BIOLOGY

(SCIENCE PAPER – 3)

Maximum Marks: 80

Time allowed: Two hours

1. *Answers to this Paper must be written on the paper provided separately.*
2. *You will **not** be 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.***

5. ***Section A** is **compulsory.** Attempt **any four** questions from **Section B.***
6. *The intended marks for questions or parts of questions are given in brackets [ ].*

Instruction for the Supervising Examiner

Kindly read aloud the Instructions given above to all the candidates present in the Examination Hall.

This paper consists of 16 printed pages.

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 questions, write the correct answer only).

(i) The number of live births per thousand people per year is called:

(a) Mortality

(b) Population density

(c) Population growth rate

(d) Natality

(ii) The structure that lies at the junction of the choroid and the iris and is itself a part of the choroid is called:

(a) Ciliary body

(b) Suspensory ligament

(c) Pupil

(d) Lens

(iii) **Assertion (A):** Seminal vesicles pour an alkaline secretion into the semen as it passes through the ureter.

Reason (R): The female vagina is acidic and needs to be neutralized for sperm survival.

(a) (A) is true and (R) is false.

(b) (A) is false and (R) is true.

(c) Both (A) and (R) are true.

(d) Both (A) and (R) are false.

(iv) The hormone that induces vigorous contractions of the uterus in a pregnant mother is:

(a) Oestrogen

(b) Prolactin

(c) Oxytocin

(d) Progesterone

(v) A scientist wanted to conduct a genetic experiment on mice. He cut the tails of all the mice and made them reproduce. What will be the phenotype of the offsprings?

(a) All the offsprings will be tailless.

(b) There will be a mix of tailed and tailless offsprings.

(c) All the offsprings will have tails.

(d) Tail of the offsprings cannot be predicted.

(vi) **Assertion (A):** A turgid plant cell is in a balanced state.

Reason (R): In a turgid cell, turgor pressure and wall pressure are equal and in the same direction.

(a) (A) is true and (R) is false.

(b) (A) is false and (R) is true.

(c) Both (A) and (R) are true.

(d) Both (A) and (R) are false.

(vii) The optimum temperature for photosynthesis is:

(a) 10 – 15ºC

(b) 60 – 65ºC

(c) 40 – 45ºC

(d) 25 – 35ºC

(viii) Ajay and Vijay are siblings. Ajay can roll his tongue while Vijay cannot. What is the genotype of their parents?

(a) Both the parents are homozygous dominant.

(b) Both the parents are homozygous recessive.

(c) One parent is homozygous dominant, and the other is homozygous recessive.

(d) Both the parents are heterozygous dominant.

(ix) **Assertion (A):** Deficiency of Antidiuretic hormone causes an increase in urination.

Reason (R): Antidiuretic hormone acts on the kidney to reabsorb water from the kidney tubules.

(a) (A) is true and (R) is false.

(b) (A) is false and (R) is true.

(c) Both (A) and (R) are true.

(d) Both (A) and (R) are false.

(x) A phase of cell division where the spindle fibres disappear is:

(a) Telophase

(b) Prophase

(c) Metaphase

(d) Anaphase

(xi) **Assertion(A):** Arachnoid layer helps in speeding up the transmission of nerve impulses along the axons.

Reason(R): Axon endings at the synapse secrete acetylene.

(a) (A) is true and (R) is false.

(b) (A) is false and (R) is true.

(c) Both (A) and (R) are true.

(d) Both (A) and (R) are false.

(xii) Many nuclear power plants are constructed near water sources. They use water for cooling their machinery and release it back into the water stream. Identify the kind of pollution caused.

(a) Radiation pollution

(b) Water pollution

(c) Industrial pollution

(d) Thermal pollution

(xiii)

Owls are nocturnal animals. They are active at night and hunt small animals for food. Owls have large eyes and can see well at night. This is due to:

(a) Cones and Rhodopsin

(b) Rods and Iodopsin

(c) Rods and Rhodopsin

(d) Cones and Iodopsin

(xiv) Sunil tried to match the tropic movements in plants with the stimulus they respond to. The tabulation is given below:

	Tropism	**Stimulus**
P	Thigmotropism	Touch
Q	Geotropism	Water
R	Chemotropism	Chemicals
S	Phototropism	Gravity

Identify the correct pair:

