

SCIENCE
Solved Paper-3 (Biology), 2019
(One hour and a half)

Answers to this paper must be written on the paper provided separately.

*You will **not** be allowed to write during the 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.

*Attempt **all** questions from **Section I** and any **four** questions from **Section II**.
The intended marks for questions or parts of questions are given in brackets [].*

SECTION I (40 Marks)

Attempt **all** questions from this section

QUESTION 1

(a) Name the following :

[5]

(i) The layer of the eyeball that provides nourishment to the eye.

Ans. Choroid

(ii) One gaseous compound which depletes the ozone layer.

Ans. CFCs (Chlorofluorocarbons)

(iii) The structure which connects the placenta and the foetus.

Ans. Umbilical cord

(iv) A pair of corresponding chromosomes of the same shape and size and derived one from each parent.

Ans. Homozygous chromosomes

(v) The compound formed when haemoglobin combines with carbon dioxide in blood.

Ans. Carbaminohaemoglobin

(b) Correct and *rewrite the statements* by changing the biological term that is underlined for each statement : [5]

(i) The theory of Inheritance of Acquired Characters was proposed by Watson and Crick.

Ans. Jean Baptiste de Lamarck

(ii) The protective sac which develops around the developing embryo is called the Pericardium.

Ans. Amnion

(iii) Maintaining balance of the body and coordinating muscular activities is carried out by the cerebrum.

Ans. Cerebellum

(iv) The kidney is composed of number of neurons.

Ans. Nephrons

(v) The part of the eye which can be donated from a clinically dead person is the Retina.

Ans. Cornea

(c) Give suitable *biological reasons* for the following statements :

[5]

(i) The birth rate in India is very high.

Ans. Illiteracy/Traditional beliefs/Mortality rate/Economic reasons/Religious and social customs/Desire for a male child/Lack of recreation.

(ii) Carbon monoxide is dangerous when inhaled.

Ans. Haemoglobin has very strong affinity for carbon monoxide forming a stable compound carboxyhaemoglobin (HbCO). This cuts down the capacity of the blood of transporting oxygen, sometimes resulting in death.

- (iii) Root hairs become flaccid and droop when excess fertilizers are added to the moist soil around them.
Ans. Because soil water becomes hypertonic due to addition of excess fertilizers as compared to cell sap of root hairs. Hence, plasmolysis/exosmosis takes place (movement of solvent from hypotonic solution to hypertonic solution) and root hairs become flaccid and droop.
- (iv) Acid rain is harmful to the environment.
Ans. Damage to vegetation by pollution of the soil/Decay of building material and paints, erosion of ancient monuments, statues and sculptures, harm to human health and aquatic life, etc.
- (v) All life on Earth is supported by Photosynthesis.
Ans. Photosynthesis is a very significant process for all life on earth as it provides food for all the living organisms (for plants themselves, animals and humans) and also provides life supporting gas (oxygen) for breathing.

(d) Match the items given in **Column A** with the most appropriate ones in **Column B** and **rewrite** the correct matching pairs. [5]

Column A

- (i) Cranial nerves
- (ii) Leydig cells
- (iii) Acetylcholine
- (iv) Spinal nerves
- (v) Sneezing

Column B

- (a) Testosterone
- (b) Natural reflex
- (c) 12 pairs
- (d) Prolactin
- (e) Neurotransmitter
- (f) 18 pairs
- (g) 31 pairs
- (h) Conditioned reflex

- Ans.** (i) (c) 12 pairs
 (ii) (a) Testosterone
 (iii) (e) Neurotransmitter
 (iv) (g) 31 pairs
 (v) (b) Natural reflex

(e) Choose the correct answer from each of the four options given below : [5]

- (i) While recording the pulse rate, where exactly does a doctor press on our wrist ?
 (a) Nerve (b) Vein
 (c) Artery (d) Capillary

Ans. (c) Artery

- (ii) In a human male, a sperm will contain :
 (a) Both X and Y chromosomes (b) Only Y chromosome
 (c) Only X chromosome (d) Either X or Y chromosome

Ans. (d) Either X or Y chromosome

- (iii) A muscular wall is absent in :
 (a) Capillary (b) Venule
 (c) Arteriole (d) Vein

