

Answer to this Paper must be written on the paper provided separately.
You will not be allowed to write during first 15 minutes.
This time is to be spent in reading the question paper.
The time given at the head of this Paper is the time allowed for writing the answers.
Section A is compulsory. Attempt any four questions from Section B.
The intended marks for questions or parts of questions are given in brackets [].

SECTION A (40 MARKS)
(Attempt all questions from this Section)

1. **Question 1: Choose the correct answers to the questions from the given options. [15]**
(Do not copy the question, write the correct answers only.)
- (i) In which condition of the day amongst the following the transpiration will be maximum? [1]
- a) Humid and cool b) Humid and windy
c) Hot, dry, windy d) Hot and humid
- (ii) A grown-up cell divides when the maximum size is attained and which disturb the _____. [1]
- a) Chromosome-Hormone ratio b) Chromosome-cytoplasm ratio
c) Enzyme-Hormone ratio d) Kern-plasma ratio
- (iii) From which of these, tears come? [1]
- a) Eyeball b) Vitreous chamber
c) Lachrymal glands d) Aqueous chamber
- (iv) Which one of the following is a greenhouse gas? [1]

a)Oxygen

b)Nitrogen

c)Methane

d)Sulphur dioxide

(v) While recording the pulse rate, where exactly does a doctor press on our wrist? [1]

a) Vein

b)Capillary

c)Artery

d)Nerve

(vi) **Assertion (A):** Ozone depletion can be reduced by limiting the use of air conditioners and refrigerators. [1]

Reason (R): Air conditioner and refrigerators release chlorofluorocarbons in the atmosphere that destroy ozone.

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

b)Both A and R are true but R is not the correct explanation of A.

c)A is true but R is false.

d)A is false but R is true.

(vii) Birth rate is the number of lives birth [1]

a)per 1000 people per decade

b)per 100 people per year

c)per 100 people per decade

d)per 1000 people per year

(viii) Ultrafiltrate generated by the glomerulus is having all the constituents of the blood plasma except [1]

a)RBC

b)All of these

c)protein

d)WBC

(ix) The first stable product formed during CO₂ fixation is [1]

a)oxygen

b)abscisic acid

c)glucose

d)Phosphoglyceric Acid (PGA)

(x) Which one of the following is the correct route during the transport of sperm in male (human)? [1]

- a) Epididymis → Vas deferens → Urethra b) Vas deferens → Epididymis → Urethra
- c) Epididymis → Urethra → Vas deferens d) Urethra → Epididymis → Vas deferens

(xi) A chromosome when present in condensed form, consists of [1]

- a) one chromatid b) four chromatids
- c) two chromatids d) five chromatids

(xii) Cretinism and myxoedema are due to [1]

- a) Hyposecretion of thyroxine b) Hypersecretion of thyroxine
- c) Hyposecretion of growth hormone d) Hypersecretion of growth hormone

(xiii) The gradual continuous increase in average temperature of surface of the earth as a result of increase in concentration of CO₂ and CFCs is termed as [1]

- a) greenhouse effect b) ozone degradation
- c) montreal protocol d) global warming

(xiv) Given below are the adaptations found in leaves to favour the occurrence of photosynthesis process. Select a statement which is incorrect. [1]

- a) Large surface area of leaves b) Presence of numerous stomata
- c) The thinness of leaves d) Increased chloroplasts on lower surface

(xv) A mixed nerve [1]

- a) has two or more roots from different parts of brain b) has a common root but branches into two nerves to different organs
- c) carries sensations from two or more different sense organs d) contains both sensory and motor fibres

2. **Question 2** [25]

(i) Name the following:

- i. The phenomenon by which living or dead plant cells absorb water by surface attraction. [1]
- ii. An apparatus that measures the rate of water uptake in a cut shoot due to transpiration. [1]
- iii. The loss of water from the injured parts of the plant. [1]
- iv. Hormones that regulate the secretion of other endocrine glands. [1]
- v. The gland that is also called hypophysis. [1]

(ii) Arrange and rewrite the terms in each group in the correct order so as to be in a logical sequence beginning with the term that is underlined.

