ICSE 2025 EXAMINATION

Sample Question Paper - 13

BIOLOGY

Time: 2 hrs. **Total Marks: 80**

General Instructions:

1. *Answers to this paper must be written on the paper provided separately.*
2. *You will be not allowed to write during first 15 minutes.*
3. *This time is to be spent in reading the question paper.*
4. *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

(Attempt all questions from this Section.)

Question 1

Choose the correct answers to the questions from the given options.
(Do not copy the question, write the correct answer only.) **[15]**

(i) **Assertion (A):** A plant used for experiments on photosynthesis is initially placed in the dark for 24 to 48 hours.
Reason (R): It helps to destarch the leaves.

1. Both A and R are true
2. Both A and R are false
3. A is true and R is false
4. A is false and R is true

(ii) Which of the following shows the correct sequence of the stages of mitosis?

1. Prophase, Metaphase, Anaphase, Telophase
2. Prophase, Metaphase, Telophase, Anaphase
3. Anaphase, Telophase, Prophase, Metaphase
4. Telophase, Anaphase, Prophase, Metaphase

(iii) Smita's urine reports suggested that she was suffering from haematuria. This indicates that her urine contains

1. Bile
2. Glucose
3. Blood
4. Albumin

(iv) The part of the human eye where the rod cells and cone cells are located is the

1. Cornea
2. Retina
3. Choroid
4. Sclera

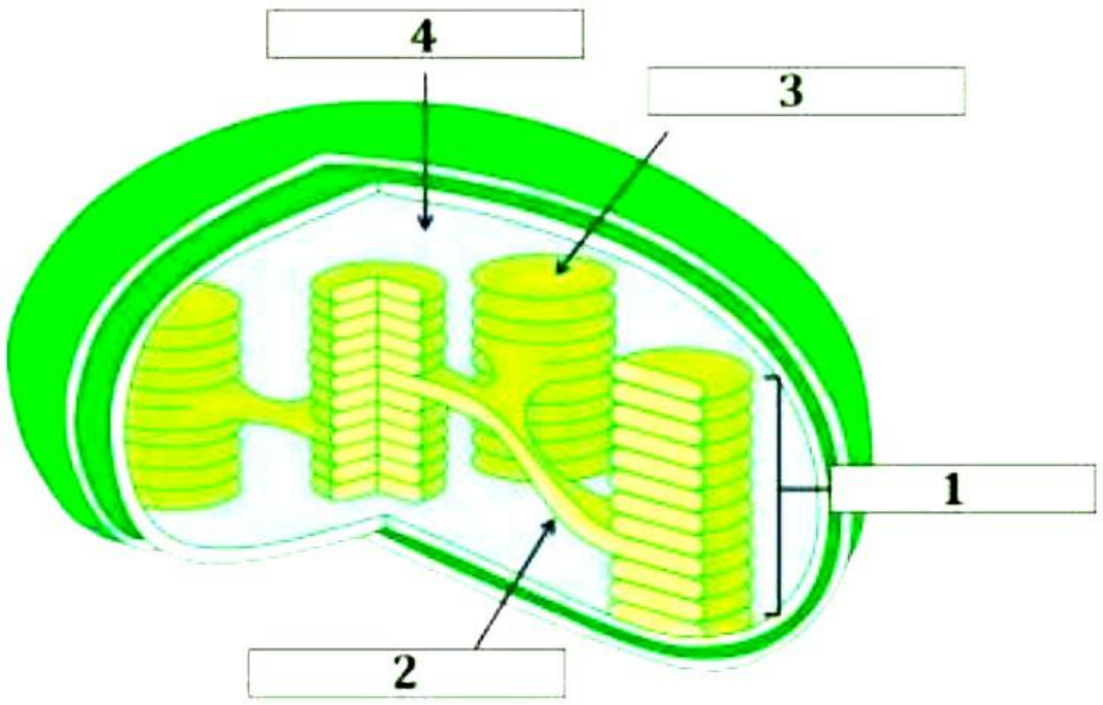
(v) **Assertion (A):** Colour blindness is more common in females than in males.
Reason (R): Males have two X chromosomes while females have only one X chromosome.

