

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)

QUESTION 1

Select the correct answers to the questions from the given options.

[15]

(Do not copy the question. Write the correct answer only) :

- (i) Identify the components of seminal vesicle secretion.
(a) mucus only (b) testosterone (c) fructose (d) spermatozoa
- (ii) Maximum number of individuals an environment can support is called :
(a) biotic potential (b) carrying capacity (c) birth rate (d) mortality
- (iii) The organ acting as a natural dialysis chamber in the human body is :
(a) Heart (b) Brain (c) Kidneys (d) Pancreas
- (iv) The path of blood circulation in the human heart is :
(a) left atrium → left ventricle → lungs → right atrium → right ventricle
(b) right atrium → aorta → lungs → left ventricle → left atrium
(c) left atrium → left ventricle → pulmonary artery → lungs → right ventricle
(d) right atrium → right ventricle → lungs → left atrium → left ventricle
- (v) Assertion (A) : Semi-circular canals are present in the middle ear and they contain sensory cells responsible for the static balance of the body.
Reason (R) : One end of each of the three semicircular canals is widened to form an ampulla which contains the sensory cells for dynamic balance.
(a) Both (A) and (R) are true (b) Both (A) and (R) are false
(c) (A) is true and (R) is false (d) (A) is false and (R) is true
- (vi) Tricuspid valve is present between :
(a) Right atrium and ventricle (b) the two atria
(c) the two ventricles (d) left atrium and ventricle
- (vii) The first vaccine was developed to provide protection from :
(a) Polio (b) Smallpox (c) Chickenpox (d) Tuberculosis
- (viii) Contraction of uterus during childbirth is caused by :
(a) TSH (b) oxytocin (c) FSH (d) glucagon

- (xi) Which of the following statements accurately compares tubectomy and vasectomy?
- Tubectomy and vasectomy are both surgical procedures performed on males to achieve permanent contraception.
 - Tubectomy and vasectomy are both surgical procedures performed on females to achieve permanent contraception.
 - Tubectomy is a surgical procedure that involves the cutting or blocking of the fallopian tubes in females, while vasectomy is a surgical procedure that involves the cutting or blocking of the vas deferens in males.
 - Tubectomy is a surgical procedure that involves the cutting or blocking of the vas deferens in males, while vasectomy is a surgical procedure that involves the cutting or blocking of the fallopian tubes in females.

- (xii) The human brain is a complex organ responsible for processing and storing information, coordinating bodily functions, and generating thoughts and emotions. It is composed of different structures. Among the listed options, identify the structures of forebrain.

P – Corpus callosum

Q – Cerebral peduncle

R – Hypothalamus

S – Optic lobes

- (a) P and R (b) Q and R (c) R and S (d) P, Q and R
- (xiii) Which of the following statements accurately compares haemophilia and colourblindness in terms of their symptoms?

- Both haemophilia and colourblindness primarily affect the visual perception of individuals.
- Haemophilia is characterised by prolonged bleeding and difficulty in blood clotting, while colourblindness is characterised by the inability to perceive certain colours.
- Haemophilia is characterised by the inability to perceive certain colours, while colourblindness is characterised by prolonged bleeding and difficulty in blood clotting.
- Both haemophilia and colourblindness have no noticeable symptoms and are typically diagnosed through genetic testing.

- (xiv) Assertion (A) : Photosynthesis occurs in all parts of a green plant.

Reason (R) : Chlorophyll is the green pigment which traps solar energy during daytime.

- Both (A) and (R) are true
 - Both (A) and (R) are false
 - (A) is true and (R) is false
 - (A) is false and (R) is true
- (xv) A colourless ground substance present inside the chloroplast is.
- Stroma
 - Grana
 - Stoma
 - Lamellae

QUESTION 2

- (i) Name the following :

- Government of India initiative aimed at cleaning roads, streets, and infrastructure.
- Blood vessel responsible for supplying blood to the liver.
- Chromosome count in a nerve cell of a human being.
- Transparent cornea-forming layer of the eyeball.
- The wax-like layer on the epidermis of leaves which reduces transpiration

- (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.