- i. Given below is the set of five terms. Rewrite the terms in logical sequence as directed at the end of each statement. [1]
Vagina, ovary, uterus, oviduct, cervix. (pathway of egg after ovulation)
- ii. Gyri and sulci are the folds of the cerebellum. [1]
- iii. Rewrite the completed explanation by inserting the key word in the space indicated by ^.
Osmosis is the movement of water molecule from its region of higher concentration to region of lower concentration through a ^ membrane. [1]
- iv. Osmosis is active transport of molecules in cells. [1]
- v. Adenine : Thymine :: Cytosine : _____ [1]

(iii) Fill in the blanks with suitable words:

- i. Copy and complete the following by filling in the blanks 1 to 5 with appropriate words. [5]
The human female gonads are ovaries. A maturing egg in the ovary is present in a sac of cells called (i)_____. As the egg grows larger, the follicle enlarges and gets filled with a fluid and is now called the (ii)_____ follicle. The process of releasing the egg from the ovary is called (iii)_____. The ovum is picked up by the oviduct funnel and fertilization

takes place in the (iv)_____. In about a week the blastocyst gets fixed in the endometrium of the uterus and this process is called (v)_____.

(iv) **Choose the odd one out from the following terms and name the category to which the others belong:**

i. Urethra, uterus, urinary bladder, ureter. [1]

ii. ACTH, TSH, ADH, FSH [1]

iii. Addison's disease, Cushing's Syndrome, Acromegaly, Leukemia. [1]

iv. Detergents, X-rays, Sewage, Oil spills [1]

v. Syringes, Soiled dressings, Discarded needles, Household detergents: [1]

(v) **Match the items given in Column I with the most appropriate ones in Column II and rewrite the correct matching pairs.**

i. Match the following columns. [5]

Column I	Column II
(a) Liver	(i) Knot-like tuft of blood capillaries in Bowman's capsule.
(b) Skin	(ii) Breakdown of proteins.
(c) Kidney	(iii) Sweat glands.
(d) Glomerulus	(iv) Bean-shaped excretory organ.

Section B

Attempt any 4 questions

3. **Question 3** [10]

(i) State Mendel's law of segregation. [1]

(ii) Briefly explain the sex-linked inheritance. [2]

(iii) Describe cell division. List various types of cell division. Also mention about the need of cell division? [2]

(iv) List any three features of garden pea with their dominant and recessive traits. [2]

- (v) A certain species has three pairs of chromosomes- an acrocentric pair and two metacentric pairs. Draw a cell of this species as it would appear in metaphase of mitosis. [3]

4. **Question 4** [10]

- (i) What is the function of ear ossicles? [1]
- (ii) Given below are two structures, write their special functional activity. [2]
- i. Myelin sheath
 - ii. Relay neuron
- (iii) During a street fight between two individuals, mention the effects on the following organs by the autonomous nervous system, in the table given below (one has been done for you as an example). [2]

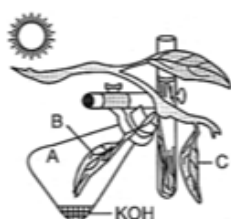
Organs	Sympathetic Nervous System	Parasympathetic Nervous System
Lungs	Dilates bronchi and bronchioles	Constricts bronchi and bronchioles
Pupil of the eye		
Salivary gland		

- (iv) Name the part of human brain which is concerned with the following [2]
- i. Seat of memory
 - ii. Coordinates muscular activity
- (v) Draw a well labelled diagram of a neuron and name the following parts: [3]
- i. Node of Ranvier
 - ii. Nissl's granules
 - iii. Cyton

5. **Question 5** [10]

- (i) State the main function of guard cells. [1]

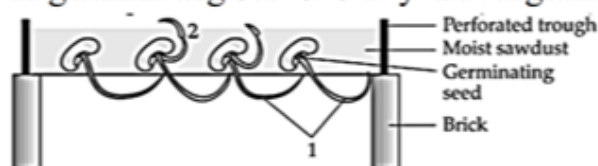
- (ii) What conditions enable RuBisCO to function as an oxygenase? Explain the ensuring process. [2]
- (iii) Plants have several pigments that can catch light energy. Two of these are chlorophyll-a and chlorophyll-b, which harness light of different wavelengths. What advantage does a plant obtain by having molecules that act at different wavelengths? [2]
- (iv) Explain briefly. [2]
- Respiration is said to be the reversal of photosynthesis.
 - Mention any two adaptations of plants for photosynthesis.
 - Name the place where dark reactions occur.
- (v) The figure given below represents an experiment to demonstrate a particular aspect of photosynthesis. The alphabet **B** represents a certain condition inside the flask. Observe the diagram and then answer the following questions. [3]



- What is the aim of the experiment?
- What happened to the leaf when tested with iodine?
- Which chemical can be used as an alternative of KOH?