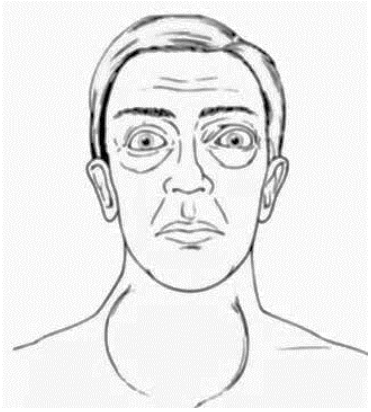
(a) P and R

(b) Q and S

(c) R and S

(d) P and S

(xv) Observe the following picture, identify the *defect* and the cause of the defect.



(a) Simple goitre, under secretion of thyroxine.

(b) Ex-ophthalmic goitre, over secretion of thyroxine.

(c) Simple goitre, over secretion of thyroxine.

(d) Ex-ophthalmic goitre, under secretion of thyroxine.

Question 2

(i) Name the following: [5]

(a) The fully developed part of the ovary containing a mature ovum.

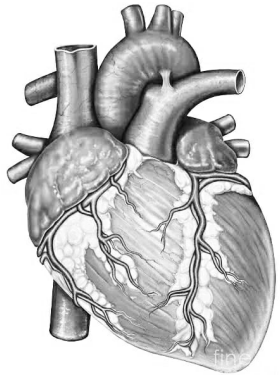
(b) A waxy layer on the upper epidermis of leaves meant to reduce Transpiration.

(c) The ear ossicle which opens into the oval window of Cochlea.

(d) The physiological process which is the starting point of all food chains.

(e) An insect which is a classic example of natural selection due to industrial melanism.

(ii) Given below is the diagram of a human heart. Read the information below the diagram and fill in the blanks: [5]



The human heart pumps blood throughout the body. It is the size of a large fist. The heart is located between the lungs in the thoracic cavity. It has four chambers. The heart functions all through the lifespan of a person and is responsible for the survival of the person.

The heart is enclosed by a membrane called (a) _____. The ventricles give rise to two large blood vessels called (b) _____ and (c) _____. The flaps of the cuspid valves are kept in position by (d) _____. (e) _____ arteries supply oxygenated blood to the walls of the heart.

(iii) Arrange the terms in each group in the correct order. Write them in a logical sequence beginning with the term that is **underlined**. [5]

(a) Palisade cells, <u>Cuticle</u>, Upper epidermis, Spongy cells.

(b) Hepatic portal vein, <u>Stomach</u>, Hepatic vein, Liver.

(c) Cyton, <u>Dendrites</u>, Synaptic cleft, Axon endings.

(d) Insulin release, <u>High blood sugar</u>, Lowers blood sugar, Stimulates glucose uptake from blood.

(e) Sperm duct, <u>Seminiferous tubule</u>, Epididymis, Efferent ducts.

(iv) Read the explanations given below and name the structures: [5]

***Example*:** *The tubules which produce sperms.*

***Answer*:** *Seminiferous tubules*

(a) The canal through which the testes descend down into the scrotum just before the birth of a male baby.

(b) The part of the brain that regulates the peristaltic movement of the alimentary canal.

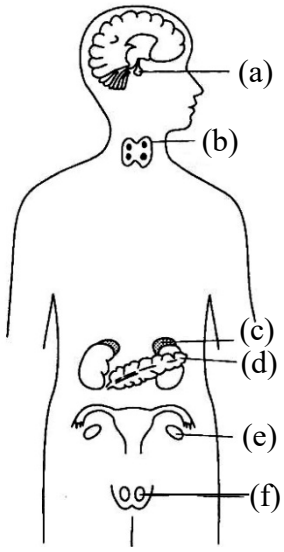
(c) A structure that collects the soundwaves and conducts them through the external auditory canal.

(d) The point of attachment of two chromatids of a chromosome.

(e) Regulation of the opening and closing of stomata.

(v) Given below is an outline of the human body showing the important endocrine glands. Match the glands marked (a) to (e) with their correct functions: [5]

Example: (f) – 6. Secretes Testosterone.

Endocrine glands	Functions
	1. Prepares the body to face stress. 2. Secretes tropic hormones 3. Secretes Oestrogens 4. Maintains blood sugar level 5. Regulates basal metabolism 6. Secretes Testosterone.