- Retina, iris, cornea, lens, sclera

(b) Cochlea, Malleus, Pinna, Stapes, Incus

(c) Receptor, Spinal cord, Effector, Motor neuron, Sensory neuron

(d) Uterus, Parturition, Fertilisation, Gestation, Implantation

(e) Distal convoluted tubule, Glomerulus, Afferent arteriole, Proximal convoluted tubule

(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

- (a) Pacemaker
- (b) Saccules
- (c) Stroma
- (d) Nephritis

Column II

- 1. Static body balance
- 2. Kidney inflammation
- 3. Uric acid accumulation
- 4. Dark reaction
- 5. SA node
- 6. Light reaction

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

- (a) Detergents, Eutrophication, sewage, oil spills
- (b) Lumen, muscular tissue, connective tissue, pericardium
- (c) Dendrites, Myelin Sheath, Axon, Duramater
- (d) Cytokinesis, Cell wall, Cell membrane, Vacuoles
- (e) Prostate gland, Cowper's gland, Seminal vesicle, Testosterone

(v) Mention the exact function of the following structures :

- (a) Iris
- (b) Inguinal canal
- (c) Nephron
- (d) Thylakoids
- (e) Proximal convoluted tubule

SECTION B

(Attempt any four questions)

QUESTION 3

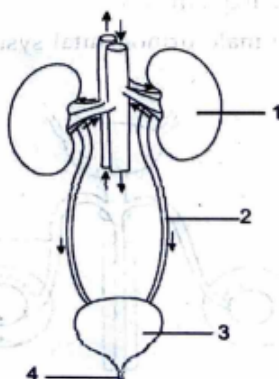
(i) Define – Plasmolysis. [1]

(ii) Give one difference between Mitral valve and Aortic semilunar valve. [2]

(iii) List any two objectives of 'Swachh Bharat Abhiyan'. [2]

(iv) Explain how the loss of nucleus and mitochondria makes erythrocytes more efficient in their function. [2]

(v) The diagram below represents an organ system in the human body. Study it and answer the questions that follow : [3]



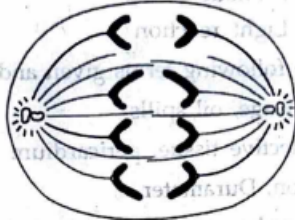
(a) Mention the significance of part marked as 1.

(b) Label the parts marked 2 and 4. Mention the function of part 4.

(c) What is the fluid that accumulates in part 3?

QUESTION 4

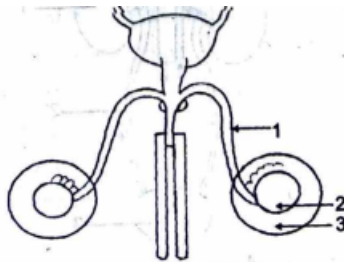
- (i) What is Neo-Darwinism? [1]
- (ii) Give two features of telophase. [2]
- (iii) Explain why the menstrual cycle stops temporarily in a woman when an ovum gets fertilized. [2]
- (iv) Mention two adaptations found in plants to overcome transpiration. [2]
- (v) Given below is a diagram representing a stage during the mitotic cell division. Study the diagram and answer the following questions. [3]



- (a) Identify the stage by giving a suitable reason.
- (b) Is it a plant or an animal cell? Give a reason to support your answer.
- (c) How many chromosomes will each daughter cell have after the completion of the above division?

