprotrophs
  - Autotrophs
  - Heterotrophs
  - Parasites
- 12) The number of edible mushroom species are about: (RWP-II-2017-A)
- 100
  - 200
  - 300
  - 400

- 13) Members of Basidiomycota are commonly called: (SGD-2015-A)
- Spitting fungi
  - Morels
  - Mushrooms
  - Molds
- 14) Parmelia is an example of: (SGD-2018-A)
- Fruticose lichen
  - Foliose lichen
  - Crustose lichen
  - Moss lichen
- 15) Which is used to give flavor, aroma and characteristic color to the cheese? (FSD-2014-A)
- Penicillium
  - Aspergillus
  - Yeast
  - Neurospora
- 16) First discovered antibiotic is: (FSD-2015-A)
- Lovastatin
  - Cyclosporine
  - Penicillin
  - Ergotone
- 17) Histoplasmosis caused by spores of fungus is a serious infection of: (FSD-2018-A)
- Kidneys
  - Skin
  - Lungs
  - Heart
- 18) The most common smut fungi are: (MTN-2014-A) (LHR-I-19-A)
- Ustilago
  - Gymnosperms
  - Mosses
  - Angiosperms
- 19) Carcinogenic aflatoxins are produced by: (MTN-2015-A)
- Aspergillus
  - Penicillium
  - Neurospora
  - Ustilago
- 20) A Single Mycelium may produce upto a kilometer of new Hyphae in only: (MTN-2016-A)
- One day
  - Five days
  - Fifteen days
  - Twenty days
- 21) Citric acid is obtained from: (MTN-I-2017-A)
- Penicillium
  - Aspergillus
  - Sarcomyces
  - Neurospora
- 22) \_\_\_\_\_ is used to inhibit fungal growth: (MTN-II-2017-A)
- Lovastatin
  - Ergotone
  - Cyclosporine
  - Griseofulvin
- 23) The cell wall of fungus contains: (MTN-II-2018-A)
- Cellulose
  - Chitin
  - Calcium carbonate
  - None of these
- 24) Alternaria is an example of: fusarium (BWP-2014-A)
- Zygomycota
  - Ascomycota
  - Basidiomycota
  - Deuteromycota
- 25) The group of Fungi in which sexual reproduction has not been observed: (BWP-2015-A)
- Deuteromycota
  - Zygomycota
  - Ascomycota
  - Basidiomycota
- 26) Asexual reproduction in yeasts occurs by: (BWP-2016-A)
- Conidia
  - Fragmentation
  - Budding
  - Resting Spores

- 27) The disease caused by a Fungus is: (BWP-2017-A)
- Ring Worm
  - Tetanus
  - Polio
  - Small pox
- 28) One example of Fruticose lichens is: (D.G.K-I-2014-A)
- Parmelia
  - Basidia
  - Lecanor
  - Ramalina
- 29) Imperfect fungi are also called: (D.G.K-II-2014-A)
- Ascomycota
  - Basidiomycota
  - Zygomycota
  - Deuteromycota
- 30) Each ascus comprises Ascospores: (D.G.K-I-2015-A)
- 04
  - 08
  - 12
  - 03
- 31) Fungi can tolerate a wide range of pH from: (D.G.K-II-2016-A)
- 3--8
  - 4--6
  - 2--9
  - 1--5
- 32) Yeasts are unicellular: (D.G.K-I-2017-A)
- Protozoans
  - Algae
  - Fungi
  - Bacteria
- 33) Predatory oyster mushroom paralyzes the following organisms: (D.G.K-II-2017-A)
- Nematodes
  - Algae
  - Bacteria
  - Snails
- 34) Which one is an example of foliose lichens: (D.G.K-I-2018-A)
- Ramalina
  - Basidia
  - Lecanora
  - Parmelia
- 35) Reindeer moss used as food for reindeer is: (D.G.K-II-2018-A)
- Moss
  - Lichen
  - Mold
  - Club fungi
- 36) Lovastatin is used for: (SAH-2014-A)
- Lowering of blood cholesterol level
  - Organ transplant
  - Inhibit fungal growth
  - Headache
- 37) Brush-like arrangement of its conidia is characteristic of: (SAH-2016-A)
- Rhizopus
  - Penicillium
  - Ustilago
  - Agaricus
- 38) Loose smut of wheat is caused by: (LHR-II-18-A)
- Puccinia
  - Penicillium
  - Aspergillus
  - Ustilago
- 39) Aspicillus belong to phylum: (RWP-I-19-A)
- Zygomycota
  - Deuteromycota
  - Ascomycota
  - Basidiomycota
- 40) Ustilago species are most common: (MTN-I-19-A)
- Rust fungi
  - Smut fungi
  - Mold
  - Yeast
- 41) Some fungi are used to control environmental pollution, the process is called: (SGD-19-A)
- Biological control
  - Fungal culture
  - Bioremediation
  - Hydroponic
- III) From Entry Test:
- 1) In general asexual reproduction is common in: (Entry Test 2009)
- Humans
  - Deuteromycota
  - Basidiomycota
  - Basidiospores
- 2) Which of the following is used for lowering blood cholesterol? (Entry Test 2009)
- Neurospora
  - Aspergillus
  - Grisofulvin
  - Lvastatin
- 3) Name the nutrition resulted by feeding on dead and decaying matter: (Entry Test 2009)
- Saprophytes
  - Symbiotic
  - Parasitic
  - Both b and c
- 4) The mutualistic association between certain fungi and roots of vascular plants is called: (Entrance Self-Test-2011)
- Lichens
  - Budding
  - Parasitism
  - Mycorrhizae
- 5) Which of the following component is found in the cell wall of fungi? (Entry Test 2012)
- Cellulose
  - Proteins
  - Chitin
  - Glycerol
- 6) Fungi which cause thrush in humans: (Entrance Test-2013)
- Sarcomeres
  - Abicain
  - Lovastatin
  - Aspergillus
- 7) Athlete's food is a disease caused by: (Entrance Test-2014)
- Bacteria
  - Fungus
  - Virus
  - Arthropods
- 8) In rhizopus, zygote forms temporary, dormant, thick-walled resistant structure called: (Entrance Test-2015)
- Zygosopore
  - Sporangia
  - Spore
  - Hydra
- 9) \_\_\_\_\_ is the yeast that grows in the mucous membrane of mouth or vagina. (Entrance Test-2016)
- Candida albicans
  - Saccharomyces cervisiae
  - Aspergillus fumigatus
  - Aspergillus flavus

## SECTION II

### SHORT QUESTIONS

26Qs

#### From Exercise:-

1. What is hypha? What is the advantage of having incomplete septa?

Ans. A) Hypha:-

Hypha (pl. hyphae) is a microscopic slender branched tube or filament of cytoplasm bounded by cell walls made of chitin and may or may not have septa.

B) Advantage of Hypha Having Incomplete Septa:-  
Incomplete septa allow the mixing of cytoplasm from cell to cell, carrying the minerals to growing tips and enabling the hyphae to grow more rapidly when food and water are abundant and temperature is favorable.

2. What is the composition of fungal cell wall and how is this composition advantageous to fungi?

Ans. A) Composition of Fungal Cell Wall:-

The cell wall of fungus lacks cellulose and has chitin.

B) Composition of Fungus Cell Wall Advantageous to Fungi:-

Chitin gives the cell wall rigidity and strength and is resistant to decay than cellulose and lignin which make up the plant cell wall.

3. To which phyla do the yeasts belong? How they differ from other fungi?

Ans. A) To Which Phyla Do the Yeasts Belong:-

Yeasts belong to three phyla of fungi i.e. Ascomycota, Basidiomycota and Deuteromycota but majority of yeasts belong to phylum Ascomycota.

B) Yeasts Different From Other Fungi:-

They differ from other fungi being unicellular and non-hyphal.

4. Name sexual and asexual spores of Ascomycetes.

Ans. A) Name of Sexual Spores of Ascomycetes:-

Ascospores

B) Name of Asexual Spores of Ascomycetes:-

Conidia

5. What are mycorrhizae?

Ans. Mycorrhizae:-

a. Mycorrhizae (Greek. mykes = fungus, rhiza = root, meaning fungus roots) are mutualistic relationships between fungus and roots of plants.

b. Fungi which form mutualistic relationships with plants are called mycorrhizal fungi. Mycorrhizal fungi are associated with 95% of all kinds of land plants.

c. The mycorrhizal fungus decomposes organic material in the soil. It also benefits the plant by increasing its absorption surface area, enabling it to take in more water and nutrients such as zinc, copper, phosphorous etc. At the same time, the roots supply fungus with sugars, amino acids, and other organic substances.

6. By what means can individuals in imperfect fungi be classified?  
Ans. Means of Classification of Imperfect Fungi:-  
The individuals in imperfect fungi can be classified on the basis of DNA sequences.

7. Give a single characteristic that differentiates Zygomycota from Basidiomycota.

Zygomycota	Basidiomycota
They have coenocytic hyphae with no septa.	They have septate hyphae with septa or cross walls.

8. Why is green mold more likely to contaminate an orange kept in a refrigerator than bacteria?

Ans. Contamination of Orange in Refrigerator:-  
Green molds are more likely to contaminate an orange kept in a refrigerator than bacteria because they grow at lower temperatures such as the 5 °C found in the normal refrigerator.

9. What is a fungus?

Ans. Fungus:-

A fungus is usually a filamentous, multi-cellular, multinucleate, spore-bearing, eukaryotic, absorptive heterotroph, usually a saprobe, having cell wall made up of chitin.

10. State two parallel characteristic of Ascomycetes and Basidiomycetes.

Ans. Two Parallel Characteristic of Ascomycetes and Basidiomycetes:-

- Both have septate-hyphae.
- Both have lengthy diakaryotic phase in their life cycle.

#### II) From Punjab Boards:-

1. What is histoplasmosis? (LHR-I-2014-A) (SAH-14) (DGK-I-14, 15)

Ans. Histoplasmosis:-

a. Histoplasmosis is a serious lung disease called summer flu. Fortunately, the infection is usually confined to the lungs and is of short duration and recovered without treatment. If the infection spreads through the blood to the heart, brain, or other parts of the body, it can be serious and sometimes fatal.

b. The causative agent of histoplasmosis is *Histoplasma capsulatum*, an ascomycete. Infection usually occurs from the inhalation of spores in dry and dusty air contaminated with bird's feces.

(Note:- Histoplasmosis is lung disease prevalent in Ohio River valley and the Mississippi River valley)

2. Why rusts and smuts are called so? (LHR-I-2014-A)

Ans. Rusts And Smuts Called So:-

a. Rusts are called so because of numerous orange, yellow colored diseases-spots on stem and leaves of their host.

b. Smuts are called so because of their black, dusty masses that resemble root or smut.

3. What is carnivorous fungus? Give example.

(LHR-II-2014-A) (SGD-16-A)

Ans. A) Carnivorous Fungus:-

The fungus which obtains its food by digesting and then absorbing the contents of worms to fulfil their nitrogen requirements is called carnivorous fungus.

B) Examples:-

a. *Pleurotus ostreatus* (Oyster Mushroom):-

It paralyzes the nematodes (that feed on this fungus) penetrate them, and absorb their nutritional contents, primarily to fulfil its nitrogen requirements. It fulfils its glucose requirements by breaking the wood.

b. *Arthrobotrys* spp.:-

Some species of *Arthrobotrys* trap soil nematodes by forming constricting rings. Their hyphae invade and digest the nematodes.

c. Other Predator Fungi:-

Other predator fungi have other adaptations such as secretion of sticky substances.

4. Enlist four plant diseases caused by fungi.

(LHR-II-2014-A)

Ans. Two Differences Between Fungi And Oomycetes:-

Fungi	Oomycetes
1. Their cell wall is made of chitin.	1. Cell wall is made of cellulose.
2. Centriole is absent.	2. Centriole is present.

5. What do you mean by budding and para sexuality?

(LHR-II-2015-A)

Ans. A) Budding:-

a. Budding is an asexual process of reproduction in which an outgrowth or bud is produced which may separate and grow by simple relatively equal cell division.

b. Yeasts multiply by budding. In yeasts a cell becomes swollen at one edge, and a new smaller cell called a bud develops from the parent cell and breaks free to live independently.

B) Par asexuality:-

Par asexuality is a kind of genetic recombination in imperfect fungi which portions of chromosomes of two nuclei lying in the same hyphae are exchanged.

6. What are septate and non-septate hyphae?

(LHR-II-2015-A)

Ans. Septate And Non-Septate Hyphae:-

a. Septate Hyphae -- When hyphae are divided by cross walls called septa into individual cells containing one or more nuclei.

b. Non-septate Hyphae -- When hyphae lack septa or cross walls and are not divided into individual cells; instead they are in the form of an elongated, multinucleated large hyphae. Such hyphae are also called coenocytic hyphae in which cytoplasm moves effectively, distributing the materials throughout.

7. Name the type of hypha and sexual spores in sac fungi. (LHR-I-2016-A)

Ans. A) Name of the Type of Hypha in Sac Fungi:-

Septate, dikaryotic

B) Name of the Sexual Spores in Sac Fungi:-

Ascospores

8. Differentiate between obligate and facultative parasites. (LHR-I-2016-A) (GRW-17) (MTN-I-18-A)

(BWP-15, 17-A)

Ans.

Obligate Parasites	Facultative Parasites
Obligate Parasites grow only on their host and can not be grown on available defined growth culture medium.	Facultative Parasite can grow parasitically on either host as well as by themselves on artificial growth media.
Examples:- Various mildews and most rust species	Example:- <i>Rhizopus</i> .

9. What is nuclear mitosis? (LHR-II-2016-A)

Ans. Nuclear Mitosis:-

Nuclear mitosis is a characteristic type of mitosis found in fungi in which:

- Nuclear envelope does not break in most fungi and disintegrates at the late stages of mitosis in few fungi.
- Mitotic spindle forms within the nucleus dragging chromosomes to opposite poles of the nucleus.
- Nuclear membrane constricts between the two clusters of daughter chromosomes.

10. What are lichens, write ecological role they play.

(LHR-II-2016-A) (GRW-14, 15-A) (MTN-I-17)

(RWP-15-A)

Ans. A) Lichens:-

Lichen is a composite organism consisting of one fungus species and one or more species of algae.

B) Ecological Role Played By Lichens:-

- They can grow at harsh places such as bare rocks etc. where any other organism cannot grow. They produce and improve the soil, thus making it suitable for plants to invade the area.
- They are ecologically very important as bioindicators of air pollution. Reduction in lichen growth is used as sensitive indicator of air pollution, particularly from sulfur dioxide.

11. What are conidia and spores? (LHR-I-2017-A)

Ans. A) Conidia:-

- Conidia are asexual reproductive cells produced by ascomycetes, some basidiomycetes and most deuteromycetes.
- They are naked spores not formed within an enclosing sac or sporangium.
- The modified hyphae which produce conidia are called conidiophores.
- Conidia are produced by only asexual process.
- Conidia may be multi-cellular.

Solved Past Papers (2007-2019)

B) Spores:-

- a. They are asexual reproductive cells produced by zygomycetes, and some deuteromycetes.
- b. They are produced in very large numbers inside the reproductive structures called sporangia.
- c. The hyphae, which form sporangia containing spores, are called sporangiophores.
- d. Spores are produced by asexual and sexual processes.
- e. They are unicellular.

12. Differentiate between plasmogamy and karyogamy. (LHR-I-2017-A, 15-A) (MTN-I-18-A) (FSD-17-A) (RWP-15-A) (SGD-18-A) (BWP-19-A)

Ans.

Plasmogamy	Karyogamy
1. It is fusion of cytoplasm.	1. It is the fusion of nuclei.
2. It occurs in cells/hyphae of Basidiomycetes and Ascomycetes.	2. It may occur in hyphae of all kinds of fungi.
3. It is not followed by karyogamy due to which two haploid nuclei co-exist and divide in the same hyphae/cells called dikaryotic hyphae/cells for most of the life of fungus.	3. Before karyogamy plasmogamy always occurs. It results in the formation of a diploid zygote.

13. Differentiate between ascus and basidium. (LHR-II-2018-A)

Ans.

Ascus	Basidium
1. It is sac like, microscopic reproductive structure produced during sexual reproduction within which sexual spores are produced.	1. It is club-like (Latin term for small pedestal), microscopic reproductive structure on which sexual spores are produced.
2. Upto eight haploid sexual spores called ascospores are produced within an ascus.	2. Four haploid sexual spores called basidiospores are borne externally at the end of basidium on slender projection.
2. It is formed by members of Ascomycota class of fungi.	2. It is formed by members of Basidiomycota class of fungi.

14. What are toad stools? Give example. (RWP-18-A) (LHR-II-2018-A) (GRW-15-A)

Ans. A) Toad Stools:-  
Toad stools are poisonous mushroom that contain poisonous alkaloids that affect the human nervous system, sometimes with fatal results.

B) Example:-  
*Amanita virosa*:-

- a. It is an extremely poisonous mushroom.
- b. It is commonly known as death angel or destroying angel.

- c. It is distinguished, as are other amanitas, by the ring of tissue around its stalk and by underground cup from which the stalk protrudes.
- d. It is 7.5 to 20 cm (3 to 8 in) tall.
- e. It is found in grass or near trees throughout North America.
- f. About 50g (2 oz) of this mushroom can kill an adult man.

15. What is Ergotism? How it is caused? (GRW-2014-A) (FSD-16-A)

Ans. Ergotism And Its Cause:-

- a. They, along with bacteria, play vital role in the recycling of inorganic nutrients in the ecosystem.
- b. Some fungi are also used for bioremediation.
- c. They clean the earth by removing the organic matter, hence are known as scavengers.

16. Define parasexuality. (GRW-2016-A) (FSD-18-A) (SAH-15-A) (DGK-II-19-A) (MTN-15-A) (BWP-14, 18-A)

Ans. Parasexuality:-

- a. Parasexuality is a kind of genetic recombination in which portions of chromosomes of two nuclei lying in the same hypha are exchanged.
- b. In parasexuality, first fusion and then segregation of heterokaryotic haploid nuclei occurs to produce recombinant nuclei.
- c. It is found in imperfect fungi.

17. What is importance of mycorrhizae for plants? (GRW-2016-A) (SAH-17) (DGK-I-15, 19-A)

Ans. Importance of Mycorrhizae for Plants:-

They increase the amount of soil contact and total surface area for absorption and help the plants in the direct absorption of phosphorus, zinc, copper and other minerals from the soil into the roots. Plants with mycorrhizal fungi absorb as much as 10 times more minerals than those without the fungi and show better growth.

18. What are rust and smut diseases of plants? (GRW-2017-A)

Ans. A) Rust Disease of Plants:-  
Rust disease of plants is characterized by numerous rusty, orange-yellow colored disease spots on the stem, leaves and other parts of the plant due to rust fungi.

B) Smut Disease of Plants:-  
Smut disease of plants is characterized by black dusty spore masses that are replaced by grain kernels of wheat, corn etc. due to smut fungi.

19. What are hyphae and mycelium? (GRW-2018-A) (DGK-II-18-A)

Ans. A) Hyphae:-  
Hyphae are microscopic slender branched tubes or filaments of cytoplasm of fungi bounded by cell walls made of chitin and may or may not have septa.

B) Mycelium:-  
Mycelium is a thick mass of hyphae that is usually large enough to be seen with the naked eye and generally it has a tough, cottony texture.

20. Differentiate between conidia and conidiophore. (GRW-2018-A)

Ans.

Conidia	Conidiophore
Conidia are asexual naked spores not formed within an enclosing sac or sporangium produced by ascomycetes, some basidiomycetes and most deuteromycetes.	Conidiophore is a modified hypha which produces conidia at its tip.

21. What is Nuclear Mitosis? (MTN-2014-A)

Ans. Nuclear Mitosis:-

- Nuclear mitosis is a characteristic type of mitosis found in fungi in which:
  - a. Nuclear envelope does not break in most fungi and disintegrates at the late stages of mitosis in few fungi.
  - b. Mitotic spindle forms within the nucleus dragging chromosomes to opposite poles of the nucleus.
  - c. Nuclear membrane constricts between the two clusters of daughter chromosomes.

22. Differentiate between Rusts and Smuts. (MTN-2014-A)

Ans.

Rusts	Smuts
1. They produce black dusty spore masses.	1. They form spores producing red orange spots.
2. They infect usually wheat, oats and rye as well as trees used for lumber such as white pines.	2. They infect corn, black berries and a number of grains such as wheat etc.

23. How Yeast differ with other Fungi? (MTN-2015-A)

Ans.

Yeasts	Other Fungi
1. Yeasts are unicellular.	1. Other fungi are either multinucleate or multicellular.
2. They are non-hyphal.	2. Their body is formed of hyphae.

24. What is Ringworm? Which fungus is the cause of this disease? (MTN-2016-A)

Ans. A) Ringworm:-

Ringworm is a superficial fungal infection in dogs and horses.

B) Fungus Causing Ringworm:-  
Species of Trichophyton and Microsporum (imperfect fungi) are the cause of ringworm disease in dogs and horses.

25. What is Endomycorrhizae? (MTN-2016-A)

Ans. Endomycorrhizae:-

a. Endomycorrhizae is a type of mycorrhizae association which is characterized by a network of fine, branched hyphae within the cortical cells of the plant roots.

b. Hyphae form coils, swellings or spores and minute branches inside and between cortical cells and outside the root.

- c. Hyphae also extend out into the surrounding soil.
- d. About 85 % of land plants are involved and over 150 species of Zygomycota are involved in this association.

26. Differentiate Fragmentation and Budding in Fungi. (MTN-I-2017-A)

Ans.

Fragmentation	Budding
1. It occurs in common hyphal fungi.	1. It occurs only unicellular fungi such as yeasts.
2. It is simple breaking of mycelium of some hyphal fungi, each broken fragment giving rise to a new mycelium.	2. It is an asymmetrical division in which tiny outgrowth or bud is produced which may separate and grow.

27. What is histoplasmosis? Write its cause and effects. (MTN-II-2018-A)

Ans. A) Histoplasmosis:-  
It is serious disease of human lungs.

B) Cause of Histoplasmosis:-  
The causative agent of histoplasmosis is *Histoplasma capsulatum*, an ascomycete. Infection usually occurs by inhaling its spores which are common in soil contaminated with bird's feces.

C) Effects of Histoplasmosis:-  
Infection of histoplasmosis usually occurs in lungs. If infection spreads into blood stream and then to other organs (which is very occasional), it can be serious and even fatal.

28. Differentiate between Rusts and Smuts. (FSD-16-A) (MTN-II-2018-A) (BWP-14, 18-A) (SGD-15-A) (DGK-I-14-A)

Ans.

Rusts	Smuts
1. They produce black dusty spore masses.	1. They form spores producing red orange spots.
2. They infect usually wheat, oats and rye as well as trees used for lumber such as white pines.	2. They infect corn, black berries and a number of grains such as wheat etc.

29. Define Endomycorrhizae and Ectomycorrhizae. (BWP-2015-A)

Ans. Endomycorrhizae and Ectomycorrhizae:-

A) Mycorrhizae:-  
Mycorrhiza is a mutualistic association of a plant root and fungal hyphae in which the fungus obtains photosynthate and the plant in turn obtains nutrients and growth substances from the fungus.

B) Two Types of Mycorrhizae:-  
There are two main types of mycorrhizae, Ectomycorrhizae and Endomycorrhizae.

a. Ectomycorrhizae:-

- i. In this association, hyphae grow between cell walls of epidermis and cortex of roots and do not enter into their cytoplasm.

- ii. Mycelium also extends far out into the soil.  
 iv. Plants involved in this association are many temperate forest species such as pines, firs etc.
- b. Endomycorrhizae: -  
 i. This association is characterized by a network of fine, branched hyphae within the cortical cells of the plant roots forming coils, swellings and minute branches  
 ii. Hyphae also extend out into the surrounding soil.  
 iii. About 85 % of land plants are involved and over 150 species of Zygomycota are involved in this association.

30. What are Diakaryotic Hyphae? (BWP-2016-A)

Ans. Diakaryotic Hyphae: -

- a. A hypha with two nuclei is called dikaryotic hypha.  
 b. This condition is described as n+n rather than 2n because there are two separate haploid nuclei.  
 c. If a dikaryotic hypha has nuclei that are derived from two genetically distinct individuals, the hypha is called heterokaryotic hypha.  
 d. Hypha whose nuclei are genetically similar to each other is called homokaryotic.

Example: -

Mushrooms, rusts, smuts, puff ball etc.

31. What is Ecological Importance of Fungi?

(BWP-2016, 19-A) (FSD-15-A)

Ans. Ecological Importance of Fungi: -

- a. They, along with bacteria, play vital role in the recycling of inorganic nutrients in the ecosystem.  
 b. Some fungi are also used for bioremediation.  
 c. They clean the earth by removing the organic matter, hence are known as scavengers.

32. Define Mycorrhizae. Give its two types.

(BWP-2017-A)

Ans. A) Mycorrhizae: -

Mycorrhiza is a mutualistic association of a plant root and fungal hyphae in which the fungus obtains photosynthate and the plant in turn obtains nutrients and growth substances from the fungus.

B) Two Types of Mycorrhizae: -

There are two main types of mycorrhizae, Ectomycorrhizae and Endomycorrhizae.

a. Ectomycorrhizae: -

- i. In this association, hyphae grow between cell walls of epidermis and cortex of roots and do not enter into their cytoplasm.  
 ii. Mycelium also extends far out into the soil.  
 iv. Plants involved in this association are many temperate forest species such as pines, firs etc.
- b. Endomycorrhizae: -  
 i. This association is characterized by a network of fine, branched hyphae within the cortical cells of the plant roots forming coils, swellings and minute branches

ii. Hyphae also extend out into the surrounding soil.

iii. About 85 % of land plants are involved and over 150 species of Zygomycota are involved in this association.

33. What is the major component of cell wall of fungi? (FSD-2014-A)

Ans. Major Component of Cell Wall of Fungi: -  
 Major component of cell wall of fungi is chitin.

34. What are conidia? (FSD-2014-A)

Ans. Conidia: -

- a. Conidia are asexual reproductive cells produced by ascomycetes, some basidiomycetes and most deuteromycetes.  
 b. They are naked spores not formed within an enclosing sac or sporangium.  
 c. The modified hyphae which produce conidia are called conidiophores.  
 d. Conidia are produced by only asexual process.  
 e. Conidia may be multi-cellular.

35. What are smuts? (FSD-2014, 18-A)

Ans. Smuts: -

- a. Smuts are fungi that produce black, dusty spore masses resembling soot or smut.  
 b. They affect corn, black berries, and a number of grains.  
 c. Some smuts enter seeds and exist inside the plant, becoming visible only near maturity. Other smuts externally infects plants. In corn smut, the mycelium grows between corn kernels and secretes substances that cause the development of tumors on the ears of corn.

Example: -

*Ustilago* species

36. Give reproduction in *Penicillium*. (FSD-2015-A)

Ans. Reproduction in *Penicillium*: -

It reproduces asexually by means of naked spores called conidia formed on special hyphae called conidiophores. On germination they give rise to new hyphae of *Penicillium*.

37. Write resemblances of fungi with plants. (FSD-2017-A)

Ans. Resemblances of Fungi with Plants: -

- a. They, like plants, have cell wall.  
 b. They, like plants, lack centrioles.  
 c. They, like plants, are non-motile.

38. Define Nuclear Mitosis.

(RWP-2014-A) (DGK-II-17) (SAH-14, 15-A)

Ans. Nuclear Mitosis: -

Nuclear mitosis is a characteristic type of mitosis found in fungi in which:

- a. Nuclear envelope does not break in most fungi and disintegrates at the late stages of mitosis in few fungi.  
 b. Mitotic spindle forms within the nucleus dragging chromosomes to opposite poles of the nucleus.  
 c. Nuclear membrane constricts between the two clusters of daughter chromosomes.

39. State role of fungi and algae in lichen for each other.

(RWP-2014-A)

Ans. A) Role of Fungi in Lichen: -

Fungi protect algae from strong light and desiccation.

B) Role of Algae in Lichen: -

Algae provide food to fungi.

40. Name methods of asexual reproduction in Fungi. (RWP-2016-A) (DGK-I-14-A)

Ans. Names of Methods of Asexual Reproduction in Fungi: -

- a. Spores  
 b. Conidia  
 c. Fragmentation  
 d. Budding

41. Name some Edible Fungi. (RWP-I-2017-A)

Ans. Names of Some Edible Fungi: -

- a. *Morchella esculenta* (Morel)  
 b. *Tuber* species (Truffles)  
 c. *Agaricus* species (Mushroom)

42. What are Aflatoxins? (RWP-I-2017, 18-A)

Ans. Aflatoxins: -

- a. Aflatoxins are potent mycotoxins (poisonous compound produced by fungi) produced by *Aspergillus flavus*, a deuteromycete.  
 b. Aflatoxin-producing fungi commonly grow on improperly stored grains such as peanut, corn etc. Milk, eggs and meat also have small traces of aflatoxin.  
 c. Aflatoxins deposited in foods and ingested by humans are thought to be carcinogenic, especially in the liver.  
 d. Any moldy human food or forage product should be discarded.

43. What is the function of constricting ring?

(RWP-II-2017-A)

Ans. Function of Constricting Ring: -

The function of constricting ring around the nematode is to invade the hyphae into the body of nematode and digest it.

44. What is the economic importance of fungi?

(RWP-II-2017-A)

Ans. Economic Importance of Fungi: -

Fungi cause economic gains or losses.

A. Economic Gains: -

- a. Some fungi are used in food industry such as yeasts, *Penicillium*, *Aspergillus* etc.  
 b. Some fungi are source antibiotics and other drugs.  
 c. Some fungi are used in genetic / molecular biological research.

B. Economic Losses: -

a. Fungi are responsible for many serious plant diseases, including powdery mildew, ergot of rye, red rot of sugar cane etc.

b. Fungi also cause certain animal diseases such as Ringworm, athlete's foot, histoplasmosis, aspergillosis etc.

c. They also incalculable damage to food, wood, fiber and leather by decomposing them.

45. What is Histoplasmosis? Give scientific name of yeast used in genetic engineering. (SGD-2015-A)

Ans. A) Histoplasmosis: -

It is serious disease of human lungs caused by *Histoplasma capsulatum*, an ascomycete and spread by inhaling its spores which are common in soil contaminated with bird's face

B) Scientific Name of Yeast Used in Genetic Engineering: -

*Saccharomyces cerevisiae*

46. Compare Ascocarp with Basidiocarp. (SGD-2016-A)

Ascocarp	Basidiocarp
1. Ascocarp is a macroscopic fruiting body containing Asci with eight haploid sexual spores called ascospores in ascomycetes.	1. Basidiocarp is a fruiting body to which four haploid sexual spores called basidiospores are attached.
2. Ascocarp is found in Ascomycetes.	2. It is found in Basidiomycetes.

47. What do you know about *Armillaria*? (SGD-2017-A)

Ans. *Armillaria*: -

- a. It is a pathogenic fungus afflicting conifers.  
 b. Its single mycelium may produce upto a kilometer of new hyphae in only one day.  
 c. It spreads upto 15 hectares (1 hectare = 10000 m<sup>2</sup>).

48. Differentiate between Ascus and Basidium.

(SGD-2017-A)

Ans.

Ascus	Basidium
1. It is sac like, microscopic reproductive structure produced during sexual reproduction within which sexual spores are produced.	1. It is club-like (Latin term for small pedestal), microscopic reproductive structure on which sexual spores are produced.
2. Upto eight haploid sexual spores called ascospores are produced within an ascus.	2. Four haploid sexual spores called basidiospores are borne externally at the end of basidium on slender projection.
3. It is formed by members of Ascomycota class of fungi.	3. It is formed by members of Basidiomycota class of fungi.

49. Differentiate between endomycorrhizae and ectomycorrhizae. (SGD-2018-A)

Ans.

Endomycorrhizae	Ectomycorrhizae
1. They grow within the cortical cells of the plant roots.	1. They grow between cell walls of epidermis and cortex of roots and do not enter into their cytoplasm.
2. Endomycorrhizal plants are about 85 % land vascular plants.	2. Ectomycorrhizal plants are temperate forest trees.
3. Endomycorrhizal fungi are over 150 species of Zygomycota.	3. Ectomycorrhizal fungi are mostly basidiomycetes but some are ascomycetes.

50. Write any two differences between fungi and animals.  
(D.G.K-II-2014-A)

Fungi	Animals
1. They have cell wall made up of chitin.	1. They lack cell wall.
2. They are absorptive heterotrophs.	2. They are usually ingestive heterotrophs.

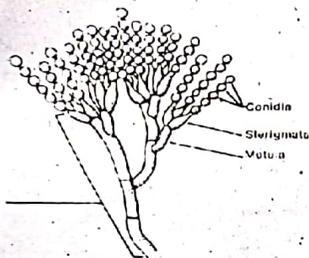
51. Write down sexual reproduction of mushrooms.  
(D.G.K-II-2015-A)

Ans. Sexual Reproduction of Mushrooms:-

- The mushroom fruiting structure grows from  $n + n$  (dikaryotic) hyphae.
- Gills on underside of mushroom's cap are lined with basidia (singular basidium), the sexual reproductive structures.
- Nuclear fusion in the basidium is followed by meiosis and four haploid basidiospores are borne on, not inside, each basidium.
- Basidiospores disperse and fall on soil to germinate into new mushrooms. During most part of their life cycle the hyphae are state; the cells are uninucleate during one phase and binucleate (dikaryotic) during the remaining, lengthy phase.

52. Sketch, structure of Penicillium. (D.G.K-II-2015-A)

Ans. Sketch of Structure of Penicillium:-



53. Give two characteristics of Fungi for their Land adaptations.  
(D.G.K-II-2016-A)

Ans. Two Characteristics of Fungi for Their Land Adaptations:-

- They have modified hyphae called rhizoids that anchor the fungus to the substrate and also digest and then absorb the food.
- They have modified hyphae that are able to reproduce without dependence on external water.

54. Why are some fungi called as predators?

(D.G.K-Group-I-2017-A)

Ans. Reason:-

Some fungi are called as predators because they prey the animals such as nematodes and fulfil their nitrogen requirements.

55. What are rusts?

Ans. Rusts:-

- Rusts are fungi that first produce numerous rusty orange yellow color or spots to the plants and then reveal masses of brick/rust-red spores on their ostia.
- There are about 7000 species of rust and they all are plant pathogens infecting leaves and stem. The plants which are infected by rusts are usually wheat, oats, and rye, as well as trees used for lumber such as white pines.

Example:-

*Puccinia* species

56. What is economic importance of yeasts?

(D.G.K-II-2018-A)

Ans. Economic Importance of Yeasts:-

- Saccharomyces cerevisiae* are used for bread baking.
- Saccharomyces ellipsoideus* are used for alcohol production.
- The cytoplasm of *Saccharomyces* is rich in B vitamins, a factor that makes yeast tablets, valuable nutritional supplements.
- Yeasts are used on a large scale to produce protein for the enrichment of animal food.

57. Differentiate between sporangia and conidia.

(D.G.K-II-2018-A) (SAH-17-A)

Ans.

Spores	Conidia
Sporangia are reproductive structures in zygomycetes in which a large number of spores are produced.	Conidia are asexual reproductive naked cells formed usually in chains or clusters at the hyphae of ascomycetes, some basidiomycetes and most deuteromycetes.

58. Define hyphae. Give their two types. (SHL-2015-A)

Ans. A) Hyphae:-

Hyphae are long, slender, branched tubular thread like filaments which form the body (mycelium) or fruiting body of fungus.

B) Two Types Of Hyphae:-

- Septate Hyphae** -- When hyphae are divided by cross walls called septa into individual cells containing one or more nuclei.
- Non-septate Hyphae** --- When hyphae lack septa or cross walls and are not divided into individual cells; instead they are in the form of an elongated, multinucleated large hyphae. Such hyphae are also called coenocytic hyphae in which cytoplasm moves effectively, distributing the materials throughout.

59. How the fungi resemble animals? (SHL-2016-A)

Ans. Fungi Resembling With Animals:-

- They, like animals, are heterotrophs.
- They contain chitin in their cell wall. Chitin is also found in the external skeleton of arthropods (a group of animals).