Ans. (a) Capillary

- (iv) On which day of the menstrual cycle does ovulation take place ?
 (a) 5th day (b) 28th day
 (c) 14th day (d) 1st day

Ans. (c) 14th day

- (v) Which one of the following does not affect the rate of transpiration ?
(a) Light (b) Humidity
(c) Wind (d) Age of the plant

Ans. (d) Age of the plant

- (f) Identify the **odd** term in each set and name the **category** to which the remaining three belong : [5]

Example : Glucose, starch, cellulose, calcium

Odd term : Calcium

Category : Others are different types of carbohydrates

- (i) Addison's disease, Cushing's Syndrome, Acromegaly, Leukemia.

Ans. *Odd term :* Leukemia

Category : Hormonal disorders

- (ii) Insulin, Adrenaline, Pepsin, Thyroxine.

Ans. *Odd term :* Pepsin

Category : Hormones

- (iii) Axon, Dendron, Photon, Cyton.

Ans. *Odd term :* Photon

Category : Parts of Neuron

- (iv) Chicken pox, Colour blindness, Haemophilia, Albinism.

Ans. *Odd term :* Chicken pox

Category : Genetic disorders / Hereditary diseases

- (v) Polythene bag, Crop residue, Animal waste, Decaying vegetable.

Ans. *Odd term :* Polythene bag

Category : Biodegradable waste

- (g) Expand the following biological abbreviations : [5]

- (i) ABA

Ans. Abscisic Acid

- (ii) IAA

Ans. Indole 3-Acetic Acid

- (iii) ATP

Ans. Adenosine Triphosphate

- (iv) DNA

Ans. Deoxyribo Nucleic Acid

- (v) TSH

Ans. Thyroid Stimulating Hormone

- (h) Study the picture given below and answer the following questions : [5]



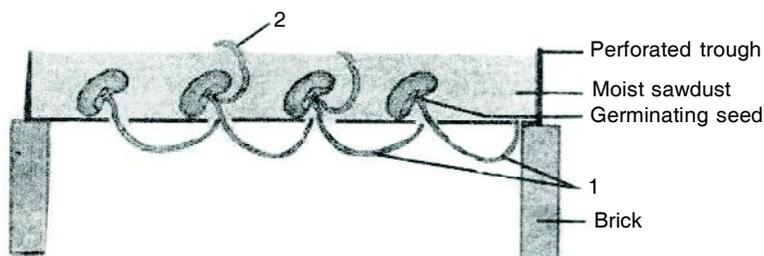
- (i) Identify the type of pollution.
Ans. Water pollution.
- (ii) Name one pollutant that causes the above pollution.
Ans. Sewage/Effluents/Oil spills, etc.
- (iii) Mention the impact of this pollution on human health
Ans. Water pollution can cause many waterborne diseases like typhoid, cholera, etc. It also reduces oxygen content of the water which is harmful for aquatic life.
- (iv) State one measure to control this pollution.
Ans. Proper sewage treatment and management / Reduction in the use of pesticides, etc.
- (v) What is a 'Pollutant' ? Explain the term.
Ans. Pollutant : The constituents which deteriorate the natural quality of air, water or land are termed as pollutants.
For example : Harmful gases, smoke, garbage, dust, etc.

SECTION II (40 Marks)

Attempt any **four** questions from this Section

QUESTION 2

- (a) Given alongside is an experimental setup to demonstrate a particular tropic movement in germinating seeds. Study the diagram and answer the questions that follow : [5]



- (i) Label the parts 1 and 2.
Ans. 1. Radicle and 2. Plumule.
- (ii) Name the tropic movement shown by part 1.
Ans. Geotropism / Hydrotropism.
- (iii) Part 1 is affected by two stimuli. Name them. Which one of the two is stronger ?
Ans. Gravity and Moisture (water). Moisture is stronger.
- (iv) What is Thigmotropism ? Give one example.
Ans. Thigmotropism : The growth movement of the parts of plant in response to **touch** stimulus is called thigmotropism. *Example :* Coiling of tendrils around the support or another plant.
- (v) What is meant by 'Positive' and 'Negative' tropic movements in plants ?
Ans. The growth movement of plant parts **towards** the stimulus is called as **positive** whereas **away from** the stimulus is called as **negative** tropic movements in plants. Shoots show negative geotropism, while roots show positive geotropism.