QUESTION 5

- (i) Define Chlorofluorocarbons (CFCs). [1]
- (ii) What is the significance of photosynthesis for life on earth? [2]
- (iii) State any two features of the plant cell which is not present in animal cells. [2]
- (iv) What is thigmotropism? Give one example. [2]
- (v) Draw a neat, labelled diagram of an experimental setup to show that oxygen is released during photosynthesis. [3]



QUESTION 6

- (i) Define Cerebrospinal fluid. [1]
- (ii) Differentiate between vasopressin and oxytocin. [2]
- (iii) State the function of pinna. [2]
- (iv) Twins may or may not be identical. Explain. [2]
- (v) The diagram given below shows the male urinogenital system of a human being. Study the diagram and answer the questions that follow : [3]

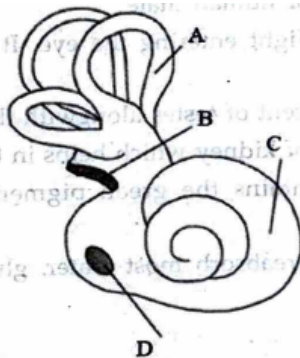
- (a) Label the parts numbered 1 and 2.
- (b) Name the corresponding structure of part (1) in female reproductive system.
- (c) What is the role of part 3?

QUESTION 7

- (i) Define Ultrafiltration. [1]
- (ii) Discuss the significance of root pressure in plants. [2]
- (iii) Differentiate between melanin and haemoglobin. [2]
- (iv) Explain why wooden frames of doors get jammed during the monsoon season [2]
- (v) Draw well labelled diagrams to show both metaphase and anaphase stage of mitosis in a plant cell having four chromosomes. [3]

QUESTION 8

- (i) Define Photophosphorylation. [1]
- (ii) Explain why mature erythrocytes in humans lack nucleus and mitochondria. [2]
- (iii) Differentiate between – Demography and Population density. [2]
- (iv) What is the importance of transpiration for plants? [2]
- (v) Refer to the given picture and answer the questions that follow : [3]



- (a) Identify A and mention its function.
- (b) B and D represents oval and round window respectively. State one characteristic of each B and D.
- (c) What would happen if the structure labeled as C gets damaged?

ANSWER 1

- (i) (c) (ii) (b) (iii) (c) (iv) (d) (v) (d) (vi) (a) (vii) (d) (viii) (a) (ix) (b) (x) (b)
(xi) (c) (xii) (a) (xiii) (b) (xiv) (d) (xv) (a)

ANSWER 2

(i) (a) Swachh Bharat Abhiyan

(b) Hepatic artery

(c) 46 chromosomes

(d) Sclera

(e) Cuticle

(ii) (a) Sclera → Cornea → Iris → Lens → Retina

(b) Pinna → Malleus → Incus → Stapes → Cochlea

(c) Receptor → Sensory neuron → Spinal cord → Motor neuron → Effector

(d) Fertilisation → Uterus → Implantation → Gestation → Parturition

(e) Afferent arteriole → Glomerulus → Proximal convoluted tubule → Distal convoluted tubule.

(iii) (a) Pacemaker – 5. SA node

(b) Sacculles – 1. Static body balance

(c) Stroma – 4. Dark reaction

(d) Nephritis – 2. Kidney inflammation

(iv) (a) Odd Term – Eutrophication

Category – Sources of water pollution

(b) Odd Term – Lumen

Category – others do not have tubular opening and are tissues related to heart

(c) Odd Term – Dura mater

Category – Parts of a nerve cell

(d) Odd Term – Cytokinesis

Category – Parts of a plant cell

(e) Odd Term – Testosterone

Category – Accessory glands of human male

- (v) (a) **Iris** : It regulates the amount of light entering the eye. It has radial muscles to widen and circular muscles to constrict the pupil.
- (b) **Inguinal Canal** : It allows the descent of testes along with their ducts, from abdomen into the scrotum.
- (c) **Nephron** : It is the excretory unit of kidney which helps in the filtration of many constituents of blood.
- (d) **Thylakoids** : Each thylakoid contains the green pigment chlorophyll in which light reaction of photosynthesis is carried out.
- (e) **Proximal Convoluted tubule** : It reabsorb most water, glucose, sodium and chloride ions from the filtrate.