### SECTION III LONG QUESTIONS

- Describe land adaptations of fungi. (4)  
(LHR-I, II-2014-A) (RWP-19-A) (SAH-19-A)  
(FSD-16-A) (RWP-II-17-A) (BWP-16, 17-A)  
(MTN-14-A)
- Explain taxonomic status of fungi. (4)  
(LHR-I-2015-A) (GRW-15-A)
- Discuss different methods of asexual reproduction in fungi. (4)  
(LHR-I-2016, 17-A) (SAH-14-A) (4)  
(GRW-14-A) (RWP-I-17-A) (FSD-14-A)  
(MTN-II-17-A) (BWP-15-A)
- What do you know about mutualistic mode of nutrition in fungi? (4)  
(LHR-II-2016-A)
- Write a note on Ascomycota. (4)  
(LHR-II-2018-A) (SGD-19-A) (DGK-I-17, 18-A)
- Describe the commercial importance especially economic gains due to fungi. (4)  
(GRW-2016-A)  
(MTN-I-17-A) (SGD-16-A) (FSD-18-A)  
(DGK-II-15, 16-A) (SAH-15-A)
- Describe the life cycle of disease loose smut of wheat. (4)  
(GRW-2017-A)
- Write a detailed note on Mycorrhizae. (4)  
(RWP-2015-A)
- Explain sexual reproduction in fungi. (4)  
(RWP-2016-A) (FSD-15-A) (SGD-17-A)  
(DGK-I-19-A) (LHR-I-19-A)
- Give the economic losses due to fungi. (4)  
(RWP-2018-A) (LHR-II-15-A) (DGK-II-14, 19-A)
- Give a brief account of fungi with reference to lichens and predators. (4)  
(FSD-2017-A)
- Characterize Basidiomycota. (4)  
(Multan Board-New Scheme-2015-A)
- Discuss mutualistic symbiotic association of fungi. (4)  
(Multan Board-New Scheme-Group-I-2018-A)
- Why taxonomic status has changed from that of a group of plant kingdom to a separate kingdom "Fungi"? (4)  
(MTN-II-2018-A)
- Give four ecological uses of Fungi. (4)  
(BWP-2014-A)
- Discuss economic gains due to fungi. (4)  
(D.G.K-I-2014-A, II-15, I-18) (LHR-II-15-A)  
(RWP-14, 18-A) (BWP-18-A)
- Give the different modes of nutrition in fungi. (4)  
(SAH-2016-A) (BWP-19-A)
- Describe and sketch the life cycle of *Rhizopus*. (4)  
(SAH-2017-A) (DGK-I-14-A) (GRW-18-A)  
(SGD-18-A)

### SECTION I MULTIPLE CHOICE QUESTIONS

## Chapter --- 9 KINGDOM PLANTAE

### MCQ

**From Exercise**

- All bryophytes (mosses, liverworts and hornworts) share certain characteristics. These are:
  - Reproductive cells in protective chambers and a waxy cuticle
  - A waxy cuticle, true leaves and reproductive cells in protective chambers
  - Vascular tissues, true leaves and a waxy cuticle
  - Reproductive cells in protective chambers and vascular tissues
  - Vascular tissues and a waxy cuticle
- A heterosporous plant is one that: (MTN-I-2008-A)
  - Produces a gametophyte that bears both sex organs
  - Produces microspores and megaspores in separate sporangia, giving rise to separate male and female gametophytes
  - Is a seedless vascular plant
  - Produces two kinds of spores, one asexually by mitosis and one type by meiosis
  - Reproduces only sexually
- The male gametophyte of an angiosperm is the: (MTN-2008) (BWP-2009-A) (D.G.K-2008-A)  
(GRW-2008-A) (FSD-2007-A)
  - Anther
  - Embryo sac
  - Microspore
  - Germinated pollen grain
  - Ovule
- Important terrestrial adaptations that evolved exclusively in seed plants include all of the following except:
  - Pollination by wind or animal instead of fertilization by swimming sperm
  - Transport of water through vascular tissues
  - Retention of the gametophyte plant within the sporophyte
  - Dispersal of new plants by seeds
  - Protection and nourishment of the embryo within the seeds

**II) From Punjab Boards:-**

- The double fertilization is the characteristic feature of: (LHR-II-2014, 15-A) (MTN-14-A) (GRW-18-A) (SGD-17-A) (FSD-18-A)
  - Gymnosperms
  - Angiosperms
  - Bryophytes
  - Pteridophytes
- The bryophytes are non-vascular plants: (LHR-I-2016-A)
  - Flowering plants
  - Flowerless plants
  - Gametophytic plants
  - Sporophytic plants
- An ovule is an integumented indehiscent: (LHR-II-2018-A)
  - Microsporangium
  - Megasporangium
  - Sporangium
  - Seed
- Tracheophyta is further subdivided into: (GRW-2015-A) (RWP-14-A)
  - 2 sub-divisions
  - 3 sub-divisions
  - 4 sub-divisions
  - 7 sub-divisions
- A haploid spermatozoid fuses with haploid egg to produce diploid: (GRW-2016-A)
  - Oosphere
  - Oospore
  - Spore
  - Gamete
- All seed produced plants are called: (GRW-2017-A) (D.G.K-I-15-A, II-16-A)
  - Bryophytes
  - Peridophytes
  - Tracheophytes
  - Spermatophytes
- After fertilization, \_\_\_\_\_ is changed into seed. (RWP-II-2017-A) (BWP-18-A) (D.G.K-II-14-A)
  - Fruit
  - Flower
  - Ovule
  - Ovary
- Mosses are: (FSD-2015-A)
  - Arthropytes
  - Spermatophytes
  - Bryophytes
  - Tracheophytes
- The part of flower which develops into fruit is: (FSD-2016-A) (SAH-15-A)
  - Seed
  - Flower
  - Ovary wall
  - Ovule wall
- Amphibious plants belong to group: (MTN-2016, 17-I-A)
  - Angiospermae
  - Bryophyta
  - Pteridophyta
  - Filicinae
- Vascular System is absent in: (BWP-2016-A)
  - Bryophytes
  - Pteridophytes
  - Gymnosperms
  - Angiosperms

12) In Flowering Plants, Ovary wall develops into:

(BWP-2017-A)

- Seed
  - Fruit
  - Flower
  - Seed Coat
- Musci are commonly called: (D.G.K-I-2014-A)
    - Liverworts
    - Mosses
    - Hornworts
    - Club mosses
  - Female gametophyte in flowering plants is: (D.G.K-II-2015-A)
    - Ovary
    - Archegonium
    - Seed
    - Embryo sac
  - The sporophyte of bryophytes is: (D.G.K-I-2017-A)
    - Haploid
    - Diploid
    - Triploid
    - Tetraploid
  - The process of evolution was completed in more than: (D.G.K-I-2018-A)
    - 15-16 million years
    - 15-17 million years
    - 15-19 million years
    - 15-20 million years
  - In mosses, archegonia and antheridia are mixed with sterile hairs called: (SAH-2017-A)
    - Mycelium
    - Paraphyses
    - Hyphae
    - Trichomes
  - The simplest of all Bryophytes are: (MTN-I-19-A)
    - Mosses
    - Liverworts
    - Mornworts
    - Club Mosses

**III) From Entry Tests:-**

- From what part of plant does a seed develop? (NSTC-8-Sample paper 2010-2012)
  - Hilum
  - Anther
  - Oviduct
  - Ovule
- The structure that includes all others is: (NSTC-8-Sample paper 2010-2012)
  - Ovary
  - Ovule
  - Style
  - Pistil
- A seven structure with 8 nuclei is: (NSTC-8-Sample paper 2010-2012)
  - Stamen
  - Ovary
  - Embryo sac
  - Seed
- Pollen grain develops from haploid microspores then later develops into sperm bearing: (NSTC-8-Sample paper 2010-2012)
  - Gametophyte
  - Sporophyte
  - Megaspore
  - Pollen sac

**SECTION II  
SHORT QUESTIONS**

2 SQs

**From Exercise:-**

- Which of the followings is nutritionally self supporting?
  - Mature liverwort and moss gametophyte.
  - Mature liverwort and moss sporophyte.
 Ans. Nutritionally Self Supporting: -  
Mature liverwort and moss sporophyte.
- Account for the fact that megaspores are large while microspores are small.
  - Mature liverwort and moss gametophyte.
  - Mature liverwort and moss sporophyte.
 Ans. Fact that Megaspores are Large While Microspores are Small: -  
Megaspores contain large amount of food for the development of zygote and then embryo.
- What important advances have angiosperms made towards the seed plant life?
  - Mature liverwort and moss gametophyte.
  - Mature liverwort and moss sporophyte.
 Ans. Important Advances Made by Angiosperms Towards the Seed Plant Life: -  
Many advances angiosperms have made towards the seed plant life. Some are:
  - Development of ovules and seeds.
  - Development of ovary into fruit.
  - Development of flower.
  - What is the importance of the following?
    - Seed
    - Double Fertilization
    - Heterospory
 Ans. Importance of Following:-
  - Seed:-
    - It protects embryo enclosed in it from unfavorable conditions and is a mean for germination of embryo far from its parent plants.
    - It supplies the food to geminating embryo.
  - Double Fertilization: =  
It ensures the production of diploid zygote and triploid endosperm. Zygote changes into embryo, while endosperm provides food for the development of embryo and sometimes for the germination of seed.
    - Heterospory: -  
Production of different types of spores in heterospory leads to the variations in the next gametophytic generation. It is also an important evolutionary step towards seed formation.

**IV) From Punjab Boards:-**

- Define double fertilization. (LHR-I-2014, 15, 16, 17-A) (DGK-I-14, II-16, I-II-19) (RWP-15, 17, 18-A) (MTN-15-A)

Ans. Double Fertilization: -

- Double fertilization is the process in which there are two fertilizations, one fertilization results in the formation of a zygote, whereas the second results in the formation of endosperm.
  - It is unique to flowering plants.
  - It ensures the production of diploid zygote and triploid endosperm. Zygote changes into embryo, while endosperm provides food for the development of embryo and sometimes for the germination of seed.
- Write down two steps involved in the evolution seed. (LHR-I-2014-A)

Ans. Two Steps Involved In Evolution of Seed: -

- The first steps which is involved in the evolution of seed is the production of two types of spores by some plants viz- microspores (small spores) and mega spores (large spores).
  - Development of an embryo sac within the sporangium is another involved in the evolution of seed.
- Differentiate between ovule and seed. (LHR-II-2014-A) (SGD-16-A)

Ans.

Ovule	Seed
1. It is seed plant structure within an ovary before fertilization.	1. It is seed plant structure formed after fertilization.
2. At maturity an ovule becomes a seed.	2. It develops from an ovule.
3. An ovule is a mega sporangium containing female gametophyte and one or two integuments, layer/s of sporophytic tissue that surround and enclose the mega sporangium.	3. It consists of an embryo and a food supply surrounded by seed coat.
4. It is only found in the ovary which may or may not be surrounded by ovary wall.	4. It is found within fruit, totally exposed or borne on scale of female cone.

4. Why bryophytes are called amphibious plants?

(LHR-II-2014, 15-A) (DGK-II-14, I-15) (BWP-17) (GRW-16-A) (SGD-16-A)

Ans. Bryophytes Called Amphibious Plants: -

The bryophytes are called amphibious plants because they can not live away from water. They need water for reproduction. Their sperms need a film of water to swim to archegonia.

5. Differentiate between microphylls and megaphylls. (LHR-I-2016-A) (SAH-16) (GRW-15-A) (MTN-I-17-18)

Ans.

Microphyll Leaf	Megaphyll Leaf
1. The leaf which has a single undivided vein is known as microphyll leaf.	1. The leaf which has divided veins and vein lets with an expanded leaf blade or lamina is called megaphyll leaf.
2. It is usually small.	2. Megaphyll is usually large in size.
3. It has a single vascular strand.	3. Megaphyll leaf has more than one vascular strands.
4. It probably evolved from small, projecting extensions of stem tissue.	4. It is probably evolved from stem branches in the same plane that gradually filled in with additional tissue to form many veined leaf.
Examples: - <i>Lycopodium</i> and other Lycopods	Examples: - Ferns and all seed plants

6. Differentiate between bryophytes and tracheophytes. (LHR-I-2017-A)

Ans.

Bryophytes	Tracheophytes
1. They lack vascular tissue.	1. They have water-conducting xylem and food-conducting phloem tissues in their stems, roots, and leaves.
2. They are typically quite small, few exceed seven centimeters in height.	2. They reach upto many meters in height.
3. Bryophytes are the plants with a dominant gametophyte generation. Their sporophytes remain permanently attached and nutritionally dependent on the gametophyte.	3. Sporophyte of tracheophytes is dominant generation of the life cycle existing as free-living plant. The gametophyte is usually short-lived and degenerates once the sporophyte is established.
4. All require water to reproduce sexually.	4. Some require water to reproduce sexually.
5. All are homosporous plants.	5. Some are homosporous while majority of plants are heterosporous.

7. Differentiate between macro gametophyte and mega gametophyte. (LHR-II-2018-A)

Ans.

Micro gametophyte	Macro gametophyte
1. It is male gametophyte.	1. It is female gametophyte.
2. It is developed from microspore.	2. It is developed from megaspore.
3. It produces sperms.	3. It produces ova.

8. How spores of mosses differ from spores of liverworts? (GRW-2014-A) (DGK-I-14-A)

Spores of Mosses	Spores of Liverworts
Spores of mosses develop into alga like structures, the protonema, the buds on which develop into male or female haploid gametophytes.	Spores of liver worts develop directly into male or female haploid gametophytes.

9. Define kingdom plant. (GRW-2018-A)

Ans. Kingdom Plantae: -

- It is the kingdom in which are included the organisms of eukaryotes, autotrophs, multicellulars, non-motile with cell walls of cellulose and which develop from embryos.
- Its members are commonly known as plants.
- It is divided into two sub-kingdoms:
  - Bryophytes --- Non-vascular plants
  - Tracheophytes --- Vascular plants

10. What is homospory? Give one example. (GRW-2018-A)

Ans. Homospory with One Example: -

- Production of one type of haploid spores is called Homospory.
- In homospory, spores give rise to gametophyte plants that produce both egg cells and sperm cells.
- It is characteristic of bryophytes, horsetails, whisk ferns, and most ferns and club mosses.

11. Differentiate between Dicots and Monocots. (LHR-I-19-A) (MTN-2014-A) (BWP-14-A) (DGK-II-18)

Dicots	Monocots
1. They have seeds with two cotyledons (seed leaves).	1. They have seeds with one cotyledon.
2. They have leaves with a network of veins (reticulate venation).	2. They have leaves with parallel veins (parallel venation).
3. Flower parts are mostly in fours or fives or multiple of four or five.	3. Flower parts are mostly in threes or multiples of three.
4. Their stems have vascular bundles in ring.	4. They have scattered vascular bundles in stem.
Examples: - Oaks, roses, mustards, cacti, blueberries, and sunflowers.	Examples: - Palms, grasses, orchids, irises, onions and lilies.

12. What are Gymnosperms? Give example. (LHR-II-16-A) (MTN-II-2017-A)

Ans. Gymnosperms with Example: -

- Gymnosperms are naked seeded plants because their ovules, which become seeds, rest exposed on a scale and is not completely enclosed by sporophyte tissues at the time of pollination. However, their seeds are sometimes enclosed other sporophyte tissues by the time they are mature.

- They lack the flowers and fruits.
- They show regular heteromorphic alternation of generation.

- They have independent, dominant sporophyte but less conspicuous, dependent gametophyte.
- The female gametophyte is permanently retained within the ovule.
- Two kinds of spore, microspores and megaspores, develop on microsporophylls and megasporophylls respectively.

Examples: -  
*Cycas* (Sago palm), *Pinus* (Pine), *Cedrus* (Deodar) etc.

13. What are essential and non-essential parts of flower? (MTN-I-2018-A) (GRW-15) (BWP-16-A)

Ans. A) Essential Parts of Flower: -  
Stamens and carpels are the essential parts of the flower. They are reproductive parts of the flower

B) Non-Essential Parts of Flower: -  
Sepals and petals are non-essential parts of flower. They are non-reproductive parts of the flower.

14. Differentiate between Homospory and Heterospory. (MTN-II-2018-A, 19-A) (RWP-19-A) (SAH-19-A) (FSD-16-A)

Ans.

Homospory	Heterospory
1. Production of one type of haploid spores is called Homospory.	1. Production of two types of haploid spores, microspores (male) and megaspores (female) is called Heterospory.
2. In homospory, spores give rise to gametophyte plants that produce both egg cells and sperm cells.	2. The evolution of heterospory was an essential step in the evolution of seeds. Microspores give rise to male gametophytes that produce sperm cells. Megaspores give rise to female gametophytes that produce eggs.
3. It is characteristic of bryophytes, horsetails, whisk ferns, and most ferns and club mosses.	3. It occurs in certain club mosses, certain ferns, and all seed plants.

15. Differentiate between Overtopping and Plannation. (MTN-II-2018, 19-A) (RWP-19-A) (SAH-19-A)

Ans.

Overtopping	Plannation
1. Unequal branching is known as Overtopping.	1. Branching in same plane is known as Plannation.
2. It was a step of evolution of megaphyll leaf in which the dichotomously branched aerial portion of the stem of psilopsida grew in different planes with some branch esremained short while other grew at much faster space.	2. It was a step of evolution of megaphyll leaf, in which unequal dichotomies were arranged in one plane.

16. Write the names of two Extinct-Vascular Plants. (BWP-2015-A)

Ans. Names of Two Extinct Vascular Plants: -  
a. *Horneophyton*  
b. *Psilophyton*

17. What is ovule? (BWP-2018-A)

- Ans. Ovule: -
- The integumented megasporangium in which megaspore retained is called an ovule or unripe seed.
  - Each ovule has main cellular body called nucellus which is surrounded by two coats, inner and outer integuments.

- One or more ovules are produced in the carpel's swollen lower portion, the ovary.

- Ovary wall may or may not surround their ovules. Ovules of angiosperms are protected but ovary wall does not surround the ovules of gymnosperms.

- Certain changes occur in the ovule, leading to the formation of megaspore. In angiosperms, megaspore generally develops into seven celled female gametophyte or embryo sac.

18. Compare monocots and dicots in at least two morphological characters. (FSD-2015-A)

Ans. Comparison of Monocots and Dicots In Atleast Two Morphological Characters: -

Morphological Characters	Monocots	Dicots
1. Arrangement of Vascular Tissues	1. Vascular tissues in stem are usually scattered or more complex arrangement.	1. Vascular tissues in stem are arranged in a circle (ring).
2. Cotyledons	2. They have seeds with one cotyledon.	2. They have seeds with two cotyledons.

19. What are homosporous and heterosporous plants? Give example. (FSD-2018-A)

Ans. A) Homosporous Plants: -  
The plants which produce only one type of spores are called Homosporous plants.

Examples: -  
Bryophytes, horsetails, whisk ferns, and most ferns and club mosses.

B) Heterosporous Plants: -  
The plants which produce two types of spores produce two different types of spores, microspores (smaller spores) and megaspores (larger spores).

Examples: -  
Certain ferns; club mosses and seed plants.

20. Define flower. What are essential and non-essential parts of flower? (FSD-2018-A)

Ans. A) Flower: -

Flower is a modified shoot which consists of a pedicel, thalamus or floral leaves (sepals, petals, stamens and carpals).

B) Essential and Non-Essential Parts of Flower: -

A) Essential Parts of Flower: -

Stamens and carpals are the essential parts of the flower. They are reproductive parts of the flower

B) Non-Essential Parts of Flower: -

Sepals and petals are non-essential parts of flower. They are non-reproductive parts of the flower.

21. Write down four characteristics of bryophytes. (RWP-2014-A)

Ans. Four Characteristics of Bryophytes: -

- They lack xylem and phloem (vascular bundle), hence are known as non-vascular plants.
- Most bryophytes are small, few exceed seven centimeters in height. The gametophytes are more conspicuous than sporophytes. Sporophytes are attached to the gametophytes and depend on them nutritionally to varying degree.
- They require water to reproduce sexually, hence are common in moist places.
- Their sporophytes produce only one type of spore, hence they are known as homosporous.

22. Name four subdivisions of Tracheophyta. (RWP-2015-A)

Ans. Names of Four Subdivisions of Tracheophyta: -

- Sub-division Psilopsida
- Sub-division Lycopsidea
- Sub-division Sphenopsida
- Sub-division Pteropsida

23. Define seed and fruit. (RWP-2016-A)

Ans. A) Seed: -

- Seed may be defined as a ripened and fertilized ovule.
- It consists of:
  - An embryo which consists of very short axis to which one or two seed-leaves called cotyledons are attached. The end of the axis lying between two cotyledons is called plumule and other end is called radical.
  - Food supply, that is stored in a structure called endosperm or albume.
  - Seed coat, that is made up of two layers. The outer, thicker layer is called test and inner thin layer is called tegamen.

B) Fruit: -

- Fruit is the ripened ovary of a flowering plant that contains one or more seeds.
- Fruit is actually the seed bearing structure in the flowering plants.

c. Fruit is composed of pericarp (the ovary wall which surrounds the seeds) and seed.

24. What is the earliest group of vascular plants? Quote only two examples its extinct plants. (RWP-2016-A)

Ans. A) Earliest Group of Vascular Plants: -

- Psilopsida is the earliest group of vascular plants, the most of its representatives have become extinct while there are only two living genera (*Psilotum*, *Tmesipteris*).
- In Psilopsida, plants have leafless and rootless sporophytes and thalloid, colorless and underground gametophytes.
- The stem of sporophyte is differentiated into:
  - Dichotomously branched underground rhizome that grows horizontally in soil and bears rhizoids but not roots.
  - An aerial dichotomously branched, green, leafless, photosynthetic part that bears small veinless outgrowths and reproductive structures sporangia at the tips of its branches.

B) Two Examples of Extinct Plants: -

- Horneophyton*
- Psilophyton*

25. What is overtopping? (RWP-I-2017-A) (DGK-I-18-A)

Ans. Overtopping: -

- Unequal branching is known as Overtopping.
- In overtopping, the dichotomously branched aerial portion of the stem of psilopsida grew in different planes with some branches remained short while other grew at much faster space.

26. How does Gymnosperm differ from Angiosperm? Give two points only. (RWP-II-2017-A) (DGK-II-19-A)

Ans. Two Differences Between Angiosperm And Gymnosperm: -

Angiosperm	Gymnosperm
1. Its reproductive structures are usually flowers.	1. Its reproductive structures are usually cones.
2. Seeds are enclosed within fruit.	2. Seeds are exposed or borne on scales of cones.

27. Give two characters of bryophyte division. (SGD-2017-A)

Ans. Two Characters of Bryophyte Division: -

- Bryophytes are non-vascular flowerless plants.
- They have a dominant independent free living haploid gametophyte generation which alternates with less conspicuous, diploid generation that is partially or totally dependent upon the gametophyte for its nutrition.

28. Name two vegetative and two reproductive evolutionary characters of Tracheophyta. (D.G.K-I-2014-A)

Ans. A) Two Vegetative Characters of Tracheophyta: -

- Root, stem and leaves
- Vascular systems in stems, roots and leaves

B) Two Reproductive. Evolutionary Characters Of Tracheophyta: -

- Protective sporangia leading to the evolution of seed
- Pollen tube for safe and water independent transmission of male gamete to female gamete, also parallel to evolution of seed

29. Define bryophytes. (D.G.K-II-2014-A)

Ans. Bryophytes: -

Bryophytes can be defined as:

"Vascular system absent; gametophyte dominant; sporophyte attached to gametophyte; homosporous".

Example: -

*Funaria*, *Marchentia*, *Porella*, *Polytrichum*, *Anthoceros* etc.

30. How double fertilization is important for storage of food? (D.G.K-II-2015-A)

Ans. Importance of Double Fertilization For Storage of Food: -

When second haploid sperm (n), during double fertilization, fuses with fusion nucleus, a triploid (3n) endosperm cell is formed that later develops into food storing endosperm tissue.

31. Differentiate between antheridia and archegonia. (D.G.K-II-2017-A)

Ans.

Archegonia	Antheridia
1. These are multi-cellular, male sex organs.	1. These are multi-cellular, female sex organs.
2. They produce and protect sperms.	2. They produce and protect eggs.
3. They are found in gametophytes of seedless plants.	3. They are found in gametophytes of seedless plants and gymnosperms.

32. Write four characteristics of bryophytes? (D.G.K-I-2018-A)

Ans. Four Characteristics of Bryophytes: -

- They lack xylem and phloem (vascular bundle), hence are known as non-vascular plants.
- Most bryophytes are small, few exceed seven centimeters in height. The gametophytes are more conspicuous than sporophytes. Sporophytes are attached to the gametophytes and depend on them nutritionally to varying degree.
- They require water to reproduce sexually, hence are common in moist places.
- Their sporophytes produce only one type of spore, hence they are known as homosporous.

33. Differentiate between anthridiophores and archegoniophores. (SHL-2015-A) (MTN-19-A) (BWP-19-A)

Ans.

Anthridiophores	Archegoniophores
1. Anthridiophores bear circular male receptacles at the top.	1. Archigoniophores bear star shaped female receptacles at the top.
2. Each anthridiophore bears male reproductive organs, the antheridia, on the upper side of receptacle.	2. Each archegoniophore bears female reproductive organs, the archegonia, on the upper side of receptacle.

### SECTION III LONG QUESTIONS

- Write main steps of evolution of megaphyll leaf. (4) (LHR-II-2015-A)
- Describe the different adaptive characters for (4) terrestrial environment. (LHR-II-2016-A) (LHR-II-2018-A)
- Enlist the steps involved in evolution of seed. (4) Describe any two in detail. (GRW-2015, 16-A) (SAH-15-A) (FSD-17-A) (MTN-I-17-A) (DGK-I-14, II-15-A)
- Describe land adaptations in bryophytes. (4) (LHR-II-19-A) (RWP-2014-A, II-17-A) (SGD-18-A) (FSD-16-A) (MTN-18, 19-A) (GRW-14-A) (SAH-19-A) (DGK-I-14-A)
- What is megaphyll? Describe various steps of evolution of Megaphyll. (RWP-2016-A) (4)
- Define angiosperms. Explain double fertilization in (4) angiosperms. How angiosperms differ from gymnosperms? (FSD-2018-A)
- Define and explain alternation of generation in (4) Bryophytes. (BWP-2015-A)
- Differentiate between Monocots and Dicots. (4) (BWP-2016-A) (GRW-17-A)
- Write a note on the Economic Importance of Family Rosaceae. (BWP-2018-A) (RWP-18-A)
- Describe life cycle of an Angiosperm plant. (4) (D.G.K-I-2015-A)
- Differentiate between microphylls and megaphylls and describe evolution of megaphyllous leaf. (4) (D.G.K-I-2018-A)
- Write down characteristics of class gymnosperae. (4) (D.G.K-II-2018-A)
- Write a note on Evolution of Leaf. (4) (LHR-II-14-A) (SAH-2014-A) (SGD-16, 17-A) (RWP-15-A) (MTN-14, II-17-A)

## SECTION I MULTIPLE CHOICE QUESTIONS

### Chapter 10 KINGDOM ANIMALIA

2MCQs

#### I) From Exercises:

- 1) Vertebrates that develop embryonic membranes around their embryos are called (Amniotes, Amniotes).
- 2) In animals the bodies of which can be divided into two equal halves only in one plane are (asymmetrical, bilaterally symmetrical, radially symmetrical).
- 3) Animals that have their body filled with parenchyma are (Acoelomates, Coelomates, Pseudocoelomates).
- 7) In annelids the organs for excretion are (flame-cells, nephridia, kidneys).
- 8) In arthropoda the body cavity is (pseudocoelom, enterocoel, haemocoel).
- 9) In mollusca the foot is used for (capturing prey, locomotion, or both).

#### II) From Punjab Boards:

- 1) *Enterobius vermicularis* is called: (LHR-I-2014-A)
  - a) Shipworms
  - b) Hookworms
  - c) Bookworms
  - d) Pinworms
- 2) In molluscs a blue colored respiratory pigment is: (LHR-I-2014-A)
  - a) Hemoglobin
  - b) Hemoerythrin
  - c) Haemocyanin
  - d) Prothrombin
- 3) The asexual reproduction in sponges is: (LHR-II-2014-A)
  - a) Fragmentation
  - b) Multiple fission
  - c) Binary fission
  - d) Budding
- 4) Blood of arthropods is: (LHR-I-2015-A)
  - a) Green color
  - b) Red color
  - c) Brown color
  - d) Colorless
- 5) *Ancylostoma duodenale* is biological name of: (LHR-I-2015-A, II-15-A)
  - a) Flatworm
  - b) Tapeworm
  - c) Roundworm
  - d) Fluke
- 6) Common name of *Ancylostoma duodenale* is: (LHR-II-2016-A)
  - a) Ship-worm
  - b) Hook-worm
  - c) Pin-worm
  - d) Tapeworm
- 7) Sea anemone belongs to phylum: (LHR-I-2017-A)
  - a) Coelenterata
  - b) Arthropoda
  - c) Echinodermata
  - d) Annelida

- 8) The animal with exceptionally large brain is: (LHR-I-2017-A)
  - a) Star fish
  - b) Octopus
  - c) Snail
  - d) Sepia
- 9) *Ascaris lumbricoides* is an intestinal parasite of: (LHR-II-2018-A, I-19-A)
  - a) Horse
  - b) Man
  - c) Donkey
  - d) Monkey
- 10) An example of beautiful and delicate sponge called Venus flower basket is: (GRW-2014-A)
  - a) Sycon
  - b) Leucosolenia
  - c) Euplectella
  - d) Spongilla
- 11) Aquatic arthropods respire through: (GRW-2015-A)(RWP-14-A)
  - a) lungs
  - b) Skin
  - c) Gills
  - d) Spiracles
- 12) The larva found in echinoderms is: (GRW-2015-A)
  - a) Trochophore
  - b) Valiger
  - c) Bipinnaria
  - d) Planaria
- 13) The phylum which is exclusively marine is: (GRW-2016-A)
  - a) Cnidaria
  - b) Porifera
  - c) Echinodermata
  - d) Annelida
- 14) The presence of notochord is the character of: (GRW-2016-A)
  - a) Arthropoda
  - b) Mollusca
  - c) Nematoda
  - d) Chordates
- 15) Flame cells are excretory cells in: (GRW-2017-A) (D.G.K-II-14A)
  - a) Flat worms
  - b) Segmented worms
  - c) Round worms
  - d) Insects
- 16) Which of the following is a motile coelenterate? (GRW-2018-A) (BWP-I-15A)
  - a) Hydra
  - b) Obelia colony
  - c) Jelly fish
  - d) Corals
- 17) Pseudocoelom is characteristic feature of phylum: (GRW-2018-A)
  - a) Nematoda
  - b) Echinodermata
  - c) Mollusca
  - d) Annelida
- 18) A free swimming trochophore larva is produced during the life cycle of: (RWP-2014-A, 15A)
  - a) Coelenterata
  - b) Porifera
  - c) Annelida
  - d) Arthropoda
- 19) The Excretory system of Flatworms is composed of: (RWP-2015-A) (LHR-I-19-A)
  - a) Nephron
  - b) Nephridia
  - c) Flame cells
  - d) Ganglia
- 20) The animals without body cavity are called: (RWP-2016-A)
  - a) Eumetazoa
  - b) Pseudocoelomata
  - c) Coelomata
  - d) Acoelomata
- 21) Garden snail belongs to: (RWP-2016-A)
  - a) Gastropoda
  - b) Cephalopoda
  - c) Pelecypoda
  - d) Arthropoda

#### 22) Pseudocoelom is present in:

- a) Cnidaria
  - b) Flatworms
  - c) Round worms
  - d) Segmented worms
- 23) Portuguese man of war is the name used for: (RWP-2018-A)(D.G.K-I-14A)
    - a) Physalia
    - b) Obelia
    - c) Hydra
    - d) Aurelia
  - 24) The largest invertebrate animal is: (RWP-2018-A)
    - a) Dog fish
    - b) Cuttle fish
    - c) Giant Squid
    - d) Octopus
  - 25) *Loligo* is an animal of Phylum Mollusca, which is commonly called: (SGD-2015-A)
    - a) Slug
    - b) Garden snail
    - c) Oyster
    - d) Squid
  - 26) Metamerically segmented animals are belonging to the: (SGD-2016-A)
    - a) Annelids
    - b) Cnidarians
    - c) Molluscs
    - d) Echinoderms
  - 27) Sepia belongs to: (SGD-2016-A)
    - a) Cephalopoda
    - b) Gastropoda
    - c) Myriapoda
    - d) Annelida
  - 28) Neamtocysts are the characteristics of phylum: (SGD-2017-A)
    - a) Nematoda
    - b) Coelenterata
    - c) Platyhelminthes
    - d) Annelida
  - 29) Which is not included in proterostomia? (FSD-2014-A)
    - a) Arthropoda
    - b) Mollusca
    - c) Annelida
    - d) Echinodermata
  - 30) The spiny skinned animals are included in: (FSD-2015-A)
    - a) Porifera
    - b) Echinodermata
    - c) Annelida
    - d) Mollusca
  - 31) A rasping tongue like radula having horay teeth is present in: (FSD-2015-A)
    - a) Sponges
    - b) Coelenterata
    - c) Annelids
    - d) Molluscs
  - 32) Flame cells are found in the phylum: (FSD-2018-A)
    - a) Nematoda
    - b) Annelida
    - c) Mollusca
    - d) Platyhelminthes
  - 33) Haemocyanin is found the phylum: (FSD-2018-A)
    - a) Echinodermata
    - b) Mollusca
    - c) Hemichordata
    - d) Chordata
  - 34) \_\_\_\_\_ has eight eyes: (MTN-2014-A)
    - a) Lamprey
    - b) Snake
    - c) Bat
    - d) Spider
  - 35) Excretory system in arthropods is composed of: (MTN-2015-A)(BWP-15-A)
    - a) Flame cells
    - b) Nephridia
    - c) Malpighian tubules
    - d) Nephrons
  - 36) Sphenodon is found in: (MTN-2015-A)
    - a) Australia
    - b) Texas
    - c) New Zealand
    - d) Berlin
- 37) The inner layer of sponges is called: (MTN-2016-A)
    - a) Pinacoderm
    - b) Choanoderm
    - c) Endoderm
    - d) Epiderm
  - 38) Sea Urchin belongs to phylum: (MTN-I-2017-A)(RWP-I-19-A)
    - a) Coelenterata
    - b) Porifera
    - c) Nematoda
    - d) Echinodermata
  - 39) Polyps and Medusa are examples of: (MTN-I-2017-A)
    - a) Coelenterata
    - b) Porifera
    - c) Nematoda
    - d) Arthropoda
  - 40) The body cavity of Nematoda is: (MTN-II-2017-A)
    - a) Blastocoel
    - b) Pseudocoelom
    - c) Coelom
    - d) Haemocoelom
  - 41) The pores by which the water leaves the body of sponges is called: (MTN-II-2017-A)
    - a) Ostia
    - b) Mouth
    - c) Anus
    - d) Osculum
  - 42) In sponges asexual reproduction takes place by budding. The internal buds are called: (MTN-I-2018-A)
    - a) Globules
    - b) Gemmules
    - c) Endosperm
    - d) Cyst
  - 43) Some of colonial members of Cnidaria have upto five different types of zooids performing different functions for the colony e.g.: (MTN-I-2018-A)
    - a) *Physalia*
    - b) *Paramecium*
    - c) *Aurelia*
    - d) *Actinia*
  - 44) The tsetse fly of African countries transmits Trypanosoma, the cause of: (MTN-II-2018-A)
    - a) Sleeping sickness
    - b) Measles
    - c) Lung infection
    - d) Malaria
  - 45) Animals of which phylum have developed bilateral symmetry in their larvae and radial symmetry in their adults: (BWP-2014-A)
    - a) Nematoda
    - b) Annelida
    - c) Mollusca
    - d) Echinodermata
  - 46) Excretory organs in arthropods are called as: (BWP-2015-A)
    - a) Kidney
    - b) Nephridia
    - c) Malpighian tubules
    - d) Flame cell
  - 47) The pores by which water enters the body of sages are called: (BWP-2015-A)(D.G.K-I-18-A)
    - a) Osculum
    - b) Ostia
    - c) Mouth
    - d) Pinacocytes
  - 48) Hydra belongs to Phylum: (BWP-2016-A)
    - a) Mollusca
    - b) Cnidaria
    - c) Annelida
    - d) Arthropoda
  - 49) Schistosoma is commonly called: (D.G.K-I-2014-A)
    - a) Liver Fluke
    - b) Tapeworm
    - c) Planaria
    - d) Blood Fluke

- 50) Roundworms are: (D.G.K-I-2015-A)  
 a) Acoelomates b) Pseudocoelomates  
 c) Coelomates d) None of them
- 51) Larva of Molluscs and Annelids: (D.G.K-II-2015-A)  
 a) Radula b) Plannula  
 c) Trochophore d) Gemmule
- 52) A blue colored respiratory pigment called haemocyanin is found in: (D.G.K-II-2016-A)  
 a) Molluscs b) Arthropods  
 c) Annelids d) Echinoderms
- 53) Which one is not example of phylum Mollusca: (D.G.K-II-2018-A)  
 a) Loligo b) Sepia  
 c) Octopus d) Asterias
- 54) In annelids excretion takes place by specialized structures called: (SAH-2014,16-A)(D.G.K-I-15)  
 a) Kidneys b) Malpighian tubules  
 c) Flame cells d) Nephridia
- 55) The animals that only exist in polyp form is: (SAH-2014-A)  
 a) Obelia b) Jelly fish  
 c) Physalia d) Hydra
- 56) In protostomes, the blastospore forms: (SAH-2015-A)  
 a) Anus b) Brain  
 c) Excretory pore d) Mouth
- 57) Dygesia is a free-living flatworm with a ciliated outer surface. It is commonly called: (SGD-I-19-A)  
 a) Tape worm b) Liver fluke  
 c) Blood fluke d) Planaria

**III From Entry Test-**

- 1) Sharks and rays are included in class: (Entry Test 2009)  
 a) Cyclostoma c) Osteichthyes  
 b) Condrichthyes d) Tetrapoda
- 2) Name the vertebrates which are without jaws: (Entry Test 2009)  
 a) Osteichthyes c) Chondrichthyes  
 b) Cyclostoma d) None of these
- 3) Which of the following damages wooden ships? (Entry Test 2009)  
 a) Sepia c) Teredo  
 b) Limax d) Ostrich
- 4) Which of the following do not have a body cavity? (Entry Test 2009)  
 a) Pseudocoelomata c) Coelomata  
 b) Acoelomata d) None of these
- 5) The sponges which belong to phylum Porifera have: (Entrance Self-Test-2011)  
 a) Maximum capacity to regenerate  
 b) Very little capacity to regenerate  
 c) Moderate capacity to regenerate  
 d) No regeneration capacity

6) The platyhelminthes liver fluke is:

(Entrance Self-Test-2011)

- a) Ectoparasite in humans  
 b) Blood parasite  
 c) Parasite of respiratory tract  
 d) Parasite in the bile duct
- 7) Which of the following is of economic importance to man? (Entrance Self-Test-2011)  
 a) Daphnia c) Silkworm  
 b) Millipede d) Scorpion
- 8) *Fasciola* is the name given to: (Entry Test 2012)  
 a) Tapeworm c) Liver fluke  
 b) Planaria d) Earthworm
- 9) *Ascaris* is: (Entry Test 2012)  
 a) Diploblastic c) Maptoic  
 b) Triploblastic d) Acoelomate
- 10) During development, in an animal, mesoderm layer gives rise to: (Entry Test 2012)  
 a) Nervous system  
 b) Alimentary canal lining  
 c) Muscular and skeletal system  
 d) Mouth
- 11) When beef which is not properly cooked is consumed by humans, they become infected by: (Entrance Test-2013)  
 a) Tape worm b) Pin worm  
 b) Hook worm d) Round worm
- 12) *Schistosoma* is a parasite that lives in the \_\_\_\_\_ of the host. (Entrance Test-2013)  
 a) Intestine b) Liver  
 b) Kidney d) Blood
- 13) The cavity between body wall and alimentary canal is: (Entrance Test-2013)  
 a) Coelom c) Endoderm  
 b) Mesoderm d) Mesoglea
- 14) The layer which forms the lining of digestive tract and glands of digestive system is: (Entrance Test-2013)  
 a) Ectoderm c) Endoderm  
 b) Mesoderm d) Mesoglea
- 15) *Ascaris* is which one of the following? (Entrance Test-2014)  
 a) Ectoparasite b) Intestinal parasite  
 c) Respiratory tract parasite  
 d) Urinogenital tract parasite
- 16) Polymorphism is a feature exhibited by members of: (Entrance Test-2014)  
 a) Coelenterata c) Porifera  
 b) Arthropoda d) Platyhelminthes
- 17) Which one of the following is the primary host of liver fluke? (Entrance Test-2014)  
 a) Man c) Snail  
 b) Sheep d) Dog

## SECTION II

### SHORT QUESTIONS

4 SQs

**From Exercise:**

No Short Question From Exercise

**III From Punjab Boards:**

1. What are deploblastic animals. (LHR-II-2014-A) (FSD-18)

Ans. Diploblastic Animals: -

- a. Their body is made up of two cellular layers, an ectoderm and endoderm. Between them is the mesogloea, a non-cellular layer.  
 b. The animals have radial symmetry hence they belong to division Radiata.  
 c. Most of the organization of diploblastic animals is at the level of tissues.  
 d. There is sac like digestive system with only one cavity called gastrovascular cavity and one opening, the mouth.  
 Example: -  
*Hydra, Obelia, Sea anemone* etc.