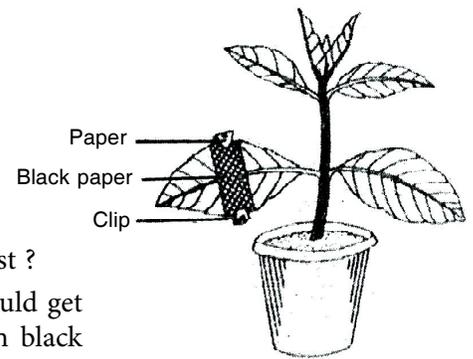
- (b) Mention the exact location of the following :

[5]

- (i) Testis
Ans. It is located in a thin-walled sac of skin called **scrotum**.
- (ii) Incus
Ans. It is located between Malleus and Stapes of Ear ossicle which is found in the Middle ear.
- (iii) Thylakoids
Ans. It is located in grana of chloroplast.
- (iv) Amniotic fluid
Ans. It is filled in the space between the amnion and the embryo (inside uterus).
- (v) Corpus callosum
Ans. It is located between two cerebral hemispheres of the brain.

QUESTION 3

(a) The diagram given alongside represents an experiment to prove the importance of a factor in photosynthesis. Answer the questions that follow : [5]



(i) Name the factor studied in this experiment.

Ans. Sunlight.

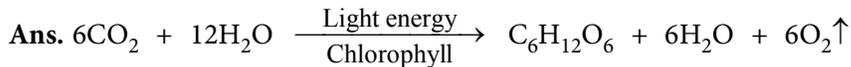
(ii) What will you observe in the experimental leaf after the starch test ?

Ans. It will be observed that only the parts of the leaf which could get sunlight turn blue black and the parts which were covered with black paper do not turn blue as they could not synthesize starch.

(iii) Explain the process of Photosynthesis.

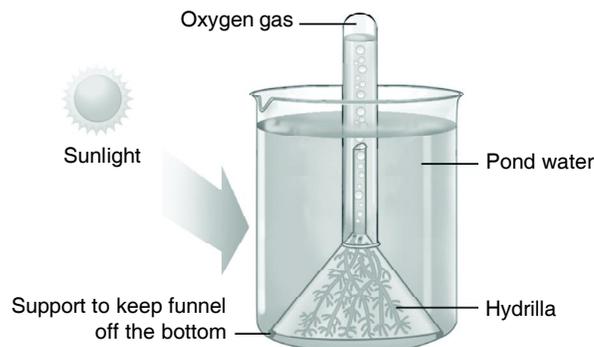
Ans. Photosynthesis is a process by which living plant cells containing chlorophyll, produce food substances from carbon dioxide and water by using light energy. Plants release oxygen as a by-product during photosynthesis.

(iv) Give a balanced chemical equation to represent the process of photosynthesis.



(v) Draw a neat, labelled diagram of an experimental setup to show that oxygen is released during photosynthesis.

Ans.



(b) State the main functions of the following :

[5]

(i) Medulla Oblongata

Ans. Its function is to control the activities of the internal organs like peristalsis, breathing movements of lungs and diaphragm, etc.

(ii) Cytokinins

Ans. Stimulate cell division and cell elongation / Prevent ageing of plant parts / Inhibit apical dominance.

(iii) Tears

Ans. Lubricate the surface of eye / Wash away dust particles / Help in killing germs / communicate emotions.

(iv) Coronary Artery

Ans. It supplies blood to the heart muscles.

(v) Seminal Vesicles

Ans. It produces a secretion which serves as a medium for the transportation of the sperms.

QUESTION 4

(a) The diagram given alongside represents an organ system in the human body. Study the same and answer the questions that follow : [5]

(i) Identify the system.

Ans. Human Urinary System.

(ii) Label the parts marked 2 and 4. Mention the function of part 5.

Ans. 2-Ureter and 4-Sphincter Part-5 is urethra. It releases urine outside the body at the time of urination (micturition).

(iii) Name the structural and functional units of the part marked 1.