ANSWER 3

- (i) **Plasmolysis** : It is the contraction of the cytoplasm from the cell wall due to the withdrawal of water when the cell is placed in a hypertonic solution.
- (ii) **Mitral valve** is located at the opening between the left auricle and the left ventricle.
Aortic semilunar valve is located at the point of origin of aorta from the left ventricle.
- (iii) **Objective of Swachh Bharat Abhiyan**
- ❖ To eradicate open defecation through the construction of toilets.
 - ❖ To spread awareness among people about cleanliness and community hygiene.

- (iv) The erythrocytes or RBCs of mammals lack nucleus, mitochondria and endoplasmic reticulum. Absence of nucleus makes the RBCs biconcave to increase their surface area volume for absorbing more oxygen. Absence of mitochondria means RBCs do not use the absorbed oxygen for themselves, so they let the lungs to absorb all the oxygen.
- (v) (a) 1 represents kidney that serves as the primary excretory organ in human body. It helps in eliminating nitrogenous waste from blood in the form of urine.
- (b) 2 — Ureter
 4 — Urethra
 Urethra let the urine pass out of the body.
- (c) Urine is accumulated in urinary bladder (3).

ANSWER 4

- (i) The modern genetics that modified Darwin's theory of natural selection and revealed the sources of variations constitutes Neo Darwinism.
- (ii) **Telophase** :
- ❖ Two sets of daughter chromosomes reach opposite poles.
 - ❖ The cleavage furrow starts deepening in the animal cells.
- (iii) When an ovum gets fertilised, it gets implanted in the uterus wall and there is no menstrual discharge. It is because the level of the hormone progesterone is increased and it prevents maturation of another follicle.
- (iv) Two adaptations found in plants to overcome the process 'transpiration' are —
- ❖ a thick cuticle is formed on the leaf surface.
 - ❖ the leaves become narrower to reduce surface area.
- (v) (a) **Early Anaphase of mitosis**
Reason — Sister chromatids are moving towards the opposite poles.
- (b) It is an animal cell. The cell wall is absent and the asters are present on opposite poles.
- (c) Each daughter cell will have 4 chromosomes after the completion of division.

ANSWER 5

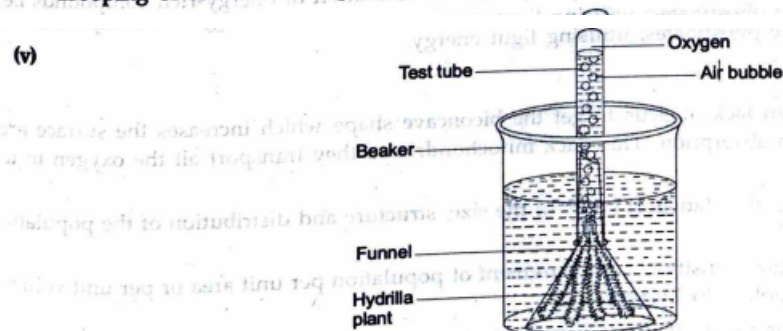
- (i) **CFCs** are the gases which gets readily liquify when compressed. Therefore, these are used in refrigeration, fire extinguishers, etc. CFCs are potent source of ozone layer depletion.
- (ii) **Significance of Photosynthesis for life on Earth** :
- ❖ Photosynthesis is ultimately the source of energy and food for all living beings, directly for plants and indirectly for animals.
 - ❖ It is the only biological process which releases oxygen into the atmosphere. This oxygen supports all life forms on the earth.

(iii) Features present in plant cell, but not present in animal cells, are :

- ❖ Cell wall is present.
- ❖ Large vacuole and chloroplasts are present.

(iv) Thigmotropism is the directional movement of plant or its part in response to touch or, contact. For example :

drooping of touch-me-not plant leaves when we touch it.



ANSWER 6

(i) **Cerebrospinal fluid** : This is the fluid present around the brain and the spinal cord to absorb shock and prevent friction and infection to the organs.