2. What is metamorphosis? (LHR-II-2014-A, I-15-A) (SGD-15-A) (SAH-14) (RWP-15-A) (BWP-14)

Ans. Metamorphosis: -

Metamorphosis is a morphological and physiological process that allows an organism to change abruptly from one distinct form to another during its life time. In general sense, metamorphosis is the developmental transformation from the larva to adult body plan. There are two types of metamorphoses:

- a. **Complete Metamorphosis:** -  
 Metamorphosis is said to be complete when egg hatches into a larva which develops into a resting stage, the pupa, which in turn transforms into an adult. Adults and their larval stages live in different habitats.  
 Examples: -  
 Mosquito, House fly etc
- b. **Incomplete Metamorphosis:** -  
 Metamorphosis is said to be incomplete when egg hatches into a tiny immature adult like creature called nymph or in star which grows directly into an adult. Both nymphs and adults live in the same habitat.  
 Example: -  
 Head louse

3. What are hermaphrodite organisms. (LHR-II-2014-A)

Ans. Hermaphrodite Organisms: -

- a. An organism that has both male and female sex organs is called Hermaphrodite.  
 b. Hermaphrodite animals usually have both testes (male sex organs) and ovaries (female sex organs) in them.  
 c. Hermaphrodite plants have both antheridia (male sex organs) and archegonia (female sex organs).  
 Examples: -  
 a. Members of phylum Platyhelminthes  
 b. Flowering plants (usually)

- 18) Which one of the following is an example of a free living carnivorous flatworm? (Entrance Test-2014)  
 a) Liver fluke c) Tapeworm  
 b) Dugesia d) Schistosoma

- 19) \_\_\_\_\_ is a triploblastic organism. (Entrance Test-2015)  
 a) Jelly fish c) Tapeworm  
 b) Sea Anemone d) Corals

- 20) In arthropods, the body cavity is in the form of: (Entrance Test-2015)  
 a) Coelom c) Pseudocoelom  
 b) Haemocoel d) Enteron

- 21) \_\_\_\_\_ is also called liver fluke. (Entrance Test-2015)  
 a) *Dugesia* c) *Fasciola*  
 b) *Taenia* d) Corals

- 22) Name common gut roundworm parasite of human and pigs: (Entrance Test-2015)  
 a) *Ascaris lumbricoides* c) *Pheretima posthuma*  
 b) *Lumbricus terrestris* d) *Hirudo medicinalis*

- 23) *Taenia* is an endoparasite of human, pig and cattle which belongs to phylum: (Entrance Test-2016)  
 a) Cnidaria c) Annelida  
 b) Aschelminthes d) Platyhelminthes

- 24) Body of \_\_\_\_\_ consists of segments called proglottids which contains mainly sex organs. (Entrance Test-2016)  
 a) *Planaria* c) *Fasciola*  
 b) *Ascaris* d) Tapeworm

- 25) \_\_\_\_\_ is a common parasite of the intestine of human and pig which belongs to phylum Nematoda. (Entrance Test-2016)  
 a) *Tenia solium* c) *Ascaris lumbricoides*  
 b) *Schistosoma* d) *Fasciola hepatica*

- 26) In radial symmetry all body parts are arranged around the central axis. Radial symmetry represents \_\_\_\_\_ mode of life. (Entrance Test-2016)  
 a) Sessile c) Active  
 b) Streamlined d) Parasitic

- 27) Pseudo-coelomates have a body cavity but it is not true coelom. Which one of the following is included in the group: (Entrance Test-2016)  
 a) Planaria c) Earthworm  
 b) Tapeworm d) *Ascaris*

- 28) Chitin, a chemical found in exoskeleton of arthropods is also found in the cell wall of: (Entry Test-2017)  
 a) Bacteria c) Cyanobacteria  
 b) Fungi d) Algae

- 29) Snails are the intermediate hosts in: (Entry Test-2017)  
 a) *Fasciola hepatica* c) *Schistosoma*  
 b) *Taenia solium* d) *Ancylostoma duodenale*

- 30) \_\_\_\_\_ is an intestinal parasite of man belonging to phylum nematode. (Entry Test-2017)  
 a) *Taenia solium* b) *Wuchereria bancrofti*  
 c) *Ascaris lumbricoides* d) *Schistosoma*

4. Write two adaptations in organisms that give in the aquatic environment. (LHR-II-2014-A)

- Ans.  
 a. They have two chambered heart with afferent and efferent bronchial system.  
 b. They have gills, adaptation to receive oxygen dissolved in water.

5. What are Cnidocytes? (LHR-I-2015-A) (FSD-16,18-A)

Ans. Cnidocytes:-  
 Cnidocytes are specialized cells in the members of phylum Cnidaria (characteristic of this group) that give rise to nematocysts, the stinging cells or capsules.

6. Differentiate between sac-like and tube-like Digestive systems. (LHR-I-2015-A)

Sac-Like Digestive System	Tube-Like Digestive System
1. It opens to the outside by only one opening called mouth. 2. It is in the form of a sac that serves as digestive as well as body cavity.	1. It opens to the outside by two openings, one is mouth present at the anterior end and the second is anus that is present at the posterior end. 2. It is in the form of alimentary canal that only acts a digestive cavity.

7. Give two characteristics of deuterostomes. (LHR-II-2015-A)

- Ans. Two Characteristics of Deuterostomes:-  
 a. Cleavage is radial and indeterminate.  
 b. Mesoderm is derived from wall of developing gut (archenterone).

8. Differentiate between radial and bilateral symmetry. (LHR-II-2015-A) (DGK-II-18)

Radial Symmetry	Bilateral Symmetry
It is that type of symmetry in which: a) Body parts of the animals are arranged around a central axis. b) Any longitudinal plane divides the animal into two similar halves. c) There is no right or left side. Examples:- Members of Phylum Cnidaria	It is that type of symmetry in which: a) Body parts of the animals are constructed along a plane running from a head to a tail region. b) Only one longitudinal plane divides the animal into two equal halves. c) There is definite right and left side. Examples:- Members of Phyla Annelida, Arthropoda, Chordata etc.

9. Write basic characters of chordates, give an example. (LHR-I-2016-A) (MTN-15, II-17) (FSD-15-A)

- Ans. A) Basic Characters of Chordates:-  
 a. Notochord:-  
 It is dorsal supporting cylindrical hollow rod situated below the nerve cord and above the gut. The majority of vertebrates have an embryonic notochord that is replaced by the vertebral column during development.

b. Nerve Cord:-  
 All chordates have hollow, dorsal, tubular nerve cord. In vertebrates, the nerve cord, often called spinal cord, is protected by vertebrae. Its anterior portion becomes brain in most chordates.

c. Pharyngeal Gill Slits:-  
 These are paired openings found in all chordates at some stage during development. In the non-vertebrate chordates (e.g. fishes), these become functioning gills, while in terrestrial vertebrates, they are modified for various purposes.

B) An Example of Chordate:-  
 Mammals

10. What is regeneration, give an example. (LHR-I-2016-A) (RWP-14-A)

Ans. A) Regeneration:-  
 The ability to regain or recover the lost or injured part of the body is called Regeneration.

B) Example:-  
 When members of Platy helminthes divide into two pieces or parts by binary fission, each part regenerates its missing part.

11. How sponges reproduce asexually? (LHR-I-2016-A) (BWP-16-A)

Ans. Asexual Reproduction of Sponges:-  
 Asexual reproduction takes place in sponges by:

- a. Regeneration of fragments of sponges  
 b. Budding --- The buds may be external or internal. The internal buds are called gem mules. Both types of buds develop into new sponges.

12. Give two differences between protostomes and deuterostomes. (LHR-II-2016-A)

Proto stomes	Deuterostomes
1. Cleavage or division of zygote is spiral and determinate. 2. Coelom or body cavity is formed due to splitting of mesoderm (schizocoelous).	1. Cleavage is radial and indeterminate. 2. Coelom is developed as an outpouching of archenterons (enterocoelous).

13. Name four harmful effects of insects. (LHR-II-2016-A) (RWP-18-A)

- Ans. Four Harmful Effects of Insects:-  
 a. They act as vectors and transmit disease causing organisms to man and domestic animals. For example, female mosquitoes of genus *Anophele* transmit *Plasmodium* that cause malaria in man.  
 b. A number of insects lay eggs on fruits and other commercial crops such as sugar cane, maize, cotton and also on vegetables etc. The larvae of these insects damage fruit and the crops resulting in economic loss to farmers.  
 c. Adults of some insects acts as pests of crops and damage these crops.  
 d. The locust that move in large numbers from country to country cause damage to standing crops and other plants.

14. Give two basic characters of phylum chordata. (LHR-II-2016-A) (GRW-14-A) (RWP-16-A) (SAH-16)

Ans. Two Basic Characters of Phylum Chordata:-

- a. Notochord is flexible cartilaginous skeletal rod which forms in the early stage in the embryos of all chordates. It extends the length of the body and persists in a few chordates throughout their life whereas in most of them is surrounded and replaced by a vertebral column.  
 b. In all chordates, in an early embryonic stage, walls of pharynx become perforated and these pores are called pharyngeal slits. In aquatic forms these pharyngeal slits develop gills whereas in terrestrial forms they close, disappear or modified.

15. Differentiate between parazoa and eumetazoa. (LHR-I-2017-A)

Parazoa	Eumetazoa
1. This subkingdom of kingdom Animalia includes simplest animals. 2. Parazoa is group of animals comprised of cells that do not work together in a coordinated manner and are not organized into tissues. 3. They are asymmetrical. 4. They have indeterminate shape. 5. This subkingdom includes only one phylum, Phylum Porifera. Examples:- <i>Sycon</i> , <i>Spongilla</i> etc.	1. This subkingdom of kingdom Animalia includes simple to highly complex animals. 2. These animals are multi-cellular in which cells are organized into tissues, organs and organ systems. 3. They are symmetrical. 4. They have determinate shape. 5. This subkingdom includes all other phyla. Examples:- <i>Hydra</i> , <i>Nerie</i> , <i>Homo sapiens</i> etc.

16. Give two examples of sponges. (LHR-I-2017-A)

Ans. Two Examples of Sponges:-

- a. *Euplectella*:-  
 It is a beautiful and delicate sponge made up of glassy framework and is called Venus flower basket.  
 b. *Leucosolenia*:-  
 It is a sponge that consists of group of erect tubes.

17. Differentiate between polyps and medusa. (LHR-I-2017-A) (RWP-15-A, 18)

Polyp.	Medusa
1. It is cylindrical animal. 2. It is sessile and is usually attached to a substratum. 3. It is asexual. 4. Mouth is facing upward. 5. Mesogloea is less.	1. It is umbrella or inverted bowl like. 2. It is free swimming. 3. It has gonads and is involved in sexual reproduction. 4. Mouth is facing downward. 5. Mesogloea is more.

18. Differentiate between coelomates and acoelomates. (LHR-II-2018-A) (DGK-II-14) (GRW-18)

Ans.

Coelomates	Acoelomates
1. They have true body Cavity or Coelom. 2. The space between body wall and the gut is enclosed by peritoneum layer and is filled by coelomic fluid. 3. Digestive system is complete with two openings, mouth and anus. 4. They have advanced organ systems. Examples:- All members of phyla Annelida to Chordata	1. They lack true body cavity or coelom. 2. The space between body wall and the gut is filled by a loose cellular tissue called mesenchyma or parenchyma. 3. Digestive System is absent in some acoelomates but when present, is sac like with only one opening, the mouth. 4. They lack circulatory and respiratory systems and poorly developed other systems. Examples:- Members of Phylum Platyhelminthes.

19. Differentiate between diploblastic and triploblastic animals. (LHR-II-2018-A) (MTN-II-17) (FSD-17-A) (RWP-14-A)

Ans.

Diploblastic Animals	Triploblastic Animals
1. Their body is made up of two cellular layers, an ectoderm and endoderm. Between them is the mesogloea, a non-cellular layer. 2. The animals have radial symmetry hence they belong to division Radiata. 3. Most of the organization of diploblastic animals is at the level of tissues. 4. There is sac like digestive system with only one cavity called gastrovascular cavity and one opening, the mouth. Examples:- <i>Hydra</i> , <i>Obelia</i> , Sea anemone etc.	1. Their body is made up of three cellular layers, ectoderm, mesoderm and endoderm. 2. The animals have bilateral symmetry hence they belong to division Bilateria. 3. These animals reflect organ level of organization. 4. They have tube within tube body plan. The digestive system has mouth at its anterior end and anus at the posterior end. Example:- <i>Neries</i> , <i>Planarians</i> etc.

20. Write down affinities of echinoderms with hemichordates. (LHR-II-2018-A)

Ans.

- They, like Hemichordates, are deuterostome in which cleavage is radial, anus develops from blastopore, coelom is enterocoelous (i.e. develops as out pouching of archenteron) and mesoderm is derived from the cells close to blastopore.
- They, like Hemichordates, have mesodermal endoskeleton
- They, like Hemichordates, have common biochemical peculiarities such as phosphocreatine.

21. Give beneficial effects of insects. (GRW-2014-A)

Ans. Beneficial Effects of Insects: -

- Honey is produced by honey bees.
- Honey bees also yield bees wax used in polishes, candle etc.
- Silkworms supply the raw silk in the Orient and Europe.
- Scavenger insects, such as Blowflies, clean the environment by eating up dead animal and vegetable matter.
- Insects are the source of pollinations.
- Many insects are used in the biological control of harmful pests.
- Many insects, such as locust, are used as source of human food in many parts of the world.

22. Give resemblances found between echinoderms and hemichordates. (GRW-2014-A) (MTN-I-17)

Ans. Both echinoderms and hemichordates resemble in:

- Division of zygote by radial cleavage.
- Development of anus from blastopore.
- Development of coelom as out pouching of archenteron.
- In having common biochemical peculiarities such as phosphocreatine.
- Having mesodermal endoskeleton, and
- Deriving mesoderm from the cells close to blastopore.

23. Mention any two commercial uses of sponges. (GRW-2015-A)

Ans. Any Two Commercial Uses of Sponges: -

- They are used for sound absorption in buildings.
- They are used in surgical operations for fluids and blood.

24. Write names and uses of any two useful insects. (GRW-2015-A)

Ans. Names And Uses of Any Two Useful Insects: -

- Name --- Honey bee  
Use --- It provides us honey and wax.
- Name --- Silkworm  
Use --- It provides us silk.

25. Give names and harms of any two harmful molluscs. (GRW-2015-A)

Ans. a. Name --- Teredo (Ship Worm)

Harm --- It damages wooden parts of the ships.

b. Name --- Slugs

Harm --- They damage gardens and cultivations by eating not only leaves but also cutting roots and stems of plants.

26. How Acoelomates differ from Pseudocoelomates? (MTN-II-17) (GRW-2016-A)

Ans.

Acoelomates	Pseudocoelomates
1. They lack any cavity.	1. They have false body cavity or pseudocoelom or pseudocoel.
2. The space between body wall and the gut is filled by a loose cellular tissue called mesenchyma or parenchyma.	2. The space between the body wall and digestive system has a cavity formed from blastocoel of embryo.
3. Digestive System is absent in some acoelomates but when present, is sac like with only one opening, the mouth.	3. The digestive is in the form of alimentary canal with two openings
Examples: - Members of Phylum Platyhelminthes.	Examples: Members of phylum Nematoda

27. Give two examples of phylum Platyhelminthes and nematodes. (GRW-2016-A)

Ans. A) Two Examples of Phylum Platyhelminthes: -

- Tenia solium*
- Fasciola hepatica*

B) Two Examples of Phylum Nematoda: -

- Ascaris lumbricoides*
- Ancylostoma duodenale*

28. What is economic importance of arthropods? (GRW-2016-A)

Ans. Economic Importance of Arthropods: -

- A number of insects lay eggs on fruits and other commercial crops such as sugar cane, maize, cotton and also on vegetables etc. The larvae of these insects damage fruit and the crops resulting in economic loss to farmers.
- Adults of some insects act as pests of crops and damage these crops.
- The locust that move in large numbers from country to country cause damage to standing crops and other plants.
- Honey is produced by honey bees.
- Honey bees also yield bees wax used in polishes, candle etc.
- Silkworms supply the raw silk in the Orient and Europe.
- Scavenger insects, such as blowflies, clean the environment by eating up dead animal and vegetable matter.
- Insect larvae are source of food for fishes.

29. What are the harms caused by insects? (GRW-2017-A)

Ans. Harms Caused By Insects: -

- They act as vectors and transmit disease causing organisms to man and domestic animals. For example, female mosquitoes of genus *Anopheles* transmit *Plasmodium* that cause malaria in man.
- A number of insects lay eggs on fruits and other commercial crops such as sugar cane, maize, cotton and also on vegetables etc. The larvae of these insects damage fruit and the crops resulting in economic loss to farmers.
- Adults of some insects act as pests of crops and damage these crops.
- The locust that move in large numbers from country to country cause damage to standing crops and other plants.

30. What is the importance of sponges? (GRW-2017-A) (BWP-14) (SGD-18)

Ans. Importance of Sponges: -

- The skeleton of sponges have been used by man mostly for washing and bathing.
- Sponges are used in surgical operations for absorbing fluids and blood.
- They are also used for sound absorptions in buildings.

31. How does metamorphosis occurs in arthropoda? (GRW-2017-A) (DGK-II-16)

Ans. Process of Metamorphosis in Arthropoda: -

In arthropoda metamorphosis occurs in one of the following two ways:

- One type of metamorphosis is complete in which egg hatches into a larva which develops into a resting stage, the pupa, which in turn transforms into an adult.  
Examples: -  
Mosquito, House fly.
- In some primitive insects the metamorphosis is incomplete, in which egg hatches into a tiny immature adult like creature called nymph which grows directly into an adult.

Example: -

Head louse

32. Give two beneficial roles of Mollusca. (GRW-2018-A)

Ans. Two Beneficial Roles of Mollusca: -

- Shells of freshwater mussels are used in button industries.
- Pearl oyster make valuable pearls.

33. What are tetrapoda? (GRW2018-A)

Ans. Tetrapoda: -

- Tetrapoda is super-class of sub-phylum Vertebrata.
- Members of this super class have two pairs of jointed limbs.
- They are commonly known as tetrapods.
- This super-class includes classes, amphibian, reptilian, aves and mammalia.

34. Write the reproduction in Platyhelminthes. (MTN-2014-A)

Ans. Reproduction in Platyhelminthes: -

Platyhelminthes reproduce both by sexual and asexual means of reproduction. Asexual reproduction is by fission in which animal constricts in the middle into two pieces, each of which regenerate the missing parts. The sexually reproducing species are hermaphrodite. Larval form is sometimes present.

35. Write down the economic importance of Mollusca. (MTN-2014-A)

Ans. Economic Importance of Mollusca: -

- Pearl oyster* makes valuable pearls naturally. Pearl culture industry is being successfully run in Japan and China by artificially making pearls in *Pearl oyster*.
- Shells of Molluscs are used in button industry, used for making ornaments, and are mixed with tar for making roads in America.
- Teredo*, a shipworm, damages wooden parts of ship.
- Slugs are harmful to plants in the garden and cultivation. They not only eat leaves, but also destroy plants by cutting up their roots and stems.

36. What is Hermaphroditic Animal? Give an example. (MTN-2015-A)

Ans. A) Hermaphroditic Animals: -

Animals which have both testes (male sex organs) and ovaries (female sex organs) are called Hermaphroditic animals.

B) Example: -

*Fasciola hepatica*

37. Differentiate between Ostia and Osculum. (MTN-2016-A) (FSD-16-A)

Ans. Differences Between Ostia And Osculum: -

Ostia	Osculum
1. Ostia are numerous small pores in sponges.	1. Osculum is usually a single large pore in the sponges.
2. These are the pores through which water enters the body.	2. This is the opening by which water leaves the body.

38. Write down two adaptations for parasitic mode of life in Platyhelminthes. (MTN-2016-A) (FSD-17) (DGK-I-14, II-16)

Ans. Two Adaptations for Parasitic Mode of Life in Platyhelminthes: -

- Neurosensory organs are not developed due to their passive mode of life.
- Alimentary canal is reduced and even absent in some platyhelminthes.

39. Write down any four adaptations of parasitic mode of life in Platyhelminthes. (MTN-I-2017-A)

Ans. Four Adaptations of Parasitic Mode of Life in Platyhelminthes: -

- Absence of epidermis and presence of resistant cuticle for protection against host enzymes

- b. Development of adhesive organs such as suckers and hooks for the attachment to the host  
 c. Degeneration of muscular and nervous systems  
 d. Simplification or complete absence of digestive system due to complete dependence on the host
40. What is Notochord? Write down its function. (MTN-I-2018-A)

Ans. A) Notochord: -

It is dorsal supporting cylindrical hollow rod situated below the nerve cord and above the gut.

B) Function of Notochord: -

Its primary function is to support and to stiffen the body that is to act as skeletal axis.

41. Differentiate between Ecdysis and Metamorphosis. (MTN-I-2018-A)

Ans.

Ecdysis	Metamorphosis
Ecdysis is casting off old cuticle and growth of new cuticle in insect and other arthropods.	Metamorphosis is the transformation of an immature larval form into a sexually mature adult in insects.

41. What is Madreporite? Write its function. (MTN-II-2018-A) (RWP-18)

Ans. A) Madreporite: -

It is sieve like plate present at the end of ring canal at aboral surface of echinoderms.

B) Function of Madreporite: -

- a. It serves as inlet of water in the water vascular system of echinoderms.  
 b. Water enters through madreporite into the channels and tube feet of water vascular system in echinoderms and is involved in the locomotion of echinoderms through tube feet.

42. Differentiate between Proterostomes and Deuterostomes. (MTN-II-2018-A)

Ans.

Protostomes	Deuterostomes
1. Cleavage or division of zygote is spiral and determinate. 2. Coelom or body cavity is formed due to splitting of mesoderm (schizocoelous). 3. Mouth arises from the blastopore or from its anterior region. 4. Mesoderm is derived from cells on anterior lip of blastopore. Examples: - Animals belonging to phyla annelida, mollusca and arthropoda	1. Cleavage is radial and indeterminate. 2. Coelom is developed as an out pouching of archenterons (enterocoelous). 3. Anus arises from the blastopore while mouth arises at some distance anterior to the blastopore. 4. Mesoderm is derived from wall of developing gut (archenteron). Examples: - Animals belonging to phyla echinodermata, hemichordata and chordata

43. How is the Spiral Cleavage different from Radial Cleavage? (MTN-II-2018-A) (BWP-18-A) (SGD-18)

Ans.

Spiral Cleavage	Radial Cleavage
1. Lines or planes of cleavage are not symmetrical between poles but are diagonal to the polar axis. 2. Unequal cells around the axis of polarity are produced i.e. at the eight cell stage the upper four cells (blastomeres) of the embryo are rotated 45° relative to the four lower blastomeres. Example: - Protostomes	1. Planes of cleavage are symmetrical to the polar axis. 2. The upper blastomeres of the embryo at eight cell stage are directly above the lower blastomeres. Example: - Deuterostomes

44. Differentiate between Schizocoelous and Enterocoelous Coeloms. (BWP-2014-A)

Ans.

Schizocoelous Coelom	Enterocoelous Coelom
It is a type of body cavity which is formed by due splitting of mesoderm. Example: - Coelom found in the members of phyla annelida, mollusca and arthropoda.	It is a type of body cavity which is formed as an out pouching of archenteron. Examples: - Coelom found in the members of phyla echinodermata, hemichordata and chordata.

45. Write any three characteristics of Mammals. (BWP-2015-A)

Ans. Differences Between Coelomate And Acoelomate:-

Coelomates	Acoelomates
1. They have true body cavity or Coelom. 2. The space between body wall and the gut is enclosed by peritoneum layer and is filled by coelomic fluid. 3. Digestive system is complete with two openings, mouth and anus. 4. They have advanced organ systems. Examples: - All members of phyla Annelida to Chordata	1. They lack true body cavity or coelom. 2. The space between body wall and the gut is filled by a loose cellular tissue called mesenchyma or parenchyma. 3. Digestive System is absent in some acoelomates but when present, is sac like with only one opening, the mouth. 4. They lack circulatory and respiratory systems and poorly developed other systems. Examples: - Members of Phylum Platyhelminthes.

46. Differentiate between Coelomate and Acoelomate. (BWP-2015-A)

Ans.

Coelomates	Acoelomates
1. They have true body cavity or Coelom. 2. The space between body wall and the gut is enclosed by peritoneum layer and is filled by coelomic fluid. 3. Digestive system is complete with two openings, mouth and anus. 4. They have advanced organ systems. Examples: - All members of phyla Annelida to Chordata	1. They lack true body cavity or coelom. 2. The space between body wall and the gut is filled by a loose cellular tissue called mesenchyma or parenchyma. 3. Digestive System is absent in some acoelomates but when present, is sac like with only one opening, the mouth. 4. They lack circulatory and respiratory systems and poorly developed other systems. Examples: - Members of Phylum Platyhelminthes.

47. Define Nymph and Metamorphosis. (GRW-18-A) (BWP-2015-A)

Ans. A) Nymph: -

It is the larva of insects that resembles adult (except that it lacks wing and its reproductive organs are immature) and lives in the same habitat as adult.

B) Metamorphosis: -

Metamorphosis is a morphological and physiological process that allows an organism to change abruptly from one distinct form to another during its life time. In general sense, metamorphosis is the transformation of an immature larval form into a sexually mature adult.

48. Write two basic forms of Cnidarians. (BWP-2016-A)

Ans. Two Basic Forms of Cnidarians (Coelenterata):-

- a. Polyp or Hydroid  
 b. Medusa or Medusoid.

49. Distinguish between Diploblastic and Triploblastic Animals. (BWP-2016-A)

Ans.

Diploblastic Animals	Triploblastic Animals
1. Their body is made up of two cellular layers, an ectoderm and endoderm. Between them is the mesogloea, a non-cellular layer. 2. The animals have radial symmetry hence they belong to division Radiata. 3. Most of the organization of diploblastic animals is at the level of tissues.	1. Their body is made up of three cellular layers, ectoderm, mesoderm and endoderm. 2. The animals have bilateral symmetry hence they belong to division Bilateria. 3. These animals reflect organ level of organization. 4. They have tube within

4. There is sac like digestive system with only one cavity called gastrovascular cavity and one opening, the mouth. Examples: - Hydra, Obelia, Sea anemone etc.	tube body plan. The digestive system has mouth at its anterior end and anus at the posterior end. Example: - Neries, Homo sapiens etc.
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50. Define Spongocoel. (BWP-2017-A)

Ans. Spongocoel: -

- a. Spongocoel is a single cavity filled water inside the body of members of phylum Porifera.  
 b. It may be divided into flagellated chambers or canals lined by flagellated choanocytes.

51. What is Metamorphosis? Describe its three stages. (BWP-2017-A)

Ans. A) Metamorphosis: -

Metamorphosis is a morphological and physiological process that allows an organism to change abruptly from one distinct form to another during its life time.

B) Three Stages of Metamorphosis: -

- a. Egg hatches into a larva.  
 b. Larva develops into a resting stage, the pupa.  
 c. Pupa transforms into an adult.

52. What are series proterostomia? (FSD-2014-A)

Ans. Series Proterostomia: -

Series Proterostomia include animals, in which cleavage is spiral and determinate, mouth develops from blastopore, coelom is schizocoelous, (formed by splitting of mesoderm) and mesoderm is derived from cells on the lip of blastopore.

53. Why annelids and arthropods are considered as having same origin? (FSD-2016-A) (RWP-15-A)

Ans. Annelids And Arthropods Considered As Having Same Origin: -

Annelids and Arthropods have same origin because both share the characteristic of having body divided into similar segments.

54. Name the excretory organs of phylum annelida and arthropoda. (FSD-2016-A)

Ans. A) Name of the Excretory Organs of Phylum Annelida:-

Nepridia

B) Name of the Excretory Organs of Phylum Arthropoda: -

Malpighian tubules

55. What is mantle? In which phylum it is present? (FSD-2017-A)

Ans. A) Mantle: -

Mantle is a glandular epithelial envelope that covers the body and secretes shell.

B) Name of Phylum In Which Mantle Is Present: -

Phylum Mollusca

56. What is a radula? (FSD-2018-A)

Ans. Radula: -

It is a rasping tongue like structure provided with many teeth in the mouth cavity of many Molluscs such as snail. It is used to scarp the food.

66. Differentiate between spiral and radial cleavage.

65. Give three basic characters of chordates.

Ans. Differences Between Spiral and Radial Cleavage -  
(D.G.K-I-2014-A)  
**Spiral Cleavage**  
1. Lines or planes of cleavage are not symmetrical between poles but are diagonal to the polar axis.  
2. Unequal cells around the axis of polarity are produced i.e. at the eight cell stage the upper four cells (blastomeres) or the embryo are rounded 45° relative to the four lower blastomeres.  
**Example:-**  
Protostomes

Ans. Three Basic Characters of Chordates:-  
(RWP-II-2017-A)  
a. Notochord:- It is dorsal supporting cylindrical hollow rod situated below the nerve cord and above the gut. The majority of vertebrates have an embryonic notochord that is replaced by the vertebral column during development.  
b. Nerve Cord:- All chordates have hollow, dorsal, tubular nerve cord. In vertebrates, the nerve cord, often called spinal cord, is protected by vertebrae. Its anterior portion becomes brain in most chordates.  
c. Pharyngeal Gill Slits:- These are paired openings found in all chordates at some stage during development. In the non-vertebrate chordates (e.g. fishes), these become functioning gills while in terrestrial vertebrates, they are modified for various purposes.

67. Differentiate between poly and medusa, (SAH-14)

B) An Example of Chordate:-  
Mammals

Ans. Differences Between Poly and Medusa, (SAH-14)  
(D.G.K-II-2014-A) (MTN-16-A) (DKR-II-16)  
**Poly**  
1. It is cylindrical animal.  
2. It is sessile and is usually attached to a substratum.  
3. It has gonads and is involved in sexual reproduction.  
4. Mouth is facing upward.  
5. Mesogloea is less.  
**Medusa**  
1. It is umbrella or inverted bowl like.  
2. It is free swimming.  
3. It has gonads and is involved in sexual reproduction.  
4. Mouth is facing downward.  
5. Mesogloea is more.

63. Write two members of platyhelminthes, (SGD-2015-A)  
Ans. Two Members of Platyhelminthes:-  
A. *Flatella hepatica*:-  
a) Common Name-----Sheep liver fluke or common liver fluke  
b) Mode of life ---- Parasitic (Endoparasite)  
c) Hosts - Two hosts.  
i. Definitive Host --- Sheep, Goat, Cattle, Humans (Occasionally)  
ii. Intermediate Host --- Snail  
D. Disease --- Fascioliasis  
E. Habitat in Definitive Host --- Bile duct  
F. Body --- Leaf-like with suckers for attachment to host tissues  
B. *Dugesia*:-  
a) Common Name --- Planaria  
b) Mode of life --- Free-living  
c) Body --- With ciliated outer surface

68. Differentiate between urochordates and cephalochordates.

64. Name three classes of phylum Annelida. (SGD-2017-A)

Ans. Differences between urochordates and cephalochordates. (D.G.K-II-2014-A)  
**Urochordates**  
1. Adults are sessile and in covering called tunic. Only larvae are free swimming.  
2. Notochord and hollow dorsal nerve cord are present in both larvae and adults.  
3. Notochord and nerve cord extend along the entire length of the body.  
**Cephalochordates**  
1. Both adults and larvae are free swimming.  
2. Notochord and hollow dorsal nerve cord are present in both larvae and adults.  
3. Notochord and nerve cord extend along the entire length of the body.

Ans. Names of Three Classes of Phylum Annelida:-  
a. Polychaeta  
b. Oligochaeta  
c. Hirudinea  
65. Give four parasitic adaptations of flatworms. (SGD-2017-A)  
Ans. Four Parasitic Adaptations of Flatworms:-  
a. Absence of epidermis and presence of resistant cuticle for protection against host enzymes  
b. Development of adhesive organs such as suckers and hooks for the attachment to the host  
c. Degeneration of muscular and nervous systems  
d. Simplification or complete absence of digestive system due to complete dependence on the host

Protostomes	Deuterostomes
1. Cleavage or division of zygote is spiral and determinate.	1. Cleavage is radial and indeterminate.
2. Coelom or body cavity is formed during mesoderming of mesoderm (schizocoelous)	2. Coelom is developed as an outpouching of archenterons (enterocoelous).

60. What is Pseudocoelom?  
Ans. Pseudocoelom:-

a. Pseudocoelom or false body cavity is the space between body wall and alimentary canal which is not completely lined with mesoderm, instead its inner wall is lined with endoderm of the gut while its outer wall is lined with mesoderm of muscles.  
b. Pseudocoelom develops from blastocoel of embryo.  
c. It is found in animals belonging to phylum Nematoda.  
61. Name two beneficial insects. (RWP-II-2017-A)  
Ans. Names of Two Beneficial Insects:-  
a. Silkworm  
b. Honey bee

76. What is Haemocyanin?  
Ans. Haemocyanin:-  
Haemocyanin are blue colored respiratory pigments found in molluscs.

71. Discuss about the brain of Octopus. (D.G.K-I-2015-A)

Ans. Brain of Octopus:-  
a. Brain of Octopus is exceptionally large and complex for an invertebrate brain.  
b. It is enclosed in a shell-like case of "Cartilage".  
c. It endows the octopus with highly developed capabilities to learn and remember.  
d. In laboratory, octopus can rapidly learn to associate certain symbols and can open a screw cap jar to obtain food.

72. Give any two beneficial effects of insects.

Ans. Any Two Beneficial Effects of Insects:- (D.G.K-II-2015-A) (BWP-18-A)  
a. Silkworms provide us silk. Farming of silk worms is being carried out at a large scale to obtain silk.  
b. Some insects protect us from other harmful insects as they are predators on these harmful insects.

73. Differentiate between Diploblastic and Triploblastic organization with two points. (D.G.K-II-2016-A)

Two Differences Between Diploblastic and Triploblastic Organisms:-	Triploblastic Animals
1. Their body is made up of two cellular layers, an ectoderm and endoderm. Between them is the mesogloea, a non-cellular layer.	1. Their body is made up of three cellular layers, ectoderm, mesoderm and endoderm. 2. The animals have bilateral symmetry hence they belong to division Bilateria. Example:- <i>Neries, Homo sapiens</i> etc. <i>Hydra, Obelia, Sea anemone</i> etc.
2. The animals have radial symmetry hence they belong to division Radiata.	

74. Give any four characters of mammals. (D.G.K-I-2017-A)

Ans. Four Characters of Mammals:-  
a. Mammals have a muscular diaphragm that separates the thoracic and abdominal cavities.  
b. Mammals have external ear or pinna and a chain of three bones in the ear.  
c. Mammals feed their young on milk produced by mammary glands of mother.  
d. They have a body covering of hair, however in a few hair is modified into scales or spines.

57. What is coelom?

Ans. Coelom:-  
a. Coelom is defined as a cavity in the mesoderm lined by an epithelium, usually houses gonads and excretory organs and contains coelomic fluid.  
b. It is formed either due to splitting of mesoderm or as an out pouching of archenteron.  
c. It is found in animals belonging to phyla annelida, mollusca, arthropoda, ectodermata, hemichordate and chordata.

58. Define the term protandrous and gemmule. (RWP-2016-A)

Ans. A) Protandrous:-  
a. The animals, in which male sex organs and male sex cells develop first and the female sex organs and female sex cells develop later and the cross fertilization is the rule, are called Protandrous.  
b. Hermaphrodite sponges, for example, are protandrous.  
B) Gemmule:-  
a. Gemmules are nutrient laden amoeboid cells surrounded by layers of epithelial cells in sponges.  
b. They are called internal buds formed during unfavorable conditions and are resistant to drought or winter.  
c. Under favourable conditions they grow into new sponges.

59. Differentiate between Protostome and Deuterostome with two points. (RWP-2016-A)

Ans. Two Differences Between Protostome and Deuterostome:-

75. Write down two differences between protostomia and deuterostomia. (D.G.K-I-2017-A)

Ans. Two Differences Between Protostomia And Deuterostomia:-

Protostomes	Deuterostomes
1. Cleavage or division of zygote is spiral and determinate.	1. Cleavage is radial and indeterminate.
2. Coelom or body cavity is formed due to splitting of mesoderm (schizocoelous).	2. Coelom is developed as an outpouching of archenterons (enterocoelous).

76. What are hook worms? (D.G.K-I-2017-A)

Ans. Hook Worms:-

- Hook worms are the members of one of the family of phylum Nematoda.
- Ancylostoma duodenale* is a common example of hook worms.
- It is found in Asia, North America and Europe.
- It is a very dangerous parasite of humans.
- It lives in the small intestine of its host attaching to the villi of intestine and feeding on blood and body fluids sucked from it. During feeding it produces an anticoagulant to prevent clotting of blood and after feeding leave the wound bleeding.
- It can cause severe anemia and retard physical and mental growth in children.

77. Write down any four characteristics of class osteichthyes (bony fishes). (D.G.K-I-2017-A)

Ans. Four Characteristics of Class Osteichthyes (Bony Fishes):-

- The members of class Osteichthyes commonly called bony fishes have more or less bony skeleton.
- Bony fishes have swim bladder with or without connection with pharynx that helps in buoyancy.
- They have brain with ten pairs of cranial nerves.
- They have gills supported by bony gill arches and covered by operculum.

120. Name two larvae found in Echinoderms.

(D.G.K-II-2017-A)

Ans. Names of Two Larvae Found In Echinoderms:-

- Bipinnaria
- Brachularia

78. What are coelomates? Give example.

(D.G.K-II-2017-A)

Ans. Coelomates with Example:-

- They have true body cavity or coelom, the body cavity that has developed from mesoderm.
- Their body cavity is lined by a layer of peritoneum that is also of mesodermal in origin.
- Their organs are enclosed within a layer of Peritonium.
- Digestive system is complete with two openings, mouth and anus.

Examples:-

Animals belonging to phyla Annelida to Chordata.

79. What are anticoagulants? Give their role.

(D.G.K-II-2017-A)

Ans. A) Anticoagulants:-

Anticoagulants are the chemicals produced by some animals during blood feeding such as hook worm or medicine used by the physicians.

B) Role of Anticoagulants:-

Anticoagulants prevent or retard clotting of blood.

80. Differentiate between an annelotes and annelotes. (D.G.K-II-2017-A)

Amniotes	Anamniotes
1. They have fetal membranes.	1. They lack fetal membranes.
2. Many lay eggs while others hatch young ones.	2. They lay eggs only.
Examples:- Reptiles, Birds, Mammals.	Examples:- Cyclostomes, Cartilage and Bony fishes, Amphibians.