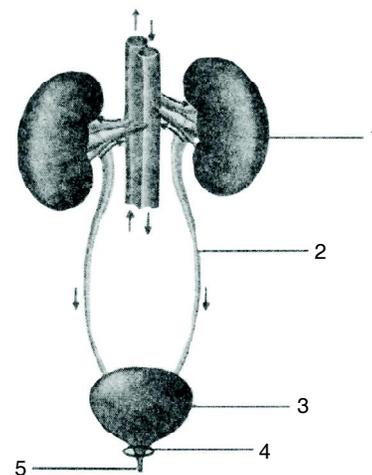
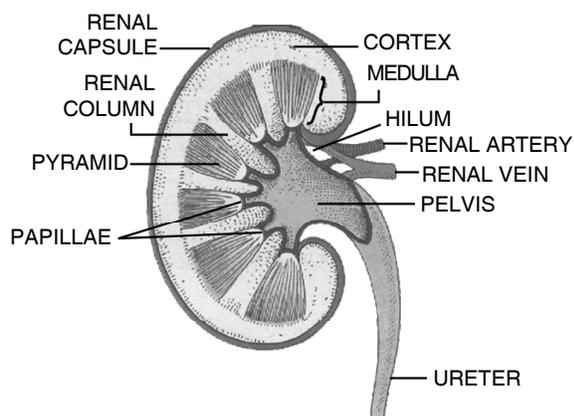
Ans. Nephron.

(iv) What is the fluid that accumulates in part 3? Which is the main nitrogenous waste present in it?

Ans. Urine. Its main nitrogenous waste is **urea**.

(v) Draw a neat, labelled diagram showing the longitudinal section of part 1.

Ans.



(b) The diagram given alongside represents an endocrine gland in the human body. Study the diagram and answer the following questions : [5]

(i) Identify the endocrine gland. Where is it located?

Ans. Pituitary gland. It is located at the base of the mid-brain below hypothalamus.

(ii) Why is the above gland referred to as the 'Master gland'?

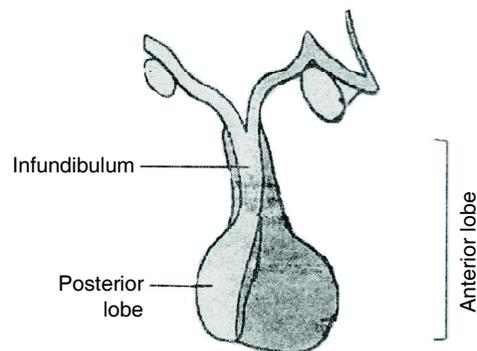
Ans. It is popularly called the master gland because it seems to control practically all other endocrine glands.

(iii) Name the hormone which in deficiency causes Diabetes Insipidus. How does this disorder differ from Diabetes Mellitus?

Ans. Antidiuretic Hormone (ADH) / Vasopressin. Deficiency of ADH causes diabetes insipidus in which urination is frequent and copious whereas Diabetes mellitus is caused due to the deficiency of Insulin in which urine contains sugar.

(iv) Explain the term 'Hormone'. What is the role of Tropic hormones in the human body?

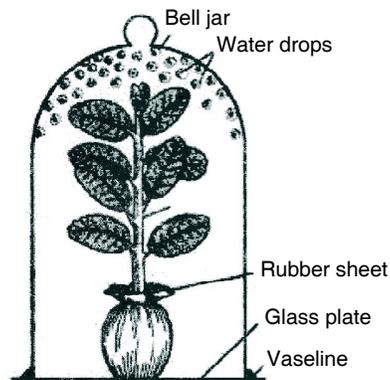
Ans. Hormone : A secretion from some glandular part of the body, which is poured directly into blood and which acts on the target organs or cells of the same individual, bringing about coordination between distant parts of the body. *For example :* Thyroxine, Insulin.



Role of tropic hormones in the human body : Tropic hormones stimulate the endocrine glands to produce their specific hormones.

- (v) Which lobe of the above gland secretes :
 1. Oxytocin 2. ACTH 3. Growth hormone

- Ans. 1. Oxytocin** — Posterior pituitary
2. ACTH — Anterior pituitary
3. Growth hormone — Anterior pituitary



QUESTION 5

- (a) Given alongside is an apparatus which was setup to investigate a physiological process in plants. The setup was placed in bright sunlight. Answer the questions that follow : [5]

- (i) Name the process being studied. Define the process.