SECTION B (40 Marks)

*(Attempt **any four** questions from this **Section**.)*

Question 3

(i) Write the overall chemical equation for photosynthesis. [1]

(ii) Ramesh is a farmer who has a vineyard and cultivates grapes. To improve the shape of the grapes and make them elongated he sprays a particular *phytohormone* at the time of fruiting. [2]

(a) Name the *phytohormone* that Ramesh sprays on the plant at the time of fruiting.

(b) These grapes are said to be seedless. What is the technical term for the formation of such fruits?

(iii) Mention the *two* pairs of nitrogenous bases that are present in a DNA strand and pair with each other by hydrogen bonds. [2]

(iv) State *any two* disadvantages of living close to an airport. [2]

(v) Draw a neat, labelled diagram of an animal cell showing Metaphase with four chromosomes. [3]

Question 4

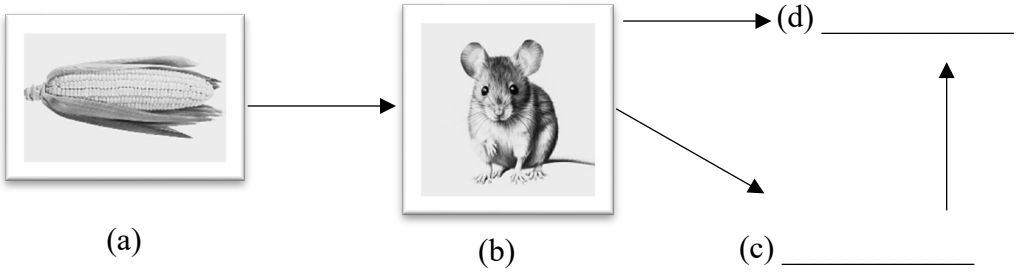
(i) What is the structure of DNA as proposed by Watson and Crick? [1]

(ii) Name the white blood cells that: [2]

(a) show phagocytosis

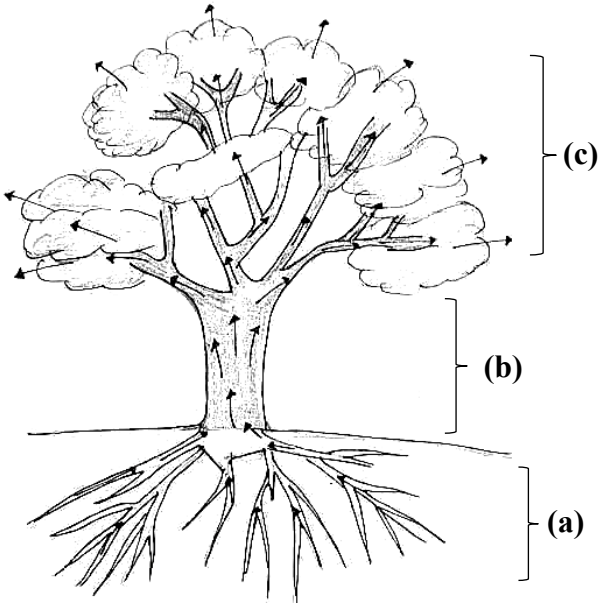
(b) produce antibodies

(iii) Complete the food chain by mentioning the names of the organisms in (c) and (d): [2]



(iv) State *any two* harmful effects of acid rain. [2]

(v) Given below is a picture of a tree. Mention the scientific phenomena occurring in the parts labelled (a), (b) and (c). [3]



Question 5

(i) What is Micturition? Explain. [1]

(ii) What are biomedical wastes? Give an example. [2]

(iii) Differentiate between the functions of Urethra and Uterus. [2]

(iv) Rachna is an expert gymnast on the balance beam. She has been vigorously practising for the Olympic Games. Lately, she has been experiencing dizziness and losing her balance during the practise sessions. [2]

(a) Which part of the membranous labyrinth is responsible for maintaining the body balance on the beam?

(b) Which type of balance is maintained by the structure mentioned in (a)?