81. What are triploblastic animals? (D.G.K-I-2018-A)

Ans. Triploblastic Animals:-

- Their body is made up of three cellular layers, ectoderm, mesoderm and endoderm.
- The animals have bilateral symmetry hence they belong to division Bilateria.
- These animals reflect organ level of organization.
- They have tube within tube body plan. The digestive system has mouth at its anterior end and anus at the posterior end.

Examples:-

*Neries, Homo sapiens etc*

82. Name any two beneficial insects. (D.G.K-I-2018-A)

Ans. Names of Any Two Beneficial Insects:-

- Silk worm
- Hone bee

83. What are pseudocoelomates and coelomates?

(D.G.K-II-2018-A)

Ans. A) Pseudocoelomates:-

- They have false body cavity or pseudocoelom or pseudocoel.
- Their cavity (i.e. pseudocoelom) develops from blastocoel of embryo.
- Their cavity is not lined by any membrane.
- Their organs are not enclosed by any membrane.

Examples:-

Animals belonging to phylum Nematoda

B) Coelomates:-

- They have true body cavity or coelom.
- Their cavity develops from mesoderm.
- Their cavity is lined by a layer of peritoneum that is also of mesodermal in origin.
- Their organs are enclosed within a layer of Peritonium.

Examples:-

Animals belonging to phyla Annelida to Chordata.

84. Define diploblastic and triploblastic organization.

(D.G.K-II-2018-A)

Ans. A) Diploblastic Organization:-

Diploblastic organization is a type of organization in which animals show two cellular layers, ectoderm and mesoderm, between them is the mesogloea, a non-cellular layer, radial symmetry and sac like digestive system.

B) Triploblastic Organization:-

Triploblastic organization is a type of organization in which animals show three cellular layers, ectoderm, mesoderm and endoderm, bilateral symmetry and tube like digestive system.

85. How spiral cleavage is different from radial cleavage?

(D.G.K-II-2018-A)

Ans. Spiral Cleavage Different From Radial Cleavage:-

Spiral Cleavage	Radial Cleavage
1. Lines or planes of cleavage are not symmetrical between poles but are diagonal to the polar axis.	1. Planes of cleavage are symmetrical to the polar axis.
2. Unequal cells around the axis of polarity are produced i.e. at the eight cell stage the upper four cells (blastomeres) of the embryo are rotated 45 relative to the four lower blastomeres.	2. The upper blastomeres of the embryo at eight cell stage are directly above the lower blastomeres.
Example:- Protostomes	Example:- Deuterostomes

86. Give the importance of earthworm. (SAH-2014-A)

Ans. Importance of Earthworm:-

- It improves drainage capacity of the soil by its burrowing activity which permits greater permission of air into the soil.
- It also enables roots to grow downwards through the soil more easily.
- Mixing and churning of the soil is brought about when earth which contains in organic particles is brought up to the surface from lower regions.

87. Name two classes of arthropods. (SAH-2015-A)

Ans. Names of Two Classes of Arthropods:-

- Insecta or Hexapoda
- Crustacea

88. Give the names of four harmful insects. (MTN-I-18)

(SAH-2017-A)

Ans. Names of Four Harmful Insects:-

- Female Mosquito
- House Fly
- Locust
- Tsetse Fly

89. Give three basic characters of chordates.

(SAH-2017-A)

Ans. Three Basic Characters of Chordates:-

A) Basic Characters of Chordates:-

- Notochord:-**  
It is dorsal supporting cylindrical hollow rod situated below the nerve cord and above the gut. The majority of vertebrates have an embryonic notochord that is replaced by the vertebral column during development.
- Nerve Cord:-**  
All chordates have hollow, dorsal, tubular nerve cord. In vertebrates, the nerve cord, often called spinal cord, is protected by vertebrae. Its anterior portion becomes brain in most chordates.
- Pharyngeal Gill Slits:-**  
These are paired openings found in all chordates at some stage during development. In the non-vertebrate chordates (e.g. fishes), these become functioning gills, while in terrestrial vertebrates, they are modified for various purposes.

B) An Example of Chordate:-  
Mammals

90. Differentiate between sac like and tube like digestive system. (SAH-2017-A)

Ans.

Sac-Like Digestive System	Tube-Like Digestive System
1. It opens to the outside by only one opening called mouth.	1. It opens to the outside by two openings, one is mouth present at the anterior end and the second is anus that is present at the posterior end.
2. It is in the form of a sac that serves as digestive as well as body cavity.	2. It is in the form of alimentary canal that only acts a digestive cavity.

91. How does transport of gases may take place in arthropods? (SAH-2017-A)

Ans. Transport of Gases In Arthropods:-

- Transport of gases, in terrestrial arthropods, takes place by an extensive tracheal system of air tubes called trachea, the main of which open to the exterior through paired openings called spiracles.
- Exchange of gases in aquatic arthropods takes place through gills and book lungs.

## SECTION III LONG QUESTIONS

No Essay Type Question According to New Pattern

## SECTION I MULTIPLE CHOICE QUESTIONS

### Chapter — 11 BIOENERGETICS

#### 2MCQs

#### D) From Evidence:

- Magnesium is an important nutrient in green plants as it is an essential component of: (D.G.K-2009) (GRW-2007)
  - Cell sap
  - Protein
  - Chlorophyll
  - Glucose
- When a green plant performs photosynthesis at its maximum rate:
  - The rate of water loss is low.
  - The water content of the plant will be low.
  - The energy content of the plant will be low.
  - The energy content will be unaffected.
- During the dark reactions of photosynthesis, the main process which occurs is:
  - Release of oxygen
  - Energy absorption by chlorophyll
  - Adding of hydrogen to carbon dioxide
  - Formation of ATP
- Which statement about ATP is not true?
  - It is used as energy currency by all cells.
  - It is formed only under aerobic conditions.
  - Some ATP is used to derive the storage of compounds.
  - It provides the energy for many different biochemical reactions.
- Glycolysis: (MTN-I-2008)
  - Produces no ATP.
  - Is the same as fermentation.
  - Takes place in the mitochondrion.
  - Reduces two molecules of  $\text{NAD}^+$  for every glucose molecule processed.
- The citric acid cycle:
  - Takes place in the mitochondrion.
  - Reduces two molecules of  $\text{NAD}^+$  for every glucose molecule processed.
  - Is the same thing as fermentation.
  - Has no connection with the respiratory chain.
- Which statement about the chemiosmotic mechanism is not true?
  - Protons return through the membrane by way of a channel protein.
  - Protons are pumped across a membrane.
  - Proton pumping is associated with the respiratory chain.
  - The membrane in question is the inner mitochondrial membrane.

- Before pyruvate enters into the citric acid cycle, it is decarboxylated, oxidized and combined with coenzyme A, forming acetyl CoA, carbon dioxide and one molecule of:
  - NADH
  - FADH<sub>2</sub>
  - ATP
  - ADP
- In the first step of the citric acid cycle, acetyl CoA reacts with oxaloacetate to form: (MTN-2007, II-18-A) (FSD-2008) (GRW-2010) (LHR-II-16-A, 19) (RWP-II-17-A, 18-A) (D.G.K-II-18-A, I-19-A)
  - Pyruvate
  - Citrate
  - NADH
  - ATP
- When deprived of oxygen, yeast cells obtain energy by fermentation, producing carbon dioxide, ATP and:
  - Acetyl CoA
  - Ethyl alcohol
  - Lactate
  - Pyruvate

#### D) From Punjab Boards:

- The process by which pH gradient across membrane drives the formation of ATP is called: (LHR-I-2014, 16-A, II-18-A) (GRW-18-A) (MTN-I-18-A)
  - Photosynthesis
  - Chemiosmosis
  - Photorespiration
  - Calvin cycle
- In respiratory chain NADH oxidized by: (LHR-I-2015-A, I-19) (SGD-18-A) (D.G.K-II-15, 16)
  - Co-factor
  - Co-enzyme
  - Cytochrome "b"
  - Cytochrome "c"
- Quantitative study of energy relationship in biological system is called: (LHR-II-2015-A) (GRW-14A, 18A) (D.G.K-II-17)
  - Bioenergetics
  - Biosynthesis
  - Biodegradation
  - Biotechnology
- Important source of atmospheric oxygen released during photosynthesis is: (LHR-II-2015-A) (RWP-14-A) (MTN-14-A) (BWP-18-A) (D.G.K-I, II-17-A)
  - Glucose
  - Nitrates
  - Water
  - Carbon dioxide
- The exchange of gases ( $\text{CO}_2$  and  $\text{O}_2$ ) between organism and its environment is called: (LHR-I-2016-A)
  - Respiration
  - External Respiration
  - Cellular respiration
  - Anaerobic respiration
- Iron containing protein is: (LHR-II-2016-A)
  - Cytochrome
  - Ferredoxine
  - Plastocyanin
  - Plastoquinone
- Which one is not the phase of Calvin cycle? (GRW-2014-A)
  - Carbon fixation
  - Reduction
  - Regeneration of  $\text{CO}_2$  acceptor
  - Phosphorylation

- Plastocyanin protein contains: (GRW-2015, 16-A) (RWP-18-A)
  - Iron
  - Copper
  - Magnesium
  - Potassium
- The dark reaction of photosynthesis occurs in: (GRW-2017-A) (MTN-17-A) (SRG-16, 18-A) (FSD-16, 17-A) (SAH-15-A)
  - Cytoplasm
  - Chlorophyll
  - Stroma
  - Granum
- The amount of energy present within the chemical bonds of the glucose is converted into ATP during anaerobic respiration is: (GRW-2017-A) (SAH-16-A)
  - 1%
  - 2%
  - 3%
  - 4%
- Pyruvic acid is produced as a result of: (RWP-2015-A)
  - Kreb's cycle
  - Glycolysis
  - Phosphorylation
  - Respiratory chain
- Haeme portion of haemoglobin is same to porphyrin ring with a difference of: (RWP-2016-A, II, 15-A, 17) (MTN-14, 16-A)
  - Carbon atom
  - Hydrogen atom
  - Iron atom
  - Oxygen atom
- Accessory Photosynthetic pigments Xanthophylls are: (SGD-2015-A)
  - Green in color
  - Red in color
  - Yellow in color
  - Orange in color
- Rubisco is: (SGD-2017-A)
  - Compound used during light Reaction
  - Electron receptor
  - An Enzyme
  - A coenzyme
- From one pyruvate passing through Kreb's cycle how many FDH<sub>2</sub> molecules are formed? (FSD-2014, 18-A)
  - 1
  - 2
  - 3
  - 4
- During respiratory chain Coenzyme Q is oxidized by: (FSD-2014-A)
  - Cytochrome a
  - Cytochrome b
  - Cytochrome c
  - Cytochrome a<sub>3</sub>
- A kind of chemical link between anabolism and catabolism: (FSD-2015-A)
  - Protein
  - Glucose
  - ATP
  - None of these
- Conversion of one pyruvic acid into one acetyl Co A gives off one molecule of: (FSD-2016-A) (MTN-II-18)
  - Citrate
  - Pyruvate
  - NADH
  - ATP
- Magnesium of chlorophyll is replaced in haemoglobin by: (FSD-2017-A) (SAH-16-A)
  - Calcium
  - Potassium
  - Iron
  - Phosphorous
- Photo system II has the form of chlorophyll a which absorbs best life of: (FSD-2018-A)
  - 670 nm
  - 680 nm
  - 690 nm
  - 700 nm
- Molecular formula for chlorophyll 'b' is: (MTN-2015-A)
  - $\text{C}_{55}\text{H}_{72}\text{O}_5\text{N}_4\text{Mg}$
  - $\text{C}_{55}\text{H}_{70}\text{O}_5\text{N}_4\text{Mg}$
  - $\text{C}_{55}\text{H}_{70}\text{O}_5\text{N}_4\text{Mg}$
  - $\text{C}_{55}\text{H}_{70}\text{O}_5\text{N}_4\text{Mg}$
- End products of anaerobic respiration in yeast: (MTN-2015-A)
  - Lactic acid
  - Methyl Alcohol
  - Ethyl Alcohol only
  - Ethyl Alcohol and  $\text{CO}_2$
- Pyruvic acid is the end product of: (MTN-2016-A)
  - Glycolysis
  - Krebs cycle
  - ETC cycle
  - Calvin cycle
- Glycolysis means breakdown of: (MTN-I-2017-A)
  - Lipid
  - Glucose
  - Carbohydrate
  - Protein
- Chlorophyll "a" is: (MTN-I-2017-A, 19-A) (GRW-16-A)
  - Yellow green
  - Blue green
  - Orange green
  - Violet blue
- Formula of Lactic acid is: (MTN-II-2017-A)
  - $\text{C}_3\text{H}_4\text{O}_3$
  - $\text{C}_3\text{H}_3\text{O}_3$
  - $\text{C}_3\text{H}_6\text{O}_3$
  - $\text{C}_3\text{H}_3\text{OH}$
- Haem portion of haemoglobin is also a porphyrin ring but containing an iron atom instead of: (MTN-I-2018-A)
  - Nitrogen atom
  - Potassium atom
  - Sulphur atom
  - Magnesium atom
- Pyruvic acid the end product of Glycolysis before entering the Krebs cycle is changed into two carbon compound: (BWP-2014-A)
  - Citric acid
  - Acetic acid
  - Succinic acid
  - $\alpha$  Ketoglutaric acid
- One of the accessory photosynthetic pigments carotenes are mostly: (BWP-2014-A)
  - Red to Orange
  - Yellow to Orange
  - Green to Yellow
  - Orange to Red
- The end product of glucose breakdown during glycolysis is: (BWP-2016-A) (FSD-15-A)
  - Acetic Acid
  - Citric Acid
  - Oxalic Acid
  - Pyruvic Acid
- Total photosynthesis is carried out by the terrestrial plants is: (BWP-2017-A) (D.G.K-II-16-A)
  - 15%
  - 20%
  - 10%
  - 22%
- The process of Glycolysis occurs in: (BWP-2018-A)
  - Mitochondria
  - Ribosomes
  - E.R
  - Cytosol
- The molecular formula of chlorophyll 'a' is: (D.G.K-I-2014-A)
  - $\text{C}_{20}\text{H}_{39}$
  - $\text{C}_{55}\text{H}_{72}\text{O}_5\text{N}_4\text{Mg}$
  - $\text{C}_{55}\text{H}_{70}\text{O}_5\text{N}_4\text{Mg}$
  - None of these
- Glycolysis occurs in: (D.G.K-II-2014-A, I-18-A)
  - Nucleus
  - Mitochondria
  - Cytosol
  - Ribosome

35) ATP synthesis in presence of light is called: (D.G.K-II-2014-A)

- Oxidative phosphorylation
- Reductive phosphorylation
- Photo phosphorylation
- Hydro phosphorylation

36) Chlorophyll molecule contains except: (D.G.K-II-2015-A)

- Prophyrin ring
- Phytol ring
- Magnesium
- Iron

37) Rubisco is the most abundant protein in: (D.G.K-I-2017-A)

- Golgi bodies
- Mitochondria
- Chloroplast
- Nucleoli

38) The light falling on leaf surface is absorbed about: (D.G.K-I-2018-A)

- 1%
- 25%
- 50%
- 100%

39) Calvin cycle is also known as: (D.G.K-II-2018-A)

- C<sub>3</sub> Pathway
- C<sub>4</sub> Pathway
- C<sub>5</sub> Pathway
- C<sub>6</sub> Pathway

40) Energy released by breaking of terminal phosphate of ATP is: (SAH-2014,15-A) (D.G.K-I-14) (RWP-19-A)

- 8.3 k cal
- 7.3 k cal
- 6.3 k cal
- 9.3 k cal

41) Most abundant protein on earth is: (SAH-2014-A)

- Rubisco
- Haemoglobin
- Albumen
- Fibrinogen

42) The movement in plants when carbon dioxide released by respiration equals the quantity required by photosynthesis is termed as: (SAH-2017-A)

- Compensation point
- Homeostasis
- Chemiosmosis
- Action spectrum

43) Photosynthetic pigments organized into clusters are called: (SAH-2017-A)

- Thylakoids
- Photosystems
- Grana
- Stroma

### III From Entry Tests:

1) In what stage of aerobic respiration are 2+ carbon molecules oxidized completely to carbon dioxide? (Entry Test 2009)

- Glycolysis
- Kreb's cycle
- ETC
- Calvin cycle

2) Chlorophylls absorb mainly wave length: (Entry Test 2009)

- Yellow
- Violet-blue
- Green
- Indigo

3) Which form of anaerobic respiration occurs in muscle cells of humans and other animals during extreme physiological activities? (Entry Test 2009)

- Alcoholic fermentation
- Lactic acid fermentation
- Glycolysis
- Pyruvic oxidation

4) In which of the following life processes is ATP produced? (NSTC-8-Sample paper 2010-2012)

- Photosynthesis a) I only
- Aerobic respiration b) II only
- Anaerobic respiration c) I and II only
- I, II and III

5) Which of the following is not the end product of glycolysis: (Entrance Self-Test-2011)

- Pyruvate
- Oxaloacetate
- ATP
- Reduced NAD

6) Which of the following does occur for the formation of acetyl Co-A from pyruvate: (Entrance Self-Test-2011)

- Decarboxylation
- Carboxylation
- Hydrogenation
- Deamination

7) At the beginning of Kreb's cycle acetyl Co-A combines with which substrate to form citrate (6-C): (Entrance Self-Test-2011)

- Oxaloacetate
- Fumarate
- Oxoglutarate
- Succinate

8) Which of the following is not the end product of non-cyclic photophosphorylation: (Entrance Self-Test-2011)

- Reduced NADP
- O<sub>2</sub>
- ATP
- CO<sub>2</sub>

9) The product(s) of cyclic phosphorylation is / are: (Entry Test-2012)

- ATP
- NADP and ATP
- NADP
- NADP, ATP and O<sub>2</sub>

10) Total NADH formed by one glucose molecule during Kreb's Cycle are: (Entry Test-2012)

- 6
- 8
- 4
- 18

11) The end product glycolysis is: (Entry Test-2012)

- ADP
- Citric acid
- Reduced FAD
- Pyruvate

12) The terminal electron acceptor in electron transport chain is: (Entry Test-2012)

- Hydrogen
- Cytochrome
- ATP
- Oxygen

13) One molecule of FADH<sub>2</sub> is produced in Kreb's cycle during conversion of: (Entry Test-2012)

- Fumarate Malate
- Malate Oxaloacetate
- Succinate Fumarate
- Ketoglutarate Succinate

14) Every molecule of NADH, fed into ETC produces: (Entrance Test-2013)

- 2 ATP
- 4 ATP
- 3 ATP
- 6 ATP

15) Final acceptor of electrons in respiratory chain is: (Entrance Test-2013)

- Cytochrome a
- Cytochrome a<sub>3</sub>
- Oxygen
- Cytochrome c

16) The end product of anaerobic respiration in humans and other mammals is: (Entrance Test-2013)

- Pyruvic acid
- Lactic acid
- Ethanol
- Glucose

17) A biochemical process which occurs within a cell to breakdown complex compounds to produce energy is called: (Entrance Test-2013)

- Respiration
- Oxidation reduction
- Photosynthesis
- Photo phosphorylation

18) Which part of chlorophyll molecule absorbs light? (Entrance Test-2013)

- Phytol
- Pyrol
- Prophyrin ring
- Thylakoid membrane

19) Oxidative phase of glycolysis starts with dehydrogenation of: (Entrance Test-2014)

- Glycolysis
- Glyceraldehyde 3-phosphate
- NADH

20) In one turn, the Kreb's cycle produces one molecule of ATP, one molecule of FADH<sub>2</sub> and — molecules of NADH: (Entrance Test-2014)

- 1
- 3
- 2
- 4

21) Which one of the following is the stage of cellular respiration for which oxygen is not essential? (Entrance Test-2014)

- Glycolysis
- Pyruvate oxidation
- Kreb's cycle
- Electron Transport Chain

22) Pyruvate, the end product of glycolysis moves from cytosol to mitochondrial matrix where it is oxidized into — producing CO<sub>2</sub> as a by-product: (Entrance Test-2014)

- Acetic acid (active)
- NAD
- Citrate
- FAD

23) Pyruvate → Acetyl CoA (Entrance Test-2014)

- FAD<sup>+</sup> → FAD
- NAD<sup>+</sup> → NADH
- NADH → NAD + H<sup>+</sup>
- FADH<sup>+</sup> → FAD + H<sup>+</sup>

24) In light independent stage of photosynthesis, the CO<sub>2</sub> combines with — to form an unstable 6-carbon intermediate. (Entrance Test-2015)

- Ribulose bisphosphate
- Hexose sugar
- Glyceraldehyde 3-phosphate
- Glyceraldehyde 9-phosphate

25) In glycolysis, glyceralate-1, 3- bisphosphate is converted into glyceralate-3-phosphate by losing — phosphate molecules. (Entrance Test-2015)

- 3
- 1
- 2
- 4

26) Malate is oxidized by — to oxaloacetate in Kreb's cycle. (Entrance Test-2015)

- ATP
- NAD
- NADP
- FAD

27) In electron transport chain, the electrons from NADH and FADH<sub>2</sub> are passed to: (Entrance Test-2015)

- Cytochrome a
- Co-enzyme c
- Cytochrome a<sub>3</sub>
- Co-enzyme Q

28) Carriers of respiratory chains are located on: (Entrance Test-2015)

- Matrix of mitochondria
- Outer membrane of mitochondria
- Inner membrane of mitochondria
- Cytoplasmic matrix

29) Each — consists of a light gathering antenna complex and reaction center. (Entrance Test-2016)

- Chlorophyll
- Photon
- Photo system
- Electron

30) Photo system I has chlorophyll a molecules which absorb maximum light of: (Entrance Test-2016)

- 680 nm
- 700 nm
- 780 nm
- 580 nm

31) Cyclic flow or C<sub>4</sub> photosynthesis produces: (Entrance Test-2016)

- ATP and CO<sub>2</sub>
- Only CO<sub>2</sub>
- ATP
- Only Oxygen

32) Immediate product formed after CO<sub>2</sub> fixation in Calvin Cycle is: (Entrance Test-2016)

- Unstable 6-carbon compound
- Unstable 5-carbon compound
- Unstable 4-carbon compound
- Unstable 3-carbon compound

33) Functional group of chlorophyll a is: (Entrance Test-2016)

- CH<sub>3</sub>
- COOH
- CHO
- OH

34) Chlorophyll molecule contains: (Entry Test-2017)

- Mg<sup>++</sup>
- K<sup>+</sup>
- Ca<sup>++</sup>
- Na<sup>+</sup>

35) The tail of chlorophyll molecule is embedded in: (Entry Test-2017)

- Membrane of mitochondria
- Thylakoid membrane
- Membrane of SER
- Membrane of RER

36) Carotenoids absorb light of: (Entry Test-2017)

- Yellow-orange range
- Orange-red range
- Yellow-red range
- Blue-violet range

37) Chlorophyll "a" and chlorophyll "b" differ in one of the functional groups — Chlorophyll "a" has: (Entry Test-2017)

- CHO
- CH<sub>3</sub>
- OH
- NH<sub>2</sub>

38) Calvin cycle occurs in: (Entry Test-2017)

- Grana of chloroplast
- Stroma of chloroplast
- Chlorophyll (Reaction centre)
- Roots of plants

39) Glyceralate-3-phosphate in the presence of ATP and reduced NADP from light depend stage is reduced: (Entry Test-2017)

- 3-carbon compound
- Ribulose bisphosphate
- 5-carbon compound
- 6-carbon compound

## SECTION II

### SHORT QUESTIONS

2 SQs

#### From Exercise:

1. List four features of a leaf which show that it is able to carry out photosynthesis.

Ans.

- Flatness and expansion of lamina or leaf blade for maximum light absorption
- Arrangement of mesophyll tissues for carrying out of photosynthesis
- Presence of stomata for entry of CO<sub>2</sub>
- Highly vascularized vascular bundles for supply of water.

2. How does light affect opening of stomata?

Ans. Light affects opening of stomata in the following two ways:

- In the presence of light chlorophyll containing guard cells synthesize sugar which in turn increase the osmotic potential of guard cells. This increase results in endosmosis and ultimately to turgidity. When guard cells become turgid their inner walls bend outward at the centre producing opening called stoma.
- Sunlight acidifies the environment of the guard cells (i.e. pumps out protons) which enables the guard cells to take up K<sup>+</sup>, water follows by osmosis, guard cells swell with water and stoma opens.

3. What causes the variations of osmotic potential in the guard cells?

Ans. Use and disuse of water in the presence and absence of photosynthesis cause the variations of osmotic potential in the guard cells.

5. What is the role of accessory pigments in light absorption?

Ans. Role of Accessory Pigments in Light Absorption: -

- Accessory pigments absorb light and transfer to main pigments of chlorophyll. Chlorophylls are main pigments while carotenoids are the main accessory pigments. Sometimes chlorophyll b also acts as an accessory pigment. The order of transfer of energy is: Carotenoid → Chlorophyll b → Chlorophyll a
- Some carotenoids protect chlorophyll from intense light by absorbing and dissipating excessive light energy, rather than transferring energy to chlorophyll.
- They enable the organisms to utilize more colors of the visible light spectrum for photosynthesis.
- They are also responsible for the brilliant colors of vegetables such as carrots, tomatoes, and peppers.

6. Explain the difference between the cyclic and non-cyclic photo-phosphorylation with the help of a scheme. (DGK-II-19-A)

Cyclic Photo-Phosphorylation	Non-Cyclic Photo-Phosphorylation
<ol style="list-style-type: none"> <li>It is cyclic flow of electron from PS I, primary acceptor, ferredoxin and cytochrome complex back to PS I.</li> <li>Only ATPs are produced.</li> <li>Electrons are cycled from ferredoxin back to cytochrome complex.</li> </ol>	<ol style="list-style-type: none"> <li>It is linear flow of electron from water to NADP<sup>+</sup> and involves both PS I and PS II.</li> <li>ATPs, NADPH and Oxygen is produced.</li> <li>Electrons pass on to a terminal acceptor NADP<sup>+</sup> and never come back to initial source.</li> </ol>

7. What is the net production of ATP during glycolysis?

Ans. Net Production of ATP During Glycolysis: -

The net production of ATP during glycolysis is 2 molecules.

8. What is the difference between the photo-phosphorylation and oxidative phosphorylation? (LHR-II-18-A)

Ans. Difference Between the Photo-Phosphorylation and Oxidative Phosphorylation: -

Photo Phosphorylation	Oxidative Phosphorylation
<ol style="list-style-type: none"> <li>It refers to a series of changes in which sun light energy absorbed by photosynthetic pigments lysis water molecules removing pairs of electrons which are passed from one substance to another and energy released is us to form ATP.</li> <li>It takes place during transport of electrons in light dependent reactions of photosynthesis.</li> </ol>	<ol style="list-style-type: none"> <li>It refers to a series of changes in which pairs of electrons are passed from one substance to another and ultimately to oxygen and the energy released during the passage is used to combine ADP molecules with phosphate molecules to form ATP.</li> <li>It occurs during oxidation reactions of electron transport chain of respiration.</li> </ol>

9. What is the location of ETC and chemiosmosis in photosynthesis and cellular respiration?

Ans. The location of ETC and chemiosmosis in photosynthesis is thylakoid membrane, while in cellular respiration is mitochondrial membrane.

10. How did the evolution of photosynthesis affect the metabolic pathway?

Ans. First photosynthetic organisms used hydrogen sulfide as a source of hydrogen for reducing carbon dioxide to sugars releasing sulfur in the atmosphere. Later water was evolved as a source of hydrogen for the same purpose releasing oxygen in the atmosphere. Accumulation of free oxygen in the atmosphere caused the evolution of use of oxygen by a series of metabolic pathways e.g. aerobic respiration.

12. Why are the carotenoids usually not obvious in the leaves? They can be seen in the leaves before leaf fall. Why?

Ans. Carotenoids Obvious in the Leaves Before Leaf Fall: -

Carotenoids are yellow pigments which are often masked by darker green color of chlorophylls. So they are usually not obvious in the leaves. Carotenoids can be seen in the leaves before leaf fall because dominant green chlorophyll pigments are destroyed before leaf fall at the end of growing season.

13. How the formation of vitamin "A" is linked with eating of carrot?

Ans. Formation of Vitamin "A" Linked With Eating of Carrot: -

The formation of vitamin A is linked with eating of carrot because it contains carotenoids, the precursor of vitamin A which are changed into vitamin A by a chemical reaction.

#### From Punjab Boards:

1. Give the importance of ATP. (LHR-II-2014-A)

Ans. Importance of ATP: -

- It is the common energy currency of cell that on demand provides the energy to the cell.
- It acts a mediator, capable of receiving energy from one reaction and transfers this energy to derive another reaction.
- ATP plays role in several endergonic reactions such as synthesis of proteins, lipids, carbohydrates, active transport etc.
- In exergonic reactions like anaerobic glycolysis and oxidative phosphorylation, it also plays its role as coenzyme.

2. Define the term bioenergetics. (LHR-II-2014-A) (DGK-I-15) (FSD-15) (RWP-14) (SGD-16, 18)

Ans. Bioenergetics: -

- Bioenergetics is the quantitative study of energy relationships and energy conversion in biological systems.
  - In bioenergetics, energy is captured and conserved from one form to another in living system and is utilized in metabolic activities.
3. What are accessory pigments? Give their one importance. (LHR-I-2015-A) (MTN-18, 19-A) (GRW-16-A) (DGK-II-17)

Ans. A) Accessory Pigments: -

Accessory pigments are usually photosynthetic pigments other than chlorophyll which themselves are not involved in the reactions of photosynthesis.

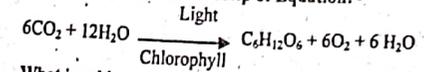
B) One Importance of Accessory Pigments: -

Accessory pigments absorb light and transfer to main pigments of chlorophyll. Carotenoids are the main accessory pigments. Sometimes chlorophyll b also acts as an accessory pigment. The order of transfer of energy is:

Carotenoid → Chlorophyll b → Chlorophyll a

4. Define photosynthesis with the help of equation. (LHR-I-2015-A) (BWP-14-A) (GRW-15-A) (FSD-18-A)

Ans. Photosynthesis with the Help of Equation: -



5. What is rubisco? Give its function. (LHR-II-2015-A) (RWP-15)

Ans. A) Rubisco: -

- It is the common name of ribulose biphosphate carboxylase / oxygenase.
- It is an enzyme in the stroma of chloroplasts that usually behaves as RUBP carboxylase but under some environmental conditions it can behave as RUBP oxygenase instead of carboxylase.

B) Function: -

It usually catalyzes the fixation of carbon dioxide into carbohydrate in the Calvin Cycle.

6. What is glycolysis, where it takes place in the cell. (LHR-I-2016-A)

Ans. A) Glycolysis: -

Glycolysis is the first phase of energy metabolism in cells in which a single six-carbon glucose molecule is converted into two molecules of the three-carbon compound pyruvate, two molecules of NADH, and two molecules of ATP.

B) Place Where Glycolysis Takes Place in the Cell: -

Glycolysis takes place in the cytoplasm of cells.

7. What is pay off phase of glycolysis? (LHR-II-2016-A)

Ans. Pay off Phase of Glycolysis: -

- It is also known as oxidative phase of glycolysis.
  - During this phase:
    - NAD<sup>+</sup> accepts electrons and hydrogen to form NADH + H<sup>+</sup>.
    - High energy phosphate bonds are formed and energy is stored in the form of ATP.
8. Differentiate between antenna complex and reaction centre. (LHR-I-2017-A)

Ans.

Antenna Complex	Reaction Centre
1. Antenna complex is a light gathering part of photosystem in thylakoid membranes.	1. It is a centre of utilization of solar energy and is a part of photosystem in thylakoid membranes.
2. It has many molecules of chlorophyll a, chlorophyll b and carotenoids.	2. It has one or more molecules of chlorophyll a along with a primary electron acceptor and associated electron carriers of electron transport system.
3. It absorbs light and transfers to the reaction centre.	3. It converts the light energy into chemical energy.

9. Define alcoholic fermentation. Write its equation. (LHR-II-2018-A)

- Ans. A) Alcoholic Fermentation: -
- It takes place in some bacteria, fungi (yeasts) and endoparasites.
  - It occurs in two steps. In the first step pyruvic acid is decarboxylated to produce Acetaldehyde. In the second step  $\text{NADH} + \text{H}^+$  reduces acetaldehyde to ethyl alcohol or ethanol.
  - Final product is ethyl alcohol or ethanol while  $\text{CO}_2$  and acetaldehyde are intermediate products.

B) Equation of Alcoholic Fermentation: -

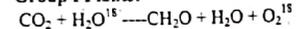


10. How it was proved that source of  $\text{O}_2$  in photosynthesis is water? (GRW-2014-A) (FSD-18-A)

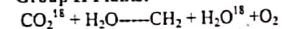
Ans. Source of  $\text{O}_2$  in Photosynthesis:-

In order to prove that the source of oxygen in photosynthesis is water scientists used water and carbon dioxide containing heavy-oxygen isotope  $\text{O}^{18}$ . Experimental green plants in one group were supplied with  $\text{H}_2\text{O}$  containing  $\text{O}^{18}$  and with  $\text{CO}_2$  containing only common oxygen  $\text{O}^{16}$ . Plants in the second group were supplied with  $\text{H}_2\text{O}$  containing common oxygen with  $\text{O}^{16}$  but  $\text{CO}_2$  containing  $\text{O}^{18}$ . It was found that plants of first group produced  $\text{O}^{18}$  and plants of second group did not.

Group I Plants: -



Group II Plants: -



11. Compare alcohol and lactic acid fermentation. (GRW-2014-A)

Ans.

Lactic Acid Fermentation	Alcoholic Fermentation
1. It occurs in muscle cells of humans and other animals during extreme physical activities.	1. It takes place in primitive cells and some eukaryotic cells such as yeast.
2. It occurs in one step in which Pyruvic Acid is reduced by $\text{NADH}_2$ to Lactic Acid.	2. It occurs in two steps. In the first step pyruvic acid is decarboxylated to produce Acetaldehyde. In the second step $\text{NADH} + \text{H}^+$ reduces acetaldehyde to Ethyl Alcohol or Ethanol.
3. Final product is Lactic Acid.	3. Final product is Ethyl Alcohol or Ethanol while $\text{CO}_2$ and Acetaldehyde are intermediate products.
Equation: - $2\text{NADH}_2 \xrightarrow{2\text{NAD}^+} 2(\text{C}_3\text{H}_7\text{O}_2) \xrightarrow{\hspace{2cm}} 2(\text{C}_3\text{H}_7\text{OH})$ Pyruvic acid $\xrightarrow{\hspace{2cm}}$ Lactic acid	Equation: - $2\text{NADH}_2 \xrightarrow{2\text{NAD}^+} 2(\text{C}_2\text{H}_5\text{OH}) + 2 \text{CO}_2$ Pyruvic acid $\xrightarrow{\hspace{2cm}}$ Ethyl Alcohol

12. Give any two differences between photosynthesis and respiration. (GRW-2015-A)

Photosynthesis	Respiration
1. It is energy consuming process.	1. It is energy releasing process.
2. Oxidation of $\text{H}_2\text{O}$ into $\text{O}_2$ and reduction of carbon into carbohydrate takes place.	2. Oxidation of carbohydrate into $\text{CO}_2$ and reduction of oxygen into $\text{H}_2\text{O}$ takes place.

13. Explain chemiosmosis. (GRW-2017-A) (DGK-I-18)

Ans. Chemiosmosis: -

- It is a biochemical process in which energy from electrons powers the movement of protons across the membrane, a process that leads to ATP formation.
- Chemiosmosis can be summarized as:
  - Electrons give up their energy as they move through a series of electron-transport reactions.
  - Energy from the electron transport reactions is used to pump protons ( $\text{H}^+$ ) across a membrane.
  - When protons move back through special proteins in the membrane, enzymes capture the energy and use it to synthesize ATP from ADP and Pi.

14. Differentiate between aerobic and anaerobic respiration. (GRW-2017-A) (RWP-19-A)

Aerobic Respiration	Anaerobic Respiration
1. It is the type of respiration in which oxygen is the final electron acceptor.	1. It is the type respiration which does not require oxygen as its final electron acceptor.
2. Glucose is completely oxidized.	2. Glucose is incompletely oxidized.
3. 36 ATP molecules per glucose molecule are produced and the energy released from this is equivalent to 363 kcal.	3. Two ATP molecules per glucose molecule are produced and the energy released from this is equivalent to 14.6 kcal.
4. End products are $\text{CO}_2$ and $\text{H}_2\text{O}$ .	4. End products are $\text{CO}_2$ and Alcohol or Lactic acid.

15. What are cytochromes? (GRW-2018-A)

Ans. Cytochromes: -

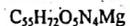
- Cytochromes are iron containing haem proteins of an electron transport system.
- They serve as electron carriers in electron transport chains of photosynthesis and cellular respiration.

16. What is a porphyrin ring of a chlorophyll molecule? (GRW-2018-A) (SAH-19-A)

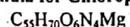
Ans. Porphyrin Ring of A Chlorophyll Molecule:-  
It is made up of four joined smaller pyrrole rings composed of carbon and nitrogen atoms. An atom of magnesium is present in the centre of porphyrin ring and is coordinated with the nitrogen of each pyrrole ring.

17. Write down the molecular formula for chlorophyll 'a' and 'b'. (MTN-2014-A) (FSD-16) (DGK-I, II-15)

Ans. A) Molecular Formula for Chlorophyll "a": -



B) Molecular Formula for Chlorophyll "b": -



18. What is compensation point? When it occurs? (MTN-2015-A) (BWP-15, 16-A) (FSD-17) (SGD-15-A) (SAH-15, 17-A) (MTN-19-A)

Ans. A) Compensation Point: -

- The compensation point is the amount of light intensity at dawn and dusk where the rate of photosynthesis, for a short time, exactly matches the rate of respiration.

Compensation point indicates that:

- The uptake of  $\text{CO}_2$  through photosynthetic pathway is exactly matched to the respiratory release of  $\text{CO}_2$ .
- The uptake of  $\text{O}_2$  by respiration is exactly matched to the photosynthetic release of oxygen. Hence; There is no net gas exchange between the leaves and the environment.

B) When Compensation Point Occurs: -

It usually occurs at dawn and dusk.

19. What is Alcoholic Fermentation? (MTN-2016-A)

Ans. Alcoholic Fermentation: -

- It takes place in some bacteria, fungi (yeasts) and endoparasites.
- It occurs in two steps. In the first step pyruvic acid is decarboxylated to produce Acetaldehyde. In the second step  $\text{NADH} + \text{H}^+$  reduces acetaldehyde to ethyl alcohol or ethanol.
- Final product is ethyl alcohol or ethanol while  $\text{CO}_2$  and acetaldehyde are intermediate products.