6. Question 6 [10]

- (i) During which phase in cell cycle, proteins and RNA are synthesised for distribution to the daughter cells? [1]
- (ii) Differentiate between G_1 and G_2 -phase. [2]
- (iii) Given below is an experimental setup to demonstrate a particular tropic movement in germinating seeds. Study the diagram and answer the questions that follow: [3]



(i) Label the parts 1 and 2.

- a. Label the parts 1 and 2
- b. Name the tropic movement shown by part 1.
- c. What is thigmotropism? Give one example.

7. Question 7 [10]

- (i) Who proposed the theory of **Natural Selection**? [1]
- (ii) Explain Darwin's concept of natural selection. [2]
- (iii) Describe Lamarck's theory of evolution. [2]
- (iv) Mention three main reasons for the sharp rise in human population in the world. [2]
- (v) Given below is a diagram of a human blood smear. Study the diagram and answer the questions that follow: [3]

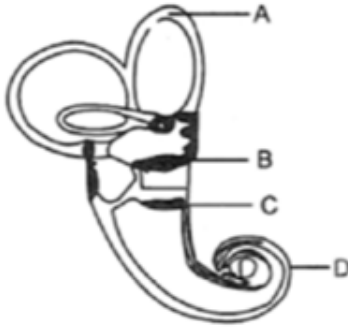


- a. Name the components numbered 1 to 4.
- b. Mention two structural differences between the parts 1 and 2.
- c. What is the average lifespan of the component numbered 1?

8. Question 8 [10]

- (i) When separated by a semipermeable membrane, water enters the sugar solution. [1]
What would we call the sugar solution, osmotically active or inactive? Why?
- (ii) From where to where do the following blood vessels carry blood? [2]
 - i. Hepatic vein
 - ii. Hepatic portal vein
- (iii) Answer the following. [2]
 - i. Name the greenhouse gases that cause global warming.
 - ii. Which of them caused ozone hole and how?

- (iv) The diagram given below represents the structure found in the inner ear. Study the same and then answer the questions that follows: [3]



- Name the part of the ear responsible for transmitting impulses to the brain.
- Name the audio receptor cells which pick up vibrations.
- Name the fluid present in the inner ear.

Section A

1. Question 1: Choose the correct answers to the questions from the given options. (Do not copy the question, write the correct answers only.)

(i) (c) Hot, dry, windy

Explanation: {

Hot, dry, windy

(ii) (d) Kern-plasma ratio

Explanation: {

A disturbance in the nucleoplasmic ratio will cause the cell to divide and attain stable ratio which is 1. If it is less or more than 1 the cell becomes unstable and divides again.

(iii)(c) Lachrymal glands

Explanation: {

Tears comes from Lachrymal glands.

(iv)(c) Methane

Explanation: {

Methane

(v) (c) Artery

Explanation: {

Artery

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

Explanation: {

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

(vii)(d) per 1000 people per year

Explanation: {

Bith rate is per 1000 people per year.

(vii)(a) RBC

Explanation: {

RBC

(ix)(d) Phosphoglyceric Acid (PGA)

Explanation: {

Phosphoglyceric Acid (PGA)

(x) (a) Epididymis → Vas deferens → Urethra

Explanation: {

Sperm is transported from Epididymis → Vas deferens → Urethra

(xi)(c) two chromatids

Explanation: {

two chromatids

(xii)(a) Hyposecretion of thyroxine

Explanation: {

Hyposecretion of thyroxine

(xiii)(d) global warming

Explanation: {

global warming

(xiv)(d) Increased chloroplasts on lower surface

Explanation: {

Increased chloroplasts on lower surface

(xv)(d) contains both sensory and motor fibres

Explanation: {

Mixed nerve contains both sensory and motor fibres.