(v) Draw a neat, labelled diagram to show that oxygen is released during photosynthesis. [3]

Question 6

(i) Where are Hydathodes located? [1]

(ii) What are Vestigial organs? Give *one* example of a vestigial structure in the human mouth. [2]

(iii) Ahmed had a severe throat infection. After a few days he developed an earache too. What could be the reason for the pain in his ears? Explain. [2]

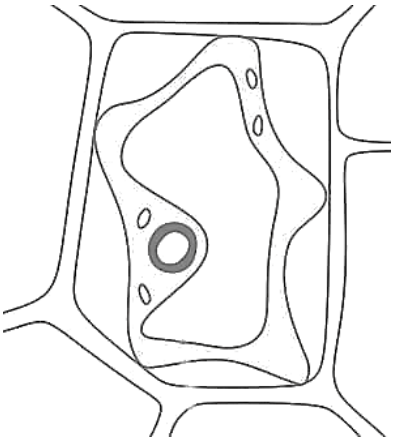
(iv) Mr. Sharma is a 76 year old man. His vision was gradually becoming blurred. He consulted an eye doctor and it was diagnosed as cataract. [2]

HEALTHY EYE CATARACT EYE

(a) Which part of the eye does cataract affect?

(b) Why does the vision become blurred?

(v) Given below is the diagram of a *plasmolysed* cortical cell of a root. [3]



Copy the diagram and label the following parts in the diagram:

(a) Cytoplasm

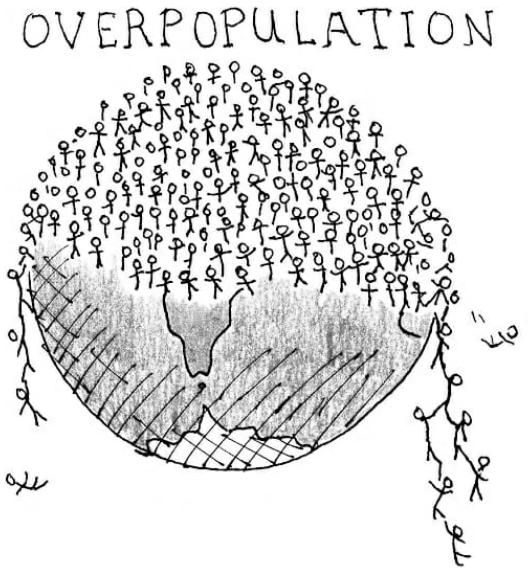
(b) Hypertonic solution

(c) Plasma membrane

Question 7

(i) Define the term Allele. [1]

(ii) In the last century, the human population has increased tremendously. Death rate has reduced and life expectancy has increased. This rapid growth has placed significant pressure on resources. Global cooperation is needed for environmental preservation. [2]



(a) Mention *any one* reason for reduction in the death rate.

(b) Name *any one* resource that is under pressure due to population explosion.

(iii) Mention *any two* functions of amniotic fluid. [2]

(iv) Expand the following abbreviations: [2]

(a) CFC

(b) CNG

(v) Vineet's day begins with a cup of piping hot coffee. Caffeine is a stimulant present in coffee which increases the circulation of Adrenaline in the body. Vineet feels refreshed, alert and focussed. [3]

(a) Name the organ that is stimulated by caffeine which makes Vineet alert and focussed.

(b) Give the collective term for the protective membranes of the organ mentioned in (a).

(c) Which part of the autonomic nervous system increases the secretion of Adrenaline?

Question 8

(i) Explain the term Excretion. [1]

(ii) State the difference between *Nephron* and *Neuron*. [2]

(iii) Mention *any two* objectives of Swachh Bharat Abhiyan. [2]

(iv) Give *any two* characteristic features of a Cro-Magnon man. [2]

(v) A farmer cultivates a unique species of tomato plants. The two traits selected for breeding were: Colour of the fruits and height of the plants. The farmer initially crosses a homozygous tall plant bearing red fruits **(TTRR)** with a dwarf plant bearing yellow fruits **(ttrr)** and the genotype of all the offsprings of the $\mathbf{F_1}$ generation was **TtRr**. Next, he crosses two $\mathbf{F_1}$ generation plants **(TtRr)**. [3]

Tall plant with red fruits **Dwarf plant with yellow fruits**

(a) Explain the phenotype of the offsprings of the $\mathbf{F_1}$ generation obtained from the initial cross.

(b) Mention the phenotypic ratio of the $\mathbf{F_2}$ generation offsprings.

(c) State Mendel's Law of Independent Assortment.