B) Equation of Alcoholic Fermentation: -



20. What is Photo phosphorylation? (MTN-I-2017-A)

Ans. Photophosphorylation: -

- It refers to a series of changes in which sun light energy absorbed by photosynthetic pigments lysis water molecules removing pairs of electrons which are passed from one substance to another and energy released is used to form ATP.
- It takes place during light dependent reactions of photosynthesis.

21. What is meant by internal respiration? (MTN-I-2017-A)

Ans. Internal Respiration: -

- It is commonly known as cellular respiration.
- It is a complex process of oxidation-reduction in which food is oxidized to release energy.
- In internal respiration, cell utilizes oxygen, produces carbon dioxide, extracts and conserves the energy from food molecules in biologically useful form such as ATP.

22. Define Chemiosmosis. (LHR-I-19-A)

(MTN-II-2017-A)

Ans. Chemiosmosis: -

- It is a biochemical process in which energy from electrons powers the movement of protons across the membrane, a process that leads to ATP formation.
- Chemiosmosis can be summarized as:
  - Electrons give up their energy as they move through a series of electron-transport reactions.

ii) Energy from the electron transport reactions is used to pump protons ( $\text{H}^+$ ) across a membrane.

iii) When protons move back through special proteins in the membrane, enzymes capture the energy and use it to synthesize ATP from ADP and Pi.

23. Write down phases of aerobic cellular respiration. (MTN-I-2018-A)

Ans. Phases of Aerobic Cellular Respiration:-

- Glycolysis
- Pyruvic acid oxidation
- Krebs cycle or citric acid cycle
- Respiratory chain

24. Differentiate between Alcoholic and Lactic acid fermentation with Reactions. (MTN-II-2018-A)

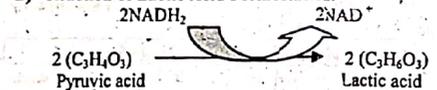
Lactic Acid Fermentation	Alcoholic Fermentation
1. It occurs in muscle cells of humans and other animals during extreme physical activities.	1. It takes place in primitive cells and some eukaryotic cells such as yeast.
2. It occurs in one step in which Pyruvic Acid is reduced by $\text{NADH}_2$ to Lactic Acid.	2. It occurs in two steps. In the first step pyruvic acid is decarboxylated to produce Acetaldehyde. In the second step $\text{NADH} + \text{H}^+$ reduces acetaldehyde to Ethyl Alcohol or Ethanol.
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Equation: - $2\text{NADH}_2 \xrightarrow{2\text{NAD}^+} 2(\text{C}_3\text{H}_7\text{O}_2) \xrightarrow{\hspace{2cm}} 2(\text{C}_3\text{H}_7\text{OH})$ Pyruvic acid $\xrightarrow{\hspace{2cm}}$ Lactic acid	Equation: - $2\text{NADH}_2 \xrightarrow{2\text{NAD}^+} 2(\text{C}_2\text{H}_5\text{OH}) + 2 \text{CO}_2$ Pyruvic acid $\xrightarrow{\hspace{2cm}}$ Ethyl Alcohol

25. What is Lactic Acid Fermentation? Give its reactions. (BWP-2015-A)

Ans. A) Lactic Acid Fermentation: -

- Lactic acid fermentation is an enzyme controlled reaction in which NADH reduces pyruvate (produced by glycolysis) to lactate or lactic acid.
- It is a form of anaerobic respiration in the muscle cells of humans and other animals during extreme physical activities in which each pyruvic acid molecule is converted into lactic acid in the absence of oxygen gas.

B) Reaction of Lactic Acid Fermentation: -



26. What is Fermentation? Name its two types. (2016-A)

Ans. A) Fermentation: -

- Fermentation is a set of anaerobic reactions in which pyruvate (pyruvic acid) generated by glycolysis is



47. What is importance of Mg in chlorophyll molecules? (D.G.K-I-2017-A)

Ans. Importance of Mg in Chlorophyll Molecules:-  
The head of chlorophyll molecule is composed of a complex porphyrin ring that absorbs sunlight. Porphyrin ring in turn is made of four joined smaller pyrrol rings composed of carbon and nitrogen atom. An atom of magnesium is present in the centre of porphyrin ring and is coordinated with the nitrogen of each pyrrol ring and plays an important role in absorbing sunlight and hence photosynthesis. Deficiency of magnesium causes yellowing in plants.

48. Differentiate between Chlorophyll "a" and Chlorophyll "b". (formulae) (D.G.K-II-2018-A) (LHR-19-A) (SGD-19-A) (BWP-14, 19-A)

Chlorophyll a	Chlorophyll b
1. It has methyl group (CH <sub>3</sub> ) at first pyrrol ring.	1. It has carbonyl group (CHO) at first pyrrol ring.
2. Its chemical formula is C <sub>55</sub> H <sub>72</sub> C <sub>3</sub> N <sub>4</sub> Mg.	2. Its chemical formula is C <sub>54</sub> H <sub>70</sub> O <sub>6</sub> N <sub>4</sub> Mg.

49. Name the most common fuel used by the cell to provide energy by cellular respiration. (SAH-2015-A)

Ans. ATP is the most common fuel used by the cell to provide energy by cellular respiration.

50. What is alcoholic fermentation? (SAH-2016-A)

Ans. Alcoholic Fermentation:-

a. It takes place in some bacteria, fungi (yeasts) and endoparasites.

b. It occurs in two steps. In the first step pyruvic acid is decarboxylated to produce Acetaldehyde. In the second step NADH + H<sup>+</sup> reduces acetaldehyde to ethyl alcohol or ethanol.

3. Final product is ethyl alcohol or ethanol while CO<sub>2</sub> and acetaldehyde are intermediate products.

51. What is a photosystem? Name its two parts or components. (SAH-2016-A)

Ans. A) Photo system:-

A Photo system consists of a pigment complex (molecules of chlorophyll a and b and carotenoids) and electron acceptor molecules for efficient absorption and utilization of solar energy in thylakoid membranes.

B) Names of Two Parts or Components:-

- Antenna complex
- Reaction center

52. Define bioenergetics. Does it obey the Laws of thermodynamics? (SAH-2017-A)

Ans. A) Bioenergetics:-

Bioenergetics is the quantitative study of energy relationships and energy conservation in biological systems.

B) Does Bioenergetics Obey the Laws of Thermodynamics:-

Yes, it obeys the laws of thermodynamics.

## SECTION III LONG QUESTIONS

- Sketch metabolic pathway of glycolysis. (LHR-I-2014-A) (MTN-15-A) (4)
- Give in detail the phases of Calvin cycle. (LHR-II-2014-A) (4)
- Describe in detail photo phosphorylation. (LHR-I-2015-A) (4)
- Write a note on Calvin Cycle. (LHR-I-2017-A, II-19-A) (SAH-19-A) (4)
- Sketch Calvin Cycle. (No description) (LHR-II-2018-A) (SGD-17-A) (BWP-14-A) (4)
- Draw the labeled sketch of glycolysis. (GRW-2014-A) (LHR-I-19-A) (MTN-I-18-A) (4)
- What is glycolysis? Sketch its various steps only (No Description). (GRW-2015-A) (DGK-I-19-A) (4)
- Describe the Niel's hypothesis in detail. (GRW-2016-A) (4)
- Explain the chloroplast as the "site of photosynthesis" in plants. (4) (GRW-2017-A)
- Draw sketch and explain Krebs cycle. (4)
- Describe the metabolic pathways of glycolysis. (4) (RWP-2015-A)
- Sketch non-cyclic photo phosphorylation. (4) (RWP-2016-A, II-17) (DGK-II-16)
- Describe respiratory chain. (4) (RWP-I-2017-A)
- What is Respiration? Give detail on Anaerobic Respiration. (4) (SRG-2016-A)
- Draw the sketch of glycolysis. (No description) (4) (SRG-2018-A)
- Describe non-cyclic phosphorylation during Z-scheme of photosynthesis. (4) (FSD-2018-A) (LHR-II-15-A) (SRG-19-A)
- Sketch the outline of Krebs cycle. (4) (MTN-2014-A) (LHR-II-16-A) (MTN-I-17) (SGD-15-A) (DGK-I, II-14-A, I, II-17, 18)
- Sketch the Z-scheme. (4) (MTN-2016-A)
- Differentiate between Aerobic and Anaerobic Respiration. (4) (MTN-II-2017-A)
- Give the diagrammatic representation of non-cyclic electron flow in Photosynthesis. (4) (BWP-2015-A) (FSD-15-A)
- Draw Calvin Cycle. (4) (BWP-2016-A)
- Discuss Cyclic Phosphorylation. (4) (BWP-2017-A)
- Sketch the process of Glycolysis. (No description) (4) (BWP-2018-A)
- Sketch the Krebs' Cycle and discuss its energy yielding steps. (4) (D.G.K-I-2015-A) (RWP-19-A)
- Describe Chemiosmosis in detail. (4) (SAH-2015-A)
- Describe water as important reactant of photosynthesis. (4) (SAH-2016-A) (LHR-I-16-A) (MTN-II-18-A) (FSD-16-A) (RWP-18-A)
- Write a note on structure of chlorophyll. (4) (SAH-2017-A)

## SECTION I MULTIPLE CHOICE QUESTIONS

### Chapter --- 12 NUTRITION

#### IMCQ

#### I) From Exerising:-

- Carnivorous plants live in soils that are deficient in:
  - Water
  - Oxygen
  - Nitrogen
  - Iron
- Digestion in *Hydra* and *Planaria* takes place within its:
  - Coelom
  - Alimentary canal
  - Gastro vascular cavity
  - Transport molecule
- Mucus in saliva is made of:
  - Glycolipids
  - Proteins
  - Phospholipids
  - Saturated fatty acids
- Structure in the mouth that prevents food from entering the nasal cavities is the:
  - Epiglottis
  - Soft palate
  - Tongue
  - Pharynx
- Many humans become ill from consuming milk and milk products because they lack:
  - Bacteria in their intestines
  - Rennin
  - Lactase
  - Hydrochloric acid

#### II) From Punjab Boards:-

- If absorption of water and salt does not take place due to infection, it causes a condition called: (LHR-I-2014-A)
  - Cholera
  - Constipation
  - Dyspepsia
  - Diarrhea
- The organism that lives upon or within another organism is called: (LHR-II-2014-A)
  - Predator
  - Pest
  - Parasite
  - Host
- Certain types of whales are: (LHR-I-2015-A) (BWP-18-A)
  - Detritivores
  - Fluid feeders
  - Omnivores
  - Filter feeders
- Carbohydrate digesting enzymes are called: (LHR-I-2016-A) (SGD-15-A) (MTN-16-A)
  - Ligase
  - Amylase
  - Protease
  - Lipase
- Pepsin is secreted by: (LHR-II-2016-A) (SGD-17-A)
  - Mucus cell
  - Zymogen cell
  - Parietal cell
  - Oxyntic cells
- Tentacles is a characteristic of: (LHR-I-2017-A) (BWP-19-A)
  - Hydra*
  - Snail
  - Amoeba*
  - Euglena*
- In root nodules, bacteria convert nitrogen into: (GRW-2015-A)
  - Ammonia
  - Nitrate
  - Urea
  - Nitrite
- Hepatic and pancreatic secretions are also stimulated by hormone: (GRW-2016-A) (RWP-18-A) (MTN-14-A) (D.G.K-II-15)
  - Gastrin
  - Insulin
  - Thyroxine
  - Secretion
- The intestinal caecae are present in the digestive system of: (GRW-2017-A)
  - Amoeba
  - Hydra
  - Planaria
  - Cockroach
- In *Hydra*, ectodermal cells get food from endodermal cells by: (GRW-2018-A)
  - Osmosis
  - Diffusion
  - Active transport
  - Facilitated diffusion
- Sites of digestion in the digestive system of man are: (RWP-2014-A)
  - 1
  - 2
  - 3
  - 4
- The first part of small intestine is called: (RWP-2015-A)
  - Rectum
  - Ileum
  - Jejunum
  - Duodenum
- In Cockroach, the partly digested food is stored in: (SGD-2016-A)
  - Rectum
  - Gizzard
  - Crop
  - Colon
- pH of fresh saliva of human is about: (SGD-2018-A) (MTN-I-19-A)
  - 6
  - 7
  - 8
  - 9
- Which one is a parasitic plant? (FSD-New Scheme-2015-A)
  - Pitcher plant
  - Venus fly trap
  - Sundew
  - Dodder
- The human stomach is situated below: (FSD-New Scheme-2016-A)
  - Liver
  - Diaphragm
  - Kidneys
  - Spleen
- Gall stones are produced due to precipitation of: (FSD-New Scheme-2017-A) (D.G.K-II-17-A)
  - Milk
  - Protein
  - Cholesterol
  - Glucose
- Parotid salivary glands are situated in front of: (Faisalabad Board-New Scheme-2018-A)
  - Jaws
  - Ears
  - Tongue
  - Eyes

- 19) Enzyme that produces amino acids: (MTN-New Scheme-2015-A)
- Trypsin
  - Erypsin
  - Chymotrypsin
  - Amino peptidase
- 20) If bile pigments are accumulated in Blood, condition is known as: (MTN-New Scheme-Group-I-2017-A)(SAH-14-A)
- Gall stone
  - Jaundice
  - Pyrosis
  - Heart pang
- 21) Emulsification is the function of: (MTN-New Scheme-Group-II-2017-A)
- Bile
  - Lipase
  - Amylase
  - Protease
- 22) HCl is secreted by following gastric cells of stomach: (Multan Board-New Scheme-Group-I-2018-A)
- Oxyntic cells
  - Chief cells
  - Mucous cells
  - Zymogenic cells
- 23) Hydra is the example of: (MTN-New Scheme-Group-II-2018-A)
- Tentacular feeding
  - Scarping feeding
  - Filter feeding
  - Fluid feeding
- 24) Which type of cells in human stomach secrete Gastrin: (Bahawalpur Board-New Scheme-2014-A)
- Mucous cells
  - Parietal cells
  - Zymogen cells
  - Endocrine cells
- 25) Seizing and Swallowing type of Macrophagous feeding is found in: (BWP-2014-A)
- Aphids
  - Hydra
  - Mussels
  - Spotted Dog Fish
- 26) The length of Duodenum of human is about: (Bahawalpur Board-New Scheme-2017-A)
- 15-20 cm
  - 20-25 cm
  - 30-35 cm
  - 10-15 cm
- 27) *Drosera intermedia* is commonly called: (D.G.K Board-New Course-Group-I-2014-A)
- Sundew
  - Venus Fly Trap
  - Pitcher Plant
  - Dodder
- 28) Each villus is richly supplied with blood capillaries and vessel of lymphatic system called: (D.G.K Board-New Course-Group II-2014)
- Arteriole
  - Bronchiole
  - Lacteal
  - Coelom
- 29) In Amoeba digestion is: (D.G.K-I-2015-A)
- Intra cellular
  - Extra cellular
  - Both external and internal
  - No digestion
- 30) Excess gastric secretion is an important factor of: (D.G.K Board-New Course-Group-II-2016-A)
- Obesity
  - Piles
  - Food poisoning
  - Peptic ulcer

- 31) Parietal cells of lining of human stomach secrete: (D.G.K Board-New Scheme-Group-II-2018-A)
- Mucus
  - Hydrochloric acid
  - Pepsinogen
  - Gastrin
- 32) Excess gastric secretion is an important factor of: (Sahiwal Board-New Scheme-2015-A)
- Obesity
  - Piles
  - Food poisoning
  - Peptic ulcer
- 33) Dipeptides are broken down into amino acids by: (Sahiwal Board-New Scheme-2016-A)
- Erypsin
  - Pepsin
  - Trypsin
  - Lipase
- 34) In human stomach HCl is secreted by: (LHR-II-14-A)
- Mucous cells
  - Oxyntic cells
  - Zymogen cell
  - Chief cell
- III. From Enzyme Tests**
- 1) Pancreas is a: (Entrance Self-Test-2011)
- Part of Stomach
  - Part of Large intestine
  - Part of Small intestine
  - Separate Gland
- 2) During swallowing the food travels from oral cavity to the stomach by way of oesophagus: (Entrance Self-Test-2011)
- Very quickly
  - Pushed down by pharynx
  - By antiparistalsis
  - Moving due to peristalsis
- 3) The term chyme is applied to: (Entrance Self-Test-2011)
- Semi digestive food in oral cavity
  - Semi-solid food in stomach
  - Semi digested food in the small intestine
  - Completely digested food in the last part of small intestine
- 4) Villi and micro villi are present: (Entrance Self-Test-2011)
- In pharynx
  - In small intestine (jejunum)
  - In oesophagus
  - In large intestine
- 5) Gastrin is the hormone which is produced by the: (Entry Test-2017)
- Liver
  - Pyloric region of stomach gland
  - Mucosal lining of intestine
- 6) Bacteria and fungi are examples of: (Entry Test-2018)
- Producers
  - Consumers
  - Decomposers
  - Detritivores
- 7) The muscles of the stomach walls thoroughly mix up the food with gastric juices and the resulting semi-solid / semi liquid material is called: (Entry Test-2018)
- Bolus
  - Mucus
  - Bolus or chyme
  - Chyme

- 8) Trypsinogen is converted into trypsin by the activity of: (Entry Test-2012)
- Protease
  - Enteroknase
  - Lipase
  - Peptidase
- 9) In large intestine, vitamin K is formed by the activity of: (Entry Test-2012)
- Symbiotic bacteria
  - Parasitic bacteria
  - Obligate parasite
  - Facultative bacteria
- 10) Goblet cells secrete: (Entry Test-2012)
- HCl
  - Enzymes
  - Mucus
  - Amylase
- 11) Which one of the following vitamins is produced by micro flora of large intestine? (Entrance Test-2013)
- Vitamin K
  - Vitamin A
  - Vitamin C
  - Vitamin D
- 12) Which of the following are absorbed in the large intestine? (Entrance Test-2013)
- Water and salts
  - Water and peptones
  - Salts and glycerol
  - Amino acids and sugars
- 13) \_\_\_\_\_ is activated to \_\_\_\_\_ by Enterokinase / Entero peptidase enzyme secreted by the lining of duodenum. (Entrance Test-2013)
- Pepsinogen, Pepsin
  - Pepsinogen, Trypsin
  - Trypsinogen, Trypsin
  - Chymotrypsinogen, Chymotrypsin
- 14) Saliva is basically composed of water, mucus, amylase and: (Entrance Test-2013)
- Sodium bicarbonate
  - Sodium hydroxide
  - Sodium chloride
  - Hydrocarbons
- 15) In human, *Escherichia coli* is involved in the formation of: (Entrance Test-2014)
- Calcium
  - Vitamin A
  - Vitamin D
  - Vitamin K
- 16) The function of Goblet cells is to secrete: (Entrance Test-2014)
- Gastrin
  - Pepsinogen
  - Hydrochloric acid
  - Mucus
- 17) HCl in gastric juice is secreted by which one of the following cells? (Entrance Test-2014)
- Chief cells
  - Mucous cells
  - Oxyntic cells
  - Kupffer cells
- 18) Gastric glands are composed of \_\_\_\_\_ types of cells. (Entrance Test-2014)
- Two
  - Four
  - Three
  - Five
- 19) Oxyntic cells in stomach produce: (Entrance Test-2015)
- Pepsin
  - Gastrin
  - Pepsinogen
  - HCl
- 20) The hormone which inhibits secretion of pancreatic juice is: (Entrance Test-2015)
- Secretin
  - Thyroxine
  - Gastrin
  - Parathormone
- 21) Trypsinogen is activated to Trypsin by: (Entrance Test-2015)
- HCl
  - Mucus
  - Enterokinase
  - Gastrin
- 22) The emulsification of fat is the role of: (Entrance Test-2015)
- Saliva
  - Pancreatic juice
  - Gastrin
  - Bile
- 23) Digestion of \_\_\_\_\_ starts in oral cavity due to the action of enzyme present in saliva. (Entrance Test-2016)
- Starch
  - Fatty acids
  - Cellulose
  - Polypeptides
- 24) Food enters from stomach into small intestine through: (Entrance Test-2016)
- Pyloric Sphincter
  - Semi lunar valve
  - Cardiac Sphincter
  - Diaphragm
- 25) \_\_\_\_\_ are the part of a gastric gland which produce hydrochloric acid. (Entrance Test-2016)
- Parietal Cells
  - Chief Cells
  - Goblet Cells
  - Zymogen Cells
- 26) Protein components of food are digested by the enzymatic secretion of: (Entrance Test-2016)
- Goblet Cells
  - Zymogen Cells
  - Parietal Cells
  - Oxyntic Cells
- 27) Digestive System consists of different layers, the most innermost is known as: (Entrance Test-2016)
- Submucosa
  - Muscularis
  - Mucosa
  - Serosa
- 28) Food is diverted in the oesophagus by: (Entry Test-2017)
- Glottis
  - Cheeks
  - Tongue
  - Epiglottis
- 29) Enzyme pepsin acts on:
- | Options | Substrate   | Products              |
|---------|-------------|-----------------------|
| A       | Protein     | Polypeptides          |
| B       | Polypeptide | Dipeptide             |
| C       | Fats        | Fatty acids/ glycerol |
| D       | Protein     | Amino acids           |

## SECTION II

### SHORT QUESTIONS

3 SQs

#### From Exercises:

No Short Question From Exercise

#### (I) From Punjab Boards:

- Write two functions of secret in.  
(LHR-I-2014-A, II-14) (FSD-15-A) (RWP-II-17-A)
- Two Functions of Secretin:-
  - Secret in stimulates the pancreas to produce pancreatic juice.
  - It also inhibits gastric secretion.
- Differentiate between diarrhea and constipation.  
(LHR-II-2014-A) (DGK-II-15)

Constipation	Diarrhea
1. It is the slow movement of feces through the large intestine.	1. It is the rapid movement of fecal matter through the large intestine.
2. It is associated with large quantities of dry and hard feces due to excessive absorption of water.	2. It is associated with watery feces due to less absorption of water and electrolytes.
3. It may lead to piles or hemorrhoids.	3. It may lead to dehydration that always proves to be fatal especially in children.

- What are insectivorous plants? How they get their carbohydrates?  
(LHR-II-2015-A)

Ans. A) Insectivorous Plants: -

- Carnivorous plants are plants that supplement their inorganic diet with organic compounds. These organ compounds are obtained by trapping and digesting insects and small animals.
- All of the insectivorous plants are true autotrophs, but when they capture prey, their growth becomes rapid.
- Apparently, nitrogen compounds of animal body are of benefit to these plants.
- In some plants, the trapped insects are decomposed by bacteria, while in others, the trapped insects are digested by enzymes secreted by the leaves.
- The plants absorb the nitrogenous compounds after digestion.

B) Getting of Carbohydrates By Insectivorous Plants:- They get their carbohydrates by synthesizing them from carbon dioxide and water during photosynthesis.

- Name of hormones secreted by digestive system (Gut).  
(LHR-II-2015-A)

Ans.

- Amino Peptidase --- Converts polypeptides into dipeptides
- Erypsin --- Changes dipeptides into amino acids
- Lipase --- Breaks fats into fatty acids and glycerol
- Maltase --- Converts maltose into glucose
- Lactase --- Breaks lactose into glucose and galactose

- Biology [Part-I]
- Name three pairs of salivary glands. (LHR-I-2016-A) (FSD-16-A) (GRW-16-A) (MTN-I-18) (DGK-I-15-A)

Ans. Names of Three Pairs of Salivary Glands: -

- Parotid Glands
  - Sublingual Glands
  - Submandibular Glands
- What is food poisoning, write its symptoms.  
(LHR-II-2016-A)

Ans. A) Food Poisoning: -

- It is an illness from indigestion of food containing toxic substances.
  - It is caused by toxins produced by bacteria *Salmonella* and *Compylobacter*.
  - It develops by the use of unpasteurized milk and improperly cooked meat.
- B) Symptoms of Food Poisoning: -
- Its symptoms are diarrhea, vomiting and abdominal pain.

- Give the composition of saliva.  
(MTN-14, II17) (SAH-14)

Ans. Composition of Saliva: -

- Saliva contains:
- Water and Mucus ---- That lubricate the food.
  - Sodium Bicarbonate and other salts ---- That stabilize pH of food for carbohydrate digestion
  - Salivary Amylase or Ptyalin ---- Which digests starch and glycogen to maltose
- Define dyspepsia and also mention its characteristics.  
(LHR-I-2017-A)

Ans. A) Dyspepsia: -

Dyspepsia can be defined as the incomplete or imperfect digestion.

B) Characteristics of Dyspepsia: -

It is characterized by symptoms such as nausea and vomiting, heartburn, flatulence, and stomach discomfort.

- How trypsinogen is activated?  
(LHR-I-2017-A)

Ans. Activation of Trypsinogen: -

Trypsinogen is activated by enterokinase, an enzyme secreted by the lining of the duodenum.

- Differentiate between appendix and appendicitis  
(LHR-I-2017-A) (RWP-15-A)

Ans.

Appendix	Appendicitis
Appendix is a finger like process or blind tube of about 18 cm which arises from lower portion of Caecum, the first part of large intestine.	Appendicitis is the inflammation of Appendix due to entrapping and then purification of food in the Appendix.

- Enlist the enzymes of digestive juice of pancreas with their function.  
(LHR-II-2018-A)

Ans.

- Pancreatic Amylase or Amylopsin --- It is carbohydrate digesting enzyme which digests starch into maltose.
- Lipase --- It is fat digesting enzyme which hydrolyzes a small percentage of fats into fatty acids and glycerol.
- Trypsin --- It is secreted in an inactive form as trypsinogen and becomes active by duodenal enzyme enterokinase. It splits protein into peptones and polypeptides.

- Differentiate between intracellular and extracellular digestion.  
(LHR-II-2018-A)

Ans.

Intracellular Digestion	Extracellular Digestion
1. It is breakdown of food within cells.	1. It is breakdown of food outside the cells into gut cavity or lumen.
2. It occurs in animals belonging to kingdom Protista.	2. It usually occurs in higher animals.

- How Sundew (*Drosera*) shows its insectivorous activity?  
(LHR-II-2018-A)

Ans. Sundew plant shows its insectivorous activity by modification of its leaves into two halves that bear numerous hair like tentacles, each with a gland at its tip. When the insect, attracted by plant odour, triggers the hair, the two halves of the leaf are enclosed trapping the insect.

- Discuss the role of trypsin in digestion.  
(GRW-2014-A) (DGK-I-14-A)

Ans. Role of Trypsin in Digestion: -

It partly digests the protein, splitting it into peptones and polypeptides.

- Write a note on Botulism.  
(GRW-2014, 16-A) (DGK-I-14) (SAH-17) (RWP-19-A) (MTN-14-A) (BWP-16-A)

Ans. Botulism: -

- Botulism is the severe form of food poisoning which is characterized by fatigue, dizziness, double vision, nausea, vomiting, diarrhea, abdominal pain and if not treated may lead to cardiac and respiratory paralysis.
  - It is caused by toxins produced by bacteria known as *Clostridium botulinum*.
  - It develops by the use of improperly canned or otherwise preserved foods especially meat.
- Give two functions of human liver.  
(GRW-2015-A)

Ans. Two Functions Of Human Liver: -

- It secretes bile which may be temporarily stored in the gall bladder and released into the duodenum through the bile duct.
- It converts highly toxic ammonia into less toxic urea to be excreted through kidneys.

- What prevents the wall of stomach from being digested?  
(GRW-2015-A)

Ans. Substance Preventing The Wall of Stomach From Being Digested: -

Mucous present in the gastric juice secreted by mucous cells of gastric gland covers the inner side of stomach and prevents the wall of the stomach from being digested.

- Give the role of large intestine of human.  
(GRW-2017-A)

Ans. Role of Large Intestine of Human: -

- It rejects undigested material as feces.
- It absorbs water and salts present in undigested material and transfer it into blood.
- It harbors a large population of useful bacteria that synthesize some vitamins especially vitamin, which are absorbed in blood.

- Write the composition of pancreatic juice.  
(GRW-2017-A)

Ans. Composition of Pancreatic Juice: -

Pancreatic juice contains following enzymes:

- Amylase --- A carbohydrate digesting enzyme
  - Lipase --- Fat digesting enzyme
  - Trypsinogen --- An inactive form of protein digesting enzyme trypsin
- What is a nutrient?  
(GRW-2018-A)

Ans. Nutrient:-

- The food or any substance that supplies the body with elements, necessary for metabolism is called nutrient.
- Certain nutrients (carbohydrates, fats and proteins) provide energy while other nutrients (water, electrolytes, minerals and vitamins) are, essential to the metabolic processes.

- Define villi.  
(GRW-2018-A)

Ans. Villi: -

Villi are numerous finger-like outgrowths that project about 1 mm from the surface of mucosa of ilium and consist of a covering of epithelial cells and capillaries of blood and vessels of lymphatic system. They increase the absorptive area 10 fold.

- What is Appendicitis? (MTN-2015-A) (SAH-16-A)

Ans. Appendicitis: -

- Inflammation of appendix is called appendicitis.
- When some food entraps in the appendix, the decay of the food causes inflammation of the appendix, the appendicitis.
- It can cause localized swelling and pain in the right side of lower abdomen.
- If the condition remained ignored for some time, the appendix may burst in the abdominal cavity that could be extremely fatal for the patient.

- What is Peristalsis? (MTN-2015-A) (BWP-2014, 15-A)

Ans. Peristalsis: -

- Peristalsis is the characteristic movement of the digestive tract by which food is moved along the cavity of the canal.

- b. It consists of the wave of contraction of the circular and longitudinal muscles preceded by the wave of relaxation thus squeezing the food just down along the canal.
- c. It starts just behind the mass of food from the buccal cavity along the esophagus to the stomach and then along the whole alimentary canal. (MTN-2016-A)

24. Define Peristalsis.

Ans. Peristalsis:-

- a. Peristalsis is the characteristic movement of the digestive tract by which food is moved along the cavity of the canal.
- b. It consists of the wave of contraction of the circular and longitudinal muscles preceded by the wave of relaxation thus squeezing the food just down along the canal.
- c. It starts just behind the mass of food from the buccal cavity along the esophagus to the stomach and then along the whole alimentary canal.

25. Enlist Gastric Glands with their secretion in man. (MTN-I-2017-A)

Ans. A) Number of Gastric Glands:- Numerous

B) List of Secretions of Gastric Glands in Man:-

- a. Mucus
- b. Hydrochloric acid
- c. Pepsinogen (Inactive form of Pepsin)

26. What are gall stones? Mention their effect. (MTN-I-2017-A)

Ans. A) Gall Stones:-

Gall stones are the stones produced in the gall bladder as a result of precipitation of cholesterol secreted by the liver.

B) Effect of Gall Stones:-

They may block release of bile.

27. What is Ulcer? (MTN-II-2017-A)

Ans. Ulcer:-

- a. Ulcer is a lesion or sore on the skin or a mucous membrane, that erodes away the skin or mucous membrane.
- b. Peptic ulcer is a break in mucus layer of the stomach or first part of small intestine, duodenum.
- c. Occasionally, peptic ulcer is so severe that a hole develops in the wall of digestive tract and the contents of the tract spill into the abdominal cavity, leading to severe infection which may prove to be fatal.

28. Why our stomach produce more gastric juice if we have more proteins in our diet? (MTN-II-2017-A)

Ans. R -sor:-

Our stomach produces more gastric juice if we have more proteins in our diet because protein present in the food, when touches the gastric endocrine lining of stomach it, stimulates the production of gastrin which is carried to blood to the gastric glands and stimulates them to produce more gastric juice.

29. What is meant by symbiotic nutrition? Give two examples. (MTN-II-2018-A) (BWP-18-A) (SGD-18-A)

Ans. A) Symbiotic Nutrition:-

Symbiotic Nutrition is a type of nutrition in which two or more organisms belonging to different species live in close association that is advantageous to both.

B) Examples:-

a. Lichen:-

It is made up of a fungus and algal cells. The alga makes food by photosynthesis while the fungus supplies water and minerals and also protection against desiccation.

b. Mycorrhiza:-

It is an association between a fungus and roots of higher plants. The fungus depends upon photosynthate of the plant. Plants receive water and minerals via fungus.

30. Differentiate between Saprophytic and Parasitic mode of nutrition. (MTN-II-2018-A)

Saprophytic Mode of Nutrition	Parasitic Mode of Nutrition
It is a type of nutrition in which organisms called saprotrophs or saprobes or decomposers or absorptive heterotrophs feed on dead organic matter of plants and animals, digest this matter externally with the help of enzymes, absorb back decomposition products and use as a source of energy.	It is a type of nutrition in which organisms called parasites live on or inside the other living organisms of different species called hosts, feed and harm them.

31. How secret in is produced? What is its effect on pancreas in man? (BWP-2014-A)

Ans. A) Production of Secret in:-

Secret in is produced by the intestinal mucosa on the entry of acidic acid from the stomach.

B) Effect of Secret in on Pancreas:-

It stimulates pancreas to produce pancreatic juice.

32. Name different cells with their secretions which produce gastric juice. (BWP-2014-A)

Ans. Names of Different Cells of Gastric Juice:-

- a. Mucous Cells --- Secrete mucus
- b. Parieta Cells or Oxyntic Cells --- Secrete HCl
- c. Chief Cells or Zymogen Cells --- Secrete Pepsinogen, an inactive form of Pepsin

33. What is Anti peristalsis? (BWP-2015-A) (DGK-I-18-A)

Ans. Antiperistalsis:-

Antiperistalsis is the reverse waves of muscular contraction in the walls of digestive tract which travel backward up the digestive tract pushing a large amount of intestinal contents all the back to the duodenum and stomach and even into the mouth leading to vomiting.

34. What is Chyme? (BWP-2015-A)

Ans. Chyme:-

a. Chyme is a semi-solid, paste like food formed in the stomach when food becomes mixed with the stomach secretion.

b. It passes from stomach down the gut.

35. Differentiate between Ingestion and Egestion. (BWP-2016-A) (DGK-II-18-A)

Ingestion	Egestion
1. It is the intake of complex food.	1. It is the elimination of residual undigested food.
2. Useful organic substances are taken in.	2. Wasteful or harmful products are laminated.
3. In most nimal it takes place through outh which is a permanent opening of digestive tract.	3. Anus is the opening in the digestive tract of animals that is used for egestion. However, mouth is used for egestion in case where anus is absent.

36. Why Tubular Digestive System is more efficient than Sac like Digestive System? (BWP-2017-A)

Ans. Tubular digestive system is more efficient than sac like because it has specialized organs or partitions for efficient digestion and absorption of food and food is completely digested within the digestive tract.

37. Differentiate between Peristalsis and Anti Peristalsis. (BWP-2017-A)

Peristalsis	Antiperistalsis
1. Peristalsis is the rhythmic waves of muscular contraction just behind the mass of food in the walls of digestive tract	1. Antiperistalsis is the reverse waves of muscular contraction in the walls of digestive tract which travel backward up the digestive tract.
2. It serves to move food down the tract.	2. It pushes a large amount of intestinal contents back to the duodenum and stomach and even into the mouth leading to vomiting.

38. Define nutrition. (FSD-2014-A)

Ans. Nutrition:-

- a. The sum total of all the processes involved in the taking in and utilization of elements by which growth, repair and maintenance of activities in the organisms are accomplished is called Nutrition.
  - b. It includes all the processes by which we take in food and utilize it, including ingestion, digestion, absorption, and assimilation.
  - c. The food or any substance that supplies the body with elements, necessary for metabolism is called nutrient.
  - d. Certain nutrients (carbohydrates, fats and proteins) provide energy while other nutrients (water, electrolytes, minerals and vitamins) are, essential to the metabolic processes.
- (Note:- The word nutrition is used in two related contexts.)

- a. First, nutrition is a branch of science that seeks to understand food, its nutrients, how the nutrients are used by the body, how less or over quantities of nutrients lead to ill health.
- b. Second, nutrition refers to all the processes by which we take in food and utilize it, including ingestion, digestion, absorption, and assimilation.

39. What is heart burn or pyrosis? (FSD-2014, 18-A) (RWP-I-17-A)

Ans. Heart Burn or Pyrosis:-

- a. Heart Burn or Pyrosis is a painful sensation in a chest cavity usually associated with the back flush of acidic chyme into the oesophagus.
- b. Heart burn or pyrosis is due to overeating, fatty food, lying down immediately after a meal, consuming too much alcohol, caffeine or smoking.

40. Describe three kinds of cells present in gastric glands. (FSD-2014-A)

Ans. Three Kind of Cells Present in Gastric Glands:-

- a. Mucous Cells --- Secrete mucus
- b. Parieta Cells or Oxyntic Cells --- Secrete HCl
- c. Chief Cells or Zymogen Cells --- Secrete Pepsinogen, an inactive form of Pepsin

41. What is meant by obesity? (FSD-2015, 17-A)

Ans. Obesity:-

- a. Obesity means deposition of excessive fat in the body.
- b. Obese is a person who has abnormal amount of fat on the body.
- c. Obesity occurs when a person eats too much food than body requirement and the surplus food is stored in the body as fat.
- d. Fat is stored in the cytoplasm of cells in the form of droplets that later become large globules. These cells are called fat cells or adipose cells.
- e. Groups of fat cells or adipose cells form adipose tissue around the kidney, in the abdomen and under the skin.

42. Differentiate between peristalsis and antiperistalsis. (FSD-2015, 18-A) (SGD-16-A)

Ans.

Peristalsis	Antiperistalsis
1. Peristalsis is the rhythmic waves of muscular contraction just behind the mass of food in the walls of digestive tract	1. Antiperistalsis is the reverse waves of muscular contraction in the walls of digestive tract which travel backward up the digestive tract.
2. It serves to move food down the tract.	2. It pushes a large amount of intestinal contents back to the duodenum and stomach and even into the mouth leading to vomiting.

43. What is jaundice? (FSD-2016-A)

Ans. Jaundice:-

- a. The word jaundice means a yellow tint to the body tissues including yellowness of the white of eyes, skin as well as deep tissues.
- b. If bile pigments are prevented from leaving digestive tract, they may accumulate in the blood causing a condition known as jaundice.

c. Jaundice also develops due to increased destruction of red blood cells with rapid release of bilirubin into the blood.

44. Enlist enzymes secreted from jejunum. (FSD-2017-A)

- Ans. List of Enzymes Secreted From Jejunum: -  
 a. Amino peptidase      b. Erypsin  
 c. Lipase                      d. Maltase  
 e. Lactase

45. What is bile? Give its functions. (FSD-2018-A)

Ans. A) Bile: -  
 Bile is green watery fluid that contains no enzyme but contains salts and pigments formed from breakdown of hemoglobin in the liver.

B) Functions: -  
 Bile emulsifies fats, i.e., it breaks up fats into small globules, which are easily digested by water-soluble lipase.