1. Both A and R are true
2. Both A and R are false
3. A is true and R is false
4. A is false and R is true

(vi) Which gland secretes both, a hormone, and an enzyme?

1. Pancreas
2. Pituitary
3. Thyroid
4. Adrenal

(vii) Observe the labelled diagram for the structure of chloroplast. In which part does dark reaction of photosynthesis take place?



1. Part 1
2. Part 2
3. Part 3
4. Part 4

(viii) Name the waxy layer on the epidermis of the leaf meant to reduce transpiration.

1. Cuticle
2. Epidermis
3. Xylem
4. Phloem

(ix) What is the scientific name of the garden pea plant used by Mendel for his experiment?

1. *Pisum vulgare*
2. *Pisum sativum*
3. *Pisum fabaceae*
4. *Pisum biflorum*

(x) **Assertion (A):** Carbon monoxide is mainly responsible for the formation of acid rain.
Reason (R): Acid rain causes damage to the vegetation and erosion of ancient monuments, statues, and sculptures.

1. Both A and R are true
2. Both A and R are false
3. A is true and R is false
4. A is false and R is true

(xi) **Assertion (A):** Salt is added to pickles to preserve them.
Reason (R): It helps to kill bacteria by deplasmolysis.

1. Both A and R are true
2. Both A and R are false
3. A is true and R is false
4. A is false and R is true

(xii) Complete stoppage of the menstrual cycle in females is called

1. Menarche
2. Menopause
3. Ovulation
4. Gestation

(xiii) Rashmi was suffering from severe sore throat. She went to the doctor who advised her to gargle with salt water 3-4 times daily. Rashmi followed the doctor's advice and felt relieved in the next 2-3 days.
Which of the following processes finds application in the situation mentioned above?

1. Diffusion
2. Osmosis
3. Osmoregulation
4. Guttation

(xiv) The use of plastic has detrimental effects on the environment. With a view to lessen plastic menace, Satish follows the below practices in his day-to-day life.

I. Avoid using disposable cutlery and straws.
II. Carry your own reusable fabric bag.
III. Ask for plastic bags only when required.
IV. Discard unwanted plastic containers and items in the nearby drainage system.

Which of these practices will certainly help to reduce plastic pollution?

1. I, II
2. II, III
3. III, IV
4. I, IV

(xv) What does CPCB stand for?

1. Central Particulate Control Board
2. Corporate Particulate Control Board
3. Central Pollution Control Board
4. Corporate Pollution Control Board

Question 2

(i) **Name the following:** **[5]**

(a) A pair of corresponding chromosomes of the same shape and size, one obtained from each parent.

(b) The hollow, pear-shaped muscular organ where the embryo develops.

(c) The solvent used to dissolve the chlorophyll pigment while testing a leaf for the presence of starch.

(d) The complex molecule consisting of a DNA strand and a core of histones.

(e) The growth-retarding hormone in plants.

(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.** **[5]**

(a) Outer membrane, Inner membrane, Intermembrane space, Thylakoid, Granum

(b) Afferent arteriole, Renal vein, Capillary network, Glomerulus, Efferent arteriole

(c) *Australopithecus*, *Cro-Magnon, Homo sapiens, Homo erectus, Homo habilis*

(d) Cerebrum, Diencephalon, Cerebellum, Medulla oblongata, Pons

(e) Auditory canal, Cochlea, Tympanum, Ear ossicles, Oval window

(iii) **Match the items given in Column I with the most appropriate ones in Column II and rewrite the correct matching pairs.** **[5]**

Column I	**Column II**
(a) Pupil	1. Industrial waste
(b) Ethylene	2. Glomerulus
(c) SA Node	3. Fruit ripening
(d) Bowman's capsule	4. Shape of the lens
(e) Fly ash	5. Iris
	6. Pacemaker