Ans. Transpiration : Transpiration is the process of loss of water in the form of water vapour from the leaves and other aerial parts of the plant.

- (ii) Why was the pot enclosed in a rubber sheet ?

Ans. The pot was enclosed in a rubber sheet to prevent evaporation from the soil.

- (iii) Mention two external factors which can accelerate the above process.

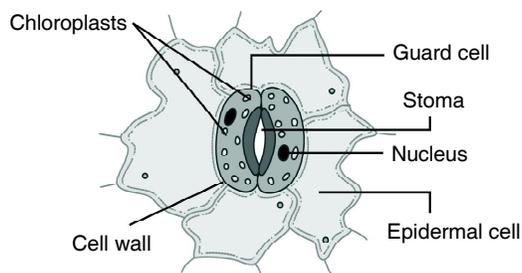
Ans. Increased intensity of sunlight / High temperature / Low humidity, etc.

- (iv) List two adaptations in plants to reduce the above process.

Ans. Sunken stomata / Fewer stomata / Narrow leaves / Thick cuticle / Loss of leaves, etc.

- (v) Draw a neat, labelled diagram of a stomatal apparatus.

Ans.



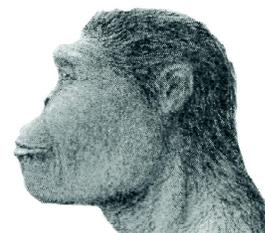
- (b) Given alongside are two stages in the evolution of man. Study them and answer the questions that follow : [5]

- (i) Identify Australopithecus and Neanderthal man from the above pictures.

- Ans.** A. Neanderthal man
 B. Australopithecus



A



B

- (ii) Mention two characteristic features each for the two stages.

- Ans. Neanderthal man :** (a) Absolute bipedalism (b) Well developed chin
Australopithecus : (a) Walked nearly straight (b) Lack of chin, prognathous face

- (iii) Who proposed the theory of 'Natural Selection' ?

Ans. Charles Darwin.

- (iv) Name the organism used as an example to explain 'Industrial Melanism'?

Ans. Peppered moth / *Biston bitularia*.

(v) Give two examples of Vestigial organs in humans.

Ans. Wisdom teeth / Vermiform appendix / Ear pinna, etc.

QUESTION 6

(a) In Mendel's experiments, tall pea plants (T) are dominant over dwarf pea plants (t). [5]

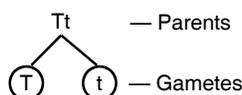
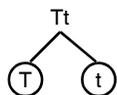
(i) What is the phenotype and genotype of the F_1 generation if a homozygous tall plant is crossed with a homozygous dwarf plant ?

Ans. *Phenotype* : Tall plants.

Genotype : Heterozygous tall plants.

(ii) Draw a Punnett square board to show the gametes and offspring when both the parents are heterozygous for tallness.

Ans. Heterozygous tall plants X Heterozygous tall plants



	T	t	
T	TT	Tt	— Offsprings
t	Tt	tt	

(iii) What is the phenotypic ratio and genotypic ratio of the above cross in (ii) ?

Ans. Phenotypic ratio = 3 : 1

Genotypic ratio = 1 : 2 : 1, where

1 = Homozygous tall plants

2 = Heterozygous tall plants

1 = Homozygous dwarf plants

(iv) State Mendel's Law of Dominance.

Ans. Mendel's Law of Dominance : Out of a pair of contrasting characters present together, only one is able to express itself while the other remains suppressed. The one that expresses is the dominant character and the one unexpressed is the recessive.

(v) What is a Dihybrid Cross ?

Ans. Dihybrid cross : The cross in which **two features** of an organism / plant are taken together at a time.

(b) Given alongside is a diagram representing a stage during the mitotic cell division. Study the diagram and answer the following questions : [5]

(i) Identify the stage by giving a suitable reason.