46. Write down the location of stomach. (RWP-2014-A)

Ans. Location of Stomach: -  
 The stomach is located below the diaphragm on the left side of the abdominal cavity.

47. Give the effects of obesity. (RWP-2014-A)

- Ans. Effects of Obesity: -  
 a. High blood pressure.  
 b. Heart Disease.  
 c. Diabetes mellitus.  
 d. Stomach disorder.

48. Write down the note of Gastrin. (RWP-2014-A)

Ans. Role of Gastrin: -  
 It stimulates gastric glands to release gastric juice.

49. Distinguish between Nutrient and Nutrition. (RWP-2015-A) (DGK-I-15-A)

Nutrients	Nutrition
Nutrient is the food or any substance that supplies the body with elements necessary for metabolism.	Nutrition is the sum total of all the processes involved in the taking in and utilization of elements by which growth, repair and maintenance of activities are accomplished.

50. Differentiate between diarrhea and constipation. (RWP-2016-A)

Constipation	Diarrhea
1. It is the slow movement of feces through the large intestine. 2. It is associated with large quantities of dry and hard feces due to excessive absorption of water. 3. It may lead to piles or hemorrhoids.	1. It is the rapid movement of fecal matter through the large intestine. 2. It is associated with watery feces due to less absorption of water and electrolytes. 3. It may lead to dehydration that always proves to be fatal especially in children.

51. What is chyme?

Ans. Chyme: -  
 a. Chyme is a semi-solid, paste like food formed in the stomach when food becomes mixed with the stomach secretion.

b. It passes from stomach down the gut.  
 52. What is the advantage of digestive tract as compared with a digestive cavity? (RWP-2016-A)

Ans. Advantage of Digestive Tract As Compared With A Digestive Cavity: -  
 The advantage of digestive tract as compared with a digestive cavity is that it has specialized organs or partitions for efficient digestion and absorption of food.

53. Define digestion. (RWP-Group-I-2017-A)

Ans. Digestion: -  
 a. Digestion is the breakdown of complex organic compounds of food into simpler diffusible molecules by the action of enzymes.

b. In complete digestion, protein is converted into amino acids, complex carbohydrates such as polysaccharides into glucose and fats into fatty acid and glycerol.

c. Digestion may be either intracellular or extracellular:  
 i. Intracellular Digestion --- Breakdown of food within cells

ii. Extracellular Digestion --- Breakdown of food outside the cells into gut cavity or lumen

54. How pepsinogen is activated? (RWP-I-2017-A)

Ans. Activation of Pepsinogen: -  
 a. Pepsinogen is activated into pepsin when exposed to the acidic medium or to some already activated pepsin.

b. This activation occurs when bolus enters the stomach it stimulates the gastric pits to secrete HCl (as H<sup>+</sup> and Cl<sup>-</sup>) and pepsinogen. The H<sup>+</sup> ions cause pepsinogen to be converted into the active enzyme pepsin.

55. Differentiate between bolus and chyme. (RWP-II-2017-A)

Chyme	Bolus
1. Chyme is a semi-solid paste like food formed in the stomach when food becomes mixed with the stomach secretion. 2. It passes from stomach down the gut.	1. Bolus is a slimy mass of food that is rolled into small oval lump in the oral cavity. 2. It is pushed into the esophagus through pharynx.

56. Name the pH and composition of saliva. (RWP-II-2017-A)

Ans. A) pH of Saliva: -  
 pH of fresh saliva is 8 which soon becomes 6 due to loss of CO<sub>2</sub>.

B) Composition of Saliva: -  
 a. Water and Mucus  
 b. Sodium bicarbonate and other salts  
 c. Salivary Amylase or ptyalin

57. What are nematocysts? Give their function. (RWP-2018-A)

Ans. A) Nematocysts: -  
 Nematocysts are numerous stinging cells embedded in the tentacles, each consisting of a coiled tiny hollow thread within a capsule and a tiny hair like trigger (cnidocoil) projecting outside.

B) Function of Nematocysts: -  
 They help the cnidarians to grasp their prey with their tentacles and push them into digestive cavity through open mouth. For example, when prey of Hydra, comes in contact with the cnidocoil, the hollow thread of the nematocyst turns inside out, ejects poison and the prey is paralysed some times and is ingested.

58. How the gall stone is formed? (SGD-2015-A)

Ans. Formation of Gall Stone: -  
 When liver secretes excessive cholesterol, it is precipitated in the gall bladder to produce gall stones.

59. Write the name cells of Gastric glands and their secretions. (SGD-2016-A)

Names of Cells of Gastric Glands	Secretions of Cells of Gastric Glands
1. Mucous Cells	1. Mucus
2. Parietal or Oxyntic Cells	2. Hydrochloric Acid
3. Zymogen or Chief Cells	3. Pepsinogen

60. What are Hunger Pangs? Give the reason. (SGD-2017-A)

Ans. A) Hunger Pangs: -  
 It is a mild pain or uncomfortable sensation which person experience in the pit of the stomach due to strong hunger contractions (peristaltic contractions) in the stomach.

B) Reason of Hunger Pangs: -  
 It occurs due to low blood glucose level.

61. Enlist steps involved in Holozoic nutrition. (SGD-2017-A)

- Ans. List of Steps Involved In Holozoic Nutrition: -  
 a. Ingestion                      b. Digestion  
 c. Absorption                      d. Assimilation  
 e. Egestion

62. What is the role of Crop or Gizzard in cockroach? (SGD-2017-A)

Ans. A) Role of Crop: -  
 Crop temporarily stores the food.

B) Role of Gizzard in Cockroach: -  
 Gizzard grinds the food and physically breakdown it.

63. What is diarrhea? (D.G.K-II-2014-A)

Ans. Diarrhea: -  
 a. Diarrhea is the rapid movement of watery fecal matter through the large intestine due to less absorption of water and electrolytes.

b. Any pathology that irritate and increase the motility of intestinal wall especially colon can cause diarrhea.  
 c. Diarrhea may lead to dehydration that always proves to be fatal especially in children.

64. What is the cause of food poisoning? (D.G.K-II-2014-A)

Ans. Cause of Food Poisoning: -  
 One of the commonest causes of food poisoning is the toxin produced by bacteria *Salmonella* and *Campylobacter* which live in the intestines of cattle, chicken and duck without causing disease symptoms in them. Humans, however, may develop food poisoning if they drink milk, eat meat or eggs which are contaminated with these bacteria.

65. Differentiate between Chyme and Bolus. (D.G.K-I-2015-A)

Chyme	Bolus
1. Chyme is a semi-solid paste like food formed in the stomach when food becomes mixed with the stomach secretion. 2. It passes from stomach down the gut.	1. Bolus is a slimy mass of food that is rolled into small oval lump in the oral cavity. 2. It is pushed into the oesophagus through pharynx.

66. Write only two functions of oral cavity. (D.G.K-II-2015-A)

Ans. Two Functions of Oral Cavity: -

- a. Lubrication: -  
 Water and mucus present in the saliva form a slimy liquid that makes the food moist and lubricate so that it can be chewed efficiently and can be passed through the oesophagus smoothly.
- b. Digestion: -  
 Enzyme present in the saliva called Salivary Amylase or Ptyalin digests the starch or glycogen present in the food into maltose.

67. What happen when Liver rupture and become large? (D.G.K-II-2016-A)

Ans. Effects of Liver Rupture and Enlargement: -  
 When Liver rupture and become large, severe internal bleeding occurs.

68. What is saliva? Give its composition. (D.G.K-I-2017-A)

Ans. A) Saliva: -  
 Saliva is a watery liquid secreted into the mouth by salivary glands, providing lubrication for chewing and swallowing, and aiding digestion.

B) Composition of Saliva: -  
 a. Water and Mucus  
 b. Sodium bicarbonate and other salts  
 c. Salivary Amylase or ptyalin

69. Write the names of four parts of digestive system of cockroach. (D.G.K-I-2017-A)

Ans. Names of Three Parts of Digestive System of Cockroach: -

- a. Foregut or Stomodaeum --- It includes: Mouth cavity with a pair of salivary glands Pharynx Crop Gizzards  
 b. Midgut or Mesenteron --- Stomach with eight hepatic caecae  
 c. Hindgut or Proctodaeum --- Ileum or small intestine, large intestine or colon, rectum with anus

70. What are root nodules? Give their role. (D.G.K-II-2017-A)

Ans. A) Root Nodules: -

Root nodules are globular structures formed on the roots of certain plants, notably legumes.

B) Role of Root Nodules: -

Root nodules contain nitrogen fixing bacteria and establish symbiosis with them. Root nodule symbiosis enables nitrogen-fixing bacteria to convert atmospheric nitrogen into a form (nitrates) that is directly available for plant growth.

71. What is obesity? Give its harmful aspects.

(D.G.K-II-2017-A)

Ans. A) Obesity: -

- Obesity means deposition of excessive fat in the body.
- Obesity occurs when a person eats too much food than body requirement and the surplus food is stored in the body as fat.

B) Harmful Aspects of Obesity: -

- High blood pressure
- Heart disease
- Stomach disorder
- Diabetes mellitus

72. What is dyspepsia? Give its two symptoms.

(D.G.K-II-2017-A)

Ans. A) Dyspepsia: -

Incomplete or imperfect digestion is called dyspepsia.

B) Two Symptoms of Dyspepsia: -

- Abdominal discomfort following meal
- Nausea and vomiting

73. What is saprophytic nutrition? (D.G.K-I-2018-A)

Ans. Saprophytic Nutrition: -

It is a type of nutrition in which organisms called Saprotrophs or saprobes or decomposers or absorptive heterotrophs feed on dead organic matter of plants and animals, digest this matter externally with the help of enzymes, absorb back decomposition products and use as a source of energy.

Examples: -

This mode of nutrition is also found in some plants.

74. What is the location and function of rectum?

(D.G.K-I-2018-A)

Ans. A) Location of Rectum: -

It is located at the end of large intestine, being a last part of the large intestine.

B) Function of Rectum: -

It temporarily stores the feces and rejects it at intervals through anus.

75. Write down functions of nematocysts.

(D.G.K-II-2018-A)

Ans. Functions of Nematocysts: -

They help the cnidarians to grasp their prey with their tentacles and push them into digestive cavity through open mouth. For example, when prey of Hydra, comes

in contact with the cnidocoil, the hollow thread of the nematocyst turns inside out, ejects poison and the prey is paralysed some times and is ingested.

76. Write down cause and symptoms of botulism.

(SAH-2014-A)

Ans. A) Cause of Botulism: -

Toxins produced by gram positive anaerobic bacillus *Clostridium botulinum* is the cause of Botulism.

B) Symptoms of Botulism: -

Symptoms of Botulism are fatigue, dizziness, double vision, nausea, vomiting, diarrhea, abdominal pain

77. Discuss parasitic nutrition in plants. (SAH-2015-A)

Ans. Parasitic Nutrition in Plants: -

- Feeding by living in or on the other organism (host) belonging to different species is called Parasitic Nutrition.
- Parasitic nutrition is also found in some plants called Parasitic Plants.
- Parasitic plants are heterotrophic plants that depend on other living plants for their nutritional requirements.
- For obtaining nourishment from higher plant, the parasitic plants develop suckers and penetrate them in the conducting tissue of the host plant for absorbing nutrients.

Examples: -

- Cuscuta* (Dodder or Amber-bail) is a leafless plant that twines with its weak and yellowish stem around shrubs and branches of host tree.
- Orobancha*, a parasitic plant, attacks the roots of plants belonging to the families Cruciferae and Solanaceae.

78. What are gastric glands.

(SAH-2016-A)

Ans. Gastric Glands: -

- Gastric glands are numerous tubular glands found in the mucosa of middle region of stomach.
- Gastric glands are composed of following three kinds of cells:
  - Mucous Cells --- Secrete mucus
  - Parieta Cells or Oxyntic Cells --- Secrete HCl
  - Chief Cells or Zymogen Cells --- Secrete Pepsinogen, an inactive form of Pepsin
- Mucus, HCl and pepsinogen (secretion of all three kinds of cells of gastric glands) are collectively called gastric juice that is regulated by smell, sight and quality of food.

79. Tubular digestive system is more efficient than sac like. Give reasons. (SAH-2016-A)

Ans. Reasons for Tubular Digestive System More Efficient Than Sac Like: -

Tubular digestive system is more efficient than sac like because it has specialized organs or partitions for efficient digestion and absorption of food and food is completely digested within the digestive tract.

## SECTION I MULTIPLE CHOICE QUESTIONS

### Chapter — 13 GASEOUS EXCHANGE IMCQ

#### (I) From Exercise:

- Air spaces between mesophyll cells of a leaf comprises of the total volume: (SAH-19-A)
  - 20%
  - 30%
  - 40%
  - 50%
- Respiratory pigment in muscles is called: (MTN-16-A)(BWP-17-A)(D.G.K-II-14-A)
  - Myoglobin
  - Globin
  - Hemoglobin
  - Hemocyanin
- Blood contains oxygen when hemoglobin is 98% saturated per 100 ml of blood: (D.G.K-II-15A)
  - 19.6 ml
  - 17.6 ml
  - 18.6 ml
  - 16.6 ml
- How much air lungs can hold when they are fully inflated? (SGD-16-A)(FSD-18-A)
  - 5 litres
  - 4 litres
  - 4.5 litres
  - 3.5 litres

#### (II) From Punjab Board:

- When oxygen saturation is 100 mm. of mercury then hemoglobin saturation is: (LHR-New Scheme-Group I-2014-A)
  - 100%
  - 98%
  - 78%
  - 68%
- Hemoglobin in man increases the oxygen carrying capacity of the blood to about: (Lahore Board-New Scheme-Group-II-2014-A)
  - 75 times
  - 50 times
  - 60 times
  - 100 times
- Respiratory activity which occurs in plants during day time: (Lahore Board-New Scheme-Group-I-2016-A)
  - Respiration
  - Transpiration
  - Photorespiration
  - Cutaneous respiration
- The main sites of exchange of gases in plants are: (Gujranwala-New Scheme-2016-A)
  - Stomata
  - Lenticel
  - Cuticle
  - Epidermis
- During photorespiration glycine is converted into serine in organelle: (GRW-New Scheme-2017-A)(RWP-15-A)(MTN-17-A)
  - Peroxisomes
  - Mitochondria
  - Chloroplast
  - Golgi bodies
- The lungs are covered by double layered thin membraneous sacs called: (Rawalpindi Board-New Scheme-2014-A)
  - Pleura
  - Air sacs
  - Larynx
  - Diaphragm

80. How the secretions of gastric juice are regulated? (SAH-2017-A)

Ans. Regulation of Secretions of Gastric Juice: -

The secretion of Gastric Juice is regulated by smell, sight and quality of food (protein). But all these secrete a very small amount of gastric juice. The enzyme present in the gastric juice partially digest protein molecules. When partially digested protein particles touch the mucosal surface of stomach they stimulate the production of gastrin hormone that is carried by the blood to the gastric glands and stimulates them to produce a large quantity of gastric juice:

## SECTION III LONG QUESTIONS

- Compare parasitic and symbiotic nutrition in plants. (LHR-I-2014-A) (4)
- Explain the process of digestion in Amoeba. (LHR-I-2015-A) (BWP-19-A) (4)
- Describe any two common diseases related to nutrition. (LHR-I-2016-A) (4)
- Describe digestion in planaria. (LHR-II-2016-A) (MTN-17-A) (4)
- Describe digestion in *Hydra*. (LHR-I-2017-A) (4)
- Explain different processes involved in digestion and absorption in animals. (GRW-2017-A) (4)
- Describe nutrition in insectivorous plants. (RWP-I-2017-A) (BWP-17-A) (4)
- Discuss the role of large intestine in human digestion. (RWP-2018-A) (LHR-II-15-A, I-19-A) (GRW-16-A) (MTN-II-17-A) (4)
- Describe Heterotrophic nutrition methods in Plants. (SGD-2015-A) (DGK-II-17-A) (4)
- Describe the role of Pancreas and Liver in Food Digestion in Humans. (SGD-2016-A) (4)
- Describe the process of absorption of food in small intestine of human. (SGD-2017-A) (FSD-15-A) (4) (DGK-II-18-A) (RWP-14-A) (LHR-II-18, 19-A) (MTN-I-18-A) (4)
- With the help of examples, describe parasitic nutrition in animals. (MTN-2014-A) (4)
- Describe the function of Enzymes present in Pancreatic Juice. (MTN-2015-A) (4)
- Write a note on digestion in oral cavity of Man. (BWP-2015-A) (RWP-15-A) (DGK-I-14, 18-A) (GRW-14-A) (FSD-14-A) (4)
- Explain Digestion in Stomach (Man). (BWP-2016-A) (DGK-II-14, 15, 16) (FSD-16-A) (LHR-II-14-A) (GRW-18-A) (4)
- Write a note on Food Poisoning. (BWP-2018-A) (4)
- Write notes on following: (SAH-2015-A) (MTN-19-A) (4)
  - Obesity
- Write a note on digestion in cockroach. (SAH-2017-A) (RWP-16-A, II-17-A) (FSD-14, 17, 18) (SG-18-A) (RWP-19-A) (SAH-16-A) (BWP-14-A) (4)

- 9) Oxygen contents of fresh air are: (R17- New Scheme-2016-4)(D.G.K-1-19-A)
- 200 ml/litre
  - 100 ml/litre
  - 10 ml/litre
  - 150 ml/litre
- 10) A litre of H<sub>2</sub>O contains \_\_\_\_\_ ml of oxygen: (R17- New Scheme-Group-II-2017-4)
- 10
  - 20
  - 30
  - 40
- 11) Myoglobin is protein pigment in: (Saragodia Board-New Scheme-2017-4)
- Red blood cell
  - Nerve cell
  - Liver cell
  - Muscle cell
- 12) All are made of cartilage except: (Fatehchhab Board-New Scheme-2014-4)
- Bronchiale
  - Larynx
  - Trachea
  - Bonnx
- 13) Water is more viscous than air: (Fatehchhab Board-New Scheme-2015-4)
- 10 times
  - 20 times
  - 50 times
  - 100 times
- 14) \_\_\_\_\_ is more important regulator of breathing process: (Madona Board-New Scheme-2014-4)
- Oxygen
  - CO<sub>2</sub>
  - Hemoglobin
  - Myoglobin
- 15) Asthma is associated with severe paroxysm of difficulty: (Madona Board-New Scheme-Group-II-2018-4)
- Walking
  - Spreading
  - Sleeping
  - Breathing
- 16) The volume of air taken inside the lungs and expelled during exercise is about: (Behawalpur Board-New Scheme-2015-4)
- 2.5 Litres
  - 1.5 Litres
  - 3.5 Litres
  - 4.5 Litres
- 17) More than ten compounds of tar of tobacco smoke are included in causing: (D.G.K Board-New Course-Group II-2016-4)
- Cancer
  - Emphysema
  - Asthma
  - Tuberculosis
- 18) Carbon dioxide per 100 ml of venous blood is: (D.G.K Board-New Course-Group II-2016-4)
- 50 ml
  - 54 ml
  - 98 ml
  - 99 ml
- 19) 100 ml of arterial blood of human being contains CO<sub>2</sub> (Carbon dioxide): (D.G.K Board-New Course-Group II-2016-4)
- 50 ml
  - 54 ml
  - 56 ml
  - 58 ml
- 20) How many molecules of oxygen can bind with a molecule of myoglobin: (Sahiwal Board-New Scheme-2015-4)
- 4
  - 3
  - 2
  - 1
- 21) Lungs are covered with double membrane sacs called: (Sahiwal Board-New Scheme-2016-4)
- Pleura
  - Scorium
  - Percardium
  - Diaphragm
- 1) When carbon dioxide pressure increases in capacity of Hemoglobin to hold oxygen: (Entry Test-2009)
- Increases many folds
  - Is doubled
  - Decreases
  - Remains constant
- 2) The total fluid capacity of lungs of adult human beings fully inflated is: (Entry Test-2009)
- 5 ml
  - 500 ml
  - 50 ml
  - 5000 ml
- 3) Exchange of gases during organismic respiration is carried out by: (Entrance Self-Test-2011)
- Diffusion
  - Facilitated Diffusion
  - Active transport
  - Facilitated Diffusion
- 4) Opening in the oral cavity (throat) through which air enters the wind pipe is called: (Entrance Self-Test-2011)
- Glottis
  - Pharynx
  - Bronchus
  - Larynx
- 5) The double layer of thin membrane which lines the cover lungs are called: (Entrance Self-Test-2011)
- Alveoli
  - Pleura
  - Diaphragm
  - Bronchiales
- 6) Transportation of oxygen from lungs to the liver cells is by means of: (Entrance Self-Test-2011)
- Complete blood
  - White blood cells
  - Lymph
  - Red blood cells
- 7) What is the residual volume of air which always remains inside the lung of humans? (Entry Test-2012)
- 2.5 litres
  - 0.5 litres
  - 1.5 litres
  - 1.5 litres
- 8) The total inside capacity of lungs is \_\_\_\_\_ for man: (Entrance Test-2011)
- 6.7 litres
  - 2.5 litres
  - 7 litres
  - 5 litres
- 9) The oxygenated blood from lungs to heart is transported by the: (Entrance Test-2011)
- Pulmonary artery
  - Pulmonary vein
  - Coronary artery
  - Hepatic artery
- 10) About 70-85 % CO<sub>2</sub> in blood is carried: (Entrance Test-2011)
- As carbonylase myoglobin
  - With proteins in plasma
  - As bicarbonate
  - As haemoglobin
- 11) CO<sub>2</sub> combines with: (Entrance Test-2011)
- Amino group of hemoglobin
  - Iron part of hemoglobin
  - Hem portion of hemoglobin
  - Plasma proteins
- 12) Low partial pressure of oxygen in tissues favors \_\_\_\_\_ of oxyhaemoglobin: (Entry Test-2011)
- Dissociation
  - Stability
  - Formation
  - Transformation
- 13) Respiratory tubules are termed as \_\_\_\_\_ of heart: (Entry Test-2011)
- 1.2 cm
  - 1 mm
  - 1 cm
  - 1.2 mm

SECTION II  
SHORT QUESTIONS

4 SQs

- 1) How does breathing differ from respiration? (R17- New Scheme-2016-4)
- | Ans. Breathing   | Respiration  |
|--|--|
| 1. Respiration of food to oxidation energy and release all those steps includes: a) help of cells for oxygen of food and the removal of carbon dioxide from the body. b) Includes unweathing gas exchange, gas transport and cellular respiration. c) Involves both mechanical aspects of respiration. | 1. It is simply the exchange of gases and the environment structures (lungs or gills) from air or water. 2. It is one of the stages of respiration. 3. It involves only mechanical aspects of respiration. |
- 2) How much carbon dioxide is present in venous and arterial blood? (R17- New Scheme-2016-4)
- Ans. A) Quantity of Carbon Dioxide Present in Venous Blood: -  
 About 54 ml of CO<sub>2</sub> per 100 ml of blood  
 B) Quantity of Carbon Dioxide Present in Arterial Blood: -  
 About 50 ml of CO<sub>2</sub> per 100 ml of blood
- 3) How does air always remain in the lungs of human beings? (R17- New Scheme-2016-4)
- Ans. About 1.5 liters air always remains in the lungs of human beings.
- 4) What are the products which are produced during photosynthesis? (R17- New Scheme-2016-4)
- Ans. Products Produced During Photosynthesis: -  
 1. Final Products: -  
 a. Intermediate products are stroma and carbon dioxide.  
 b. Intermediate products are glycolate and glycine.  
 c. How much a water medium is denser than air for Air Water Medium Denser Than Air: -  
 A water medium is 50 times denser than air for exchange of respiratory gases.
- 1) What is cancer or carcinoma? (LHR-1-2014-A)
- Ans. Cancer Or Carcinoma: -  
 Cancer is basically malignant tumor of potentially unlimited growth that expands locally by invasion and systemically by metastasis.
- 2) Chromosoma is the cancer derived from ectoderm and endoderm: (LHR-1-2014-A)
- 3) Why cancer is also known as carcinoma: (LHR-1-2014-A)
- 4) Why oxygen can be obtained more easily from air than water? (LHR-1-2014-A)
- 5) Oxygen can be obtained more easily from air than water because: (LHR-1-2014-A)
- 6) Write two properties a respiratory surface: (LHR-1-2014-A)
- 7) Surface area of respiratory surfaces should be large in relation to size of organism and should be kept moist only on \_\_\_\_\_ two cell thick: (LHR-1-2014-A)
- 8) Write down first two steps of \_\_\_\_\_: (LHR-1-2014-A)
- 9) Ans. First Two Steps of Photorespiration: (LHR-1-2014-A)
- 10) RuBP reacts with oxygen to form glycolate, a two carbon compound: (LHR-1-2014-A)
- 11) The glycine that produced diffuses into peroxisomes where glycolate is converted into glycine through a \_\_\_\_\_: (LHR-1-2014-A)
- 12) Glycolate \_\_\_\_\_ Glycine: (LHR-1-2014-A)
- 13) How pH and temperature effect the capacity of hemoglobin to combine with oxygen? (RWP-18-A)
- 14) Ans. A) Effect of pH on Hemoglobin Capacity to Combine O<sub>2</sub>: (LHR-1-2014-A)
- 15) As the pH of the blood declines, the amount oxygen increases in blood pH \_\_\_\_\_ Conversely, an increase in hemoglobin to bind oxygen: (LHR-1-2014-A)
- 16) Effect of Temperature on Hemoglobin Capacity to Combine Oxygen: (LHR-1-2014-A)
- 17) Rise in temperature causes a decrease in the oxygen carrying capacity of hemoglobin (blood): (LHR-1-2014-A)
- 18) What is photorespiration? (LHR-1-2014-A)
- 19) Ans. Photorespiration: - (D.G.K-1-19-A)
- 20) a. Photorespiration is an insignificant form of the dark reactions of photosynthesis in which C<sub>3</sub> compounds, CO<sub>2</sub> is depleted, and no carbohydrates are generated. b. In photorespiration, ribulose biphosphate carboxylase /oxygenase (RuBP-CO<sub>2</sub> fixase) fixes oxygen instead of carbon dioxide which results in lowering the overall rate of carbon dioxide fixation and plant growth. c. In photorespiration, RuBP combines with oxygen and is converted through a series of steps into stroma and CO<sub>2</sub>. d. Photorespiration occurs in a hot and dry \_\_\_\_\_ and the level of oxygen inside the leaf rises and level of CO<sub>2</sub> falls due to change of stroma and consumption of CO<sub>2</sub> in photosynthesis: (D.G.K-1-19-A)

7. What is respiratory distress syndrome? (RWP-19-A) (LHR-I-2015, 16, 17, 19-A) (GRW-17) (BWP-18-A) (DGK-I-18) (SAH-14)

Ans. Respiratory Distress Syndrome:-

It is a condition in newborn premature babies, especially in infants with a gestation age of less than 7 months, in which surfactant (mixture of lipoprotein molecules produced by secretory cells of the alveolar epithelium) is so greatly depressed that causes a serious tendency for the lungs of these babies to collapse.

8. What are alveoli? Give their function. (LHR-II-2015, 16-A) (RWP-1-17)

Ans. A) Alveoli:-

- Alveoli (sing. Alveolus) are tiny, thin walled, blind ended sacs within the lungs in which bronchioles terminate.
  - Each alveolus is lined by an extremely thin single layer of epithelial cells.
  - They are surrounded by extremely thin extensive capillary network.
  - The internal area of alveoli is provided with a thin layer of fluid containing surfactant that reduces the internal surface area to prevent it from collapsing during gas exchange.
- B) Function of Alveoli:-  
The walls of the alveoli are the sites where all the gaseous exchange between the air and blood takes place.

9. Define respiratory surface. Give their properties. (LHR-II-2015-A) (BWP-19-A)

Ans. A) Respiratory Surface:-

Respiratory surfaces are the sites where gaseous exchange takes place.

B) Properties of Respiratory Surface:-

- Surface area of respiratory surfaces should be large in relation to size of organism and should be kept moist.
- Epithelium of respiratory surfaces must be thin with only one or two cell thick.
- Concentration gradient must be maintained at the points where diffusion occurs.
- Respiratory surfaces must contain the network of blood capillaries.

10. What is rubisco? Give its function. (LHR-II-2015-A) (FSD-14-A) (RWP-15-A) (DGK-I-19)

Ans. A) Rubisco:-

It is an enzyme in the stroma of chloroplasts that is abbreviated form of Ribulose Bisphosphate Carboxylase/Oxygenase

B) Functions:-

- It usually catalyzes the fixation of carbon dioxide into carbohydrate in the Calvin Cycle.
- Sometimes it fixes oxygen instead of carbon dioxide in a process called photorespiration which results in lowering the overall rate of carbon dioxide fixation and plant growth.

11. What is cellular respiration? (LHR-I-2016-A)

Ans. Cellular Respiration:-

- Cellular Respiration is a complex process of oxidation-reduction in which food is oxidized to release energy.

- b. In cellular respiration, cell utilizes oxygen, produces carbon dioxide, extracts and conserves the energy from food molecules in biologically useful form such as ATP. (LHR-I-2016-A)

12. What is inspiration? (LHR-I-2016-A)

Ans. Inspiration:-

- It is the process of taking in of air from atmosphere upto lungs.
- Contraction of muscles of ribs and diaphragm, causes elevation of ribs and makes the diaphragm flat due to which thoracic cavity is enlarged and negative pressure is developed inside the thoracic cavity as well as lungs and air is rushed into the lungs through respiratory passage.

13. Give composition of breathed air in man. (LHR-II-2016-A)

Ans. Composition of Breathed Air In Man:-

	Inhaled %	Exhaled %
Oxygen	21	16
Carbon dioxide	0.04	4
Water vapors	Variable	Saturated
Nitrogen	79	79

14. Give two properties of respiratory surfaces in animal. (LHR-II-2016-A) (GRW-14) (DGK-II-2015, 19-A)

Ans. Two Properties of Respiratory Surfaces In Animal:

- Surface area of respiratory surfaces should be large in relation to size of organism and should be kept moist.
- Epithelium of respiratory surfaces must be thin with only one or two cell thick.

15. What is the rate of breathing at rest and during exercise? (LHR-II-2018-A)

Ans. A) Rate of Breathing At Rest:-

Rate of breathing at rest in humans is 15-20 times per minute.

B) Rate of Breathing During Exercise:-

Rate of breathing during exercise may rise to 30 times per minute.

16. Differentiate between bronchi and bronchioles. (LHR-II-2018-A) (BWP-18-A) (FSD-16-A) (RWP-II-2017) (DGK-I-2014, 18) (SGD-19-A)

Ans. Differences Between Bronchi And Bronchioles:-

Bronchi	Bronchioles
1. Bronchi are the branches of trachea and two main bronchi formed by division and sub-division.	1. Bronchioles are the branches of smaller bronchi and have a diameter of one millimeter or less.
2. Bronchi have the same cartilage rings as trachea, but are progressively replaced by cartilage plates.	2. Bronchioles totally lack cartilages.
3. Two bronchi continue to divide and subdivide and ultimately form bronchioles.	3. They continue to divide and subdivide and terminate into air sacs.

17. Give percentage of CO<sub>2</sub> in venous and arterial blood. (GRW-2014-A) (DGK-II-16) (MTN-I-17) (FSD-17)

Ans. Percentage of CO<sub>2</sub> In Venous And Arterial Blood:

- A) Quantity of Carbon Dioxide Present in Venous Blood:-  
About 54 ml of CO<sub>2</sub> per 100 ml of blood
- B) Quantity of Carbon Dioxide Present in Arterial Blood:-  
About 50 ml of CO<sub>2</sub> per 100 ml of blood
18. Differentiate between organismic and cellular respiration. (GRW-2015-A)

Organismic Respiration	Cellular Respiration
1. It includes all those steps involved in the transport of oxygen from environment to respiratory surfaces and then to body cells.	1. It includes all biochemical reactions which extract chemical energy of glucose and other compounds and convert it into the form of ATP molecules.
2. It is involved in the supply of O <sub>2</sub> necessary for cellular respiration and removal of CO <sub>2</sub> thus produced from the body.	2. It is directly involved in the production of energy, necessary for all living activities.

19. What is the role of "Surfactant" in respiratory distress syndrome? (GRW-2015-A)

Ans. Role of "Surfactant" In Respiratory Distress Syndrome:-

In respiratory syndrome, surfactant is produced less amount, hence it is unable to perform its normal role (i.e. reduction of surface tension of the fluid of alveoli and hence reduction of tendency of lungs to collapse).

20. Name respiratory disorders. Explain one. (GRW-2016-A)

Ans. A) Names of Respiratory Disorders:-

- Asthma
- Emphysema
- Lung Cancer
- Tuberculosis

B) Explanation of One Respiratory Disorder:-

Tuberculosis is an airborne disease of the lungs caused by *Mycobacterium tuberculosis* is an air borne disease of the lungs and accompanied by degeneration of the lung tissue and spread to other organs. Pulmonary tuberculosis is a disease of lungs in which inside of lung is damaged resulting in cough and fever. It is more common in poor people. Malnutrition and poor living conditions facilitate *Mycobacterium* to grow. The disease is curable with proper medical attention. It is a contagious disease.

21. Why air is better medium than H<sub>2</sub>O? (MTN-16-A) (DGK-I-15) (SAH-15-A, I-19-A) (GRW-2016, 17-A)

Ans. Air is Better Medium Than H<sub>2</sub>O:-

- The oxygen content of air is much higher (i.e. 200 ml / litre) than the oxygen content of equal volume of water (i.e. 10 ml / litre).
- Oxygen diffuses about 8000 times more quickly in air than water.
- Water is 8000 times denser than air.
- Water is 50 times more viscous than air.

22. Define the term alveoli and air sac. (GRW-2016-A)

Ans. A) Alveoli:-

Alveoli are tiny, blind end sacs with single layered wall of epithelial cells in the lungs which are surrounded by a capillary network are the sites of gaseous exchange between air and blood.

B) Air Sac:-

- Air sac is a functional unit of the lungs.
- Each air sac consists of several microscopic single layered structures called alveoli.

23. How does CO<sub>2</sub> affect the oxygen carrying capacity of hemoglobin? (GRW-2016-A) (DGK-II-17-A)

Ans. CO<sub>2</sub> Affecting the Oxygen Carrying Capacity of Hemoglobin:-

Increasing concentration of CO<sub>2</sub> decreases the capacity of hemoglobin to combine with oxygen, hence favouring the greater liberation of oxygen from the blood to the tissues where carbon dioxide concentration is very high.

24. Where carbonic anhydrase enzyme is present? Give its role. (GRW-2017-A)

Ans. Carbonic Anhydrase Enzyme Location:-  
Red Blood Cell (RBC)

B) Role of Carbonic Anhydrase:-

- Carbonic anhydrase catalyzes the combination of carbon dioxide with water to form carbonic acid at high concentration of carbon dioxide in the capillaries of tissues.
- It also facilitates the conversion of oxyhaemoglobin into hemoglobin and oxygen at low oxygen concentration and less pressure in the capillaries of tissues.

25. What is Larynx? (MTN-2014-A) (SAH-19)

Ans. Larynx:-

- Larynx is a complex structure surrounding the upper end of trachea which is made up a nine cartilages that are connected by membranes and ligament and moved by muscles. It is lined by mucous membrane.
- The opening of larynx is known as glottis which is guarded by a flap of tissue called epiglottis.
- At the edge of glottis embedded in the mucous membrane are vocal cords which help in voice production when vibrated by air.

26. Differentiate between Diaphragm and Pleura.  
(MTN-2014-A) (BWP-2015-A, 17) (RWP-18-A)  
(MTN-16, 17) (DGK-118, 11-15, 16)

Ans.

Diaphragm	Pleura
It is sheet of skeletal muscles which separated the chest cavity and lungs from the abdominal cavity.	Pleura are two thin membranes which enclose each lung and within which is a fluid that acts as lubricant

27. What is Photorespiration? Name organelle involved in it.  
(MTN-2015-A) (RWP-14-A)

Ans. A) Photorespiration: -

Photorespiration is a process in the leaves of plants in dry and hot season in which RUBP combines with oxygen and is converted through a series of steps into serine and CO<sub>2</sub>.

- B) Name of Organelle Involved In Photorespiration: -

- Chloroplasts
- Peroxisomes
- Mitochondria

28. What is Larynx? (MTN-2015-A)

Ans. Larynx: -

- Larynx is a complex structure surrounding the upper end of trachea which is made up of nine cartilages that are connected by membranes and ligament and moved by muscles. It is lined by mucous membrane.
- The opening of larynx is known as glottis which is guarded by a flap of tissue called epiglottis.
- At the edge of glottis embedded in the mucous membrane are vocal cords which help in voice production when vibrated by air.

29. What is Pulmonary Tuberculosis? Give its causes.  
(MTN-2015-A) (DGK-I-19-A) (MTN-I-17)

Ans. A) Pulmonary Tuberculosis: -

Pulmonary tuberculosis is a disease of lungs in which part of lung is damaged resulting in cough and fever.

- B) Causes of Pulmonary Tuberculosis: -

- Tuberculosis is caused by *Mycobacterium tuberculosis*, the "tubercle" bacillus.
- It is a contagious disease which is passed from person to person in air-borne droplets produced by coughing or sneezing.
- People who live in urban crowded areas often contract tuberculosis because malnutrition and a generally poor quality of life contribute the establishment of disease and overcrowding increases the concentration of bacilli in air.

30. Differentiate between Inhalation and Exhalation.  
(MTN-2016-A)

Inhalation	Exhalation
1. It is the process of taking in of air from atmosphere upto lungs.	1. It is the process of giving out of air from lungs to external environment.
2. Contraction of muscles of ribs and diaphragm, causes elevation of ribs and makes the diaphragm flat due to which thoracic cavity is enlarged and negative pressure is developed inside the thoracic cavity as well as lungs and air is rushed into the lungs through respiratory passage.	2. Relaxation of muscles of ribs and diaphragm settles down the ribs and makes the diaphragm dome shaped, thus reducing the thoracic cavity, and pressure is exerted on the lungs and air is moved out through respiratory passage.

31. What are Vocal Cords? (MTN-2016-A)

Ans. Vocal Cords: -

- Vocal cords are two flexible bands of connective tissue that protrude from the lateral walls of the larynx towards the centre of the glottis.
- During normal breathing vocal cords are wide open to allow easy passage of air.
- They help in voice production.

32. What are Vocal Cords? Give their function.  
(MTN-I-2017-A)

Ans. A) Vocal Cords: -

Vocal cords are two flexible bands of connective tissue that protrude from the lateral walls of the larynx towards the centre of the glottis.

- B) Functions of Vocal Cords: -

They help in voice production. During voice production vocal cords move together so that passage of air between them will cause their vibration, hence voice production.

33. Relate lung cancer with smoking. (MTN-II-2017-A)

Ans. Relation of Lung Cancer with Smoking: -

It is estimated that 90 % of lung cancer is caused by smoking. More than ten compounds of tar of tobacco smoke are involved to cause cancer.