(iv) **Choose the odd one out from the following terms and name the category to which the others belong:** **[5]**

(a) Transpiration, Photosynthesis, Phagocytosis, Guttation
(b) Plastic bags, Cow dung, Styrofoam, Metallic cans
(c) Thyroid, Thyroxine, Pancreas, Adrenal
(d) Leptotene, Metaphase, Anaphase, Telophase
(e) Ovary, Fallopian tube, Ureter, Uterus

(v) **State the exact location of the following structures.** **[5]**

(a) Spindle fibres
(b) Root hair
(c) Thylakoids
(d) PCT
(e) Thyroid gland

SECTION B

(Attempt any four questions from this section.)

Question 3

(i) What is synapsis? [1]

(ii) Explain the term plasmolysis. Give one application of this phenomenon in our daily lives. [2]

(iii) Suggest two measures to control air pollution. [2]

(iv) Give the exact location and function of thylakoids. [2]

(v) State the structural and the functional unit of the nervous system. Draw a neat and well-labelled diagram to represent the same. [3]

Question 4

(i) What is the role of cerebrospinal fluid? [1]

(ii) Name the hormones which lead to the following conditions: [2]

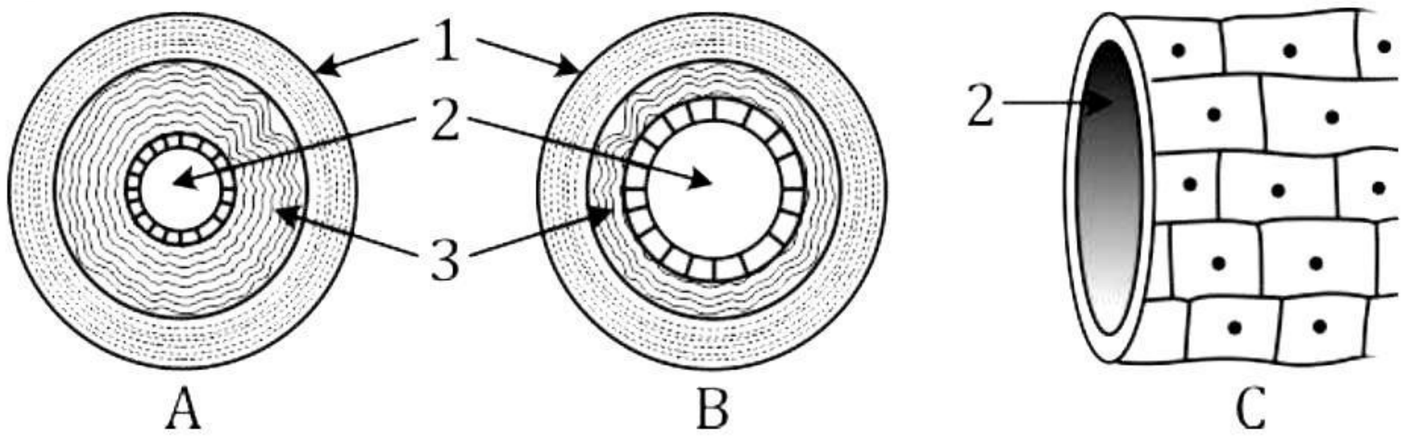
(a) Myxoedema

(b) Gigantism

(iii) 'Kidneys are the master chemist of the body'. Comment. [2]

(iv) Write the common name and the scientific name of the insect involved in the phenomenon of industrial melanism. [2]

(v) The diagrams below are cross-sections of blood vessels. [3]



(a) Identify the blood vessels A, B and C.

(b) Name the parts labelled 1 to 3.

(c) In which of the above blood vessels does the exchange of gases occur?