(ii) **Vasopressin** : It is water-retaining hormone responsible for maintaining electrolyte balance.

Oxytocin : It causes contraction of uterus during childbirth and secretion of milk during lactation period.

(iii) **Pinna** : The external ear or the 'Pinna' of human beings capture the sound waves from the air and pass them into the middle ear.

(iv) If the twins are produced from the same zygote, the twins will be identical. But, if two zygotes are produced which give rise to two individuals, they may not be identical.

(a) 1 — Vas deferens (sperm duct)

2 — Testis (testicle)

(b) Oviduct or Fallopian tube

(c) **Scrotum** is a sac of skin that supports the testes. It is found outside the body cavity and allows sperm to develop maintaining the low temperature.

ANSWER 7

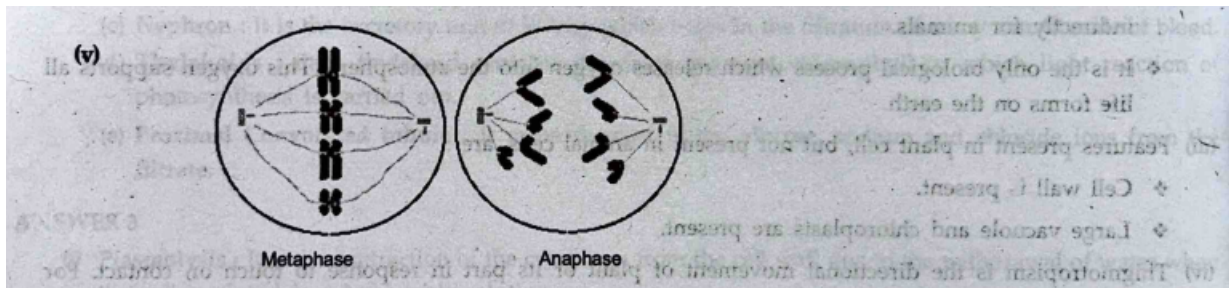
(i) **Ultrafiltration** is a process in which hydrostatic pressure causes water and small dissolved molecules and ions to move across a membrane (a fine filter) against the concentration gradient in glomerulus.

(ii) Root pressure builds up force to push the water in xylem vessels up to a certain height which is sufficient for herbaceous small plants.

(iii) **Melanin** : It is a dark-coloured protective pigment in the skin.

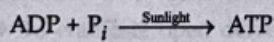
Haemoglobin : It is an iron-containing proteinaceous pigment present in the red blood cells which helps in transporting oxygen to the tissue cells from the lungs.

(iv) During monsoon, the wooden doors or frames absorb the moisture and swell up due to imbibition. It makes them difficult to close or they get jammed.



ANSWER 8

- (i) **Photophosphorylation** : Photophosphorylation is the process of formation of energy-rich compounds i.e., ATP from ADP and inorganic phosphates, utilising light energy.



- (ii) Mature erythrocytes in human lack nucleus to get the biconcave shape which increases the surface area and volume for more oxygen absorption. They lack mitochondria so they transport all the oxygen to the tissues without any loss.

- (iii) **Demography** : Demography is the statistical study of the size, structure and distribution of the population especially of human beings.

Population Density : Population density is a measurement of population per unit area or per unit volume. It is a quantity, frequently applied to living beings.

- (iv) Transpiration is important for plants in two ways :

- ❖ The loss of water creates suction force in the stem to enable the roots to absorb water and minerals.
- ❖ Loss of water in vapour form from the leaves creates a cooling effect in the surrounding area of the plant.

- (v) (a) A represents vestibular apparatus and it provides the sense of balance and the information about body position.

- (b) Oval window is the upper opening and it is enclosed by the stapes footplate. Round window is the lower opening and it is covered by a thin tympanic membrane.

- (c) C represent cochlea and its damage could result in permanent hearing loss.