2. Question 2

(i) Name the following:

- i. 1. Imbibition
- ii. 1. Potometer
- iii. 1. Bleeding
- iv. 1. Tropic hormones
- v. 1. Pituitary gland
2. Pituitary

(ii) Arrange and rewrite the terms in each group in the correct order so as to be in a logical sequence beginning with the term that is underlined.

- i. The logical sequence is ovary, oviduct, uterus, cervix and vagina.
- ii. Gyri and sulci are the folds of cerebrum.
Cerebellum only contains gyri and not sulci.
- iii. Osmosis is the movement of water molecule from its region of higher concentration to region of lower concentration through a semipermeable membrane.
- iv. Osmosis is passive transport of molecules in cells.

v. Guanine

(iii) Fill in the blanks with suitable words:

- i. (i) follicle, (ii) graafian, (iii) ovulation, (iv) fallopian tube/oviduct/uterine tube, (v) implantation

(iv) Choose the odd one out from the following terms and name the category to which the others belong:

- i. **Odd term** - Uterus, a part of reproductive system.

Category - Organs of excretory system

- ii. **Odd term** - ADH

Category - Hormones of anterior lobe of pituitary gland.

- iii. **Odd term** - Leukemia

Category - Hormonal / Endocrinal disorders

- iv. **Odd Term** : X-rays

Category: Water pollutants

- v. **Odd term**: Household detergents

Category: Biomedical Wastes

(v) Match the items given in Column I with the most appropriate ones in Column II and rewrite the correct matching pairs.

- i. (a) - (iii), (b) - (iv), (c) - (v), (d) - (ii)

Section B

3. Question 3

(i) Law of segregation states that the two contrasting factors do not mix in the F_1 hybrids but segregate or separate from each other at the time of gamete formation.

(ii) Sex-linked inheritance is the appearance of a trait which is due to the presence of an allele exclusively located on X-chromosome or Y-chromosome. This can be classified into two types X-linked inheritance and Y-linked inheritance.

(iii) Cell division, cell reproduction or cell multiplication is the process of formation of new daughter cells from the pre-existing cell or parent cell. It is of three types

i. Amitosis

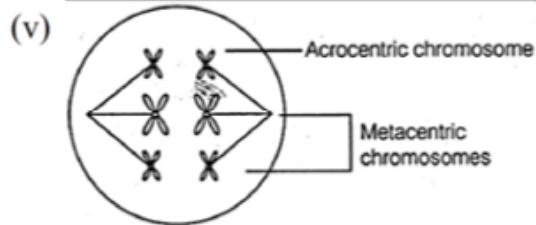
ii. Mitosis

iii. Meiosis.

A cell divides when it attains the size and the nucleocytoplasmic ratio disturbs. The DNA duplication also causes a cell to divide.

(iv)

Character	Dominant	Recessive
Stem height	Tall	Short
Colour of seed	Yellow	Green
Shape of seed	Round	Wrinkled



4. Question 4

(i) Amplifies sound vibration received by the tympanum and transmit it to inner ear/transfers sound vibrations from tympanum to cochlea.

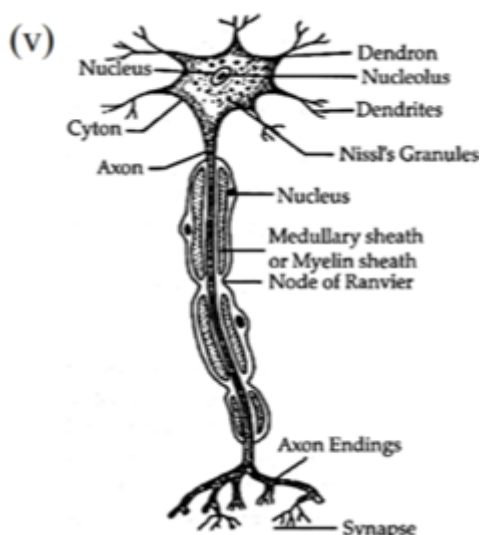
- (ii) i. **Myelin sheath:** It provides an insulation around the axon for increasing the speed of impulses.
 ii. **Relay or connecting neuron:** It serves as a link between the sensory and motor neuron. These are mainly found in brain and spinal cord.