Question 5

(i) Injury to the medulla oblongata results in death. Give reason. [1]

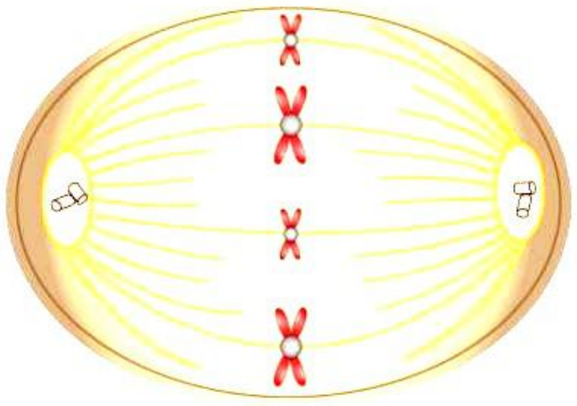
(ii) Three small bones of the ear ossicles are advantageous as compared to one single bone for hearing. Give reason. [2]

(iii) State any two internal factors which affect photosynthesis. [2]

(iv) Draw a neat diagram of the human sperm as seen under high magnification and label the following parts: [2]

1. Acrosome
2. Mitochondria

(v) The diagram below represents a stage during cell division. Study the same and answer the questions which follow: [3]



(a) Identify whether it is a plant cell or an animal cell. Give a reason in support of your answer.

(b) Name the stage depicted in the diagram.

(c) Name the type of cell division which occurs during -

1. Replacement of old leaves by new ones
2. Formation of gametes

Question 6

(i) Expand: ODF [1]

(ii) Differentiate between population density and population explosion. [2]

(iii) Why are pancreas called an exo-endocrine gland? [2]

(iv) Mention any three adaptations found in plants to overcome transpiration. [2]

(v) [3]

(a) Draw a diagram of the nucleus of a cell, having chromosome number 6, as it would appear in the metaphase stage of mitosis and label the following parts in the diagram:
(Aster, Achromatic spindle, Chromatid, Centromere)

(b) Mention the difference between mitosis and meiosis with reference to -

- Number of daughter cells formed at the end of the division.
- The chromosome number of the daughter cells formed.

Question 7

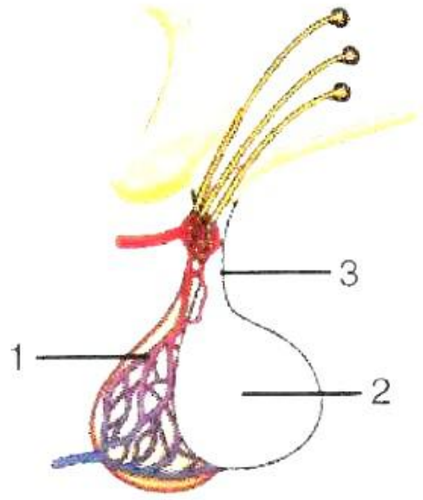
(i) List two natural sources of pollution. [1]

(ii) Name and define the process which occurs in the glomerulus. [2]

(iii) Mention the six ancestral forms in their correct sequence through which modern man has evolved. [2]

(iv) Sex of the child depends on the father. Explain. [2]

(v) The diagram given below shows an endocrine gland in the human body. Study the diagram and answer the following questions: [3]



(a) Identify the gland.

(b) Label the guidelines 1, 2 and 3 shown in the figure.

(c) Name one secretion each from part 1 and part 2.

Question 8

(i) Name the three small bones present in the middle ear. [1]

(ii) Mention any two roles of the plant hormone 'cytokinin'. [2]

(iii) State the functions of the following: [2]

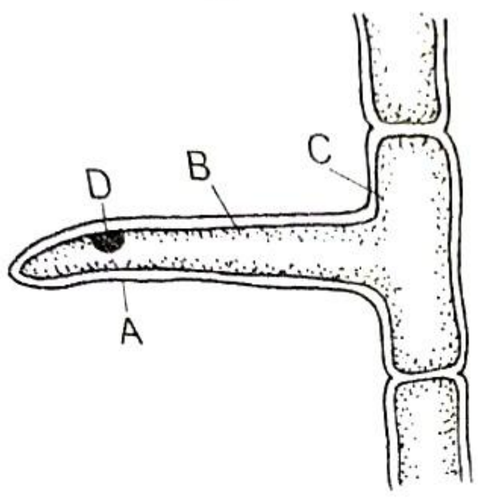
1. Sperm duct
2. Seminal vesicles

(iv) Explain the following terms.: [2]