34. How hemoglobin helps in transport of Oxygen?  
(MTN-II-2017-A)

Ans. Haemoglobin Helping in Transport of Oxygen: -

Hemoglobin helps in transport of Oxygen by readily with it to form highly unstable compound oxyhemoglobin in the capillaries of lungs. Oxyhemoglobin is carried to body tissues through blood circulation where it splits into hemoglobin and oxygen that diffuses into cells of the tissues.

35. Define Breathing. Give its frequency.  
(MTN-II-2017-A)

Ans. A) Breathing: -

Breathing is a process in which fresh air containing more oxygen is pumped into the lungs and air with carbon dioxide is pumped out of the lungs through two mechanical processes inspiration and expiration respectively.

- B) Frequency of Breathing: -

Frequency of breathing in humans at rest is 15 to 20 times per minute.

36. Differentiate between Hemoglobin and Oxyhemoglobin.  
(MTN-I-2018-A)

Hemoglobin	Oxyhemoglobin
Hemoglobin is a purple red protein present in the red blood cells of many animals including humans.	Oxyhemoglobin is bright red temporary unstable compound formed by the combination of oxygen and hemoglobin.

37. Differentiate between Inspiration and Expiration.  
(MTN-I-2018-A) (FSD-18-A) (DGK-II-17)

Ans.

Inspiration	Expiration
1. It is the process of taking in of air from atmosphere upto lungs.	1. It is the process of giving out of air from lungs to external environment.
2. Contraction of muscles of ribs and diaphragm, causes elevation of ribs and makes the diaphragm flat due to which thoracic cavity is enlarged and negative pressure is developed inside the thoracic cavity as well as lungs and air is rushed into the lungs through respiratory passage.	2. Relaxation of muscles of ribs and diaphragm settles down the ribs and makes the diaphragm dome shaped, thus reducing the thoracic cavity, and pressure is exerted on the lungs and air is moved out through respiratory passage.

38. What are the symptoms of Asthma?  
(MTN-I-2018-A) (BWP-15-A) (SAH-19-A)

Ans. Symptoms of Asthma: -

Symptoms of Asthma include severe paroxysm of difficult breathing, usually followed by a period of relief, with recurrence of attack at more or less frequent intervals.

39. Mention at least two properties of respiratory surfaces in animals.  
(MTN-II-2018-A)

Ans. Two Properties of Respiratory Surfaces In Animals: -

- Surface area of respiratory surfaces should be large in relation to size of organism and should be kept moist.
- Epithelium of respiratory surfaces must be thin with only one or two cell thick.

40. In hot and dry season, level of O<sub>2</sub> rises inside the leaf. Give its reasons.  
(MTN-II-2018-A)  
The Leaf. Reasons: -

In hot and dry season level of oxygen inside the leaf rises because of closing of stomata and consumption of CO<sub>2</sub> in photosynthesis.

41. How does temperature affect the oxygen carrying capacity of Hemoglobin?  
(BWP-2014-A)

Ans. Rise in temperature causes a decrease in the oxygen carrying capacity of hemoglobin (blood).

42. When lungs are fully inflated, what is the total inside capacity of lung?  
(BWP-2015-A)

Ans. Total Inside Capacity of Lungs When Fully Inflated: -

Total inside capacity of lung when it is fully inflated is 5 litre.

43. Define bronchi and its role in birds. (BWP-2018-A)

Ans. A) Parabronchi: -  
Parabronchi are numerous tiny, thin walled, highly vascularized parallel ducts in the lungs of birds that are open at both ends and allow continuous flow of air in one direction which is opposite to the flow of blood in the capillaries surrounding them.

- B) Role of Parabronchi in Birds: -  
b. Role of Parabronchi in birds is the exchange of gases between air and blood through its walls.

44. What is myoglobin?  
(FSD-2014-A)

Ans. Myoglobin: -  
Myoglobin, also known as muscle hemoglobin, is a hemoglobin like iron containing protein in skeletal and cardiac muscles consisting of just one polypeptide chain along with heme prosthetic group which stores oxygen in tissues.

45. What is asthma?  
(FSD-2014, 17-A) (RWP-II-17) (SGD-19-A)

Ans. Asthma: -

- It is a lung disease of allergic nature characterized by paroxysm of extremely difficult breathing, particularly exhalation producing loud wheezing noises usually followed by a period of complete relief, with recurrence of attack at more or less frequent intervals.
- In asthma, the airways are sensitive to wide range of allergens such as pollens, spores, cold, humidity, pollution etc. that cause constriction of small bronchiole tubes.

- Some degree of bronchial inflammation occurs, in which inflammatory chemicals such as histamine are released into the circulatory system that cause severe contraction of the bronchiole.

46. How rubisco decide either oxygenase or carboxylase?  
(FSD-2015-A)

Ans. Rubisco decide either oxygenase or carboxylase due to relative concentration of carbon dioxide and oxygen.

- It acts as oxygenase and photorespiration starts when level of oxygen rises in the leaf due to closing of stomata that do not allow oxygen to go out and level of carbon dioxide falls due its consumption.

b. It acts as carboxylase when more carbon dioxide is present in the leaf and Calvin cycle starts.

47. What is difference between glottis and epiglottis? (FSD-2015-A) (RWP-16-A)

Ans. Difference Between Glottis And Epiglottis: -

Glottis	Epiglottis
It is opening of the larynx which allows passage of air in and out of the lungs and is also involved in voice production.	It is one of the nine cartilage of larynx (or a flap of tissue) that serves as a lid which automatically covers glottis during the act of swallowing. So as to prevent the entry of food or liquids into the glottis.

48. Give two properties of respiratory surfaces (FSD-2016-A)

Ans. Two Properties of Respiratory Surfaces: -

- Surface area of respiratory surfaces should be large in relation to size of organism and should be kept moist.
- Epithelium of respiratory surfaces must be thin with only one or two cell thick.

49. How haemoglobin differ from myoglobin? (FSD-2016-A)

Ans. Hemoglobin Different From Myoglobin: -

Hemoglobin	Myoglobin
1. It is a globular protein which has four polypeptide chains coiled around one another.	1. It is a small protein composed of just one polypeptide chain with eight helices.
2. It has an iron containing heme group that binds oxygen.	2. It has an iron containing heme prosthetic group that binds oxygen.
3. Only one oxygen atom can bind to each myoglobin molecule.	3. Four oxygen molecules can bind to each haemoglobin molecule.
4. It is found in muscles.	4. It is found in red blood cells.
5. It stores oxygen.	5. It transports oxygen.
6. It has more affinity with oxygen.	6. It has less affinity with oxygen.
7. It loses oxygen at PO <sub>2</sub> 20 mmHg.	7. It loses oxygen at PO <sub>2</sub> 60 mmHg.

50. What do you know about parabronchi and counter current exchange? (FSD-2016-A)

Ans. A) Parabronchi: -

Parabronchi are numerous tiny, thin walled, highly vascularized parallel ducts in the lungs of birds that are open at both ends and allow continuous flow of air in one direction.

B) Counter Current Exchange: -

The exchange of gases between blood and air or water when they flow in opposite direction is called Counter Current Exchange.

51. What is mechanism of exhalation in man. (FSD-2017-A)

Ans. Mechanism of Exhalation in Man: -

During expiration in man:

- Muscles of ribs are relaxed and the ribs move downward and inward reducing the space from the sides of chest cavity.

- Muscles of diaphragm also relax becoming more dome like and reducing chest cavity from the floor.
  - Reduction in the space of chest cavity exerts pressure on the lungs moving out the inside air.
52. Differentiate between breathing and cellular respiration. (FSD-2018-A) (RWP-19-A) (DGK-1-18-A)

Cellular Respiration	Breathing
Respiration is the process by which cell utilizes oxygen, produces carbon dioxide, extracts and conserves the energy from food molecules in biologically useful form, such as, ATP.	1. It is simply the exchange of gases between environment and the respiratory structures (lungs or gills) from air or water.

53. What is serine and how it is formed? (FSD-2018-A)

Ans. A) Serine: -

Serine is a final product of photorespiration in plants.

B) How Serine Is Formed: -

Serine is formed in the mitochondria of plants by the conversion of two glycine molecules. CO<sub>2</sub> is also formed in this reaction.

54. What is biological oxidation? (FSD-2018-A)

Ans. Biological Oxidation: -

- Biological oxidation is the aggregate of oxidation reactions that proceed in all living cells.
- These are energy producing reactions in living cells involving the transfer of hydrogen atoms or electrons from one molecule to another.
- Biological oxidation is catalyzed by enzymes called oxidoreductases.

55. State names & four proportion & respiratory surfaces. (RWP-2014-A)

Ans. Names of Four Properties of Respiratory Surfaces:

- Large surface area and moisture
- Thin epithelium
- Ventilation
- Capillary network.

56. Define tuberculosis. Give its causes. (RWP-2015-A)

Ans. A) Pulmonary Tuberculosis: -

Pulmonary tuberculosis is a disease of lungs in which inside of lung is damaged resulting in cough and fever.

B) Causes of Pulmonary Tuberculosis: -

- Tuberculosis is caused by *Mycobacterium tuberculosis*, the "tubercle" bacillus.
- It is a contagious disease which is passed from person to person in air-borne droplets produced by coughing or sneezing.
- People who live in urban crowded areas often contract tuberculosis because malnutrition and a generally poor quality of life contribute the establishment of disease and overcrowding increases the concentration of bacilli in air.

57. Give effect of temperature on O<sub>2</sub> carrying capacity of hemoglobin. (RWP-2015-A)

Ans. Effect of Temperature on O<sub>2</sub> Carrying Capacity of Hemoglobin: -

Rise in temperature causes a decrease in the oxygen-carrying capacity of blood such as during increased muscular activity.

58. Give two properties of respiratory surface. (RWP-2016-A)

Ans. Two Properties of Respiratory Surface: -

- Surface area of respiratory surfaces should be large in relation to size of organism and should be kept moist.
- Epithelium of respiratory surfaces must be thin with only one or two cell thick.

59. Define photorespiration. (RWP-I-2017-A)

Ans. Photorespiration: -

- Photorespiration is an insufficient form of the dark reactions of photosynthesis in which O<sub>2</sub> accumulates, CO<sub>2</sub> is depleted, and no carbohydrates are generated.
- In photorespiration, ribulose bisphosphate carboxylase /oxygenase (rubisco) fixes oxygen instead of carbon dioxide which results in lowering the overall rate of carbon dioxide fixation and plant growth.
- In photorespiration, RUBP combines with oxygen and is converted through a series of steps into serine and CO<sub>2</sub>.
- Photorespiration occurs in a hot and dry day when the level of oxygen inside the leaf rises and level of CO<sub>2</sub> falls due closing of stomata and consumption of CO<sub>2</sub> in photosynthesis.

60. Name different parts of air passage way of man. (RWP-II-2017-A)

Ans. Names Different Parts of Air Passage Way of Man:

- Nasal Cavities
- Pharynx or Throat
- Larynx or Voice Box
- Trachea or Wind Pipe
- Bronchi and Bronchiole
- Air Sacs and Alveoli
- Lungs

61. Give percentage of O<sub>2</sub> and CO<sub>2</sub> inhaled and exhaled air (in an adult human). (RWP-II-2017-A)

Ans. Percentage of O<sub>2</sub> and CO<sub>2</sub> Inhaled and Exhaled Air (In An Adult Human): -

	Inhaled %	Exhaled %
Oxygen	21	16
Carbon dioxide	0.04	4
Water vapors	Variable	Saturated
Nitrogen	79	79

62. What is the composition of exhaled air and inhaled air? (RWP-2018-A)

Ans. Composition of Exhaled Air and Inhaled Air: -

Composition of Inhaled Air	Composition of Exhaled Air
1. Oxygen 21 %	1. Oxygen 16 %
2. Carbon dioxide 0.04 %	2. Carbon dioxide 4%
3. Water vapors Variable	3. Water vapors Variable
4. Nitrogen 79 %	4. Nitrogen 79 %

63. What is the amount of CO<sub>2</sub> / 100 ml in arterial and venous blood?

Ans. A) Quantity of Carbon Dioxide Present In Venous Blood: -

About 54 ml of CO<sub>2</sub> per 100 ml of blood

B) Quantity of Carbon Dioxide Present in Arterial Blood: -

About 50 ml of CO<sub>2</sub> per 100 ml of blood

64. Differentiate between organismic and cellular respiration. (SGD-2015-A)

Ans. Organismic Respiration Cellular Respiration

- |  |  |
|--|--|
| 1. It includes all those steps involved in the transport of oxygen from environment to respiratory surfaces and then to body cells.              | 1. It includes all biochemical reactions which extract chemical energy of glucose and other compounds and convert it into the form of ATP molecules. |
| 2. It is involved in the supply of O <sub>2</sub> necessary for cellular respiration and removal of CO <sub>2</sub> thus produced from the body. | 2. It is directly involved in the production of energy, necessary for all living activities.   |

65. What are Alveoli? Give their Function. (SGD-2016-A)

Ans. Alveoli and Their Function: -

A) Alveoli: -

- Alveoli (sing. Alveolus) are tiny, thin-walled, blind ended sacs within the lungs in which bronchioles terminate.
- Each alveolus is lined by an extremely thin single layer of epithelial cells.
- They are surrounded by extremely thin extensive capillary network.
- The internal area of alveoli is provided, with a thin layer of fluid containing surfactant that reduces the internal surface area to prevent it from collapsing during gas exchange.

B) Function of Alveoli: -

The walls of the alveoli are the sites where all the gaseous exchange between the air and blood takes place.

66. What are the causes of asthma? (SGD-2016-A)

Ans. Causes of Asthma: -

- It is an allergic reactions to pollen, spores, cold, humidity, pollution etc. which manifests itself by spasmodic contraction of small bronchiole tubes.
- It also results in the release of inflammatory chemicals such as histamine into the circulatory system that cause severe contraction of the bronchiole.

67. Describe the role of nasal cavity in man.

(SGD-2017-A)

Ans. Role of Nasal Cavity in Man:-

Role of nasal cavity in man is to:

- Warm the Air -- This is accomplished by the presence of a plexus of veins in the subcutaneous connective tissues.
- Moisten the Air -- Moisture is derived from mucus secreted by mucus secreting cells.
- Clean the Inspired Air--- Dust particles from air are removed by the hairs and sticky surface of the mucus membrane.

68. Differentiate between myoglobin and hemoglobin.

(SGD-2017-A)

Ans.

Haemoglobin	Myoglobin
1. It is a globular protein which has four polypeptide chains coiled around one another.	1. It is a small protein composed of just one polypeptide chain with eight helices.
2. It has an iron containing haem group that binds oxygen.	2. It has an iron containing haemprosthetic group that binds oxygen.
3. Only one oxygen atom can bind to each myoglobin molecule.	3. Four oxygen molecules can bind to each hemoglobin molecule.
4. It is found in muscles.	4. It is found in red blood cells.
5. It stores oxygen.	5. It transports oxygen.
6. It has more affinity with oxygen.	6. It has less affinity with oxygen.
7. It loses oxygen at PO <sub>2</sub> 20 mmHg.	7. It loses oxygen at PO <sub>2</sub> 60 mmHg.

69. Give role of respiratory pigments. (SGD-2018-A)

Ans. Role of Respiratory Pigments:-

Various types of respiratory pigments are present in different animals. The pigments combines with oxygen reversibly and increase the oxygen carrying capacity of the blood. There are two respiratory pigments.

- Haemoglobin** -- It increases the oxygen carrying capacity of blood to about 75 times.
- Myoglobin** ---It serves as an intermediate compound for the transfer of oxygen from hemoglobin to aerobic metabolic processes of the muscle cells. It can also store some oxygen.

70. Give the composition of inhaled and exhaled air.

(SGD-2018-A)

Ans. Composition of Inhaled And Exhaled Air:-

Composition of Inhaled Air	Composition of Exhaled Air
1. Oxygen 21 %	1. Oxygen 16 %
2. Carbon dioxide 0.04 %	2. Carbon dioxide 4%
3. Water vapors Variable	3. Water vapors Variable
4. Nitrogen 79 %	4. Nitrogen 79 %

71. What are alveoli? Give their function. (SGD-2018-A)

Ans. A) Alveoli:-

- Alveoli (sing. Alveolus) are tiny, thin walled, blind ended sacs within the lungs in which bronchioles terminate.
- Each alveolus is lined by an extremely thin single layer of epithelial cells.
- They are surrounded by extremely thin extensive capillary network.
- The internal area of alveoli is provided with a thin layer of fluid containing surfactant that reduces the internal surface area to prevent it from collapsing during gas exchange.

B) Function of Alveoli:-

The walls of the alveoli are the sites where all the gaseous exchange between the air and blood takes place.

72. What is Pleura?

(D.G.K-I-2014-A)

Ans. Pleura:-

Pleura or pleural membranes are two thin membranes which enclose each lung and within which there is fluid filled cavity known as pleural cavity. Fluid in the pleural cavity acts as a lubricant.

73. Write two properties of Respiratory surfaces in animals. (D.G.K-I-2014-A)

Ans. Two Properties of Respiratory Surfaces in Animals:-

- Surface area of respiratory surfaces should be large in relation to size of organism and should be kept moist.
- Epithelium of respiratory surfaces must be thin with only one or two cell thick.

74. What is pulmonary respiration? (D.G.K-II-2014-A)

Ans. Pulmonary Respiration:-

It is the exchange of gases through lungs. Lung are the structures in terrestrial vertebrates which are involved in respiration called Pulmonary Respiration. Air passages of all lungs terminate into air tubes or air chambers or sacs richly supplied with blood capillaries where exchange of gases occurs.

75. What are counter current exchange and parabronchi?

(D.G.K-I-2015-A)

Ans. A) Counter Current Exchange:-

- It is the exchange of gases between two media (blood and air or water) that are flowing in opposite direction.
- It increases the amount of oxygen entering in the blood.

76. Name some respiratory disorder and explain any one.

(D.G.K-I-2015-A)

Ans. A) Names of Respiratory Disorders:-

- Asthma
- Emphysema
- Lung Cancer
- Tuberculosis

B) Explanation of One Respiratory Disorder:-

Tuberculosis is an airborne disease of the lungs caused by *Mycobacterium tuberculosis* is an air borne disease of the lungs and accompanied by degeneration of the lung tissue and spread to other organs. Pulmonary tuberculosis is a disease of lungs in which inside of

lung is damaged resulting in cough and fever. It is more common in poor people. Malnutrition and poor living conditions facilitate *Mycobacterium* to grow. The disease is curable with proper medical attention. It is a contagious disease.

77. Write any two properties of Respiratory Surface in Animal. (D.G.K-I-2015-A)

Ans. Two Properties of Respiratory Surface in Animal:

- Surface area of respiratory surfaces should be large in relation to size of organism and should be kept moist.
- Epithelium of respiratory surfaces must be thin with only one or two cell thick.

78. Name different parts of Air passage way of man.

(D.G.K-II-2015-A)

Ans. Names of Different Parts of Air Passage Way of Man:

- Nasal Cavities
- Pharynx or Throat
- Larynx or Voice Box
- Trachea or Wind Pipe
- Bronchi and Bronchiole
- Air Sacs and Alveoli
- Lungs

79. Write at least two different states of CO<sub>2</sub> transportation in blood. (D.G.K-I-2017-A)

Ans. Two Different States of CO<sub>2</sub> Transportation In Blood:

a. As Bicarbonate Ions:-

Approximately 70 % carbon dioxide is transported in the blood as bicarbonate ions. Carbon dioxide diffuses into the blood and enters the red blood cells and combines with water to form carbonic acid in the presence of enzyme carbonic anhydrase.

Carbonic anhydrase



Carbonic acid is an unstable compound and dissociates to form hydrogen ions and bicarbonate ions.



When blood leaves the capillary bed most of carbon dioxide is in the form of bicarbonate ions. In the capillaries of lungs reversible reactions occur and CO<sub>2</sub> released diffuses out into the space of alveolar sac.

b. As Carboxyhaemoglobin:-

About 23 % carbon dioxide is carried as carboxyhaemoglobin. Carboxyhaemoglobin is formed when carbon dioxide combines with amino group of hemoglobin.

80. What is epiglottis? Mention its function.

(D.G.K-I-2017-A)

Ans. A) Epiglottis:-

- Epiglottis is one of the nine cartilaginous structures that make up the larynx (voice box)
- It is the flap made of elastic cartilage covered with mucous membrane attached to entrance of the larynx.

B) Functions of Epiglottis:-

- It is normally pointed upward during breathing and allows transport of air for inspiration and expiration.
- It folds down to a more horizontal position, during swallowing of food preventing it from going to the trachea and, instead, directing it to the oesophagus.

81. What are the products that are produced during photorespiration?

Ans. Products Produced During Photorespiration:-

a. Final Products:-

The final products which are produced during photorespiration are serine and carbon dioxide.

b. Intermediate Products:-

The intermediate products are glycolate and glycine.

82. State the effects of change in temperature on transport of oxygen in blood. (D.G.K-II-2018-A)

Ans. Effects of Change in Temperature on Transport of Oxygen In Blood:-

Rise in temperature causes a decrease in the oxygen carrying capacity of hemoglobin (blood).

83. How much carbon dioxide is present in venous blood? How CO<sub>2</sub> affects oxygen carrying capacity of hemoglobin? (D.G.K-II-2018-A)

Ans. A) Carbon Dioxide Present In Venous Blood:-

About 54 ml of CO<sub>2</sub> per 100 ml of blood

B) CO<sub>2</sub> Affecting Oxygen Carrying Capacity of Hemoglobin:-

Concentration of carbon dioxide decreases the capacity of hemoglobin to hold oxygen. Hence increasing CO<sub>2</sub> concentration favors the greater liberation of oxygen from the blood to the tissues.

84. Name properties of respiratory surfaces in animals.

(SAH-2014-A)

Ans. Names of Properties of Respiratory Surfaces

- Large surface and moisture
- Thin epithelium
- Ventilation
- Capillary network

85. Discuss respiratory mechanism in cockroach.

(SAH-2015-A)

Ans. Respiratory Mechanism in Cockroach:-

Respiratory mechanism in Cockroach includes pumping of air in and out of the body by the expansion and relaxation of the abdominal muscles. This respiratory mechanism is divided into inspiration (inhalation) and expiration (exhalation):

a. Expiration:-

When abdomen contracts, the anterior four pairs of spiracles close and posterior six pairs of spiracles open and air is forced through the tracheae and out of the body.

b. Inspiration:-

When abdomen expands, the first four pairs of spiracles open and the air rushes in through these spiracles into tracheoles.

86. Name properties of respiratory surfaces in animals.  
(SAH-2015-A)

Ans. Names of Properties of Respiratory Surfaces in Animals: -

- Large surface and moisture
- Thin epithelium
- Ventilation
- Capillary network

87. Give composition of inhaled and exhaled (breathed) air.  
(SAH-2016-A)

Ans. Composition of Inhaled and Exhaled (Breathed) Air:

	Inhaled %	Exhaled %
Oxygen	21	16
Carbon dioxide	0.04	4
Water vapors	Variable	Saturated
Nitrogen	79	79

88. What is pleura?  
(SAH-2016-A)

Ans. Pleura: -

Pleura or pleural membranes are two thin membranes which enclose each lung and within which there is fluid filled cavity known as pleural cavity. Fluid in the pleural cavity acts as a lubricant.

89. Give one difference between alveoli and parabronchi.  
(SAH-2016-A)

Ans. One Difference Between Alveoli And Parabronchi:

Alveoli	Parabronchi
Alveoli are tiny, thin-walled, highly vascularized, blind-ended cavities in lungs of mammals.	Parabronchi are numerous tiny, thin walled, highly vascularized parallel ducts in the lungs of birds that are open at both ends.

90. What is mechanism of inhalation air in man?  
(SAH-2017-A)

Ans. Mechanism of Inhalation of Air in Man: -

Contraction of muscles of ribs and diaphragm, causes elevation of ribs and makes the diaphragm flat due to which thoracic cavity is enlarged and negative pressure is developed inside the thoracic cavity as well as lungs and air is rushed into the lungs through respiratory passage.

### SECTION III LONG QUESTIONS

No Essay Type Question According to New Pattern

## SECTION I MULTIPLE CHOICE QUESTIONS

### Chapter 14 TRANSPORT

2MCQs

#### (I) From Exercise:

- Which of the following is not true of guard cells?
  - They are present in the epidermis of leaf.
  - They are connected with plasmodesmata with other epidermal cells.
  - They contain chloroplasts.
  - They are kidney shaped.
- The casparian strips are present in:
  - Cortex cells of roots
  - Endodermis cells of roots
  - Cells of pericycle
  - Cells of phloem
- Lymph most closely resembles with:
  - Blood
  - Plasma
  - Interstitial fluid
  - Urine
- Hydathodes are associated with: (LHR-II-14-A)  
(BWP-15-A) (RWP-16-A) (DGK-II-14-A)
  - Transpiration
  - Guttation
  - Conduction
  - None of the above
- According to pressure flow theory, which of the following serves as sink:
  - Leaves
  - Stem
  - Roots
  - None of the above
- The process that most likely/directly enables a root hair cell to absorb minerals by active transport and enables a muscle cell to contract is:
  - Circulation
  - Excretion
  - Respiration
  - Assimilation
- Which of the following processes cause substances to move across membranes without the expenditure of cellular energy?
  - Endocytosis
  - Active transport
  - Diffusion
  - None of the above
- Cardiac muscle can be distinguished from other muscle fibers because cardiac muscles:
  - Contain only action
  - Voluntary in action
  - Lack regular arrangement of sarcomas
  - Has intercalated discs

#### (II) From Punjab Boards:

- The condition cause narrowing and hardening of arteries is called:
  - Atherosclerosis
  - Necrosis
  - Sclerosis
  - Apoptosis

(Lahore Board-New Scheme-Group-I-2014-A)
- Attraction between water - water molecules in xylem tissues is called:
  - Tension
  - Adhesion
  - Cohesion
  - Imbibition

(LHR-New Scheme-Group-II-2014-A)(SAH-14-A)
- The cells which supply ATP and proteins to sieve tubes are:
  - Companion
  - Epidermal
  - Tracheids
  - Vesels

(Lahore Board-New Scheme-Group-I-2015-A)
- The renal vein brings the impure blood from ---.
  - Brain
  - Kidney
  - Lungs
  - Liver

(Lahore Board-New Scheme-Group-II-2015-A)
- The uncontrolled production of white blood cells result in:
  - Leucaemia
  - Thalassaemia
  - Oedema
  - Asthma

(LHR-New Scheme-Group-II-2015-A)(BWP-17-A)
- The heart is enclosed in a double membranous sac called:
  - Epicardium
  - Myocardium
  - Pericardium
  - Endocardium

(LHR-New Scheme-Group-I-2016-A)(RWP-14-A)
- In the embryonic life, the red blood cells are formed in:
  - Red bone marrow
  - Liver and spleen
  - In the bone marrow of sternum and ribs
  - Bone marrow of vertebrae

(LHR-New Scheme-Group-I-2016-A)(MTN-16-A)
- Antiserum is a serum containing:
  - Hormones
  - Antigen
  - Enzyme
  - Antibodies

(LHR Board-New Scheme-Group-I-2017-A)
- Thalassemia is also called:
  - Cooley's anaemia
  - Thomas anaemia
  - Peter's anaemia
  - Mendel's anaemia

(LHR-New Scheme-Group-II-2018-A)
- Enlargement of spleen is seen in:
  - Blood cancer
  - Thalassaemia
  - Odema
  - Hepatitis

(LHR-New Scheme-Group-II-2018-A)
- Which one is not the layer of wall of heart?
  - Pericardium
  - Epicardium
  - Myocardium
  - Endocardium

(Gujranwala Board-New Scheme-2014-A)
- The plasma proteins constitute percent by weight of plasma: (GRW-New Scheme-2015,17-A)(SAH-16-A)
  - 7-9 %
  - 9-11 %
  - 11-13
  - 13-15 %
- The ions involved in the opening and closing of stomata are:
  - Sodium
  - Calcium
  - Potassium
  - Magnesium

(GRW-New Scheme-2015-A)  
(SAH-14-A)(FSD-18-A)
- The normal pH of blood is:
  - 7.4
  - 6.0
  - 8.0
  - 9.0

(GRW-New Scheme-2016-A)(SGD-15A)(FSD-15,18-A)
- Single circuit heart is present in:
  - Fish
  - Amphibia
  - Reptiles
  - Mammals

(GRW-New Scheme-2017-A)(FSD-17-A)(BWP-19-A)  
(LHR-I-19-A)(MTN-I-17-A)(D.G.K-II-15-A, I-II-18-A)
- One complete heart cycle lasts for about:
  - 0.2 sec
  - 0.5 sec
  - 0.8 sec
  - 1.0 sec

(GRW-New Scheme-2018-A)(FSD-18-A)
- The volume of dry seeds may increase upto 200 times after absorbing water by:
  - Diffusion
  - Imbibition
  - Osmosis
  - Active transport

(RWP-New Scheme-2014,15-A)
- Match heart attack with one of the followings:
  - Stroke
  - Oedema
  - Hypertension
  - Myocardial infarction

(RWP-New Scheme-2015-A)
- Blood provides immunity by:
  - Leukocytes
  - Platelets
  - RBC
  - Lymphocytes

(RWP-Board-New Scheme-2016-A)
- Discharge of blood from blood vessel is called as:
  - Stroke
  - Heart attack
  - Thrombosis
  - Hemorrhage

(RWP-New Scheme-2018-A)
- Liver receives blood from digestive system through:
  - Portal vein
  - Hepatic vein
  - Iliac vein
  - Hepatic portal vein

(SGD-New Scheme-2015-A)
- Guttation occurs in plants through:
  - Cuticle
  - Hydathodes
  - Lenticels
  - Stomata

(SGD-New Scheme-2016-A)(RWP-18-A)  
(D.G.K-I-18-A)(FSD-16-A)(SAH-15-A)
- The pressure flow theory was first proposed in 1930 by:
  - Ernst Haeckel
  - Ernst Munch
  - Fleming
  - Dixon

(SGD-New Scheme-2016-A)

- 24) Water potential of pure water is:  
(Sargodha Board-New Scheme-2017-A)  
a) +10                      b) +5  
c) Zero                      d) -10
- 25) Cohesion tension theory was proposed by:  
(SGD-New Scheme-2017-A)(BWP-18-A)  
a) Dixon                      b) Robert Brown  
c) Sack                      d) Van Mohl
- 26) Cuticular respiration takes place at:  
(SGD-New Scheme-2018-A)  
a) Night                      b) Morning  
c) Evening                      d) None
- 27) Antibodies are produced from:  
(SGD-New Scheme-2018-A)  
a) Eosinophils                      b) Basophils  
c) Monocyte                      d) Lymphocytes
- 28) Which is found in interstitial fluid?  
(FSD-New Scheme-2014-A)  
a) Large proteins                      b) White blood cells  
c) Red blood cells                      d) Platelets
- 29) All have open blood circulatory system except:  
(Faisalabad Board-New Scheme-2014-A)  
a) Octopus                      b) Snail  
c) Insect                      d) Calms
- 30) One cubic millimeter human male blood contains RBC:  
(FSD-New Scheme-2015-A)  
a) 4—4.5 million                      b) 5—5.5 million  
c) 6—6.5 million                      d) 3—3.5 million
- 31) Sieve tube cells and companion cells communicate with each other through:  
(FSD-New Scheme-2016-A)  
a) Sieve pores                      b) Casparian strip  
c) Plasmodesmata                      d) Cell membranes
- 32) Haeme portion of haemoglobin contains an atom of:  
(Multan Board-New Scheme-2014-A)  
a) Magnesium                      b) Iron  
c) Phosphorous                      d) Calcium
- 33) — is an example of Agranulocytes.  
(MTN-New Scheme-2014-A)(BWP-14-A)  
a) Eosinophils                      b) Basophils  
c) Neutrophils                      d) Monocytes
- 34) — is incorrect about guard cells.  
(MTN Board-New Scheme-2015-A)  
a) Have chloroplasts                      b) Bean-shaped  
c) Connected to surrounding cells by plasmodesmata  
d) Surrounds stoma
- 35) Cytoplasmic strands that extend through pores in adjacent cell wall are:  
(MTN Board-New Scheme-2016-A)  
a) Plasmodesmata                      b) Plasmofiber  
c) Plasmofilament                      d) Plasmodstrand
- 36) A substance that inhibits blood clotting is:  
(MTN-New Scheme-Group-I-2017-A)  
a) Heparin                      b) Fibrinogen  
c) Fibrin                      d) Thrombin
- 37) Passive Immunity is developed by:  
(Multan Board-New Scheme-Group-II-2017-A)  
a) Vaccine                      b) Serum  
c) Antiserum                      d) Antibodies
- 38) Bleeding Phenomenon is not shown by:  
(MTN-New Scheme-Group-II-2017-A)  
a) Strawberry                      b) Sugar maple  
c) Grape wine                      d) Palms
- 39) After a fatty meal, fat globules may make up:  
(Multan Board-New Scheme-Group-I-2018-A)  
a) 10% of the lymph                      b) 1% of the lymph  
c) 15% of the lymph                      d) 1.5% of the lymph
- 40) A hormone released by mesophyll cells at high temperature is called:  
(Multan Board-New Scheme-Group-I-2018-A)  
a) Acetic acid                      b) Abscisic acid  
c) Hydrochloric acid                      d) Sulphuric acid
- 41) Left systemic arch disappears in:  
(Multan Board-New Scheme-Group-II-2018-A)  
a) Amphibians                      b) Birds  
c) Reptiles                      d) Fishes
- 42) Platelets are not cells but are fragments of large cells called:  
(MTN-II-2018-A)(SAH-16-A)  
a) Microkaryocytes                      b) Karyocytes  
c) Megakaryocytes                      d) Karyokinesis
- 43) Air space between Mesophyll Cells of a leaf comprises \_\_\_\_\_ of total volume of leaf:  
(BWP Board-New Scheme-2015-A)  
a) 20%                      b) 30%  
c) 40%                      d) 50%
- 44) A condition of high blood pressure is known as:  
(Bahawalpur Board-New Scheme-2016-A)  
a) Hypotension                      b) Haemorrhage  
c) Hypertension                      d) Arteriosclerosis
- 45) The maximum depth of roots of Prosopis is:  
(Bahawalpur Board-New Scheme-2017-A)  
a) 40 meters                      b) 50 meters  
c) 60 meters                      d) 70 meters
- 46) Temperature that causes closure of Stomata is:  
(BWP-New Scheme-2018-A)(D.G.K-I-15-A)  
a) 30—40°C                      b) 30—35°C  
c) 25—35°C                      d) 40—45°C
- 47) Double Circuit Heart is not found in:  
(D.G.K Board-New Course-Group-I-2014-A)  
a) Birds                      b) Mammals  
c) Reptiles                      d) Fish
- 48) The discharge of blood from blood vessels is called:  
(D.G.K Board-New Course-Group-I-2017-A)  
a) Stroke                      b) Haemorrhage  
c) Hypertension                      d) Hypotension
- 49) The loss of blood through hydathodes is called:  
(D.G.K Board-New Course-Group-I-2017-A)(SAH-19-A)(BWP-16-A)  
a) Bleeding                      b) Guttation  
c) Transpiration                      d) Imbibition

- 50) Pathway of water consisting of interconnected protoplasts in root cells is called:  
(D.G.K Board-New Course-Group-II-2017-A)  
a) Apoplast                      b) Symplast  
c) Protoplast                      d) Tonoplast
- 51) In normal human body percentage of plasma in blood volume is:  
(D.G.K Board-New Course-Group-II-2017-A)  
a) 45%                      b) 30%  
c) 55%                      d) 60%
- 52) Which one of the following is not cell but the fragment of large cells?  
(SHL Board-New Scheme-2017-A)  
a) Basophils                      b) Leucocytes  
c) Platelets                      d) Erythrocytes
- (III) From Entry Test:-**
- 1) The dew drops on the tips of grass leaves is an example of:  
(Entry Test 2009)  
a) Infestation                      c) Exudation  
b) Bleeding                      d) Imbibition
- 2) The attraction among water molecules which hold water together is called:  
(Entry Test 2009)  
a) Tension                      c) Cohesion  
b) Adhesion                      d) Imbibition
- 3) The chemical nature of antibody is:  
(Entrance Self-Test-2011)  
a) Glycoprotein                      c) Lipoproteins  
b) Glycolipids                      d) Polysaccharide
- 4) Which chemicals are secreted by T-helper cells to stimulate B-plasma cells to divide?  
(Entrance Self-Test-2011)  
a) Interferons                      c) Histamines  
b) Cytokinins                      d) Fibrin
- 5) Which of the following is described as vaccination?  
(Entrance Self-Test-2011)  
a) Artificial active immunity  
b) Natural active immunity  
c) Artificial passive immunity  
d) Natural passive immunity
- 6) B-lymphocytes and T-lymphocytes are formed:  
(Entrance Self-Test-2011)  
a) Before birth in bone marrow  
b) Before birth in thymus glands  
c) After maturity in blood  
d) After birth in blood
- 7) The antibodies provided to infant through mother's milk is an example of:  
(Entrance Self-Test-2011)  
a) Natural passive immunity  
b) Artificial passive immunity  
c) Natural active immunity  
d) Artificial active immunity
- 8) Antigen is a foreign or any other molecule which stimulates the formation of:  
(Entry Test 2012)  
a) NiC complex                      c) Mucus  
b) Immunogen                      d) Antibodies
- 9) Antibodies are produced by which of the following lymphocytes?  
(Entry Test 2012)  
a) B lymphocytes                      c) T lymphocytes  
b) A lymphocytes                      d) B and T lymphocytes
- 10) Skin and mucus membranes are part of the body defense system and they form the:  
(Entry Test 2012)  
a) Physical barriers                      c) Chemical barriers  
b) Mechanical barriers                      d) Biological barriers
- 11) T-lymphocytes become mature and complete under the influence of:  
(Entry Test 2012)  
a) Liver                      c) Thymus gland  
b) Bursa of fabrics                      d) Spleen
- 12) Snake bite is treated with which type of immunization?  
(Entry Test 2012)  
a) Active                      c) Humoral  
b) Passive                      d) Specific
- 13) Mature mammalian red blood cells do not have:  
(Entry Test 2012)  
a) Nucleus                      c) Fluids  
b) Red color                      d) Haemoglobin
- 14) In normal person plasma contributes about by volume of blood:  
(Entry Test 2012)  
a) 30%                      c) 45%  
b) 90%                      d) 55%
- 15) Which vein has oxygenated blood?  
(Entry Test 2012)  
a) Femoral vein                      c) Pulmonary vein  
b) Subclavian vein                      d) Jugular vein
- 16) The average life span of red blood cell is about:  
(Entrance Test-2013)  
a) Four months                      c) Five months  
b) Two months                      d) One month
- 17) The lymphatic vessels of the body empty into the blood stream at the:  
(Entrance Test-2013)  
a) Abdominal vein                      c) Jugular vein  
b) Subclavian vein                      d) Bile duct  
(Entrance Test-2013)
- 18) Right atrium is separated from right ventricle by:  
(Entrance Test-2013)  
a) Tricuspid valve                      c) Semi lunar valve  
b) Bicuspid valve                      d) Septum
- 19) In passive immunity which of the following components are injected into body?  
(Entrance Test-2013)  
a) Antigens                      c) Serum  
b) Immunogens                      d) Immunoglobulins
- 20) Which part of antibody recognizes the antigen during immune response?  
(Entrance Test-2013)  
a) Heavy part                      c) Light part  
b) Variable part                      d) Constant part