(iii)

Organs	Sympathetic Nervous System	Parasympathetic Nervous System
Lungs	Dilates bronchi and bronchioles	Constricts bronchi and bronchioles
Pupil of the eye	Dilates Pupil	Constricts Pupil
Salivary gland	Inhibits salivary glands and digestive glands	Stimulate salivary glands and digestive glands

(iv) i. Part associated with seat of memory is cerebrum of the brain.

ii. The part that coordinates muscular activity is cerebellum of the brain.



5. Question 5

- (i) Guard cell regulate CO_2 influx from the atmosphere into the leaves for photosynthetic carbon fixation. Stomatal guard cells also regulate water loss of plants via transpiration to the atmosphere.
- (ii) Carboxylation is the most crucial step of the Calvin cycle, where CO_2 is utilised for the carboxylation of RuBisCO. This reaction is catalysed by the enzyme RuBP carboxylase which results in the formation of 2 molecules of 3PGA. Since, this enzyme also has an oxygenation activity, it would be more correct to call it RuBP carboxylase-oxygenase or RubBisCO.
- (iii) Chlorophyll has various pigments like a and b. These pigments have a tendency to absorb different light or different wavelengths. Thus, this characteristic feature of various pigments of chlorophyll makes them most effective for photosynthesis.
- (iv) i. Respiration is a catabolic process while photosynthesis is an anabolic process. During respiration, O_2 is taken in and CO_2 is given out while during photosynthesis, CO_2 is taken in and O_2 is given out.
ii. Two adaptations of plant for photosynthesis are:
 - a. Large surface area of the leaves.
 - b. Presence of chloroplasts.
- iii. Dark reactions occur in the stroma of the chloroplast.
- (v) a. The aim of the experiment is to show that CO_2 is necessary for photosynthesis.
b. The leaf inside the flask does not give a blue-black colour when tested with iodine.
c. NaOH can be used as an alternative for KOH.

6. Question 6

(i) RNA and proteins are synthesised in both G₁-phase and G₂-phase.

(ii)	G ₁ -phase	G ₂ -phase
	It is called the first growth period.	It is a post-synthetic phase.
	Its duration is variable.	It lasts for 2-5 years.
	Cells grow in size.	Cell prepares to go into the mitotic phase.

(iii)a. Part 1 and 2 is as follows

1- Radicle

2- Plumule

b. The tropic movement is hydrotropism.

c. Movement of plant in response to touch stimulus.

Example: Pea, Vines, Cuscuta, Cucumber

7. Question 7

(i) Charles Darwin

(ii) According to Darwin's concept of natural selection, the organisms, which are provided with favourable variations would survive because they are fittest to face their surrounding, while the organisms, which are unfit for surrounding variations are destroyed.

(iii)**Lamarck's Theory:** It is known as theory of inheritance of acquired characters. According to this theory, organisms undergo certain changes to adapt themselves to the environment. These characters acquired by an organism during its lifetime, are passed on to the progeny, e.g. the long neck of giraffe was explained by Lamarck, as an outcome of these animals having to stretch their necks constantly to eat the leaves on the upper branches of the trees.

(iv) Three main reasons for sharp rise in human population in the world are:

i. Decreased death rate due to advanced medical facilities.

ii. Increase food availability due to advance agricultural technology.

iii. Fewer infants deaths.

(v) a. Name the components numbered '1' to '4' are as follows:

1. RBC

2. WBC

3. Platelets

4. Plasma

b. Structural differences between part 1 RBC and part 2 WBC are as follows:

RBC	WBC
-----	-----

Biconcave in shape	Amoeboid in shape
Nucleus absent	Nucleus present

c. The average lifespan of RBC is 120 days.

8. Question 8

- (i) The sugar solution is osmotically active because it possesses lower water potential and can cause osmotic entry of water into it.
- (ii) i. Hepatic vein carries blood from liver to posterior vena cava.
ii. Hepatic portal vein carries blood from intestine to liver.
- (iii) i. CO₂, CH₄, N₂O and CFCs.
ii. CFCs cause ozone hole. These are used in refrigerators. They travel up to stratosphere. In the stratosphere, UV-rays act on them and a chlorine atom is released. These chlorine atoms act as catalyst and degrade ozone.
- (iv) a. The auditory nerve is the part of ear responsible for transmitting impulses to the brain.
b. Organ of Corti is the audio receptor cells that pick up vibration.
c. Endolymph is the fluid that is present in the inner ear.