(1) Mutation

(2) Alleles

(v) The diagram shows a layer of epidermal cells showing a fully grown root hair. Observe the diagram carefully and answer the questions given below: [3]



(a) Name the parts labelled A, B, C and D.

(b) The root hair cell is in a turgid state. Name and explain the process which caused this state.

(c) Mention one distinct difference between the parts labelled A and B.

Solution

SECTION A

Solution 1

(i) Both A and R are true

(ii) Prophase, Metaphase, Anaphase, Telophase

(iii) Blood

(iv) Retina

(v) Both A and R are false

(vi) Pancreas

(vii) Part 4

(viii) Cuticle

(ix) *Pisum sativum*

(x) A is false and R is true

(xi) A is true and R is false

(xii) Menopause

(xiii) Osmosis

(xiv) I, II

(xv) Central Pollution Control Board

Solution 2

(i)

(a) Homologous chromosomes

(b) Uterus

(c) Methylated spirit

(d) Nucleosome

(e) Abscisic acid

(ii)

(a) Outer membrane, Intermembrane space, Inner membrane, Granum, Thylakoid

(b) Afferent arteriole, Glomerulus, Efferent arteriole, Capillary network, Renal vein

(c) *Australopithecus, Homo habilis, Homo erectus, Cro-Magnon, Homo sapiens*

(d) Cerebrum, Diencephalon, Cerebellum, Pons, Medulla oblongata

(e) Auditory canal, Tympanum, Ear ossicles, Oval window, Cochlea

(iii)

Column I	Column II
(a) Pupil	5. Iris
(b) Ethylene	3. Fruit ripening
(c) SA Node	6. Pacemaker
(d) Bowman's capsule	2. Glomerulus
(e) Fly ash	1. Industrial waste

(iv)

(a) Phagocytosis (Rest are processes/activities of the plants)
(b) Cow dung (Rest are non-biodegradable wastes)
(c) Thyroxine (Rest are endocrine glands)
(d) Leptotene (Rest are stages of mitosis)
(e) Ureter (Rest are parts of the human female reproductive system)

(v)

(a) Spindle fibres: Between the two centrioles
(b) Root hair: Extension of the outer epidermal cells of the root
(c) Thylakoids: In the stroma of the chloroplast
(d) PCT: In the cortex region of the kidney between the Malpighian capsule and the loop of Henle
(e) Thyroid gland: In front of the neck just below the larynx

SECTION B

Solution 3

(i) Synapsis is the pairing of two homologous chromosomes. It occurs during the zygotene stage of Meiosis I.

(ii) Plasmolysis is the shrinkage of protoplasm from the cell wall when a cell is placed in a hypertonic solution.

Application of plasmolysis:

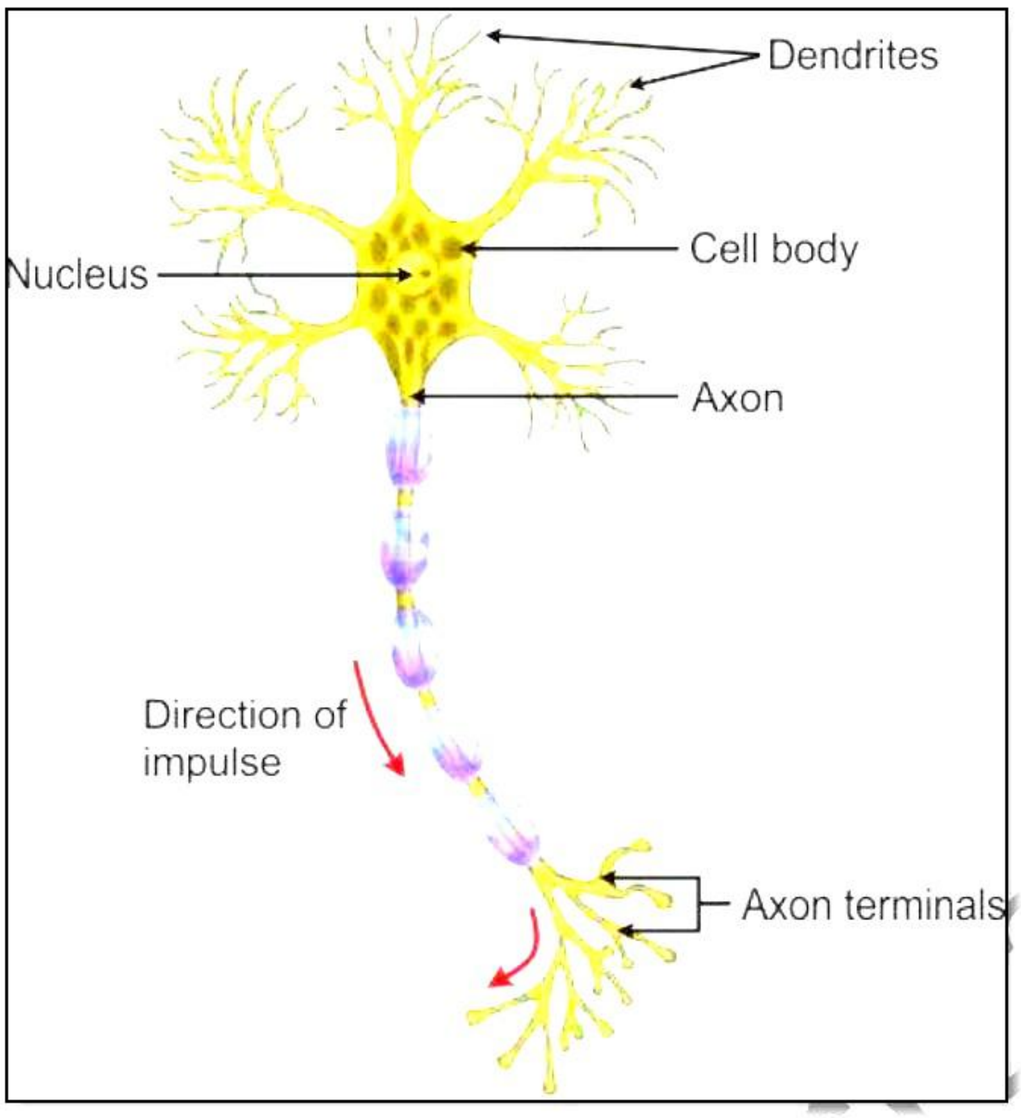
Preservation of jams is made by adding sugar. Meat and fish are preserved by adding salt to them. This creates a hypertonic medium for the microorganisms, thus killing them.

(iii) Measures to control air pollution: *(Any two)*

1. Use of efficient engines
2. Use of good quality automobile fuels
3. Use of lead-free petrol in vehicles
4. Greater use of compressed natural gas

(iv) Location: Arranged as piles in the stroma of chloroplasts.
Function: Contains pigment chlorophyll and acts as the site for the light reaction of photosynthesis.

(v) Neuron is the structural and functional unit of the nervous system.



Solution 4

(i) The cerebrospinal fluid acts like a cushion and protects the brain from mechanical shocks.

(ii)
(a) Thyroxine
(b) Growth hormone (Somatotropin)

(iii) The kidneys purify the blood by excreting toxic and waste products from the blood. They maintain the concentration of salts and the amount of water in the body. In this way, the kidneys eliminate only the wastes and extra substances from the body. Hence, we can say that kidneys are the master chemist of the body.