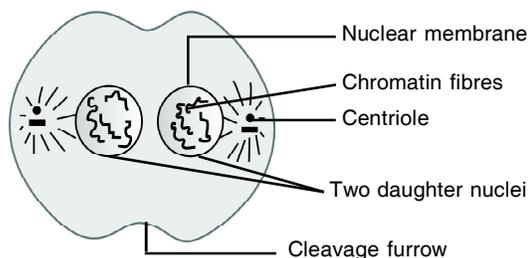
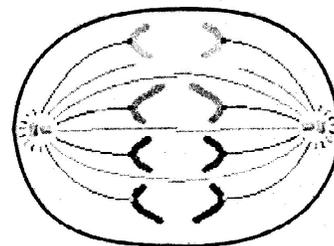
Ans. Anaphase, chromosomes are split into chromatids which start moving towards the opposite poles.

(ii) Is it a plant or an animal cell ? Give a reason to support your answer.

Ans. Animal cell. Centrioles are present with asters.

(iii) Draw a neat, labelled diagram of the stage which follows the one shown in the diagram.

Ans. Telophase



(iv) How many chromosomes will each daughter cell have after the completion of the above division ?

Ans. 4 / Four.

(v) Name the four nitrogenous bases.

Ans. Adenine (A), Guanine (G), Thymine (T) and Cytosine (C).

QUESTION 7

(a) Answer the following questions briefly :

[5]

(i) How are the cytons and axons placed in the brain and the spinal cord ?

Ans. The outer portion of brain *i.e.* cortex consists of cytons, termed as gray matter. The inner portion consists of axons, known as white matter. In spinal cord, the arrangement of white and gray matter is reversed from that of brain. The gray matter containing cytons lies on the inner side and the white matter on the outer side.

(ii) Which part of the human ear gives 'Dynamic balance' and 'Static balance' to the body ?

Ans. Dynamic balance — Semicircular canals. Static balance — Utriculus and sacculus

(iii) Explain how the human eye adapts itself to bright light and dim light.

Ans. Adaptations in bright light and dim light are termed as light adaptation and dark adaptation respectively.

Light adaptation	Dark Adaptation
1. Rhodopsin of the rods is bleached.	1. Iodopsin of the cones is bleached.
2. Cones become active and synthesize iodopsin.	2. Rods become active and synthesize rhodopsin.
3. The pupil constricts (gets narrower) to reduce the amount of light entering the eyes.	3. The pupil dilates (gets wider) to enhance the amount of light entering the eyes.

(iv) What is Parthenocarpy ? Give one example.

Ans. Parthenocarpy : The process of development of fruits without fertilization.

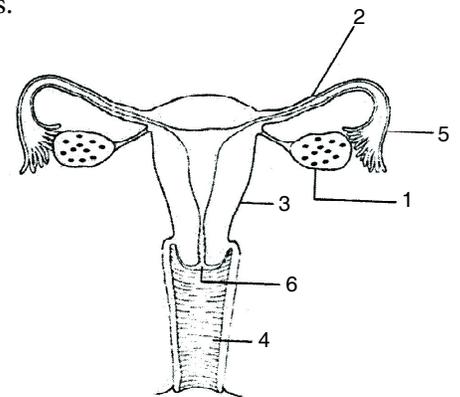
Example : Auxins can induce fruit formation without fertilization in apples, tomatoes, bananas, etc. (seedless fruits)

(v) Mention any two objectives of 'Swachh Bharat Abhiyan'.

Ans. Objectives of 'Swachh Bharat Abhiyan' :

1. to clean the streets, roads and infrastructure of the country's cities and towns.
2. to eliminate open defecation through the construction of individual, cluster and community toilets.
3. to establish an accountable mechanism of monitoring latrine use.
4. to achieve efficient solid and liquid waste management systems.

(b) The diagram alongside represents a system in the human body. Study the diagram and answer the following questions : [5]



(i) Identify the system.

Ans. Human female reproductive system.

(ii) Label the parts marked 5 and 6.

Ans. 5—Oviducal Funnel / Funnel of oviduct

6—Cervix

(iii) Name the two hormones secreted by 1.

Ans. Oestrogen and progesterone.

(iv) Mention the number and the name of the part involved in fertilization and implanation from the above diagram.

Ans. Fertilization : 2—Fallopian tube / Oviduct

Implantation : 3—Uterus

(v) Mention the surgical methods of contraception in : 1. Human males. 2. Human females.

Ans. 1. Human males — Vasectomy.

2. Human females — Tubectomy