- 21) Two identical light chains and two identical heavy chains in antibody molecule are linked by: (Entrance Test-2013)  
 a) Disulphide bridges c) Glycerol bond  
 b) Peptide bond d) Ionic bond
- 22) Antibodies are produced against invading cells by: (Entrance Test-2013)  
 a) Lymphocytes c) Basophils  
 b) Basophils d) Neutrophils
- 23) In the structural diagram of an antibody molecule which portion is occupied by variable chains? (Entrance Test-2013)  
 a) Lower portion c) Middle portion  
 b) Upper portion d) In between chains
- 24) Histamine is produced by which one of the following cells? (Entrance Test-2014)  
 a) Basophils c) Monocyte  
 b) Platelets d) Eosinophils
- 25) Which one of the following is the most numerous / commonest of white blood cells? (Entrance Test-2014)  
 a) Eosinophils c) Neutrophils  
 b) Monocytes d) Lymphocytes
- 26) The oxygenated blood from lungs to heart is transported by the: (Entrance Test-2014)  
 a) Pulmonary artery c) Pulmonary vein  
 b) Coronary artery d) Hepatic artery
- 27) Which one of the following proteins takes part in blood clotting?  
 a) Prothrombin c) Immunoglobulin  
 b) Fibrinogen d) Globulin
- 28) T-lymphocytes recognize antigen and attack microorganism or transplanted organ and tissues. This effect is called: (Entrance Test-2014)  
 a) Cell-mediated response  
 b) Humoral response  
 c) Active Immunity  
 d) Passive immunity
- 29) Which part of antibody recognizes the antigen during immune response? (Entrance Test-2014)  
 a) Heavy part c) Constant part  
 b) Light part d) Variable part
- 30) Which type of immunity is achieved by injecting antibodies, antiserum, anti-venom serum? (Entrance Test-2014)  
 a) Active immunity  
 b) Passive immunity  
 c) Artificially induced immunity  
 d) Naturally induced immunity
- 31) Which one of the following gland is involved in the production of lymphocytes? (Entrance Test-2014)  
 a) Pineal c) Thymus  
 b) Pituitary d) Adrenal

- 32) Antibodies are proteins and made up of how many polypeptide chains? (Entrance Test-2014)  
 a) One c) Three  
 b) Two d) Four
- 33) In \_\_\_\_\_ response,  $\beta$ -cells produce plasma cells that synthesize antibodies and release in blood plasma and tissue fluid. (Entrance Test-2015)  
 a) Cell-Mediated c) Humoral  
 b) Hormonal d) Phototactic
- 34) Passive immunity is used against: (Entrance Test-2015)  
 a) Malaria c) Dengue  
 b) Typhoid d) Tetanus
- 35) B-lymphocytes are named due to their relationship with: (Entrance Test-2015)  
 a) Blood c) Bone marrow  
 b) Bursa of Fabricius d) Bile duct
- 36) The lymph vessel of villi is called: (Entrance Test-2015)  
 a) Epithelium c) Adrenals  
 b) Afferent lymph vessel d) Lacteals
- 37) Right atrium is separated from right ventricle by: (Entrance Test-2015)  
 a) Bicuspid valve c) Tricuspid valve  
 b) Semilunar valve d) Interatrial septum
- 38) The flaps of tricuspid valves are attached to muscular extensions of right ventricle known as: (Entrance Test-2015)  
 a) Smooth muscles c) Intercostal muscles  
 b) Papillary muscles d) Skeletal muscles
- 39) One complete heart beat consists of one systole and one diastole and lasts for about: (Entrance Test-2015)  
 a) 0.8 seconds c) 0.4 seconds  
 b) 0.2 seconds d) 0.5 seconds
- 40) The heart beat cycle starts when electric impulses are generated from: (Entrance Test-2015)  
 a) AV-Node c) SA Node  
 b) SV Node d) PQ Node
- 41) B-cells release antibodies in blood plasma, tissue fluid and lymph. This kind of immune response is called: (Entrance Test-2016)  
 a) Cell Mediated Response  
 b) Humoral Response  
 c) Active Response  
 d) Compound Response
- 42) The type of immunity in which antibodies are passed from one individual to another is called: (Entrance Test-2016)  
 a) Passive Immunity  
 b) Artificial Active Immunity  
 c) Natural Active Immunity  
 d) Humoral Immunity

## SECTION II

### SHORT QUESTIONS

2 SQs

No Short Question From Exercise

From Punjab Boards:

1. What are blue babies? (LHR-I-2014, 15, 16, 17-A) (GRW-14, 16-A) (MTN-15) (DGK-I-19-A) (SAH-17-A) (RWP-14, 19-A)

Ans. Blue Babies: -

- The term blue babies is usually applied for new born babies with cyanosis (blueness of skin) due to mixing of oxygenated and deoxygenated blood between two atria and supply of this mixed blood to the body.
  - One cause of blue babies is the failure of inter arterial foramen (an opening in the inter arterial septum) to close.
  - Second cause of blue babies is the failure of ductus arteriosus (duct in embryo in pulmonary artery and aorta) to fully constrict.
2. Differentiate between active and passive immunity. (LHR-I-2014-A) (RWP-II-17)

Ans.

Active Immunity	Passive Immunity
1. Individuals synthesize their own antibodies.	1. Individuals get prepared antibodies from outside source.
2. It provides protection for long period of time.	2. It is short lived.
3. It takes time in developing.	3. It provides immediate protection.

3. Define Immunity:

(LHR-II-2014-A) (DGK-I-15-A) (BWP-16-A) (SAH-1)

Ans. Immunity: -

- The capacity to recognize the intrusion of any matter foreign to the body and to mobilize cells and products to help remove the particular sort of foreign material with greater speed and effectiveness is called Immunity.
- Immunity is the protection from infection, re-infection and hyper-infection.
- Immunity is the capability of humar, body to resist almost all types of organisms or toxins that tend to damage tissues and organs.
- There are three mechanisms in animals to defend body against foreign invaders. These are:
  - Physical barriers like skin and mucous membrane
  - Phagocytes
  - Immune system

- 43) To combat the active infections of tetanus, rabies and snakes the \_\_\_\_\_ method of immunization is used. (Entrance Test-2016)  
 a) Active c) Active Artificial  
 b) Humoral d) Passive

- 44) In antibody molecule, two heavy and two light chains are bounded by: (Entrance Test-2016)  
 a) Disulphide Bond c) Hydrogen Bond  
 b) Monosulphide Bond d) Ionic Bond

- 45) Variable amino acid sequences in antibody molecule are found in: (Entrance Test-2016)

- Both light chains only
- Both heavy chains only
- One heavy chain and one light chain
- Both heavy and light chains

- 46) In human the closed sac which surrounds the heart is: (Entrance Test-2016)

- Endocardium c) Pericardium  
 b) Myocardium d) Epicardium

- 47) Cardiac tendineae are fibrous cords attached with: (Entrance Test-2016)

- Cardiac end of stomach valve  
 b) Tricuspid valve of heart  
 c) Pyloric sphincter of stomach  
 d) Eyelids

- 48) Bicuspid valve controls the flow of blood from: (Entrance Test-2016)

- Right atrium to right ventricle  
 b) Right ventricle to pulmonary artery  
 c) Left ventricle to aorta  
 d) Left atrium to left ventricle

- 49) Elastic fibers are absent in the walls of \_\_\_\_\_ (Entry Test-2017)

- Aorta c) Veins  
 b) Arteries d) Capillaries

- 50) A type of blood cell that produces heparin is: (Entry Test-2017)

- Basophils c) Eosinophils  
 b) Neutrophils d) Monocyte

- 51) Thoracic lymph duct of lymphatic system opens into: (Entry Test-2017)

- Superior vena cava c) Inferior vena cava  
 b) Subclavian vein d) Renal vein

- 52) The antibody molecule consists of \_\_\_\_\_ polypeptide chains. (Entry Test-2017)

- Eight c) Six  
 b) Four d) Two

- 53) \_\_\_\_\_ cells survive for a few days and secrete a huge number of antibodies in blood tissue fluids or lymph. (Entry Test-2017)

- Memory cells c) T-lymphocyte  
 b) B-lymphocytes d) Plasma cells

- 54) The intermediate protection from infection of snake bite can be obtained by: (Entry Test-2017)

- Active immunity  
 b) Natural active immunity  
 c) Passive immunity  
 d) Vaccination

4. What is Guttation?

(LHR-II-2014-A) (FSD-17-A) (DGK-II-14-A)

Ans. Guttation: -

- The exudation of liquid water from leaves due to root pressure through openings, the hydathodes, is called Guttation.
- Guttation does not take place through stomata, but instead occurs through special group of cells located near the ends of small veins that form openings called hydathodes.
- Guttation occurs when transpiration is negligible and available soil moisture is high.
- It typically occurs at night because stomata are closed, but water continues to move into the roots by osmosis.
- The guttation is in fact due to positive pressure-the root pressure, developed in the xylem tissue of roots.

5. State pressure flow theory. Who proposed it first?

(LHR-II-2015-A)

Ans. A) Pressure Flow Theory: -

Pressure Flow Theory states that the flow of solution in the sieve elements is driven by an osmotically generated pressure gradient between source and sink.

- Who Proposed Pressure Flow Theory First: - Ernst Munch in 1930 proposed the pressure flow theory first.

6. Differentiate between single and double circuit heart.

(LHR-II-2015-A) (GRW-15-A) (FSD-17, 18-A)

Ans.

Single Circuit Heart	Double Circuit Heart
1. In single circuit heart, blood flows in one direction.	1. In double circuit heart, blood flows in two directions.
2. Oxygenated blood from gills is not returned to heart and is supplied to body tissues.	2. Oxygenated blood from lungs is returned to heart.
3. It receives deoxygenated blood from the body tissues and never receives oxygenated blood.	3. It receives deoxygenated blood from the body tissues as well as oxygenated blood from lungs.
4. It supplies deoxygenated blood to gills for oxygenation.	4. It supplies deoxygenated blood to lungs and oxygenated blood to body tissues.
Examples: - Fishes	Examples: - Amphibian, reptiles, birds and mammals

7. What is single circuit heart, give an example.

(LHR-II-2016-A) (SAH-16) (MTN-14-A)

Ans. A) Single Circuit Heart: -

- The heart in which the blood flows only once through it for every complete circuit of the body is called Single Circuit Heart.
- It receives deoxygenated blood from the body tissues which is supplied to gills for oxygenation. Oxygenated blood from gills is not returned to heart and is supplied to body tissues. The heart never receives oxygenated blood.

B) Example of Single Circuit Heart: -  
Heart of fishes

8. What do you about bleeding in plants?

(LHR-II-2018-A) (MTN-1-18-A)  
(DGK-II-17-A, 1-19-A) (SGD-17-A)

Ans. Bleeding In Plants: -

- It is flow of sap from the plant when it is cut, pruned, tapped or otherwise wounded.
- It occurs from cut ends or surfaces of plants.
- It takes place when plant is cut, pruned, tapped or otherwise wounded.
- In bleeding considerable quantity of sap upto the extent of 10-15 liters per day comes out with considerable force.
- There are two main factors responsible for bleeding i.e. hydrostatic pressure in the xylem and phloem elements and root pressure.
- Bleeding is often seen in many land plants in the spring, particularly grape wine, some palms, sugar maple etc.

9. What is cell-mediated and humoral immune response?

(LHR-II-2018-A)

Ans. A) Cell-Mediated Response: -

- It is the direct immune response in which T lymphocyte cells recognize antigen, then combat microorganisms and/ or affect the rejection of foreign tissue (in case of tissue transplant).
- In cell mediate response, a kind of lymphocytes originates in bone marrow, but instead of migrating straight to the lymph nodes, it first goes to the thymus gland where it is turned into T lymphocytes. These T lymphocytes themselves, rather than antibodies, attack the antigen on intracellular pathogens, tumor cells or other foreign tissues.

B) Humoral Response: -

- It is a type of response in which antibodies (immunoglobulin's) are produced by antigen-stimulated cells called B-lymphocytes.
- In humoral response, B-lymphocytes originate in response to antigen in the bone marrow and then migrate to the lymph nodes where they proliferate into plasma cells that in turn give rise antibodies that are liberated into the blood plasma and tissue fluid. Here these antibodies attach to surface of bacteria and speed up phagocytosis or combine with and neutralize toxins produced by microorganisms by producing antitoxins.

10. Define imbibition.

(GRW-2014-A)

Ans. Imbibition: -

- Absorption of water and swelling of hydrophilic (water loving) substances is known as Imbibition.
- The cell wall components especially cellulose, pectin and lignin take up water and as a result increase in volume, but the components do not dissolve in water.
- The root cell walls imbibe water from the soil which moves by apoplast pathway.
- The absorption of water by a seed prior to germination is an example of imbibition. The volume of dry seed may increase upto 200 times by imbibition, as result the seed coat ruptures and makes the germination of seed effective.
- It is a reverse process and when water is lost, the original volume of cell wall and of protoplasm is restored.

11. Discuss briefly the "Symplast Pathway".

(GRW-2015-A) (BWP-14-A)

Ans. "Symplast Pathway": -

- In this pathway water flows directly through the plasma membranes and the protoplasts of the cells, passing from one cell to the next by way of the plasmodesmata.
- This pathway does not become discontinuous and water flows upto xylem through this pathway.

12. What is hypertension: -

Ans. Hypertension: -

- It is a condition of high blood pressure.
- It is a disorder with sustained diastolic pressures of 90 mmHg and above and systolic pressures of 135 and above (normal blood pressure is 115/70 mm Hg).
- It promotes arteriosclerosis.
- Due to prolonged high blood pressure, heart muscles become weak and thickened and heart may enlarge and fail to pump blood effectively. Blood may then be retained in the heart and lungs, often leading to fatal condition called congestive heart failure.

13. Define heart attack and give its causes.

(GRW-2017-A)

Ans. A) Heart Attack: -

- It refers to the death or necrosis of the part of heart muscles.
- In medical terminology it is known as Myocardial (heart muscle) Infarction (death due to lack of oxygen).
- It is characterized by severe continuous chest pain radiating to shoulder, arm, neck or jaw. Other symptoms may include sweating, nausea shortness of breath and dizziness or fainting.

B) Causes of Heart Attack: -

- It occurs due to blockage of blood vessel in the heart (any of the coronary artery) by an embolus or locally formed thrombus and the blood supply to some cardiac muscles stop. As consequence, the effected cardiac muscles die due to lack of nutrients and oxygen. If area is small the victim may recover from the heart attack but death of the large area of cardiac muscles are fatal.

14. Define antigen and antibody.

(GRW-2017-A)

Ans. A) Antigen: -

- Antigen is a foreign substance that elicits an immune response by inducing antibody formation and is destroyed by these antibodies.

b. Antigen is also known as immunogen.

c. It is often a protein.

B) Antibody: -

- Antibody is a protein compound produced by plasma cells in response to specific antigens and have the capacity to react against the antigens.

b. It is a substance that is produced by the body itself or produced in another person and inoculated in the body which destroy antigens that stimulates its production.

c. It is also known as immunoglobulin.

d. Antibodies are globular proteins that are synthesized by plasma cells derived from B lymphocytes in

15. What are blood platelets? Give their function.

(GRW-2018-A) (SGD-19-A) (SAH-14) (BWP-14)

Ans. A) Blood Platelets: -

Platelets are tiny spherical or disc-shaped fragments of large cells called megakaryocytes in the bone marrow that lack nuclei.

B) Function of Platelets: -

Platelets play an important role in blood clotting. They help in conversion of fibrinogen, a soluble protein, into insoluble form, fibrin. The fibrin threads enmesh red blood cells and other platelets in the area of damaged tissue, ultimately forming a blood clot. The clot serves as a temporary seal to prevent bleeding until the damaged tissue can be repaired.

16. Where the human's heart is located in the body? Give names of layers that surround the heart.

(GRW-2018-A)

Ans. A) Location of Human's Heart in the Body: -

Human's heart is located in the chest cavity.

B) Names of Layers That Surround The Heart: -

Pericardium

17. What are Guard cells? Give their function.

(GRW-2018-A)

Ans. A) Guard Cells: -

- Guard cells are modified kidney shaped cells of usually lower epidermis of leaf.
- Two guard cells form a stoma, a pore in the lower epidermis of leaf.
- Guard cells, unlike other epidermal cells, are provided with chloroplasts and are the only photosynthesizing cells of epidermis of leaf in which sugars are produced during day time when light is available.

B) Function of Guard Cells: -

They control the transport of gases and water through stomata by opening and closing them.

18. What organic nutrients are present in the blood plasma of man?

(MTN-2014-A)

Ans. Organic Nutrients Present in the Blood Plasma of Man: -

- Glucose, fats, phospholipids, amino acids and lactic acids are the organic nutrients present in the blood plasma of man.
- Some of these nutrients enter the blood from the intestine.
- Lactic acid is produced in muscles as a result of glycolysis and is transported by blood to liver.
- Urea is an important constituent. It is metabolized to some extent but also serves as precursor of steroid hormones.

19. What is Blood Pressure?

(MTN-2016-A)

Ans. Blood Pressure: -

- The force exerted by blood against the inner walls of the blood vessels is called Blood Pressure.
- It is measured in millimeters of mercury (mm Hg).
- Mercury manometers called sphygmomanometer are usually used for measuring the blood pressure.

d. The normal blood pressure in the large arteries of healthy young adult at the level of the heart is normally about 115/70 mmHg.

e. Blood pressure is generated by the contraction of ventricles (ventricle systole) and is the highest in aorta and then gradually reduces in arteries due to elasticity of arteries and friction between flowing blood and walls of blood vessels.

**20. What is Passive Immunity?**  
**Ans. Passive Immunity:** - (MTN-2016-A)

- It is a type of immunity which is not developed by the body itself, instead it develops when antibodies or activated T-lymphocytes enter the body from an outside source to make a person immune against a disease.
- It is either natural as in the transfer of antibodies from mother to fetus across placenta or artificial by inoculation of antiserum containing antibodies or lymphocytes formed in another person.
- It affords protection for a limited period.
- It provides immediate protection.

**21. Define Osmosis.**  
**Ans. Osmosis:** - (MTN-II-2017-A)

- It is the movement of water or any other solvent molecules through a semi permeable membrane from a region of its higher concentration to a region of its lower concentration.
- Osmosis must occur through semi permeable membrane usually plasma membrane of cells.
- Movement of solvent molecules through biological membranes is rapid.

**22. Define Cohesion Tension Theory.** (MTN-I-2018-A)  
**Ans. Cohesion Tension Theory:** -

- Cohesion tension theory states as; the transpiration pull produce water tension in the xylem which pull the water upward and cohesive and adhesive forces maintain the water column in the xylem.
- This theory explains that water vapors transpire from the surface of leaf mesophyll cells to the atmosphere through stomata. This produces a tension that pulls water out of leaf xylem toward the mesophyll cells. The cohesion of water molecules and adhesion of water molecules with vessels and tracheids of xylem allows unbroken columns of water to be pulled up the narrow vessels and tracheids of stem xylem. This in turn pulls water up root xylem, forming a continuous column of water from root xylem to stem xylem to leaf xylem. As water moves upward in the root, it produces a pull that causes soil water to diffuse into root.

**23. Write a note on Stroke.**  
**Ans. Stroke:** - (MTN-II-2018-A)

- It is also known as Cerebral Infarction.
- It is necrosis or death of neural tissue due to blockage of blood supply to neural tissue and hence lack of O<sub>2</sub> to neural tissue.
- It occurs due to embolus or locally formed the thrombus.

**24. Differentiate between Thrombus and Embolus.**  
 (MTN-II-2018-A) (BWP-17-A)

Thrombus	Embolus
Thrombus is a solid mass or plug of blood clot in a blood vessel.	It is blood clot that after formation is dislodged and carried to some other location in the circulatory system.

**25. Define antiserum.**  
**Ans. Antiserum:** - (BWP-2015-A)

- Antiserum is human or non-human blood serum containing antibodies against specific antigens.
- It is injected in the body to treat or protect against specific diseases.
- Antiserum from animals are most often used.

**26. What is Open Circulatory System? Give an example.**  
 (BWP-2015-A)

**Ans. Open Circulatory System With An Example:** -

- A circulatory system in which blood does not remain enclosed in the blood vessels and flows within the body cavities and bathes the tissues is called Open Circulatory System.
- Blood is pumped by a heart which propels it into blood vessels which open into sinuses (reduced body cavities) from where it is driven back into the heart.
- Exchange of materials occurs between blood and tissues when blood directly bathes the tissues.
- It does not transport gases, that being transported by Tracheal System.

**Example:** -  
 Cockroach

**27. Differentiate between Pulmonary and Systemic Circulation.**  
 (BWP-2016-A) (DGK-I-17) (SAH-17, 19-A)

**Ans.**

Pulmonary Circulation	Systemic Circulation
1. It is the part of circulatory system which delivers blood to and from the lungs for oxygenation.	1. It is the part of circulatory system that delivers blood to and from the tissues and organs of the body.
2. Pulmonary circulation connects the heart and lungs.	2. Systemic Circulation connects the heart with all body tissues.
3. Blood flows through the pulmonary circulation in the following sequence: Right atrium → Right Ventricle → Pulmonary Arteries → Pulmonary Capillaries (in lungs) → Pulmonary Veins → Left atrium	3. Blood flows through systemic circulation in the following sequence: Left atrium → Left Ventricle → Aorta → Arteries in body tissues → Arterioles in body tissues → Capillaries in body tissues → Venules in body tissues → Veins in body tissues → Vena cava → Left atrium

**Solved Past Papers (2007-2019)**

**28. What is Hemorrhage? Give its cause.** (BWP-2017-A)  
**Ans. A) Haemorrhage:** -

- It is the discharge or escape of blood from blood vessels.
- The hemorrhage may occur any where in the body. But the most dangerous is the brain hemorrhage causing stroke which occurs due to bursting of any of the artery supplying the brain.

**B) Cause of Hemorrhage:** -  
 Hardening of arteries, loss of elasticity of arteries due to atherosclerosis, formation of clot due to thrombo-embolism and high blood pressures (hypertension) are the cause of hemorrhage.

**29. Differentiate between Apoplast and Symplast Pathways.** (BWP-2018-A) (FSD-15-A) (DGK-II-19-A)

Apoplast Pathway	Symplast Pathway
1. In this pathway water flows through cell walls.	1. In this pathway water flows directly through the plasma membranes and the protoplasts of the cells, passing from one cell to the next by way of the plasmodesmata.
2. This pathway becomes discontinuous in the endodermis due to casparian strips and then water must pass through the membrane and protoplast of endoderm cells before it can reach the xylem.	2. This pathway does not become discontinuous and water flows upto xylem through this pathway.

**30. What are Oedema and Leukemia?** (FSD-2016-A)  
**Ans. B) Leukemia:** -

- The uncontrolled production of the white blood cells (leucocytes) is called Leukemia.
- It is a malignant disorder of haemopoietic tissues.
- It is caused by cancerous mutation in the myelogenous (bone marrow cells) or lymphogenous cells.
- It is characterized by greatly increased numbers of incompletely differentiated and defective white blood cells.

**31. Where stomata are found in isobilateral leaf?**  
 (FSD-2016-A)

**Ans. Place of Stomata Found in Isobilateral Leaf:** -  
 Stomata are found in isobilateral leaf in both upper and lower epidermis.

**32. Differentiate between Band T lymphocytes.**  
 (FSD-2018-A)

**Ans.**

T-Lymphocytes	B-Lymphocytes
1. They arise from bone marrow Thymus.	1. They arise from bone marrow of gut associated lymphoid tissues.
2. They take part in cell-mediated immune responses.	2. They take part in humoral or antibody-mediated immune responses.
3. They defend against pathogens including protists and fungi that enter the cells.	3. They defend against viruses and bacteria that enter the blood and lymph.

**33. What is Brain Haemorrhage? Give its two preventive measures.**  
 (RWP-2015-A)

- Ans. A) Brain Haemorrhage:** -
- It is the discharge of blood from blood vessels of brain.
  - It occurs due to bursting of any of the artery supplying the brain.
  - It causes stroke.

**B) Two Preventive Measures of Brain Haemorrhage:**

- To avoid brain hemorrhage blood pressure must be controlled between normal limits.
- To avoid brain hemorrhage, take less amount of cholesterol in food.

**34. What are Hydathodes?**  
**Ans. Hydathodes:** - (RWP-2016-A)

- They are openings of water secreting glands.
- Hydathodes are situated in special group of cells near the ends of small veins in leaves.

**35. Define stroke and write its effects.**  
 (RWP-I-2017, 14-A)

**Ans. A) Stroke:** -

- It is necrosis or death of the part of brain.
- It occurs due to interruption of blood supply and hence oxygen to brain.
- It is also known as Cerebral Infarction

**B) Effects of Stroke:** -

- The effects of stroke vary from person to person based on the type, severity, location, and number of strokes.
- Stroke usually affects one side of the brain.

**36. How guttation differ from imbibition?**  
 (RWP-II-2017-A)

**Ans. Guttation Different From Imbibition:** -

Guttation	Imbibition
1. It is exudation of liquid water from plants that takes place through water secreting glands or hydathodes.	1. It is the absorption of water and swelling of hydrophilic substances.
2. It takes place at night when transpiration is suppressed.	2. It may take place any time when moisture or water is available.
<b>Example:</b> - The dew drops that can be seen on the tips of grass leaves are actually guttation droplets exuded from hydathodes.	<b>Example:</b> - Seeds swell by absorbing water when they are placed in water.

**B) Passive Immunity:** -

- It is a type of immunity which is not developed by the body itself, instead it develops when antibodies or activated T-lymphocytes enter the body from an outside source to make a person immune against a disease.

- b. It is either natural as in the transfer of antibodies from mother to fetus across placenta or artificial by inoculation of antiserum containing antibodies or lymphocytes formed in another person.
- c. It affords protection for a limited period.
- d. It provides immediate protection.

37. What is meant by systemic circulation? (RWP-2018-A)

Ans. Systemic Circulation: -

- a. It is the part of circulatory system that delivers blood to and from heart and the tissues and organs of the body.
- b. Systemic Circulation connects the heart with all body tissues.
- c. Systemic Circulation is by systemic arch distributing blood to different parts of the body and the blood returns from the body to the heart in the right atrium via precaval and postcaval. Blood flows through systemic circulation in the following sequence:  
Left atrium → Left Ventricle → Aorta → Arteries in body tissues → Arterioles in the capillaries of body tissues → Venules in body tissues → Vena → cava → Left atrium

38. Give the preventive measures of Haemorrhage. (SGD-2015-A)

Ans. Preventive Measures of Hemorrhage: -

- Taking of less cholesterol in food
- Maintenance of normal blood pressure.
- Do not become over weight.
- Do regular exercise.
- Avoid stress and tension.

39. How Systolic Pressure differ from Dastolic pressure? (SGD-2016-A)

Ans. Systolic Pressure Different From Dastolic Pressure: -

Systolic Blood Pressure	Diastolic Blood Pressure
1. It is the force exerted by blood on the walls of arteries when ventricles contract.	1. It is the blood pressure on the walls of arteries when ventricles relax.
2. Systolic blood pressure in normal individuals is 120 mmHg.	2. Diastolic pressure in normal individuals ranges between 75-85 mmHg.

40. Differentiate between active transport and facilitated diffusion. (SGD-2017-A)

Active Transport	Facilitated Diffusion
1. The process of using a carrier protein to move molecules up a concentration gradient is called active transport.	1. It is the process of using carrier protein to move molecules down the concentration gradient.
2. This transport takes place at the expense of cells metabolic energy-ATP.	2. In facilitated diffusion no additional energy has to be supplied.

41. Define ECG.

Ans. ECG: -

- a. Recording of electric potential of heart is called Electrocardiogram (ECG or EKG).
- b. It helps to diagnose the abnormalities in the rhythmicity and conduction system of the heart.
- c. Heart chambers contract by nerve impulse. As each wave of contraction spreads through the heart, electric currents flow into the tissues surrounding the heart and onto the body surface. By placing electrodes on and onto the body surface, electric activity can be amplified and recorded by an electrocardiograph. The graph produced is called an electrocardiogram or ECG or EKG.
- d. The machine which takes electrocardiogram is called ECG machine.

42. How stomata open? Give one method. (SGD-2018-A)

Ans. One Method Showing How Stomata Open: -

- Potassium ions move from epidermal cells into guard cells under the influence of light and low level of CO<sub>2</sub> in the leaf. Water follows these ions and enters guard cells which become turgid and stomata open.

43. Give any two reasons for thrombus Formation. (D.G.K-I-2014-A)

Ans. Two Reasons for Thrombus Formation: -

- Irritation or infection of lining of blood vessels
- Reduced rate of blood flow due to long periods of inactivity

44. What is edema and describe its types. (D.G.K-II-2014-A)

Ans. A) Edema: -

- Edema means the presence of excess fluid in the tissues of the body.
- It disturbs the exchange and concentration of minerals and ions in the blood and body cells, affects blood pressure, increases heart load etc.

B. Types of Edema: -

- Intracellular Edema: -**
  - It is the excess fluid in the cells.
  - It is caused by osmosis of water into the cells.
  - It causes depression of metabolic systems especially K<sup>+</sup> and Na<sup>+</sup> pump (due to lack of nutrients and O<sub>2</sub> in the tissues).
- Extracellular Edema: -**
  - It is the excess fluid outside the cells in tissues.
  - It may be the result of abnormal leakage of fluid from the blood capillaries or failure of the lymphatic system to return fluid from interstitial fluid.
  - It is caused by renal retention of salts and water.

45. What are platelets? (D.G.K-II-2015-A)

Ans. A) Blood Platelets: -

- Platelets are tiny spherical or disc-shaped fragments of large cells called megakaryocytes in the bone marrow that lack nuclei.

B) Function of Platelets: -

- Platelets play an important role in blood clotting. They help in conversion of fibrinogen, a soluble protein into insoluble form, fibrin. The fibrin threads entangle

red blood cells and other platelets in the area of damaged tissue, ultimately forming a blood clot. The clot serves as a temporary seal to prevent bleeding until the damaged tissue can be repaired.

46. What is Facilitated Diffusion? Give Its function. (D.G.K-II-2016-A)

Ans. A) Facilitated Diffusion: -

It is the diffusion which takes place through the carrier protein molecules of the cell membrane.

B) Function of Facilitated Diffusion: -

It transports some molecules of minerals through the epidermal cells of roots.

47. What are the preventive measures for the irradiation of Haemorrhage problems? (D.G.K-II-2016-A)

Ans. Preventive Measures For the Irradiation of Haemorrhage Problems: -

- Taking less amount of cholesterol in food.
- Maintenance of normal blood pressure.
- Do not become overweight.
- Do regular exercise.
- Avoid stress and tension.

48. How sieve cells and companion communicate? (D.G.K-I-2017-A)

Ans. Communication of Cells and Companion Cells: - Sieve cells and companion communicate through plasmodesmata.

49. Differentiate between Active transport and Diffusion. (D.G.K-I-2018-A)

Ans.

Diffusion	Active Transport
1. Diffusion is the net movement of a kind of molecules from an area of higher concentration to an area of lower concentration.	1. The process of using a carrier protein to move molecules up a concentration gradient is called active transport.
2. Diffusion is due to kinetic energy found in the individual molecules and does not require any cellular energy in the form of ATP.	2. This transport takes place at the expense of cells metabolic energy-ATP.
3. It is not specific and may and may not be carried by carrier protein molecules. It may or may not take place through membrane.	3. Active transport is very specific. Only certain molecules or ions are able to be moved in this way and must be carried by the proteins in the membrane.
4. It takes place in the living as well as non-living systems.	4. It occurs in living systems.

50. Cell Mediated Response: -

- It is the direct immune response in which T lymphocyte cells recognize antigen, then combat microorganisms and/or affect the rejection of foreign tissue (in case of tissue transplant).
- In cell mediated response, a kind of lymphocytes originates in bone marrow, but instead of migrating straight to the lymph nodes, it first goes to the thymus gland where it is turned into T lymphocytes. These T lymphocytes themselves, rather than antibodies, attack the antigen on intracellular pathogens, tumor cells or other foreign tissues.

51. What is bursa of fabricius? (D.G.K-II-2018-A)

Ans. Bursa of Fabricius: -

- It is a blind sac that is connected by a small duct to dorsal of cloaca of young birds.
- It functions as a lymph gland during the first two to three months after chicken hatches. It is the structure where B lymphocytes mature. It plays an important role in developing immunity by producing antibodies.

52. Differentiate between open and closed circulatory systems. (SAH-2014-A)

Ans.

Open Circulatory System	Closed Circulatory System
1. The blood does not remain enclosed in blood vessels and comes in direct contact with surrounding tissues and bathes them.	1. The blood circulates through closed blood vessels and does not come out at any place in direct contact with the surrounding tissues.
2. It has no typical arteries, veins and capillaries and blood, circulates in the cavities or sinuses. Blood is called hemolymph and the cavities or sinuses with blood are collectively known as hemocoel.	2. It consists of interconnected system of arteries, veins and capillaries.
3. Blood is pumped by a heart which propels it into blood vessels which open into sinuses from where it is driven back into the heart.	3. Blood is pumped by the heart rapidly around the body under sustained high pressure and back to the heart.
4. Exchange of materials occurs between blood and tissues when blood directly bathes the tissues.	4. Exchange of materials occurs across the walls of blood capillaries between the blood and tissues via tissue fluid.
5. It does not transport gases which are transported by Tracheal System.	5. It also transport gases i.e. oxygen and carbon dioxide.
Example: - Cockroach	Example: - Earthworm

53. What do you mean by plasmodesmata? (D.G.K-I-2018-A)

Ans. Plasmodesmata:-

- Plasmodesmata are cytoplasmic strands that extend through pores in adjacent cell walls.
- They connect cytoplasm of neighbouring cells.
- They allow exchange of materials between adjacent living cells.

54. What is cell mediated response? (D.G.K-II-2018-A)

Ans. Cell Mediated Response:-

- It is the direct immune response in which T lymphocyte cells recognize antigen, then combat microorganisms and/or affect the rejection of foreign tissue (in case of tissue transplant).
- In cell mediated response, a kind of lymphocytes originates in bone marrow, but instead of migrating straight to the lymph nodes, it first goes to the thymus gland where it is turned into T lymphocytes. These T lymphocytes themselves, rather than antibodies, attack the antigen on intracellular pathogens, tumor cells or other foreign tissues.

55. What are lymph nodes? What is their function? (SAH-2015-A)

Ans. A) Lymph Nodes:-

- Lymph nodes are masses of connective tissue at certain pathway through the course of lymph vessels.
  - Lymph nodes vary considerably in size from microscopic to about one inch in diameter.
  - Each node consists of a thin, fibrous, outer capsule and inner mass of lymphoid tissue containing antibodies, lymphocytes and macrophages.
  - Several afferent lymph vessels enter each lymph node carrying lymph from lymph vessel into lymph node, while a single large efferent lymph vessel brings back lymph from lymph nodes into the lymph vessel.
- Lymph nodes are present in the neck region, axilla and groin of humans.

B) Function of Lymph Nodes:-

Lymph nodes act as filters that trap microorganisms and other foreign bodies in the lymph. The lymphocytes and macrophages present in the lymph nodes destroy the bacteria and viruses.

### SECTION III

#### LONG QUESTIONS

- Explain transpiration as necessary evil. (4)  
(LHR-I-2014-A) (MTN-16-A) (RWP-16, 18-A)  
(GRW-16-A) (LHR-II-15-A)
- What are lymph nodes? Give their functions. (4)  
(LHR-II-2014-A)
- Give functions of lymphatic system. (4)  
(LHR-I-2015, 19-A) (DGK-I-17-A) (FSD-17-A)  
(LHR-I-19-A)

4. What is myocardial infarction? Explain. (4)  
(LHR-I-2016-A) (DGK-I-15,

- Soil water moves and reaches to xylem by various pathways, explain. (LHR-I-2017-A) (DGK-I-19-A) (4)
- How CO<sub>2</sub> Concentration and humidity affect the rate of transpiration? (LHR-II-2018-A) (4)
- Explain different functions of human blood. (4)  
(GRW-2015,
- What is cardiac cycle? Describe its phases. (4)  
(GRW-2018-A) (SAH-19,
- Describe influx of K<sup>+</sup> ions hypothesis to explain the opening and closing of stomata. (RWP-2014-A) (4)
- Describe cohesion tension theory about ascent of sap. (RWP-2016-
- Write a note on white blood cells. (SGD-2015-A) (4)
- Write a note on active immunity and passive immunity. (FSD-2015-A
- Explain different hypothesis for opening and closing of stomata. (FSD-2016-A) (GRW-14-A) (4)
- (RWP-II-17-A) (BWP-17-A) (DGK-I-1
- Explain the structure of heart of man. (FSD-2018-
- Describe the composition of Blood Plasma. (MTN-2014-A) (RWP-I-17-
- Define Root Pressure. Explain its role in Ascent of sap. (MTN-2015-
- Explain uptake of water by roots, give different pathways taken up by water. (MTN-II-2017-A)
- Give detailed account of Thalassemia. (MTN-I-2018
- Compare closed and open circulatory system. (MTN-II-2018
- Describe Blood Pressure and rate of flow of Blood. (BWP-2014
- Give four functions of Blood. (BWP-2015-A) (LHR-II-16
- Give an account of Blood Plasma. (BWP-2016-A)
- Define immunity. Discuss its types. (FSD-14-A) (SGD-19-A) (BWP-17-A) (DGK-II-16
- Write detail account for functions of blood. (D.G.K-II-2014-A) (BWP-19-A) (DGK-I
- Write a note on cohesion tension theory. (LHR-II-19-A) (SAH-15, 16
- What is transpiration? (D.G.K-II-2017-A) (MTN-I-17, 18
- Write a note on lymphatic system of man. (D.G.K-II-2018-A) (SGD-I-
- How arteries are different from veins? (SAH-A-2014-A) GRW-17-A) (RWP-I-
- Explain pressure flow theory for translocation of food in plants. (4) (SAH-A-2016, 17-

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