(iv) Common name: Peppered moth
Scientific name: *Biston betularia*

(v)

(a) A - Artery
B - Vein
C - Blood capillary

(b) 1 - External layer of connective tissue (Tunica externa)
2 - Lumen
3 - Middle layer of smooth muscles and elastic fibres (Tunica media)

(c) The exchange of gases takes place in the blood capillaries (C).

Solution 5

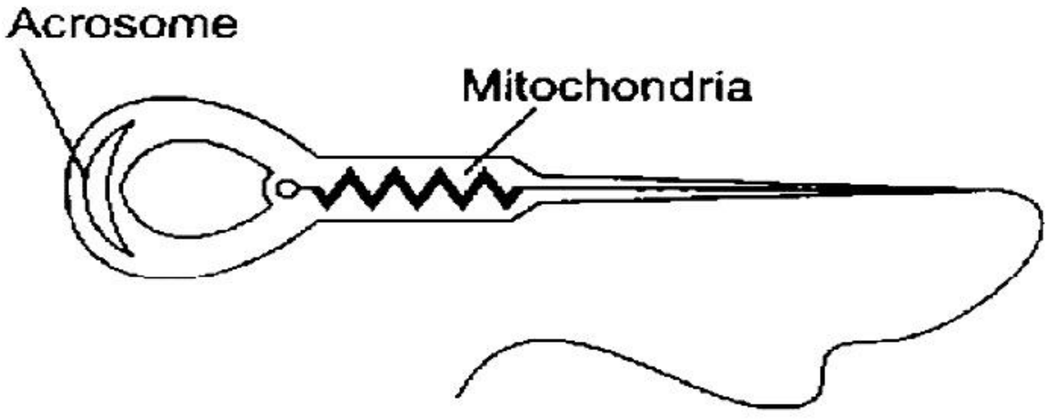
(i) The medulla oblongata regulates the involuntary activities of the body such as heartbeat, breathing rate, saliva secretion, and gut peristalsis. Injury to the medulla oblongata can disturb or halt these activities resulting in death.

(ii) Three small bones of ear ossicles transmit the vibrations received by the tympanum and amplify them. If these were replaced by a single bone, the vibrations received by the tympanum would not be amplified. Hence, three small bones of ear ossicles are advantageous as compared to one single bone for hearing.

(iii) Internal factors which affect photosynthesis: *(Any two)*

1. Chlorophyll content of the leaf
2. Anatomy of the leaf
3. Accumulation of the end products
4. Internal carbon dioxide concentration

(iv) Human sperm



(v)

(a) It is an animal cell because it shows the presence of centrioles.

(b) Metaphase stage of mitosis.

(c)

1. Mitosis
2. Meiosis

Solution 6

(i) ODF: Open Defecation Free

(ii) Population density is the total number of individuals per square kilometre (km^2) at any given time.
Population explosion refers to the rapid and massive rise in the world population that has occurred over the last few hundred years.

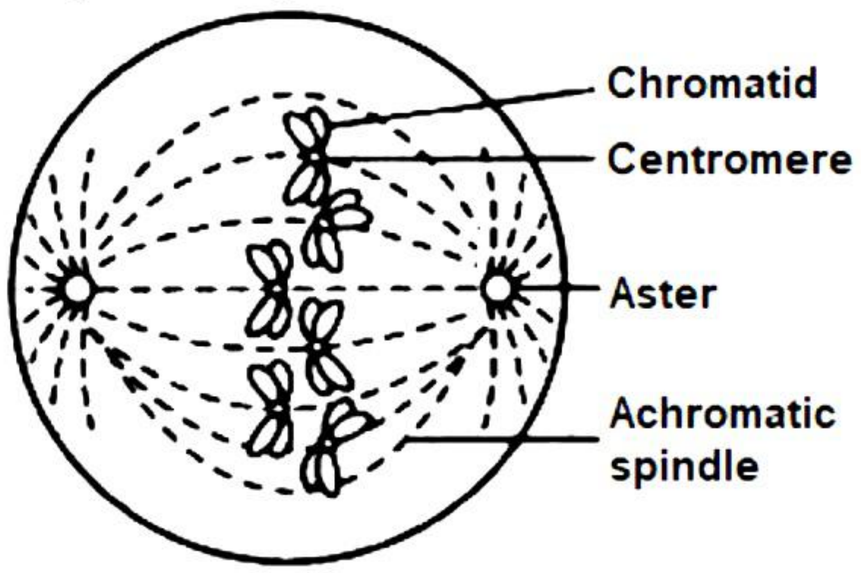
(iii) Pancreas acts as an exocrine gland, which is a duct gland. It secretes pancreatic juice in the small intestine which helps in digestion.
The pancreas also contains the cells called Islets of Langerhans which are endocrine glands. They secrete the hormones insulin, glucagon, and somatostatin. Since pancreas performs both exocrine and endocrine functions, it is regarded as an exo-endocrine gland.

(iv) <u>Adaptations in plants to overcome transpiration:</u>

- Thick cuticle
- Sunken stomata
- Modification of leaves into spines

(v)

(a) <u>Metaphase stage of mitosis with chromosome number 6:</u>



(b) <u>Differences between mitosis and meiosis:</u>

Mitosis	Meiosis
1. Number of daughter cells formed at the end of the division is 2.	1. Number of daughter cells formed at the end of the division is 4.
2. Chromosome number of the daughter cells is 46.	2. Chromosome number of the daughter cells is 23.

Solution 7

(i) Forest fires and volcanic eruptions are natural sources of pollution.

(ii) The process which occurs in the glomerulus is ultrafiltration or glomerular filtration. The process of filtration of blood from the glomerulus into the Bowman's capsule because of increased glomerular blood pressure is called ultrafiltration.

(iii) <u>The sequence of evolution of modern man:</u>

1. *Australopithecus*
2. *Homo habilis*
3. *Homo erectus*
4. *Neanderthal man*
5. *Cro-Magnon*
6. *Homo sapiens*

(iv) Sex chromosomes are homozygous (XX) in females and heterozygous (XY) in males. If a sperm bearing an X chromosome fertilises the ovum, then an XX zygote is formed, and the child born is a female. If a sperm bearing a Y chromosome fertilises the ovum, then an XY zygote is formed, and the child born is a male. Thus, the sex of the child depends on the kind of sperm which fertilizes the ovum.

(v)

(a) Pituitary gland

(b) 1 - Posterior pituitary
2 - Anterior pituitary
3 - Hypophysial stalk

(c) Secretions from posterior pituitary (1) - Vasopressin and oxytocin *(Any one)*
Secretions from anterior pituitary (2) - Thyroid stimulating hormone (TSH) and growth hormone (GH) *(Any one)*

Solution 8

(i) Malleus (hammer), incus (anvil) and stapes (stirrup).

(ii) <u>Role of cytokinins:</u> *(Any two)*

- Stimulate cell division and cell enlargement.
- Prevent ageing of plant parts.
- Inhibit apical dominance.

(iii)

1. <u>Sperm duct:</u> Transports sperms from the epididymis to the urethra.
2. <u>Seminal vesicles</u>: Produce a secretion which serves as a medium for the transportation of the sperms.

(iv)

(1) Mutation: A sudden change in one or more genes or in the number or in the structure of chromosomes which causes changes in certain traits is called a mutation.

(2) Alleles: The alternative forms of a gene responsible for the alternative forms of a character occupying the same position on homologous chromosomes are called alleles.

(v)

a) A - Cell wall
B - Cell membrane
C - Epidermal cell
D - Nucleus

b) The process is osmosis; it causes the cell to become turgid. Osmosis is the movement of water molecules from a region of their high concentration to a region of their low concentration through a semi-permeable membrane.

c) Part A: Cell wall; Part B: Cell membrane

Cell Wall	Cell Membrane
• Freely permeable	• Semi-permeable